Categorical Exclusion

Appendix H

Air Quality

U.S. Department of Transportation
Federal Highway Administration

Indiana Division

575 N. Pennsylvania St, Room 254
Indianapolis, IN 46204
317-226-7475
317-226-7341

September 27, 2023

In Reply Refer To:
HDA-IN

Ms. Lyndsay Quist
Deputy Commissioner Capital Program Management
Indiana Department of Transportation (INDOT)
100 North Senate Avenue
Indianapolis, IN 46204

Dear Ms. Quist:

We have completed our review of the INDOT's Amendment 2 to the FY 2024-2028 Indiana Statewide Transportation Improvement Program (STIP) dated September 26, 2023. This amendment is for the inclusion of the following documents by reference:

- Evansville Metropolitan Planning Organization (EMPO)
  FY24-28 Transportation Improvement Program (TIP) Amendment 1

- Kentuckiana Regional Planning and Development Agency (KIPDA)
  FY23-26 Transportation Improvement Program (TIP) Amendment 3

INDOT, EMPO and KIPDA have re-demonstrated fiscal constraint, air quality conformity, and provided opportunity for public comment and involvement, where applicable, regarding the documents identified above. The Federal Highway Administration (FHWA) considers this amendment to be in substantial compliance with the applicable requirements as sufficient to support a consistency finding for the STIP.

FHWA and the Federal Transit Administration (FTA) take formal action, through the development of the Federal Planning Finding (FPF), to evaluate and ensure that the STIP and MPO TIPs are developed according to statewide and metropolitan planning processes consistent with 23 U.S.C. 134 and 135, and 49 U.S.C. 5303 and 5304, as well as 23 CFR part 450, 500, and 49 CFR part 613. FHWA and FTA are required under 23 CFR 450.220 (b) to document and issue an FPF in conjunction with the approval of the STIP, or amended STIP. Based on the recently conducted FPF (dated August 31, 2023), FHWA and FTA find that the amended Indiana FY2024-2028 STIP substantially meets the transportation planning requirements and is approving the amended STIP (as recorded in Amendment 2) subject to the corrective actions outlined in the FPF. FHWA and FTA will continue to partner with the INDOT to ensure the previously developed action plan is implemented to address the corrective actions. If progress is not made in addressing the corrective actions, future amendments to the FY2024-2028 STIP, or adoption of the FY2026-2030 STIP, may not be approved by USDOT.

FHWA only recognizes years 2024-2027 in the STIP. Any projects and/or phases of projects added in years outside of 2024-2027 are considered illustrative, and thus ineligible for federal funding at this time.

Should you have any questions regarding this approval please contact Erica Tait at 317-226-7481 or e-mail at erica.tait@dot.gov.

Sincerely,

For: Jermaine R. Hannon
Division Administrator

Enclosure

cc: Michael McNeil, INDOT
April Leckie, INDOT

Table 4.4: TIP Projects Listing (Cont.)

Sponsor: Indiana Department of Transportation											
Route Des# Length: Description:	Project Limits Planning Reference Federal Funding Category	Amendment/ Modification Date	Phase	All amounts in thousands 2024	2025	2026	2027	2028	Planning/ Cost to Complete	Federal Share 2024-2028 Estimates	State Share
Vanderburgh County											
US 41	Intersection with Hillsdale Rd., 2.04 mi. N of SR 57		PE							$ -	$ -
1400005			RW							$ -	$ -
0.105 mi.	NHPP	9/21/2023	CN	$5,448						$ 4,358	$ 1,090
Contract 37845; Intersection improvement project. Includes Des# 1900273 & 1900275, small structure replacements										Project Total *	$6,432
US 41	Intersection with Lynch Rd., 1.0 mi. N of SR 66		PE							$ -	$ -
1601011			RW							$ -	$ -
n/a	NHPP		CN			$1,337				$ 1,070	$ 267
Contract 39923; Intersection improvement with turn lanes										Project Total *	$1,540
US 41	From SR 66/SR 62 (Lloyd) to 3.2 mi N of SR 57		PE							$ -	$ -
1601066			RW							$ -	$ -
2.0 mi.	NHPP		CN	$28,117						$ 22,494	$ 5,623
Contract 41410; Pavement Replacement;										Project Total *	$30,504
I-64	Over Abandoned N & S Railroad, 0.82 mi E SR-65		PE							$ -	$ -
1900099			RW							$ -	$ -
n/a	NHPP		CN	$3,563						$ 3,207	$ 356
Contract 42187; Bridge Deck Replacement; Includes Des# 1900100, 2000767										Project Total *	$3,563
SR 62	From Vanderburgh/Posey County line east to St Joseph Ave		PE	$1,031						$ 825	$ 206
1900308			RW	$1,041						$ 833	$ 208
1.85 mi.	NHPP	9/14/2023	CN	$74,900	$23,300	$20,000				$ 94,560	$ 23,640
Contract 42287; Road Reconstruction & Intersection Improvements at Schutte, Boehne Camp, Red Bank, Rosenberger; Bridge Replacements at CSX Railroad, Carpenter Creek & Tekoppel Ave. and the pedestrian bridge over SR 62 at St Joe. Includes Des# 1500041, 1600060, 1602258, 1702066, 1900258, 1900260, 1900262, 1900264, 2001917, 2100041										Project Total *	$126,631
SR 62	At Vann Ave, Burkhardt Rd, Cross Pointe Blvd, Stockwell Rd		PE							$ -	$ -
1900292			RW	$65						$ 52	$ 13
n/a	NHPP	9/14/2023	CN	$27,251	$10,600					$ 30,281	$ 7,570
Contract 44898; Intersection Improvements; Includes Des# 1900268, 1900317, 2000217, 2201283										Project Total *	$37,916
SR 62	SR 62 from 3.92 mi W of S US 41 (Ingle Ave to 2.72 mi W of Jct US 41 (Wabash Ave)		PE	$10	$40					$ 40	$ 10
2301254			RW							$ -	$ -
1.99 mi.	NHPP	9/14/2023	CN			$3,670	$34,411			$ 30,465	$ 7,616
Contract 45152: Pavement replacement and interseciton improvements; includes Des# 1900263, 2000187, 1900308										Project Total *	$38,131
Various	Various Locations on US 41 and I-69		PE							$ -	$ -
2000987			RW							$ -	$ -
n/a	NHPP		CN	$2,417						$ 1,934	$ 483
Contract 42736; Small structure projects; Includes Des# 2001053										Project Total *	$3,068
SR 62	At Boehne Camp Rd and at Red Bank Rd		PE							$ -	$ -
1900258			RW	$20						$ 16	$ 4
n/a	NHPP		CN		$7,168					$ 5,734	$ 1,434
Contract 43199; Intersection Improvement; Includes Des# 1900260										Project Total *	$8,218
Various	Various locations in the Vincennes District		PE	$250						$ 200	$ 50
2002024			RW							$ -	$ -
n/a	STBG		CN		$5,171					$ 4,137	$ 1,034
Contract 43231; Bridge rehabilitation; Includes Des# 2002046, 2002134, 2002135, 2002368, 2200910, 2200911										Project Total *	$5,421
I-69	From US 41 to I-64		PE		$660					$ 594	$ 66
1802087			RW							$ -	$ -
n/a	NHPP		CN			$7,200				$ 6,480	$ 720
Contract 43506: ITS Traffic Management Systems; Includes Des# 2002562										Project Total *	$7,860
SR 57	From 1.32 mi N of US 41 to S jct of I 69		PE							$ -	$ -
2100260			RW							$ -	$ -
6.442 mi	NHPP		CN	$10		$5,329				$ 4,271	$ 1,068
Contract 43982; HMA Overlay, preventative maintenance.										Project Total *	$5,789
SR 66	Over UNT, 1.45 mi E of Jct SR 65		PE	$140						$ 112	$ 28
2100812			RW							$ -	$ -
n/a	STBG		CN			$430				$ 344	$ 86
Contract 43986; Small structure pipe lining.										Project Total *	$570
SR 62	At Boeke Rd. 1.01 mi E of US 41		PE	$980						$ 784	$ 196
2100044			RW		$100					$ 80	$ 20
0.1 mi	STBG	11/9/2023	CN			$2,499				$ 1,999	$ 500
Contract 44013; Intersection improvement with added turn lanes. Includes Des# 2100051 (at Stockwell Rd)										Project Total *	$3,579

Categorical Exclusion

Appendix I

Other Information

Land and Water Conservation Fund (LWCF) County Property List for Indiana (Last Updated March 2022)

ProjectNumber	SubProjectCode	County	Property
1800013	1800013	Vanderburgh	Garvin Park
1800086	1800086	Vanderburgh	Wesselman Park and Par 3 Golf Course
1800093	1800093A	Vanderburgh	Howell Park
1800093	1800093B	Vanderburgh	Price Park
1800093	1800093C	Vanderburgh	Sunrise Park
1800093.4	1800093.4	Vanderburgh	Fourth and Main Park
1800094	1800094	Vanderburgh	Pigeon Creek Greenway, Stream Valley Park
1800100	1800100	Vanderburgh	Anthony C. Oates Park and Pool
1800109	1800109	Vanderburgh	Golfmoor Park & Lakeview Tennis Courts
1800224	1800224	Vanderburgh	Pigeon Creek Greenway, Stream Valley Park
1800224.2	1800224.2	Vanderburgh	Tepe Park
1800288	1800288	Vanderburgh	Burdette Park
1800333	1800333	Vanderburgh	Kleymeyer Park
1800334	1800334C	Vanderburgh	Stockwell Park
1800390	1800390	Vanderburgh	William J. Moutoux Park
1800496	1800496	Vanderburgh	Pigeon Creek Greenway, Stream Valley Park

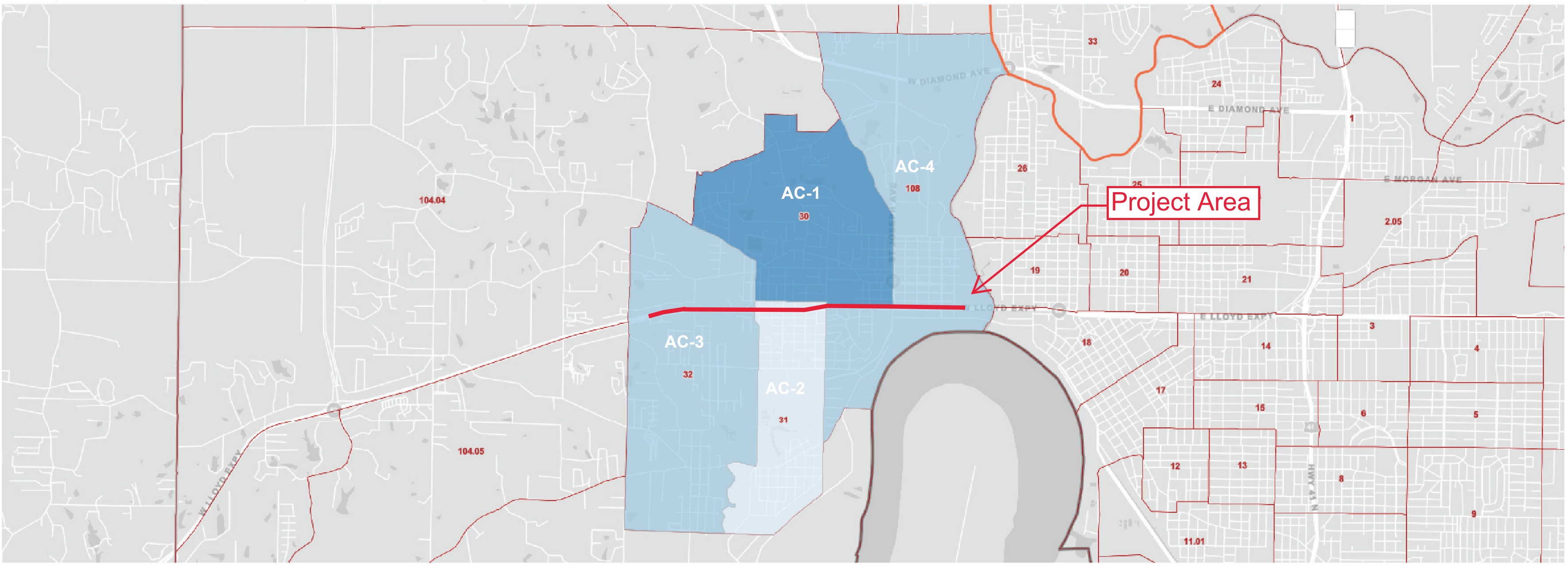
*Park names may have changed. If acquisition of publically owned land or impacts to publically owned land is anticipated, coordination with IDNR, Division of Outdoor Recreation, should occur.

American Community Survey

Total:—Estimate in **4 Geos** in **2021**

2021 : ACS 5-Year Estimates Detailed Tables

Variable(s) | Select Clear Geos Layer | Year | Basemap Boundaries | Colors Classes | Identify Table Notes | Share



Total:—Estimate in 2021 Geos: 4

3,799—4,909	1
2,543—3,798	2
2,542—2,542	1

Styles

State
County

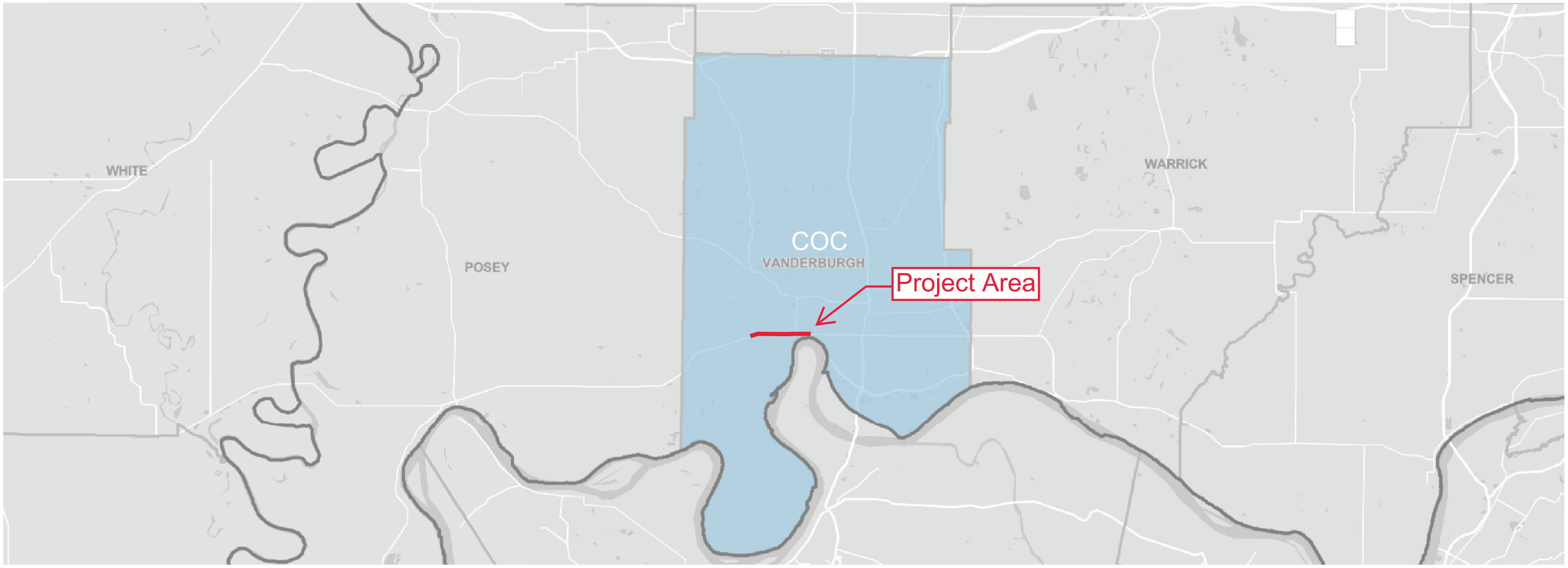
View More

B03002 | 2021 ACS 5-Year Estimates Detailed Tables 3000 ft

Select Geography in the map

EXIT SELECT TOOL

Select Clear Geos Layer Year Basemap Boundaries Share



Total:—Estimate in 2021 Geos: 1

179,987—179,987 1

Styles

State

County

B03002 | 2021 ACS 1-Year Estimates Detailed Tables 3 mi

HISPANIC OR LATINO ORIGIN BY RACE

Note: This is a modified view of the original table produced by the U.S. Census Bureau. This download or printed version may have missing information from the original table.

	Vanderburgh County, Indiana		Census Tract 30, Vanderburgh County, Indiana		Census Tract 31, Vanderburgh County, Indiana		Census Tract 32, Vanderburgh County, Indiana		Census Tract 108, Vanderburgh Count	
Label	**Estimate**	**Margin of Error**	**Estimate**	**Margin of Error**	**Estimate**	**Margin of Error**	**Estimate**	**Margin of Error**	**Estimate**	**Margi**
Total:	179,695	*****	4,909	±522	2,542	±335	3,798	±589	3,739	
Not Hispanic or Latino:	174,515	*****	4,807	±551	2,453	±364	3,686	±587	3,731	
White alone	148,265	±352	4,682	±576	2,411	±357	3,510	±569	3,321	
Black or African American alone	17,689	±613	4	±8	12	±19	32	±40	193	
American Indian and Alaska Native alone	63	±38	5	±7	0	±12	0	±12	3	
Asian alone	2,454	±289	0	±12	0	±12	124	±117	0	
Native Hawaiian and Other Pacific Islander alone	376	±80	0	±12	0	±12	0	±12	0	
Some other race alone	536	±405	0	±12	0	±12	0	±12	0	
Two or more races:	5,132	±785	116	±97	30	±24	20	±22	214	
Two races including Some other race	352	±200	6	±12	0	±12	0	±12	3	
Two races excluding Some other race, and three or more races	4,780	±759	110	±96	30	±24	20	±22	211	
Hispanic or Latino:	5,180	*****	102	±96	89	±96	112	±97	8	
White alone	2,517	±362	93	±94	35	±43	111	±97	8	
Black or African American alone	42	±38	0	±12	0	±12	0	±12	0	
American Indian and Alaska Native alone	55	±198	0	±12	0	±12	0	±12	0	
Asian alone	10	±20	0	±12	0	±12	0	±12	0	
Native Hawaiian and Other Pacific Islander alone	0	±29	0	±12	0	±12	0	±12	0	
Some other race alone	1,791	±362	9	±19	0	±12	1	±5	0	
Two or more races:	765	±249	0	±12	54	±57	0	±12	0	
Two races including Some other race	679	±243	0	±12	41	±51	0	±12	0	
Two races excluding Some other race, and three or more races	86	±60	0	±12	13	±18	0	±12	0	

Table Notes

HISPANIC OR LATINO ORIGIN BY RACE

Survey/Program: American Community Survey

Universe: Total population
Year: 2021
Estimates: 5-Year
Table ID: B03002

Although the American Community Survey (ACS) produces population, demographic and housing unit estimates, it is the Census Bureau's Population Estimates Program that produces and disseminates the official estimates of the population for the nation, states, counties, cities, and towns and estimates of housing units for states and counties.

Supporting documentation on code lists, subject definitions, data accuracy, and statistical testing can be found on the American Community Survey website in the Technical Documentation section.

Sample size and data quality measures (including coverage rates, allocation rates, and response rates) can be found on the American Community Survey website in the Methodology section.

Source: U.S. Census Bureau, 2017-2021 American Community Survey 5-Year Estimates

Data are based on a sample and are subject to sampling variability. The degree of uncertainty for an estimate arising from sampling variability is represented through the use of a margin of error. The value shown here is the 90 percent margin of error. The margin of error can be interpreted roughly as providing a 90 percent probability that the interval defined by the estimate minus the margin of error and the estimate plus the margin of error (the lower and upper confidence bounds) contains the true value. In addition to sampling variability, the ACS estimates are subject to nonsampling error (for a discussion of nonsampling variability, see ACS Technical Documentation). The effect of nonsampling error is not represented in these tables.

The Hispanic origin and race codes were updated in 2020. For more information on the Hispanic origin and race code changes, please visit the American Community Survey Technical Documentation website.

The 2017-2021 American Community Survey (ACS) data generally reflect the March 2020 Office of Management and Budget (OMB) delineations of metropolitan and micropolitan statistical areas. In certain instances, the names, codes, and boundaries of the principal cities shown in ACS tables may differ from the OMB delineation lists due to differences in the effective dates of the geographic entities.

Estimates of urban and rural populations, housing units, and characteristics reflect boundaries of urban areas defined based on Census 2010 data. As a result, data for urban and rural areas from the ACS do not necessarily reflect the results of ongoing urbanization.

Explanation of Symbols:

-

The estimate could not be computed because there were an insufficient number of sample observations. For a ratio of medians estimate, one or both of the median estimates falls in the lowest interval or highest interval of an open-ended distribution. For a 5-year median estimate, the margin of error associated with a median was larger than the median itself.

N

The estimate or margin of error cannot be displayed because there were an insufficient number of sample cases in the selected geographic area.

(X)

The estimate or margin of error is not applicable or not available.

median-

The median falls in the lowest interval of an open-ended distribution (for example "2,500-")

median+

The median falls in the highest interval of an open-ended distribution (for example "250,000+").

**

The margin of error could not be computed because there were an insufficient number of sample observations.

***

The margin of error could not be computed because the median falls in the lowest interval or highest interval of an open-ended distribution.

*****

A margin of error is not appropriate because the corresponding estimate is controlled to an independent population or housing estimate. Effectively, the corresponding estimate has no sampling error and the margin of error may be treated as zero.

POVERTY STATUS IN THE PAST 12 MONTHS BY SEX BY AGE

Note: This is a modified view of the original table produced by the U.S. Census Bureau. This download or printed version may have missing information from the original table.

	Vanderburgh County, Indiana		Census Tract 30, Vanderburgh County, Indiana		Census Tract 31, Vanderburgh County, Indiana		Census Tract 32, Vanderburgh County, Indiana		Census Tract 108, Vanderburgh County, Indiana	
Label	Estimate	Margin of Error	Estimate	Margin of Error	Estimate	Margin of Error	Estimate	Margin of Error	Estimate	Margin of Err
Total:	172,843	±631	4,718	±512	2,488	±318	3,798	±589	3,628	±4
Income in the past 12 months below poverty level:	26,353	±1,742	615	±344	254	±151	606	±237	785	±2
Male:	11,307	±948	374	±202	73	±55	290	±110	277	±1
Under 5 years	1,265	±288	65	±76	26	±29	11	±17	18	±
5 years	186	±118	0	±12	18	±29	0	±12	12	±
6 to 11 years	1,399	±349	0	±12	0	±12	0	±12	14	±
12 to 14 years	698	±202	0	±12	0	±12	0	±12	12	±
15 years	235	±114	0	±12	0	±12	0	±12	15	±
16 and 17 years	387	±131	0	±12	0	±12	12	±19	3	
18 to 24 years	1,380	±275	126	±134	0	±12	140	±80	27	±
25 to 34 years	1,077	±257	84	±81	15	±23	71	±59	12	±
35 to 44 years	967	±210	48	±71	14	±20	32	±42	23	±
45 to 54 years	1,282	±300	27	±46	0	±12	9	±17	68	±
55 to 64 years	1,490	±238	0	±12	0	±12	15	±17	28	±
65 to 74 years	592	±175	14	±23	0	±12	0	±12	22	±
75 years and over	349	±100	10	±16	0	±12	0	±12	23	±
Female:	15,046	±1,039	241	±190	181	±105	316	±166	508	±1
Under 5 years	1,284	±240	36	±57	14	±24	32	±42	55	±
5 years	270	±180	0	±12	0	±12	0	±12	3	
6 to 11 years	1,458	±325	0	±12	25	±40	92	±85	31	±
12 to 14 years	773	±196	0	±12	0	±12	0	±12	15	±
15 years	169	±94	0	±12	0	±12	0	±12	0	±
16 and 17 years	459	±131	0	±12	9	±14	0	±12	23	±
18 to 24 years	2,344	±331	10	±18	42	±54	100	±55	54	±
25 to 34 years	2,260	±346	69	±76	30	±34	54	±40	34	±
35 to 44 years	1,662	±264	117	±91	9	±14	0	±12	30	±
45 to 54 years	1,286	±250	0	±12	18	±22	17	±22	127	±
55 to 64 years	1,432	±239	0	±12	24	±22	12	±18	71	±
65 to 74 years	664	±161	0	±12	10	±16	0	±12	36	±
75 years and over	985	±197	9	±16	0	±12	9	±14	29	±
Income in the past 12 months at or above poverty level:	146,490	±1,923	4,103	±647	2,234	±361	3,192	±634	2,843	±4
Male:	73,217	±1,008	2,326	±417	1,138	±258	1,465	±410	1,494	±3

Table Notes

POVERTY STATUS IN THE PAST 12 MONTHS BY SEX BY AGE

Universe: Population for whom poverty status is determined

Survey/Program: American Community Survey

Year: 2021

Estimates: 5-Year

Table ID: B17001

Although the American Community Survey (ACS) produces population, demographic and housing unit estimates, it is the Census Bureau's Population Estimates Program that produces and disseminates the official estimates of the population for the nation, states, counties, cities, and towns and estimates of housing units for states and counties.

Supporting documentation on code lists, subject definitions, data accuracy, and statistical testing can be found on the American Community Survey website in the Technical Documentation section.

Sample size and data quality measures (including coverage rates, allocation rates, and response rates) can be found on the American Community Survey website in the Methodology section.

Source: U.S. Census Bureau, 2017-2021 American Community Survey 5-Year Estimates

Data are based on a sample and are subject to sampling variability. The degree of uncertainty for an estimate arising from sampling variability is represented through the use of a margin of error. The value shown here is the 90 percent margin of error. The margin of error can be interpreted roughly as providing a 90 percent probability that the interval defined by the estimate minus the margin of error and the estimate plus the margin of error (the lower and upper confidence bounds) contains the true value. In addition to sampling variability, the ACS estimates are subject to nonsampling error (for a discussion of nonsampling variability, see ACS Technical Documentation). The effect of nonsampling error is not represented in these tables.

The 2017-2021 American Community Survey (ACS) data generally reflect the March 2020 Office of Management and Budget (OMB) delineations of metropolitan and micropolitan statistical areas. In certain instances, the names, codes, and boundaries of the principal cities shown in ACS tables may differ from the OMB delineation lists due to differences in the effective dates of the geographic entities.

Estimates of urban and rural populations, housing units, and characteristics reflect boundaries of urban areas defined based on Census 2010 data. As a result, data for urban and rural areas from the ACS do not necessarily reflect the results of ongoing urbanization.

Explanation of Symbols:

-

The estimate could not be computed because there were an insufficient number of sample observations. For a ratio of medians estimate, one or both of the median estimates falls in the lowest interval or highest interval of an open-ended distribution. For a 5-year median estimate, the margin of error associated with a median was larger than the median itself.

N

The estimate or margin of error cannot be displayed because there were an insufficient number of sample cases in the selected geographic area.

(X)

The estimate or margin of error is not applicable or not available.

median-

The median falls in the lowest interval of an open-ended distribution (for example "2,500-")

median+

The median falls in the highest interval of an open-ended distribution (for example "250,000+").

**

The margin of error could not be computed because there were an insufficient number of sample observations.

***

The margin of error could not be computed because the median falls in the lowest interval or highest interval of an open-ended distribution.

*****

A margin of error is not appropriate because the corresponding estimate is controlled to an independent population or housing estimate. Effectively, the corresponding estimate has no sampling error and the margin of error may be treated as zero.

	COC	AC 1	AC 2	AC 3	AC 4
	Vanderburgh County	Census Tract 30, Vanderburgh County, Indiana	Census Tract 31, Vanderburgh County, Indiana	Census Tract 32, Vanderburgh County, Indiana	Census Tract 108, Vanderburgh County, Indiana
LOW-INCOME POPULATION					
Total Population for Whom Poverty Status is Determined	172,843	4,718	2,488	3,798	3,628
Total Population Below Poverty Level	26,353	615	254	606	785
Percent Low-Income	15.25%	13.04%	10.21%	15.96%	21.64%
125 Percent of COC	19.06%				
AC Percent Low-Income Greater Than 125 Percent of COC?		NO	NO	NO	YES
AC Percent Low-Income Greater Than 50 Percent?		NO	NO	NO	NO
Population of EJ Concern?		NO	NO	NO	YES
MINORITY POPULATION					
Total Population	179,695	4,909	2,542	3,798	3,739
Minority Population	31,430	227	131	288	418
Percent Minority	17.49%	4.62%	5.15%	7.58%	11.18%
125 Percent of COC	21.86%				
AC Percent Minority Greater Than 125 Percent of COC?		NO	NO	NO	NO
AC Percent Minority Greater Than 50 Percent?		NO	NO	NO	NO
Population of EJ Concern?		NO	NO	NO	NO

Payton Parke

From: Fair, Terri <TFair@indot.IN.gov>
Sent: Wednesday, April 12, 2023 8:52 AM
To: Payton Parke
Cc: Passmore, Andrew D
Subject: Lead Des 1900308 SR 62 Road Reconstruction Project - EJ Analysis
Attachments: Des 1900308 Draft EJ Analysis - REV 1.pdf

EXTERNAL

INDOT-Environmental Services Division (ESD) has reviewed the project information along with the Environmental Justice (EJ) Analysis for the above referenced project. With the information provided, the project may require minimal right-of-way, require no relocations, and would not disrupt community cohesion or create a physical barrier. With the information provided, INDOT-ESD would not consider the impacts associated with this project as causing a disproportionately high and adverse effect on minority and/or low-income populations of EJ concern relative to non-EJ populations in accordance with the provisions of Executive Order 12898 and FHWA Order 6640.23a. No further EJ Analysis is required.

Lead Des. No. 1900308 Maintenance of Traffic Table

Westside Section IB: Rosenberger to Ingle

General Notes:

Westside Nut Club Fall Festival is first full week in October - no construction work this week

Phases	Start	Finish	Traffic Restrictions	Traffic Flow	Detour	Other Restriction
Phases 1-4:	April 8, 2024	October 1, 2025				
Phase 1A: SR 62 Crossover & Median Temp. Pavement, from start, west of Rosenberger, to Barker bridge			Shift traffic to the outside of the roadway; Close 1-WB & 1-EB inside Ln from west of Rosenberger to east of Rosenberger (following Section IA), Close 1-WB & 2-EB Lns from east of Rosenberger to Barker bridge	1-WB & 1-EB Ln Beginning to Ingle, 2-WB & 1-EB Lns Ingle to Barker, Lt Turns open at Rosenberger; transition from 3-WB to 2-WB at St Joseph	NA	NA
Phase 1B: SR 62 EB Outside Shoulder Strengthening from Rosenberger to Ingle			Close 1-2 EB outside Lns, Shift EB traffic to the inside Ln	1-WB & 1-EB Ln Beginning to Ingle, 2-WB & 1-EB Lns Ingle to Barker, Lt Turns open at Rosenberger	NA	NA
Phase 2: Northside, from start, west of Rosenberger, to MSE wall west of Ingle			Shift WB traffic onto EB side SR 62; Close 1-WB & 1-EB Ln on SR 62 from west of Rosenberger to east of Rosenberger (following Section IA MOT), close 1-WB & 2-EB Lns from east of Rosenberger to crossover east of Ingle	1-EB & 1-WB Ln on SR 62 from west of Rosenberger to east of Rosenberger (following Section IA MOT), taper to 2-WB Lns from east of Rosenberger to crossover at Ingle; taper 1-EB to 2-EB Lns east of Ingle; SR 62 onto Rosenberger open	NA	NA
Phase 2A: Rosenberger north approach/University Drive	14 day closure		Close Rosenberger north approach and University	Detour N Rosenberger	Rosenberger - SR 62/Red Bank/Hogue; University not signed for detour	Red Bank cannot be closed same time as N Rosenberger. Access to be maintained to Thorton's and convenient care
Phase 2B: Tekoppel for bridge	Intermediate clossure for Demo & Beams		Shift Tekoppel traffic and/or close Tekoppel as needed	Detour Tekoppel	Franklin/Barker/Claremont	No work on Barker during Tekoppel detour periods

Phase 3: Southside, from start, west of Rosenberger, to MSE wall west of Ingle			Shift EB traffic onto WB side SR 62; Close 1-WB & 1-EB Ln on SR 62 from west of Rosenberger to east of Rosenberger (following Section IA MOT); close 1-WB & 2-EB Lns from east of Rosenberger to crossover east of Ingle	1-EB & 1-WB Ln on SR 62 from west of Rosenberger to east of Rosenberger (following Section IA MOT), taper to 2-WB Lns from east of Rosenberger to crossover at Ingle; taper from 3-WB to 2-WB east of Wabash; taper 1-EB to 2-EB Lns east of Ingle; SR 62 onto Rosenberger open	NA	NA
Phase 3A: Rosenberger south approach	14 day closure		Close Rosenberger south approach	Detour S Rosenberger	SR 62/Red Bank/Claremont/Bosse/Cox	NA
Phase 3B: Tekoppel for bridge	Intermediate clossure for Demo & Beams		Shift Tekoppel traffic and/or close Tekoppel as needed	Detour Tekoppel	Franklin/Barker/Claremont	No work on Barker during Tekoppel detour periods
Phase 4: Median/Turn Lanes/Crossover, from start, west of Rosenberger to west of Tekoppel			Shift traffic to outside Lns; Close 2-WB & 1-EB inside Ln on SR 62 from west of Rosenberger to west of Tekoppel	1-WB & 2 EB on SR 62 from west of Rosenberger to Tekoppel; (following Section IA MOT), taper from 3-WB to 2-WB east of Wabash; taper 2-EB to 3-EB and 1-WB to 2 WB Lns west of Tekoppel	NA	Shorter construction zone in order to leave section unconstructed for future Section II crossovers
Phase 4A: SR 62 Median/Turn Lane at Rosenberger west approach			Close EB to NB Lt Turn on SR 62	Detour SR 62 EB to NB; SR 62 WB to SB open	Rosenberger - SR 62/Red Bank/Hogue	SR 62 Lt Turn EB to NB at Rosenberger cannot be closed same time as SR 62 Lt Turn WB to SB at Rosenberger
Phase 4B: SR 62 Median/Turn Lane at Rosenberger east approach			Close WB to SB Lt Turn on SR 62	Detour SR 62 WB to SB; SR 62 EB to NB open	Rosenberger - SR 62/Red Bank/Claremont/Bosse/Cox	SR 62 Lt Turn WB to SB at Rosenberger cannot be closed same time as SR 62 Lt Turn EB to NB at Rosenberger

Westside Section 2: Ingle to Wabash

General Notes:

Westside Nut Club Fall Festival is first full week in October - no construction work this week

Phases	Start	Finish	Traffic Restrictions	Traffic Flow	Detour	Other Restriction
Phases 1-4:	October 20, 2025	October 1, 2027				
Phase 1A: Crossover and Temp. Pavement from Barker bridge to end, east of Wabash			Close inside lanes 1 WB and 1 EB. Shift traffic to the outside of the roadway; Close WB to SB Lt Turn at St Joseph, Close EB to NB Lt Turn at Wabash	2 lanes WB and 2 lanes EB, other Lt turns open at Wabash and St Joseph	NA	NA
Phase 1B: Storm Sewer Trunkline South Approach Between St Joseph and Ohio	14 day closure		St Joseph close NB traffic, close inside SB Ln; Ohio close access; Close WB to SB Lt Turn at St Joseph, Close EB to NB Lt Turn at Wabash	S St Joseph/Ray Becker Parkway Detour; Ohio Detour, other Lt turns open at Wabash and St Joseph	NB St Joseph use S Barker/W Franklin; Ohio at St Joseph use Wabash/SR 62/St Joseph NB St Joseph to SR 62 use S Barker/Pennsylvania St	Maintain access for Mead Johnson trucks only
Phase 2: SR 62 Northside, MSE wall west of Ingle to end, east of Wabash			Shift WB traffic onto EB side SR 62; Close 1-Ln WB & 2-Ln EB SR 62; Close WB to SB Lt Turn at St Joseph, Close EB to NB Lt Turn at Wabash	SR 62 2-Lns WB & 1-Ln EB;Wabash & St Joseph onto SR 62 open; other Lt turns open at Wabash and St Joseph	NA	NA
Phase 2A: Barker NE Ramp	21 day closure		Close Barker NE ramp	Detour NE ramp; NW ramp access from WB side	Igleheart NW ramp/Igleheart; Flagger condition at Barker	Barker NE ramp cannot be closed same time as St Joseph
Phase 2B: Igleheart/NW ramp	21 day closure		Close Igleheart from Barker to NW ramp; Close NW ramp permanently	Detour Igleheart; no detour posted for NW ramp; Open access from WB SR 62 to Corbierre	Igleheart - Corbierre/Ingle; SR 62 - Ingle	Igleheart, and NW ramp cannot be closed same time as Corbierre and Ingle
Phase 2C: Corbierre/N Ingle	No Time Set		Close Corbierre from Tekoppel to SR 62; Close Ingle access from SR 62; Close intersections of Walker, Ingle, Addison with Corbierre	Detour Corbierre; Detour access to Tekoppel from SR 62; NW ramp open, Igleheart to WB SR 62 open	Corbierre & access to Tekoppel - NE ramp/Igleheart; SR 62 - Igleheart/NW ramp; Detours will not be signed for local streets Walker, Addison, and Ingle	Corbierre cannot be closed same time as Igleheart, and NW ramp; access at Ingle to be maintained throughout construction
Phase 2D: N Lemcke	No Time Set		Close N Lemcke permanently	No Detour Posted	NA	NA
Phase 2E: St Joseph Ave north approach	21 day closure		Close St Joseph north approach; Close EB to NB Lt Turn on SR 62; Close WB to NB Rt Turn on SR 62	North approach Detour; SR 62 WB to SB St Joseph open	Franklin/Wabash/SR 62	St Joseph cannot be closed same time as Wabash and NE Barker Ramp

Phase 2F: N 12th Ave	No Time Set		Close N 12th permanently	No Detour Posted	NA	NA
Phase 2G: N 10th Ave	No Time Set		Close N 10th north approach	Detour	Indiana/Wabash/SR62	Access not provied to SR 62 during Section II Phase II
Phase 2H: Wabash Ave north approach	14 day closure		Close N Wabash north approach; Close EB to NB Lt Turn on SR 62; Close WB to NB Rt Turn on SR 62	North approach Detour; SR 62 WB to SB Wabash open	SR 62/St Joseph/Franklin	Wabash cannot be closed same time as St Joseph
Phase 3: SR 62 Southside, MSE wall west of Ingle to end, east of Wabash			Shift SR62 traffic from Phase 2 EB side to WB side; Close WB to SB Lt Turn at St Joseph, Close EB to NB Lt Turn at Wabash	SR 62 2-Lns WB & 1-Ln EB; Wabash & St Joseph onto SR 62 open; other Lt turns open at Wabash and St Joseph	NA	NA
Phase 3A: Barker SW Ramp	21 day closure		Close SW ramp	Detour SW Ramp; Ingle south approach access from EB side	No Trucks - Ingle/Claremont; Trucks - SR 62/St Joseph/Ray Becker/Barker	SW Ramp must be reconstructed before S Ingle closure
Phase 3B: Ingle south approach			Permanent closure	No Detour Posted	NA	SW Barker ramp must be constructed before Ingle permenant closure
Phase 3C: Pennsylvania Ramp/S Lemcke	14 day closure		Close Pennsylvania Ramp/Lemcke	Detour	Pennsylvania Ramp - Barker/Ray Becker/St Joseph; Barker/W Franklin/St Joseph; Lemcke - Forest/Barker/Ray Becker/St Joseph	Phased construction to allow trucks from Med Johnson to exist from drive on Lemcke onto EB SR 62
Phase 3D: St Joseph south approach	14 day closure		Close St Joseph Ave south approach; Close WB to SB Lt Turn on SR 62; Close EB to SB Rt on SR 62	South approach Detour; SR 62 EB to NB St Joseph open	Ohio/Wabash/SR 62	St Joseph cannot be closed same time as Wabash and Pennsylvania Ramp
Phase 3E: Wabash south approach	14 day closure		Close S Wabash north approach; Close WB to SB Lt Turn on SR 62; Close EB to SB Rt on SR 62	South approach Detour; SR 62 EB to NB Wabash open	SR 62/St Joseph/Ohio	Wabash cannot be closed same time as St Joseph
Phase 4: SR 62 Median/Turn Lanes/Crossover from west of Tekoppel to end, east of Wabash			Close inside lane in WB & EB direction, shift traffic to outside; Close WB to SB Lt Turn at St Joseph, Close EB to NB Lt Turn at Wabash	2 lanes WB and 2 lanes EB, other Lt Turns open	NA	NA
Phase 4A: SR 62 Median/Turn Lane at St Joseph EB approach	7 day closure		Close EB to NB Lt Turn on SR 62	Detour SR 62 EB to NB; SR 62 WB to SB open	SR 62/Wabash/Franklin	SR 62 Lt Turn EB to NB at St Joseph cannot be closed same time as SR 62 Lt Turn EB to NB at Wabash
Phase 4B: SR 62 Median/Turn Lane at St Joseph WB approach	7 day closure		Close WB to SB Lt Turn on SR 62	Detour SR 62 WB to SB; SR 62 EB to NB open	SR 62/Wabash/Ohio	SR 62 Lt Turn WB to SB at St Joseph cannot be closed same time as SR 62 Lt Turn WB to SB at Wabash

Phase 4C: SR 62 Median/Turn Lane at Wabash EB approach	7 day closure		Close EB to NB Lt Turn on SR 62	Detour SR 62 EB to NB; SR 62 WB to SB open	SR 62/St Joseph/Franklin	SR 62 Lt Turn EB to NB at Wabash cannot be closed same time as SR 62 Lt Turn EB to NB at St Joseph
Phase 4D: SR 62 Median/Turn Lane at Wabash WB approach	7 day closure		Close WB to BB Lt Turn on SR 62	Detour SR 62 WB to SB; SR 62 EB to NB open	SR 62/St Joseph/Ohio	SR 62 Lt Turn WB to SB at Wabash cannot be closed same time as SR 62 Lt Turn WB to SB at St Joseph

INDIANA DEPARTMENT OF TRANSPORTATION

August 4, 2022

Mr. Steve Schaefer, Deputy Mayor
City of Evansville
1 N.W. Martin Luther King, Jr. Boulevard
Evansville, Indiana 47708-1833

Re: Section 4(f) Coordination
Des. No. 1900308
SR 62 (Lloyd Expressway) Road Reconstruction Project, Phase 1
Vanderburgh County, Indiana

Dear Mr. Schaefer:

The Indiana Department of Transportation (INDOT), with funding from the Federal Highway Administration (FHWA), proposes to proceed with a road reconstruction project on SR 62. Des No. 1900308 will include road reconstruction along SR 62 within the project area. The proposed improvements include entrance and exit ramp reconfiguration, relocations, and closures, as well as closure of select local cross streets to improve traffic flow.

Section 4(f) of the U.S. Department of Transportation Act of 1966 prohibits the use of certain public and historic lands for federally funded transportation projects unless there is no feasible and reasonable alternative. The law applies to significant publicly owned parks, recreation areas, wildlife/waterfowl refuges, and National Register of Historic Places eligible or listed historic properties. Lands subject to this law are considered Section 4(f) resources.

West Side Nut Club Park is located within the project area. Based on its public ownership, local significance, and its designation as a facility primarily functioning for recreation, the West Side Nut Club Park is a Section 4(f) resource. It is our understanding that you are the designated "Official with Jurisdiction" (OWJ) for the park. An OWJ is "the officials of the agency or agencies that own or administer the property in question and who are empowered to represent the agency on matters related to the property".

Phase 1 of the SR 62 (Lloyd Expressway) Road Reconstruction Project will affect the West Side Nut Club Park, a recreational park owned and maintained by your department. In order to complete the roadway work, the sidewalk adjacent to the south of the park will need to be closed for a portion of the construction period, approximately six months. The sidewalk will remain open at least one day after construction on the Lloyd Expressway begins and will reopen at least one day prior to the finish of construction.

Information regarding the proposed project and an aerial photograph illustrating the proposed closure were provided to you via email by Lochmueller Group on August 1, 2022. The sidewalk closure described above and in the aforementioned email constitutes a temporary occupancy exception, as described in the Federal Highway Administration's *Section 4(f) Policy Paper (dated July 20, 2012),* for the following reasons:

- The length of time that the sidewalk adjacent to West Side Nut Club Park will be closed will be less than the time needed for construction. The sidewalk will remain open a minimum of one day after the start of construction on the Lloyd Expressway and will reopen at least one day prior to the completion of construction. This will be included as a firm commitment in the National Environmental Policy Act (NEPA) document.
- Ownership and management of the West Side Nut Club Park will be retained by the Evansville Department of Parks and Recreation.
- The scope of work near the West Side Nut Club Park is minor. No work is planned within West Side Nut Club Park, only on the adjacent sidewalk. Several of the sidewalk and drive approaches leading from the sidewalk into the park are no longer in use and will be removed; the fencing and existing gates will remain in-place. The sidewalk and drive approaches to be removed are not ADA compliant and do not connect to established pedestrian facilities in the park. The closure of the sidewalk is required for removal of the sidewalk and drive approaches and reconstruction of the sidewalk.
- The West Side Nut Club Park will remain accessible via the sidewalk along Indiana Street on the north side of the park. Additionally, a pedestrian detour utilizing St. Joseph Avenue, Indiana Street, and Wabash Avenue will be in place for the sidewalk adjacent to the southern boundary of the West Side Nut Club Park (along the Lloyd Expressway). Therefore, there are no anticipated permanent adverse physical impacts, nor will there be interference with the protected activities, features, or attributes of the property, on either a temporary or permanent basis.
- Upon completion of the project, the West Side Nut Club Park and the sidewalk adjacent to its southern boundary (along the Lloyd Expressway) will be returned to a condition that is at least as good as that which existed prior to the project.

This project fulfills all of the conditions listed in 23 CFR 774.13(d) because the occupancy will be temporary with no change in ownership, the scope of work is minor, there will be no permanent impacts, the project will not interfere with the activities, features, or attributes of the park, and the land will be fully restored upon completion. Therefore, INDOT respectfully requests your signature below to document your concurrence.

Thank you,

Holly Hume

Holly Hume
Environmental Specialist
Lochmueller Group, Inc.

Concurrence:

Steve Schaefer, Deputy Mayor
City of Evansville

8/8/22
Date

Bridge Inspection Report

062-82-03965 B

SR 62

over

TEKOPPLE AVENUE

Inspection Date: 04/28/2022

Inspected By: Tony Hoover

Inspection Type(s): Routine

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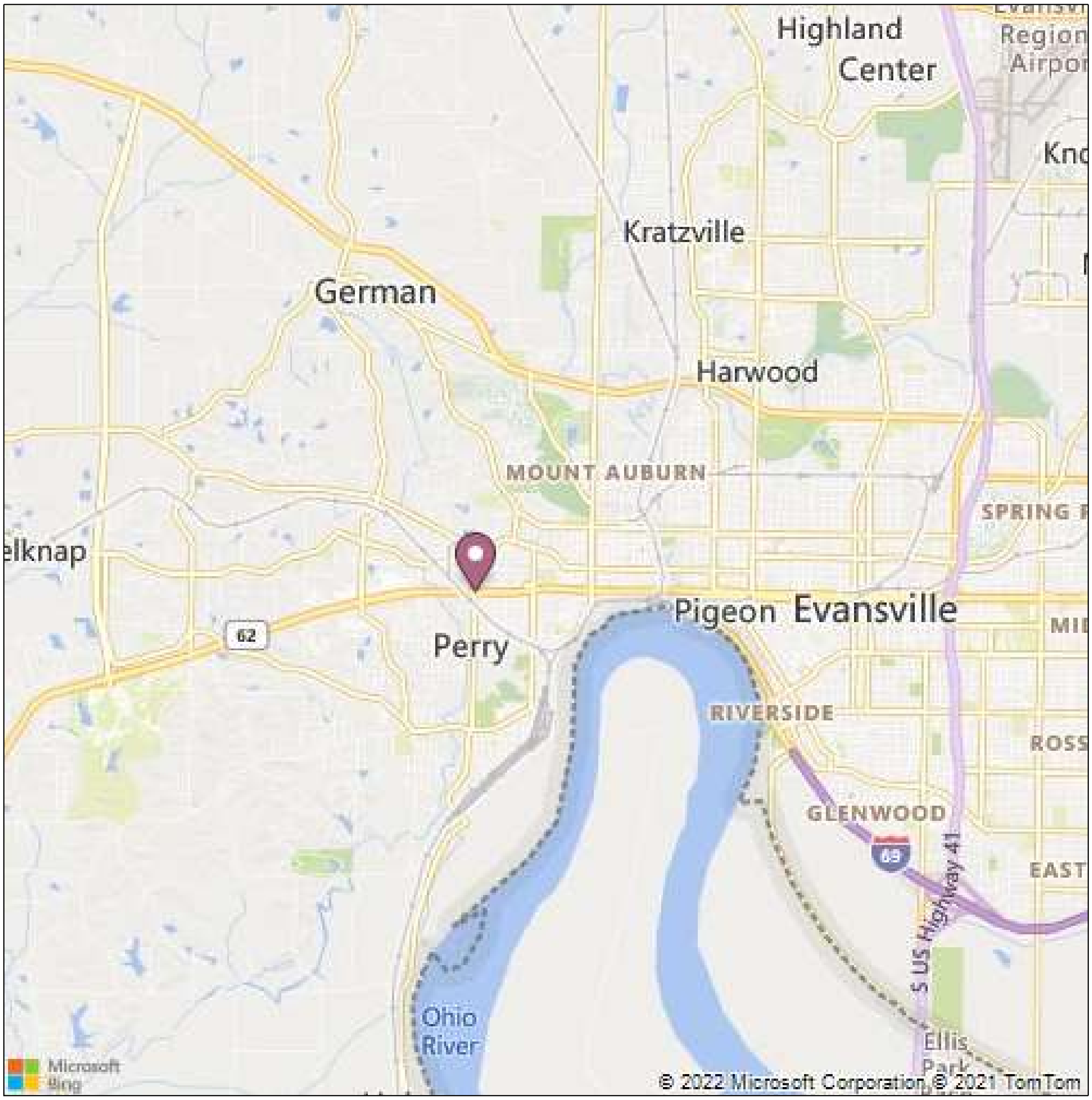


Latitude: 37.97755

Longitude: -87.61893

Latitude: 37.97755

Longitude: -87.61893

History:

Bridge originally built in 1956 under Contract No. 3961.

Bridge rehabilitation project, deck overlay 1 ["A" Rehabilitation] done in 1978 under Contract No. B-11082; project scope included partial depth deck patching, installing new joints, and select superstructure and substructure repairs.

Bridge rehabilitation project, deck overlay 2 ["B" Rehabilitation] done in 2001 under DES No. 9700040, Contract No. B-23878; project scope included replacing the original barriers and curbs with new concrete parapet barriers, partial and full depth deck patching, placing new median curb, replacing the approach slabs, and installing new joints.

Current Summary:

The deck topside surfaces appeared predominantly sound; however, the underside surfaces exhibited widespread full depth patching along with both impending spalls and large areas of spalling with exposed reinforcing. Some of the full depth patching exhibited cracking with efflorescence, suggesting that some underlying deterioration within the patching is still occurring. Most of the spalls with exposed reinforcing was visible in the outermost bays. While the deck underside exhibited fairly widespread deterioration, the RCGs appeared mostly sound and only exhibited few areas of generally isolated shallow depth spalls with exposed reinforcing (primarily stirrup reinforcing) as detailed in the condition comments. The substructure units also appeared mainly sound, but the abutments did exhibit shallow spalls and cracking with both efflorescence and rust stains.

Recommendations:

Bridge replacement project is currently programmed in SPMS (as part of a Non-I district pavement project) under DES No. 1600060, Contract No. R-42287, with a November 15, 2023 scheduled letting date. The nearby bridges within this SR 62 corridor are also scheduled for replacement.

IDENTIFICATION

(1) STATE CODE:	185 - Indiana
(8) STRUCTURE:	021950
(5 A-B-C-D-E) INV. ROUTE:	1 - 3 - 1 - 00062 - 0
(2) HIGHWAY AGENCY DISTRICT:	06 - Vincennes
(3) COUNTY CODE:	082 - VANDERBURGH
(4) PLACE CODE:	22000 - EVANSVILLE
(6) FEATURES INTERSECTED:	TEKOPPLE AVENUE
(7) FACILITY CARRIED:	SR 62
(9) LOCATION:	04.09 W US 41
(11) MILEPOINT:	0005.010

(12) BASE HIGHWAY NETWORK:	1
(13A) INVENTORY ROUTE:	0000000001
(13B) SUBROUTE NUMBER:	01
(16) LATITUDE:	37.97755
(17) LONGITUDE:	-87.61893
(98) BORDER	
A) STATE NAME:	
B) PERCENT	%
(99) BORDER BRIDGE STRUCT. NO:	

STRUCTURE TYPE AND MATERIAL

(43) STRUCTURE TYPE, MAIN:	
A) KIND OF MATERIAL/DESIGN:	2 - Concrete continuous
B) TYPE OF DESIGN/CONSTR:	02 - Stringer/Multi-beam or Girder
(44) STRUCTURE TYPE, APPROACH SPANS:	
A) KIND OF MATERIAL/DESIGN:	0 - Other
B) TYPE OF DESIGN/CONSTR:	00 - Other

(45) NUMBER OF SPANS IN MAIN UNIT:	003
(46) NUMBER OF APPROACH SPANS:	0000
(107) DECK STRUCTURE TYPE:	1 - Concrete Cast-in-Place
(108) WEARING SURFACE/PROT SYS:	
A) WEARING SURFACE:	9 - Other
B) DECK MEMBRANE:	0 - None
C) DECK PROTECTION:	0 - None

AGE OF SERVICE

(27) YEAR BUILT:	1956
(106) YEAR RECONSTRUCTED:	2001
(42) TYPE OF SERVICE:	
A) ON BRIDGE:	1 - Highway
B) UNDER BRIDGE:	1 - Highway, with or w/out pedestrian

(28) LANES:		
A) ON BRIDGE:	04	
B) UNDER BRIDGE:	02	
(29) AVERAGE DAILY TRAFFIC:	044520	
(30) YEAR OF AVERAGE DAILY TRAFFIC:	2004	
(109) AVERAGE DAILY TRUCK TRAFFIC:	05	%
(19) BYPASS DETOUR LENGTH:	005	MI

GEOMETRIC DATA

(48) LENGTH OF MAX SPAN:	0059.0	FT
(49) STRUCTURE LENGTH:	00138.0	FT
(50) CURB/SIDEWALK WIDTHS:		
A) LEFT	00.0	FT
B) RIGHT:	00.0	FT
(51) BRDG RDWY WIDTH CURB-TO-CURB:	058.0	FT
(52) DECK WIDTH, OUT-TO-OUT:	065.0	FT
(32) APPROACH ROADWAY	058.0	FT
(33) BRIDGE MEDIAN:	2 - Closed median (no barrier)	
(34) SKEW:	00	DEG

(35) STRUCTURE FLARED:	0 - No flare	
(10) INV RTE, MIN VERT CLEARANCE:	99.99	FT
(47) TOT HORIZ CLEARANCE:	029.0	FT
(53) VERT CLEAR OVER BR RDWY:	99.99	FT
(54) MIN VERTICAL UNDERCLEARANCE:		
A) REFERENCE FEATURE:	H	
B) MIN VERT UNDERCLEAR:	18.03	FT
(55) LATERAL UNDERCLEARANCE RIGHT:		
A) REFERENCE FEATURE:	H	
B) MIN LATERAL UNDERCLEAR:	009.2	FT
(56) MIN LATERAL UNDERCLEAR ON LEFT:	00.0	FT

INSPECTIONS

(90) INSPECTION DATE:	04/28/2022
(92) CRITICAL FEATURE INSPECTION:	
A) FRACTURE CRITICAL REQUIRED/FREQUENCY:	N
B) UNDERWATER INSPECTION REQUIRED/FREQUENCY:	N
C) OTHER SPECIAL INSPECTION REQUIRED/FREQUENCY:	N

(91) DESIGNATED INSPECTION FREQUENCY:	24 MONTHS
(93) CRITICAL FEATURE INSPECTION DATE:	
A) FRACTURE CRITICAL DATE:	
B) UNDERWATER INSP DATE:	
C) OTHER SPECIAL INSP DATE:	

CONDITION

(58) DECK:	5 - Fair Condition (minor section loss)
(58.01) WEARING SURFACE:	7 - Good Condition
(59) SUPERSTRUCTURE:	5 - Fair Condition (minor section loss)

(60) SUBSTRUCTURE:	5 - Fair Condition (minor section loss)
(61) CHANNEL/CHANNEL PROTECTION:	N - Not Applicable
(62) CULVERTS:	N - Not Applicable

CONDITION COMMENTS

(58) DECK: 5 - Fair Condition (minor section loss)

Comments:
Underside exhibited approximately 860 SFT (around 14% surface area) of full-depth patching; some patches exhibited transverse cracking with efflorescence. Underside also exhibited approximately 55 SFT impending spalls and approximately 1,560 SFT spalling with exposed reinforcing (around 26% surface area), predominantly in the outside bays. Overall level of deterioration did not appear to have significantly increased since 2018 inspection; condition still bordering on "poor" evaluation.

(58.01) WEARING SURFACE: 7 - Good Condition

Comments:
Plans specify overlay with microsilica and corrosion inhibitor. Appeared predominantly sound. Intermittent minor width transverse cracks mainly through center of structure. Spot chaining done in 2018 did not detect any delamination. Traffic volume is high and full surface chaining is very difficult to do safely.

(59) SUPERSTRUCTURE: 5 - Fair Condition (minor section loss)

Comments:
RCGs typically exhibited fine-width flexural cracking near midspan; this manner of cracking is typical for these types of structure. Approximately 14 LFT total spalling with exposed reinforcing visible; most of this spalling appeared shallow and exposing the stirrup reinforcing. Spalling most pronounced on Beams 1, 3, and 5 in Span C, and on Beams 1 and 3 in Span A. Coping beams in all three spans have patches; few cracks are visible.

(60) SUBSTRUCTURE: 5 - Fair Condition (minor section loss)

Comments:
Intermediate piers appeared mostly sound; however both pier caps near the middle exhibited minor spalls/cracks with efflorescence, and a patch on one column of Pier 3 exhibited cracking with moisture stains. Both abutments exhibited areas of deterioration consisting of shallow to minimally moderate deep spalls with some exposed reinforcing (but little to no loss of bearing areas) and moderate cracking with efflorescence and rust staining on few backwall bays and bearing seat front faces.

(61) CHANNEL/CHANNEL PROTECTION N - Not Applicable

Comments:

(62) CULVERTS: N - Not Applicable

Comments:

LOAD RATING AND POSTING

(31) DESIGN LOAD:	5 - HS 20	(66) INVENTORY RATING:	0.655
(70) BRIDGE POSTING	5 - Equal to or above legal loads	(65) INVENTORY RATING METHOD:	8 - Load and Resistance Factor Rating (LRFR) rating report by rating factor (RF) method using HL-93 loadings.
(41) STRUCTURE OPEN/POSTED/CLOSED:	A - Open		
(64) OPERATING RATING:	0.891		
(63) OPERATING RATING METHOD:	8 - Load and Resistance Factor Rating (LRFR) rating report by rating factor (RF) method using HL-93 loadings.	(66B) INVENTORY RATING (H):	
		(66C) TONS POSTED :	
		(66D) DATE POSTED/CLOSED:	

APPRAISAL

SUFFICIENCY RATING:	58.1	(36) TRAFFIC SAFETY FEATURE:	
STATUS:	0	36A) BRIDGE RAILINGS:	1
(67) STRUCTURAL EVALUATION:	5	36B) TRANSITIONS:	1
(68) DECK GEOMETRY:	4	36C) APPROACH GUARDRAIL:	1
(69) UNDERCLEARANCES, VERTICAL & HORIZONTAL:	5	36D) APPROACH GUARDRAIL ENDS:	1

(71) WATERWAY ADEQUACY: N - Not Applicable

Comments:

(72) APPROACH ROADWAY ALIGNMENT: 8 - Equal to present desirable criteria

Comments:

(113) SCOUR CRITICAL BRIDGES: N - Not over waterway

Comments:

CLASSIFICATION

(20) TOLL:	3 - On Free Road
(22) OWNER:	01 - State Highway Agency
(37) HISTORICAL SIGNIFICANCE:	5 - Not eligible
(101) PARALLEL STRUCTURE:	N - No parallel structure
(103) TEMPORARY STRUCTURE:	
(105) FEDERAL LANDS HIGHWAYS:	0-Not Applicable
(112) NBIS BRIDGE LENGTH:	Yes
(21) MAINT. RESPONSIBILITY:	01 - State Highway Agency
(26) FUNCTIONAL CLASS OF INVENTORY RTE:	12 - Urban - Principal Arterial - Other Freeway or Expressway
(100) STRAHNET HIGHWAY:	Not a STRAHNET route
(102) DIRECTION OF TRAFFIC:	1-way traffic
(104) HIGHWAY SYSTEM OF INVENTORY ROUTE:	1 - Structure/Route is on NHS
(110) DESIGNATED NATIONAL NETWORK:	Inventory route on National Truck Network

NAVIGATION DATA

(38) NAVIGATION CONTROL:	N - Not applicable, no waterway
(111) PIER OR ABUTMENT PROTECTION:	
(39) NAVIGATION VERTICAL CLEAR:	000.0 FT
(116) MINIMUM NAVIGATION VERT. CLEARANCE, VERT. LIFT BRIDGE:	FT
(40) NAV HORIZONTAL CLEARANCE:	0000.0 FT

PROPOSED IMPROVEMENTS

(75A) TYPE OF WORK:	
(75B) WORK DONE BY:	
(76) LENGTH OF IMPROVEMENT:	00000.0 FT
(94) BRIDGE IMPROVEMENT COST:	$ 000000
(95) ROADWAY IMPROVEMENT COST:	$ 000000
(96) TOTAL PROJECT COST:	$ 000000
(97) YR OF IMPROVEMENT COST EST:	
(114) FUTURE AVG DAILY TRAFFIC:	062729
(115) YR OF FUTURE ADT:	2034

	Environment	Total Quantity	Units	Condition State 1	Condition State 2	Condition State 3	Condition State 4
12 - Reinforced Concrete Deck	2 - Low	8970	sq. ft.	6459	951	1560	0
	138' X 65' = 8,970 SFT (deck)						
510 - Wearing Surfaces		7452	sq. ft.	7377	75	0	0
	138' X 54' = 7,452 SFT						
110 - Reinforced Concrete Open Girder/Beam	2 - Low	1096	ft.	1041	55	0	0
	8 beam lines X 137' = 1,096 LFT						
205 - Reinforced Concrete Column	2 - Low	16	each	15	1	0	0
	2 Piers X 8 columns = 16 EACH						
215 - Reinforced Concrete Abutment	2 - Low	130	ft.	94	10	26	0
	2 X 65' = 130 LFT						
234 - Reinforced Concrete Pier Cap	2 - Low	126	ft.	109	15	2	0
	2 X 63' = 126 LFT						
301 - Pourable Joint Seal	2 - Low	130	ft.	126	4	0	0
	2 X 65' = 130 LFT						
316 - Other Bearing	2 - Low	16	each	16	0	0	0
	2 abutments X 8 beam lines = 16 EACH (appear to be fabric pads defined as "other"). Beams ends at piers bear directly on pier caps with no bearings.						
321 - Reinforced Concrete Approach Slab	2 - Low	2712	sq. ft.	2705	7	0	0
	Per Plans Bill of Materials = 252 SQM = 2,712 SFT						
331 - Reinforced Concrete Bridge Railing	2 - Low	276	ft.	276	0	0	0
	2 X 138' = 276 LFT						

PHOTO 1

Description Alignment looking east.

PHOTO 2

Description South Elevation.

PHOTO 3

Description West end of approach covered terminal joint exhibits spalling in bituminous.

PHOTO 4

Description West Concrete Approach conditions; notice on west bound right lane exhibits a minor longitudinal full length crack.

PHOTO 5

Description West type Pourable Deck Joint conditions.

PHOTO 6

Description Overall view of Topside.

PHOTO 7

Description Intermittent minor width transverse cracks mainly through center of structure.

PHOTO 8

Description East type Pourable Deck Joint conditions.

PHOTO 9

Description East Concrete Approach conditions.

PHOTO 10

Description East end of east approach exhibits covered terminal joint that exhibits spalling in bituminous covering.

PHOTO 11

Description Underside Span A overall condition.

PHOTO 12

Description Underside Span A exhibits a few small spall with exposed reinforcement, cracking with light efflorescence and or delamination in areas.

PHOTO 13

Description Underside Span B overall condition; notice almost typical beams exhibits small delamination/cracking in areas.

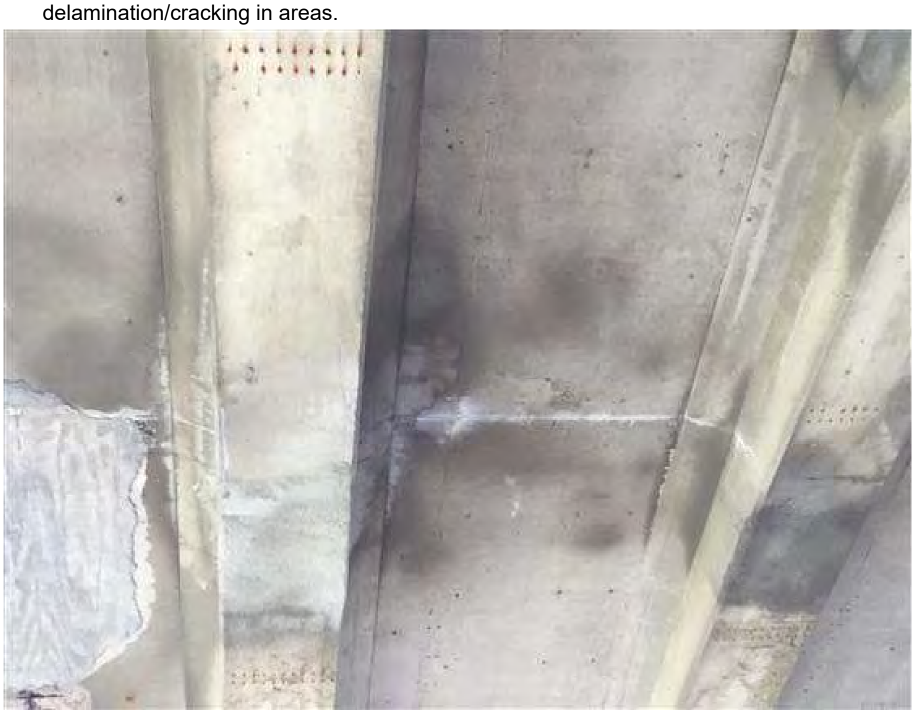


PHOTO 14

Description Beam 2 in span B exhibits real fine flexural cracking on beam.

PHOTO 15

Description Span B Bay 4 exhibits approximately 10 SFT of delamination that needs removed over traffic lanes.

PHOTO 16

Description Underside Span B exhibits approximately 80 SFT of spalling with exposed reinforcement.

PHOTO 17

Description Bay 7 in span B exhibits approximately 40 SFT of spalling with exposed reinforcement.

PHOTO 18

Description Beam 8 in Span B exh small areas of delamination/ cracking.

PHOTO 19

Description Underside Span C overall condition.

PHOTO 20

Description East fascia beam and bay 7 exhibits areas of spalling with exposed reinforcement and cracking bay 7 exhibits approximately 20 SFT of spalling with exposed reinforcement and beam approximately 4 SFT of delamination, spalling and or cracking .

PHOTO 21

Description Beam 5 in span C exhibits a few areas of small spalls over reinforcement due to lack of coverage, a few on other beams also.

PHOTO 22

Description Span C bay 4 exhibits spalling around previous full deck patching, typical in other bays and spans.

PHOTO 23

Description Beam 1 and bay 1 in span C exhibits spalling with exposed reinforcement beam 1 exhibits approximately 5 SFT of spalling and bay 1 exhibits approximately 20 SFT of spalling with exposed reinforcement.

PHOTO 24

Description Abutment 1 overall condition.

PHOTO 25

Description Abutment 1 exhibits areas approximately 5 SFT spalling.

PHOTO 26

Description Pier 2 overall condition.

PHOTO 27

Description Small delamination/ cracking areas on Pier caps.

PHOTO 28

Description A few fine cracks with light efflorescence on bottom of pier caps.

PHOTO 29

Description Pier 3 overall condition.

PHOTO 30

Description Pier 3 column 1 exhibits map cracking over a previous patch.

PHOTO 31

Description Abutment 4 overall condition.

PHOTO 32

Description Abutment 4 exhibits moderate horizontal cracking with rust staining and spalling in areas approximately 12 LFT total length.

PHOTO 33

Description Typical condition of both concrete Slope walls notice some minor to moderate width cracking with very little settlement.

Miscellaneous Asset Data

021950

Asset Management

Load Rating 2:

Has the dead load or the structural condition of the primary load carrying members changed since the last inspection? No

Extended Frequency: Submittal Date:

Inspector:

INDOT Reviewer:

This bridge has been accepted into the Extended Frequency Program. Approval Date:

Joints: ** Indicate location, type, and rating of lowest rated joint.*

Transverse South/West	P - Poured Silicone (narrow width, repla	7 - Good Condition

Comments:

Since 2018 inspections, maintenance unit cleaned out both joints and restored with recently placed poured silicone sealer material; all appeared predominantly sound and functioning.

Terminal Joints: **Rating of lowest rated terminal joint.* N

Comments:

Concrete Slopewall: **Rating of lowest rated slopewall.* 7

Comments:

Typical condition of both concrete Slope walls notice some minor to moderate width cracking with very little settlement.

Bearings: ** Indicate type, and rating of lowest rated bearing.*

5 - Other 6

Comments:

Appeared to be felt pads.

Approach Slabs: ** Indicate if present & condition rating.*

1 - Approach Slabs 7 - Good condition, minor cracking, wide spacing

Comments:

West Concrete Approach exhibits on west bound right lane exhibits a minor longitudinal full length crack.

Paint: ** Indicate if paint present , year painted & condition rating.*

N - No Paint N

Comments:

Endangered Species: ** If yes, add one photo to the dropdown field*

Bats: seen or heard under structure? * N

Birds/swallows/nests seen? Empty nests present? * N

BRIDGE Culvert Geometry:

Barrel Length:

Height:

Width:

LOAD RATING - BRADIN

Load Rating Date: 06-FEB-08

National Bridge Inventory (NBI):

(65) INVENTORY RATING METHOD: 8

(66) INVENTORY RATING: 0.655

(63) OPERATING RATING METHOD: 8

(64) OPERATING RATING: 0.891

(31) DESIGN LOAD: 5

(70) BRIDGE POSTING: 5

(41) STRUCTURE OPEN/POSTED/CLOSED: A

(66C) TONS POSTED:

(66D) DATE POSTED/CLOSED:

Posting Configurations:

Emergency Vehicles:

EV2: LEGAL RF: 1.569

EV3: LEGAL RF: 1.007

2-Axles:

H20-44: LEGAL RF: 1.891

ALTERNATE MILITARY: LEGAL RF: 1.519

3-Axles:

HS20: LEGAL RF: 1.176

AASHTO TYPE 3: LEGAL RF: 1.636

4-Axles:

SU4: LEGAL RF: 1.456

TOLL ROAD LOADING NO. 2:
ROUTINE PERMIT RF:

5-Axles:

AASHTO TYPE 3S2: LEGAL RF: 1.544

SU5: LEGAL RF: 1.304

TOLL ROAD LOADING NO. 1: ROUTINE PERMIT RF:

6+-Axles:

AASHTO TYPE 3-3: LEGAL RF: 1.719

LANE TYPE: LEGAL RF: 2.107

SU6: LEGAL RF: 1.175

SPECIAL TOLL ROAD TRUCK: ROUTINE PERMIT RF:

SU7: LEGAL RF: 1.078

MICHIGAN TRAIN TRUCK NO. 5: ROUTINE PERMIT RF:

MICHIGAN TRAIN TRUCK NO. 8: ROUTINE PERMIT RF:

Other Configurations:

H20-44: DESIGN RF: 1.412

NRL: LEGAL RF: 1.027

SUPERLOAD-11 AXLES: SPECIAL PERMIT RF: 0.999

SUPERLOAD-13 AXLES: SPECIAL PERMIT RF: 1.117

SUPERLOAD-14 AXLES: SPECIAL PERMIT RF: 0.79

SUPERLOAD-19 AXLES (152.5T): SPECIAL PERMIT RF: 0.942

SUPERLOAD-19 AXLES (240.045T): SPECIAL PERMIT RF: 0.808

Date Reported: 05/06/2022
Priority: Yellow - 2
Work Code: Deck Patch

Deficiency Description:
Span B Bay 4 exhibits approximately 10 SFT of delamination.

Latitude 37.97755
Longitude -87.61893

Work Description:

Date Repairs Completed:

Maintenance Comments:

Stage: Open

PHOTO 1 Description Alignment looking east.

Stage: Open

PHOTO 2 Description South Elevation.

Stage: Open

PHOTO 3 Description Span B Bay 4 exhibits approximately 10 SFT of delamination that needs removed over traffic lanes.

Stage: Open

PHOTO 4 Description Underside Span B exhibits approximately 80 SFT of spalling with exposed reinforcement.

Bridge Inspection Report

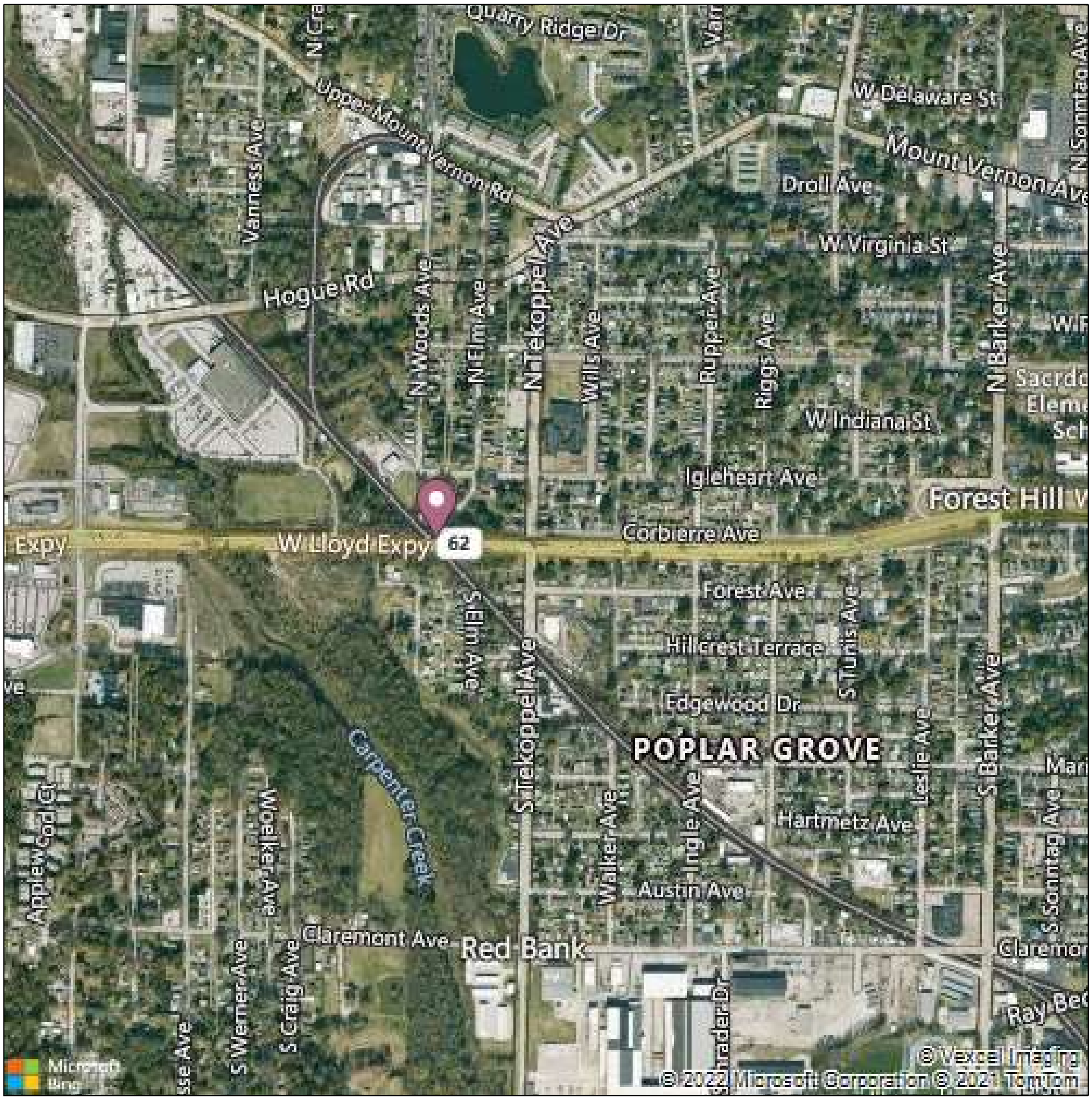
062-82-02195 B
SR 62
over
EVANSVILLE WESTERN RR

Inspection Date: 04/20/2022

Inspected By: Jariah W. Besing

Inspection Type(s): Routine

TABLE OF CONTENTS



Latitude: 37.97769

Longitude: -87.62083

History:

Bridge replacement project is currently programmed in SPMS (as part of a Non-I district pavement project) under DES No. 1500041, Contract No. R-42287, with a November 15, 2023 scheduled letting date. The nearby bridges within this SR 62 corridor are also scheduled for replacement.

Substructure repair and rehabilitation project ["B" Rehabilitation] done in 2000 under DES No. 8911605, Contract No. B-23878; project scope included deck overlay 2, placing new approach slabs, replacing the coping curbs and railings with new concrete parapet barriers, converting the Pier 3 cap to semi-integral, and replacing the remaining deck joints. This project also included installing steel bents at both sides of all the intermediate piers to provide supplemental support for the badly deteriorating piers.

Deck reconstruction and overlay 1 project ["A" Rehabilitation] done in 1978 under Contract No. B-11082; project scope included partial depth deck patching and placing new approach slabs.

Bridge originally built in 1956 under Contract No. 4073.

Condition Summary:

All of the main bridge components still remain in fair to poor condition with slight to no changes in the extent of deteriorations from previous inspections. The deck topside exhibit intermittent minor to moderate width longitudinal and transverse cracks throughout the surface. Several area of patching visible along the joints over the intermediate piers with most of the patched areas exhibiting minor width cracking. The underside exhibit several areas of patching, cracking with efflorescence and further impending spalls. In addition, several of the RCG beams exhibit map cracking with moderate to severe efflorescence at beam ends with few beams exhibiting spalls and further impending spall areas; mainly over the abutments and over the piers and most pronounced near the centerline. The pier caps exhibit significant map cracking with severe efflorescence; furthermore, Pier 2 cap exhibit the most pronounced deterioration of spalling with exposed reinforcement at South end. In addition, several columns exhibit significant cracking with severe efflorescence. The steel support framing bents at each piers seems to be in generally good physical condition and did not exhibit any visible deteriorations.

Recommendation:

Bridge replacement project is currently programmed in SPMS (as part of a Non-I district pavement project) under DES No. 1500041, Contract No. R-42287, with a November 15, 2023 scheduled letting date. The nearby bridges within this SR 62 corridor are also scheduled for replacement. Nothing further is recommended at this time.

IDENTIFICATION

(1) STATE CODE:	185 - Indiana
(8) STRUCTURE:	021940
(5 A-B-C-D-E) INV. ROUTE:	1 - 3 - 1 - 00062 - 0
(2) HIGHWAY AGENCY DISTRICT:	06 - Vincennes
(3) COUNTY CODE:	082 - VANDERBURGH
(4) PLACE CODE:	22000 - EVANSVILLE
(6) FEATURES INTERSECTED:	EVANSVILLE WESTERN RR
(7) FACILITY CARRIED:	SR 62
(9) LOCATION:	04.19 W US 41
(11) MILEPOINT:	0004.910

(12) BASE HIGHWAY NETWORK:	1
(13A) INVENTORY ROUTE:	0000000001
(13B) SUBROUTE NUMBER:	01
(16) LATITUDE:	37.97769
(17) LONGITUDE:	-87.62083
(98) BORDER	
A) STATE NAME:	
B) PERCENT	%
(99) BORDER BRIDGE STRUCT. NO:	

STRUCTURE TYPE AND MATERIAL

(43) STRUCTURE TYPE, MAIN:	
A) KIND OF MATERIAL/DESIGN:	3 - Steel
B) TYPE OF DESIGN/CONSTR:	02 - Stringer/Multi-beam or Girder
(44) STRUCTURE TYPE, APPROACH SPANS:	
A) KIND OF MATERIAL/DESIGN:	1 - Concrete
B) TYPE OF DESIGN/CONSTR:	02 - Stringer/Multi-beam or Girder

(45) NUMBER OF SPANS IN MAIN UNIT:	001
(46) NUMBER OF APPROACH SPANS:	0004
(107) DECK STRUCTURE TYPE:	1 - Concrete Cast-in-Place
(108) WEARING SURFACE/PROT SYS:	
A) WEARING SURFACE:	3 - Latex Concrete or similar additive
B) DECK MEMBRANE:	0 - None
C) DECK PROTECTION:	0 - None

AGE OF SERVICE

(27) YEAR BUILT:	1956
(106) YEAR RECONSTRUCTED:	2000
(42) TYPE OF SERVICE:	
A) ON BRIDGE:	1 - Highway
B) UNDER BRIDGE:	2 - Railroad

(28) LANES:	
A) ON BRIDGE:	04
B) UNDER BRIDGE:	00
(29) AVERAGE DAILY TRAFFIC:	044520
(30) YEAR OF AVERAGE DAILY TRAFFIC:	2004
(109) AVERAGE DAILY TRUCK TRAFFIC:	05 %
(19) BYPASS DETOUR LENGTH:	005 MI

GEOMETRIC DATA

(48) LENGTH OF MAX SPAN:	0051.0 FT		(35) STRUCTURE FLARED:	0 - No flare
(49) STRUCTURE LENGTH:	00261.0 FT		(10) INV RTE, MIN VERT CLEARANCE:	99.99 FT
(50) CURB/SIDEWALK WIDTHS:			(47) TOT HORIZ CLEARANCE:	029.0 FT
A) LEFT	00.0 FT		(53) VERT CLEAR OVER BR RDWY:	99.99 FT
B) RIGHT:	00.0 FT		(54) MIN VERTICAL UNDERCLEARANCE:	
(51) BRDG RDWY WIDTH CURB-TO-CURB:	062.0 FT		A) REFERENCE FEATURE:	R
(52) DECK WIDTH, OUT-TO-OUT:	065.0 FT		B) MIN VERT UNDERCLEAR:	22.42 FT
(32) APPROACH ROADWAY	062.0 FT		(55) LATERAL UNDERCLEARANCE RIGHT:	
(33) BRIDGE MEDIAN:	2 - Closed median (no barrier)		A) REFERENCE FEATURE:	R
(34) SKEW:	45 DEG		B) MIN LATERAL UNDERCLEAR:	008.7 FT
			(56) MIN LATERAL UNDERCLEAR ON LEFT:	00.0 FT

INSPECTIONS

(90) INSPECTION DATE:	04/20/2022	(91) DESIGNATED INSPECTION FREQUENCY:	12 MONTHS
(92) CRITICAL FEATURE INSPECTION:		(93) CRITICAL FEATURE INSPECTION DATE:	
A) FRACTURE CRITICAL REQUIRED/FREQUENCY:	N	A) FRACTURE CRITICAL DATE:	
B) UNDERWATER INSPECTION REQUIRED/FREQUENCY:	N	B) UNDERWATER INSP DATE:	
C) OTHER SPECIAL INSPECTION REQUIRED/FREQUENCY:	N	C) OTHER SPECIAL INSP DATE:	

CONDITION

(58) DECK:	5 - Fair Condition (minor section loss)	(60) SUBSTRUCTURE:	4 - Poor Condition (advanced deterioration)
(58.01) WEARING SURFACE:	6 - Satisfactory Condition	(61) CHANNEL/CHANNEL PROTECTION:	N - Not Applicable
(59) SUPERSTRUCTURE:	5 - Fair Condition (minor section loss)	(62) CULVERTS:	N - Not Applicable

CONDITION COMMENTS

(58) DECK: 5 - Fair Condition (minor section loss)

Comments:

Widespread deterioration consisting of approximately 1,800 SFT cracking, much with moderate to severe efflorescence, (14% SA), around 500 SFT patching (4% SA); much of the patching also exhibited cracks with efflorescence, and some impending spalls. Area in Span A, Bay 1 exhibited 10 SFT spalling with exposed reinforcing, and around 50 SFT total spalling with exposed reinforcing was visible along centerline. Overall condition borderlines on "4" poor. Bridge programmed for full replacement project with a November 2023 letting.

(58.01) WEARING SURFACE: 6 - Satisfactory Condition

Comments:
Several moderate width transverse cracks visible randomly throughout, along with similar width cracks extending perpendicular from the joints. Approximately 1 SF spall in eastbound driving lane over Span C. Wheel paths have moderate glazing. Chaining not done due to high traffic; spot chaining done in 2018 detected around 50 SFT delamination near West end. Approximately 14 SFT patching at interior joint over Pier 2 still intact. Numerous section of the joints are failing and the patched areas exhibit cracking.

(59) SUPERSTRUCTURE: 5 - Fair Condition (minor section loss)

Comments:
RCGs typically exhibit hairline flexural cracks, and several RCG ends within around 2 feet of the piers exhibit minor to moderate longitudinal cracking with efflorescence and a few spot rust stains; few RCG ends at the abutments exhibited similar cracking. Few RCGs also exhibited isolated spots of impending spalls and spalls with exposed reinforcing. Beam 1 at Pier 2 exhibited heavy spalling, exposed reinforcing, and some loss of bearing. The steel beams in Span C exhibited widespread corrosion where the coating is not effective. Bridge programmed for full replacement project with a November 2023 letting.

(60) SUBSTRUCTURE: 4 - Poor Condition (advanced deterioration)

Comments:
Pier 2 and Pier 5 caps have significant map cracking with heavy efflorescence; in addition, Pier 2 cap at the South end was crumbling and exposing reinforcement. Columns 1 to 3 at Pier 5 from the North end and all columns at Pier 2 have map cracking with heavy efflorescence, and Columns 1 to 3 at Pier 4 from the South end exhibited some spalls, impending spalls, and cracks within the shotcrete patches. Southeast corner at bottom of Pier 4 under Beam 1 has moderate spalling exposing reinforcement with loss of bearing area. Approximately 15 feet of undercutting present at North end of the West abutment. Bridge programmed for full replacement project with a November 2023 letting.

(61) CHANNEL/CHANNEL PROTECTION N - Not Applicable

Comments:

(62) CULVERTS: N - Not Applicable

Comments:

LOAD RATING AND POSTING

(31) DESIGN LOAD:	5 - HS 20	(66) INVENTORY RATING:	0.971
(70) BRIDGE POSTING	5 - Equal to or above legal loads	(65) INVENTORY RATING METHOD:	8 - Load and Resistance Factor Rating (LRFR) rating report by rating factor (RF) method using HL-93 loadings.
(41) STRUCTURE OPEN/POSTED/CLOSED:	A - Open		
(64) OPERATING RATING:	1.258		
(63) OPERATING RATING METHOD:	8 - Load and Resistance Factor Rating (LRFR) rating report by rating factor (RF) method using HL-93 loadings.	(66B) INVENTORY RATING (H):	
		(66C) TONS POSTED :	
		(66D) DATE POSTED/CLOSED:	

APPRAISAL

SUFFICIENCY RATING:	52.7	(36) TRAFFIC SAFETY FEATURE:	
STATUS:	1	36A) BRIDGE RAILINGS:	1
(67) STRUCTURAL EVALUATION:	4	36B) TRANSITIONS:	1
(68) DECK GEOMETRY:	4	36C) APPROACH GUARDRAIL:	1
(69) UNDERCLEARANCES, VERTICAL & HORIZONTAL:	4	36D) APPROACH GUARDRAIL ENDS:	1

(71) WATERWAY ADEQUACY: N - Not Applicable
Comments:

(72) APPROACH ROADWAY ALIGNMENT: 8 - Equal to present desirable criteria
Comments:

(113) SCOUR CRITICAL BRIDGES: N - Not over waterway
Comments:

CLASSIFICATION

(20) TOLL:	3 - On Free Road	(21) MAINT. RESPONSIBILITY:	01 - State Highway Agency
(22) OWNER:	01 - State Highway Agency	(26) FUNCTIONAL CLASS OF INVENTORY RTE:	12 - Urban - Principal Arterial - Other Freeway or Expressway
(37) HISTORICAL SIGNIFICANCE:	5 - Not eligible	(100) STRAHNET HIGHWAY:	Not a STRAHNET route
(101) PARALLEL STRUCTURE:	N - No parallel structure	(102) DIRECTION OF TRAFFIC:	2-way traffic
(103) TEMPORARY STRUCTURE:		(104) HIGHWAY SYSTEM OF INVENTORY ROUTE:	1 - Structure/Route is on NHS
(105) FEDERAL LANDS HIGHWAYS:	0-Not Applicable	(110) DESIGNATED NATIONAL NETWORK:	Inventory route on National Truck Network
(112) NBIS BRIDGE LENGTH:	Yes		

NAVIGATION DATA

(38) NAVIGATION CONTROL:	N - Not applicable, no waterway	(39) NAVIGATION VERTICAL CLEAR:	000.0 FT
(111) PIER OR ABUTMENT PROTECTION:		(116) MINIMUM NAVIGATION VERT. CLEARANCE, VERT. LIFT BRIDGE:	FT
		(40) NAV HORIZONTAL CLEARANCE:	0000.0 FT

PROPOSED IMPROVEMENTS

(75A) TYPE OF WORK:		(95) ROADWAY IMPROVEMENT COST:	$ 000000
(75B) WORK DONE BY:		(96) TOTAL PROJECT COST:	$ 000000
(76) LENGTH OF IMPROVEMENT:	000000.0 FT	(97) YR OF IMPROVEMENT COST EST:	
(94) BRIDGE IMPROVEMENT COST:	$ 000000	(114) FUTURE AVG DAILY TRAFFIC:	062729
		(115) YR OF FUTURE ADT:	2034

	Environment	Total Quantity	Units	Condition State 1	Condition State 2	Condition State 3	Condition State 4
12 - Reinforced Concrete Deck	2 - Low	16965	sq. ft.	14535	2310	120	0
	200' X 65' = 13,000 SFT (deck). 200' X 58' = 11,600 SFT (wearing surface, excluding mountable median).						
510 - Wearing Surfaces		16182	sq. ft.	15922	260	0	0
	200*62						
107 - Steel Open Girder/Beam	2 - Low	612	ft.	612	0	0	0
	12*51						
515 - Steel Protective Coating		4794	sq. ft.	4284	0	510	0
	((35*2+12*2)/12*612						
110 - Reinforced Concrete Open Girder/Beam	2 - Low	2100	ft.	1996	1	101	2
	10*52.5*4						
205 - Reinforced Concrete Column	2 - Low	36	each	22	3	11	0
	18 x 2 = 36.0						
215 - Reinforced Concrete Abutment	2 - Low	184	ft.	184	0	0	0
	92.0 x 2 = 184.0						
234 - Reinforced Concrete Pier Cap	2 - Low	208	ft.	49	50	104	5
	52*4						
301 - Pourable Joint Seal	2 - Low	558	ft.	308	0	250	0
311 - Movable Bearing	2 - Low	26	each	26	0	0	0
	Per plans						
313 - Fixed Bearing	2 - Low	26	each	26	0	0	0
	Per plans						
321 - Reinforced Concrete Approach Slab	2 - Low	3120	sq. ft.	3070	50	0	0
	(24.0 x 65.0) x 2 = 3120.0						
331 - Reinforced Concrete Bridge Railing	2 - Low	400	ft.	400	0	0	0
	2 X 200' = 400 LFT						

PHOTO 1

Description Eastbound alignment

PHOTO 2 Elevation

Description South Elevation.

PHOTO 3

Description Wearing surface overall condition

PHOTO 4

Description West terminal joint in poor condition

PHOTO 5

Description West approach slab and Type 1A joint overall condition, westbound lanes

PHOTO 6

Description Wearing surface overall condition

PHOTO 7

Description West approach slab and Type 1A joint overall condition, eastbound lanes

PHOTO 9

Description Moderate width crack perpendicular to the skew in west approach slab of eastbound lanes

PHOTO 10

Description Approximately 10 LF patching and 3 LF failure along west deck joint

PHOTO 11

Description Wheel paths have moderate glazing

PHOTO 12

Description Approximately 2 SF spall or loose concrete at joint over Pier 2 in eastbound lanes

PHOTO 13

Description XJS joint over Pier 2 overall condition

PHOTO 14

Description Approximately 1 SF spall in eastbound driving lane over Span C

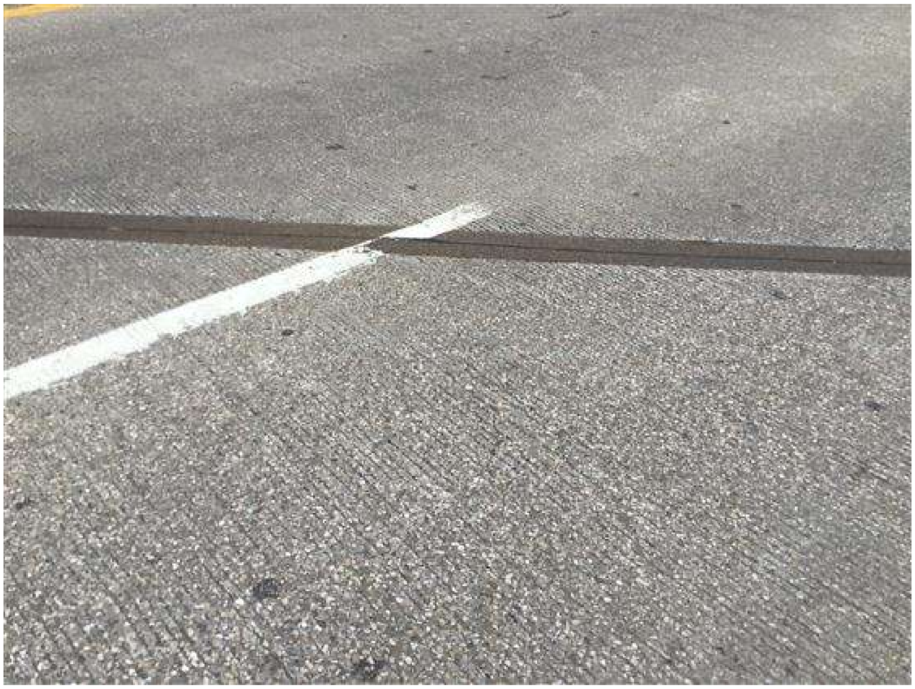


PHOTO 15

Description Minor width cracks perpendicular to the skew at deck joints

PHOTO 16

Description XJS joint over Pier 4 overall condition

PHOTO 17

Description Minor width transverse cracks

PHOTO 18

Description XJS joint over Pier 5 overall condition; approximately 10 LF joint failure

PHOTO 19

Description Few moderate width cracks perpendicular to the skew in east approach slab, eastbound lanes

PHOTO 20

Description East approach slab overall condition

PHOTO 21

Description East Type 1A joint overall condition; approximately 2 LF deck failure and 10 LF joint failure

PHOTO 22

Description East terminal joint, eastbound lanes (all terminal joints in similar and poor condition)

PHOTO 23

Description Span A overall condition

PHOTO 24

Description Deterioration on south end of original Pier 2

PHOTO 25

Description Deterioration on south end of original Pier 2

PHOTO 26

Description Deterioration of Beam 1 over original Pier 2

PHOTO 27

Description Area in Span A, Bay 1 exhibited 10 SFT spalling with exposed reinforcing

PHOTO 28

Description All beams in Span A, at Pier 2 have minor cracking and efflorescence and/or rust staining consistent with a leaking joint above (Beam 2 shown)

PHOTO 29

Description All beams in Span A, at Pier 2 have minor cracking and efflorescence and/or rust staining consistent with a leaking joint above (Beams 6 & 7 shown)

PHOTO 30

Description Span B overall condition

PHOTO 31

Description Bays 1 - 3, Span B (condition typical of deck underside)

PHOTO 32

Description Beam 3 over west abutment has horizontal cracking with moderate rust staining

PHOTO 33

Description Span B, Pier 2 beam end typical condition

PHOTO 34

Description Span C overall condition

PHOTO 35

Description Fascia bays typical have more patching, cracking, and impending spalls (Bay 1, Span A shown)

PHOTO 36

Description Cracks with light efflorescence in patched deck typical around intermediate piers

PHOTO 37

Description Span D overall condition

PHOTO 38

Description Small spall exposing reinforcement in Bay 9, Span D near Pier 4

PHOTO 39

Description Span E overall condition

PHOTO 40

Description Beams over Pier 5 exhibit cracking with moderate efflorescence and/or minor-to-moderate rust staining

PHOTO 41

Description Beam 5 over east abutment has hairline cracking in previous patch

PHOTO 42

Description West abutment overall condition

PHOTO 43

Description Erosion at north end of west abutment

PHOTO 44

Description Deterioration on south end of original Pier 2

PHOTO 45

Description Deterioration on south end of original Pier 2

PHOTO 46

Description Pier 2 overall condition

PHOTO 47

Description Original Pier 2 overall condition

PHOTO 48

Description Pier 3 overall condition

PHOTO 49

Description Approximately 5 SF spalling exposing reinforcement in west face of Pier 3

PHOTO 50

Description Pier 3 overall condition

PHOTO 51

Description Pier 4 overall condition

PHOTO 52

Description Patching in Pier 3 showing hairline cracks between Columns 6 & 7

PHOTO 53

Description Pier 4 overall condition

PHOTO 54

Description Pier 5 cap and columns have significant hairline cracking with heavy efflorescence

PHOTO 55

Description Approximately 1 SF spall exposing reinforcement in Column 8, Pier 5

PHOTO 56

Description Condition of Pier 5 cap along midline

PHOTO 57

Description East abutment overall condition

Miscellaneous Asset Data

021940

Asset Management

Load Rating 2:

Has the dead load or the structural condition of the primary load carrying members changed since the last inspection? No

Extended Frequency: Submittal Date:

Inspector:

INDOT Reviewer:

This bridge has been accepted into the Extended Frequency Program. Approval Date:

Joints: ** Indicate location, type, and rating of lowest rated joint.*

Mid-Section	O - XJS	4 - Poor Condition, leaking, noising damage, areas of adhesion loss

Comments:

Approximately 60% to 70% of the XJS joints over original Piers 2, 4, & 5 have tears, edge spalling, and missing sealer material, and are allowing water to leak through. Joints are essentially ineffective. Approximately 10 LF patching and 3 LF failure along west deck joint. Approximately 2 SF spall or loose concrete at joint over Pier 2 in eastbound lanes.

Terminal Joints: **Rating of lowest rated terminal joint.* N

Comments:

Concrete Slopewall: **Rating of lowest rated slopewall.* N

Comments:

Bearings: ** Indicate type, and rating of lowest rated bearing.*

5 - Other 5

Comments:

Bearings are not easily visible and difficult to inspect.

Approach Slabs: ** Indicate if present & condition rating.*

1 - Approach Slabs — 6 - Satisfactory condition, mild crack, wide spacing

Comments:

Few moderate width cracks visible, some transverse and some extending perpendicular from the joints visible in approach slabs.

Paint: ** Indicate if paint present , year painted & condition rating.*

1 - Steel Beams — 4 - Poor Condition – larger areas of rust and peeling, section loss

Comments:

Paint is in poor condition within Span C over RR, allowing widespread surface rusting where coating is ineffective.

Endangered Species: ** If yes, add one photo to the dropdown field*

Bats: seen or heard under structure? * N

Birds/swallows/nests seen? Empty nests present? * N

BRIDGE Culvert Geometry:

Barrel Length:

Height:

Width:

LOAD RATING - BRADIN

Load Rating Date: 22-JAN-08

National Bridge Inventory (NBI):

(65) INVENTORY RATING METHOD:	8
(66) INVENTORY RATING:	0.971
(63) OPERATING RATING METHOD:	8
(64) OPERATING RATING:	1.258
(31) DESIGN LOAD:	5
(70) BRIDGE POSTING:	5
(41) STRUCTURE OPEN/POSTED/CLOSED:	A
(66C) TONS POSTED:	
(66D) DATE POSTED/CLOSED:	

Posting Configurations:

Emergency Vehicles:

EV2: LEGAL RF:	1.6
EV3: LEGAL RF:	1.037

2-Axles:

H20-44: LEGAL RF:	1.835
ALTERNATE MILITARY: LEGAL RF:	1.477

3-Axles:

HS20: LEGAL RF:	1.306
AASHTO TYPE 3: LEGAL RF:	1.723

4-Axles:

SU4: LEGAL RF:	1.502
TOLL ROAD LOADING NO. 2: ROUTINE PERMIT RF:	

5-Axles:

AASHTO TYPE 3S2: LEGAL RF:	1.845
SU5: LEGAL RF:	1.387
TOLL ROAD LOADING NO. 1: ROUTINE PERMIT RF:	

6+-Axles:

AASHTO TYPE 3-3: LEGAL RF:	2.027
LANE TYPE: LEGAL RF:	99
SU6: LEGAL RF:	1.246
SPECIAL TOLL ROAD TRUCK: ROUTINE PERMIT RF:	
SU7: LEGAL RF:	1.153
MICHIGAN TRAIN TRUCK NO. 5: ROUTINE PERMIT RF:	
MICHIGAN TRAIN TRUCK NO. 8: ROUTINE PERMIT RF:	

Other Configurations:

H20-44: DESIGN RF:	1.699
NRL: LEGAL RF:	1.102
SUPERLOAD-11 AXLES: SPECIAL PERMIT RF:	1.348
SUPERLOAD-13 AXLES: SPECIAL PERMIT RF:	1.543
SUPERLOAD-14 AXLES: SPECIAL PERMIT RF:	1.112
SUPERLOAD-19 AXLES (152.5T): SPECIAL PERMIT RF:	1.384
SUPERLOAD-19 AXLES (240.045T): SPECIAL PERMIT RF:	1.167

Bridge Inspection Report

062-82-03957 B
SR 62
over
CARPENTER CREEK

Inspection Date: 04/20/2022

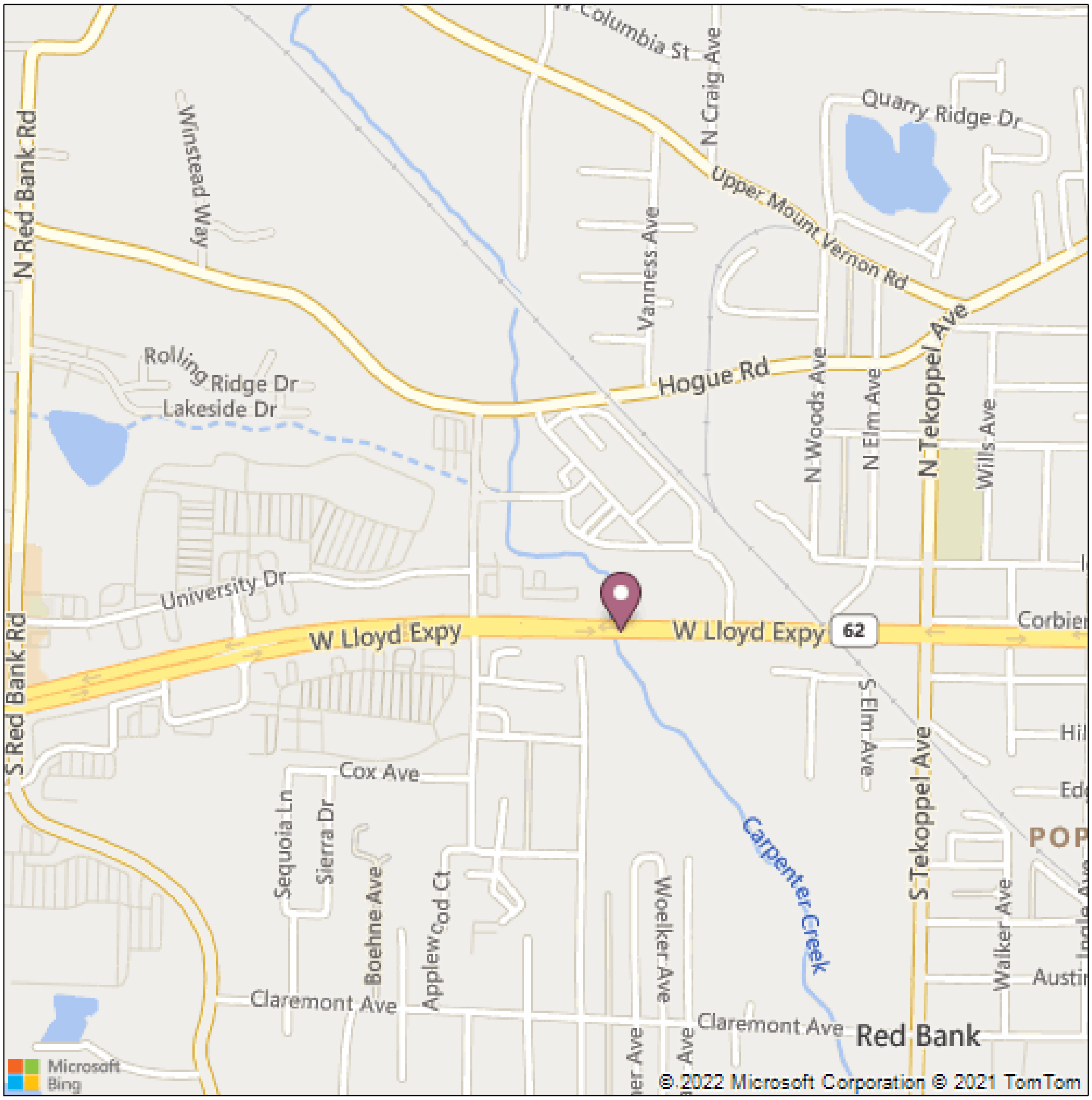
Inspected By: James Hefferman

Inspection Type(s): Routine

TABLE OF CONTENTS

Latitude: 37.9776

Longitude: -87.6250



Latitude: 37.9776

Longitude: -87.6250

History:

Bridge Replace (11/15/2023) [Programmed] DES No: 1602258 - Contract No: R-42287.

Rehab B (2001): Bridge Deck Overlay 2 [LMC] completed under DES No: 9700030 - Contract No: B-23878.

Rehab A (1978): Bridge Deck Overlay 1 completed under Contract # B-11082.

New Bridge(1956): Contract # 3959.

Condition Summary:

Overall, the bridge deck components appeared generally sound, but do exhibit numerous areas of moderate to severe concrete deterioration that consisted primarily of impending spalls and spalls with exposed reinforcing on the deck underside, and longitudinal cracking with a few impending spalls and spalls with exposed reinforcing on the reinforced concrete beams. Some full depth patches on the deck underside were exhibiting cracks with efflorescence. Most of the beam deterioration was present at the beam ends near the intermediate piers. Some cracking with efflorescence and a couple minor spalls with exposed reinforcing also visible on the substructure units. None of the visible deterioration appeared to be structurally detrimental at this time.

Recommendation:

Replacement (11/15/2023) [Programmed] DES No: 1602258 - Contract No: R-42287.

IDENTIFICATION

(1) STATE CODE:	185 - Indiana
(8) STRUCTURE:	021930
(5 A-B-C-D-E) INV. ROUTE:	1 - 3 - 1 - 00062 - 0
(2) HIGHWAY AGENCY DISTRICT:	06 - Vincennes
(3) COUNTY CODE:	082 - VANDERBURGH
(4) PLACE CODE:	22000 - EVANSVILLE
(6) FEATURES INTERSECTED:	CARPENTER CREEK
(7) FACILITY CARRIED:	SR 62
(9) LOCATION:	04.43 W US 41
(11) MILEPOINT:	0004.670

(12) BASE HIGHWAY NETWORK:	1
(13A) INVENTORY ROUTE:	0000000001
(13B) SUBROUTE NUMBER:	01
(16) LATITUDE:	37.9776
(17) LONGITUDE:	-87.6250
(98) BORDER	
A) STATE NAME:	
B) PERCENT	%
(99) BORDER BRIDGE STRUCT. NO:	

STRUCTURE TYPE AND MATERIAL

(43) STRUCTURE TYPE, MAIN:	
A) KIND OF MATERIAL/DESIGN:	2 - Concrete continuous
B) TYPE OF DESIGN/CONSTR:	02 - Stringer/Multi-beam or Girder
(44) STRUCTURE TYPE, APPROACH SPANS:	
A) KIND OF MATERIAL/DESIGN:	0 - Other
B) TYPE OF DESIGN/CONSTR:	00 - Other

(45) NUMBER OF SPANS IN MAIN UNIT:	003
(46) NUMBER OF APPROACH SPANS:	0000
(107) DECK STRUCTURE TYPE:	1 - Concrete Cast-in-Place
(108) WEARING SURFACE/PROT SYS:	
A) WEARING SURFACE:	3 - Latex Concrete or similar additive
B) DECK MEMBRANE:	0 - None
C) DECK PROTECTION:	0 - None

AGE OF SERVICE

(27) YEAR BUILT:	1956
(106) YEAR RECONSTRUCTED:	2000
(42) TYPE OF SERVICE:	
A) ON BRIDGE:	1 - Highway
B) UNDER BRIDGE:	5 - Waterway

(28) LANES:		
A) ON BRIDGE:	04	
B) UNDER BRIDGE:	00	
(29) AVERAGE DAILY TRAFFIC:	044520	
(30) YEAR OF AVERAGE DAILY TRAFFIC:	2004	
(109) AVERAGE DAILY TRUCK TRAFFIC:	05	%
(19) BYPASS DETOUR LENGTH:	005	MI

GEOMETRIC DATA

(48) LENGTH OF MAX SPAN:	0034.0	FT
(49) STRUCTURE LENGTH:	00110.0	FT
(50) CURB/SIDEWALK WIDTHS:		
A) LEFT	00.0	FT
B) RIGHT:	00.0	FT
(51) BRDG RDWY WIDTH CURB-TO-CURB:	061.5	FT
(52) DECK WIDTH, OUT-TO-OUT:	064.5	FT
(32) APPROACH ROADWAY	061.5	FT
(33) BRIDGE MEDIAN:	2 - Closed median (no barrier)	
(34) SKEW:	15	DEG

(35) STRUCTURE FLARED:	0 - No flare	
(10) INV RTE, MIN VERT CLEARANCE:	99.99	FT
(47) TOT HORIZ CLEARANCE:	028.7	FT
(53) VERT CLEAR OVER BR RDWY:	99.99	FT
(54) MIN VERTICAL UNDERCLEARANCE:		
A) REFERENCE FEATURE:	N	
B) MIN VERT UNDERCLEAR:	00.00	FT
(55) LATERAL UNDERCLEARANCE RIGHT:		
A) REFERENCE FEATURE:	N	
B) MIN LATERAL UNDERCLEAR:	000.0	FT
(56) MIN LATERAL UNDERCLEAR ON LEFT:	00.0	FT

INSPECTIONS

(90) INSPECTION DATE:	04/20/2022
(92) CRITICAL FEATURE INSPECTION:	
A) FRACTURE CRITICAL REQUIRED/FREQUENCY:	N
B) UNDERWATER INSPECTION REQUIRED/FREQUENCY:	N
C) OTHER SPECIAL INSPECTION REQUIRED/FREQUENCY:	N

(91) DESIGNATED INSPECTION FREQUENCY:	24 MONTHS
(93) CRITICAL FEATURE INSPECTION DATE:	
A) FRACTURE CRITICAL DATE:	
B) UNDERWATER INSP DATE:	
C) OTHER SPECIAL INSP DATE:	

CONDITION

(58) DECK:	5 - Fair Condition (minor section loss)
(58.01) WEARING SURFACE:	5 - Fair Condition
(59) SUPERSTRUCTURE:	5 - Fair Condition (minor section loss)

(60) SUBSTRUCTURE:	6 - Satisfactory Condition (minor deterioration)
(61) CHANNEL/CHANNEL PROTECTION:	6 - Bank slump. widespread minor damage
(62) CULVERTS:	N - Not Applicable

CONDITION COMMENTS

(58) DECK: 5 - Fair Condition (minor section loss)

Comments:

Underside exhibits few medium to large-sized areas of impending spalls and spalls with exposed reinforcing with minor section loss; Span A, Bay 1 approximately 40 SFT, Span A, Bay 9 approximately 15 SFT, Span B, Bay 1 approximately 20 SFT, and Span C, Bay 9 approximately 20 SFT. Approximately 1,000 SFT full depth patching; mostly appeared sound but some intermittent transverse cracks with efflorescence visible. Span A coping area has heavy spalling with section loss exposing reinforcement.

(58.01) WEARING SURFACE: 5 - Fair Condition

Comments:
Short, longitudinal and transverse cracks visible (transverse cracking predominantly over intermediate piers). High traffic volume in 2018 permitted only partial chaining; where done, chaining detected approximately 20 SFT total delamination (approximately half of this delamination around large impending spalled area at the joint over the West abutment. Approximately 4 LFT minor edge spalling present along West joint.

(59) SUPERSTRUCTURE: 5 - Fair Condition (minor section loss)

Comments:
All beam ends near the piers exhibited minor to moderate longitudinal cracking near the lower edges, typically 2' to 4' in length. Span B Beam 7 has severe spalling with heavy section loss exposing primary reinforcement strands near the beam end at Pier 3. No visible signs of sheer cracking or other indications of potential beam failure. Beams 2 and 3 in Span B at Pier 3 exhibited a pronounced impending spall, and Beam 9, Span B at Pier 3 exhibited an approximate 1' spall with exposed reinforcing. Beam 6 in Span C exhibited several shallow spalls with exposed stirrup reinforcing. Minor shallow spall with no exposed reinforcing was visible at Beam 7 end at the West abutment.

(60) SUBSTRUCTURE: 6 - Satisfactory Condition (minor deterioration)

Comments:
Abutment 1 back wall exhibited areas of heavy map cracking with moderate efflorescence. Pier 3 east side has moderate width vertical cracking spaced approximately 10 FT apart. Few minor cracks with efflorescence visible in Intermediate Pier walls near cap and near patches, and a couple shallow spalls with exposed reinforcing.

(61) CHANNEL/CHANNEL PROTECTION 6 - Bank slump. widespread minor damage

Comments:
Channel has widespread, minor degradation outside of structure limits. Channel bottom is visible around intermediate piers.

(62) CULVERTS: N - Not Applicable

Comments:

LOAD RATING AND POSTING

(31) DESIGN LOAD:	5 - HS 20	(66) INVENTORY RATING:	1.008
(70) BRIDGE POSTING	5 - Equal to or above legal loads	(65) INVENTORY RATING METHOD:	8 - Load and Resistance Factor Rating (LRFR) rating report by rating factor (RF) method using HL-93 loadings.
(41) STRUCTURE OPEN/POSTED/CLOSED:	A - Open		
(64) OPERATING RATING:	1.307		
(63) OPERATING RATING METHOD:	8 - Load and Resistance Factor Rating (LRFR) rating report by rating factor (RF) method using HL-93 loadings.	(66B) INVENTORY RATING (H):	
		(66C) TONS POSTED :	
		(66D) DATE POSTED/CLOSED:	

APPRAISAL

SUFFICIENCY RATING:	71.0	(36) TRAFFIC SAFETY FEATURE:	
STATUS:	0	36A) BRIDGE RAILINGS:	1
(67) STRUCTURAL EVALUATION:	5	36B) TRANSITIONS:	1
(68) DECK GEOMETRY:	4	36C) APPROACH GUARDRAIL:	1
(69) UNDERCLEARANCES, VERTICAL & HORIZONTAL:	N	36D) APPROACH GUARDRAIL ENDS:	1

(71) WATERWAY ADEQUACY: 9 - Bridge Above Flood Water Elevations
Comments:

(72) APPROACH ROADWAY ALIGNMENT: 8 - Equal to present desirable criteria
Comments:

(113) SCOUR CRITICAL BRIDGES: 8 - Stable for scour conditions
Comments:
No scour issues apparent.
Scour Channel Profile data in BIAS bridge file.

CLASSIFICATION

(20) TOLL:	3 - On Free Road
(22) OWNER:	01 - State Highway Agency
(37) HISTORICAL SIGNIFICANCE:	5 - Not eligible
(101) PARALLEL STRUCTURE:	N - No parallel structure
(103) TEMPORARY STRUCTURE:	
(105) FEDERAL LANDS HIGHWAYS:	0-Not Applicable
(112) NBIS BRIDGE LENGTH:	Yes
(21) MAINT. RESPONSIBILITY:	01 - State Highway Agency
(26) FUNCTIONAL CLASS OF INVENTORY RTE:	12 - Urban - Principal Arterial - Other Freeway or Expressway
(100) STRAHNET HIGHWAY:	Not a STRAHNET route
(102) DIRECTION OF TRAFFIC:	2-way traffic
(104) HIGHWAY SYSTEM OF INVENTORY ROUTE:	1 - Structure/Route is on NHS
(110) DESIGNATED NATIONAL NETWORK:	Inventory route on National Truck Network

NAVIGATION DATA

(38) NAVIGATION CONTROL:	0 - No navigation control on waterway (bridge permit not required)
(111) PIER OR ABUTMENT PROTECTION:	
(39) NAVIGATION VERTICAL CLEAR:	000.0 FT
(116) MINIMUM NAVIGATION VERT. CLEARANCE, VERT. LIFT BRIDGE:	FT
(40) NAV HORIZONTAL CLEARANCE:	0000.0 FT

PROPOSED IMPROVEMENTS

(75A) TYPE OF WORK:	
(75B) WORK DONE BY:	
(76) LENGTH OF IMPROVEMENT:	00000.0 FT
(94) BRIDGE IMPROVEMENT COST:	$ 000000
(95) ROADWAY IMPROVEMENT COST:	$ 000000
(96) TOTAL PROJECT COST:	$ 000000
(97) YR OF IMPROVEMENT COST EST:	
(114) FUTURE AVG DAILY TRAFFIC:	062729
(115) YR OF FUTURE ADT:	2034

	Environment	Total Quantity	Units	Condition State 1	Condition State 2	Condition State 3	Condition State 4
12 - Reinforced Concrete Deck	2 - Low	7095	sq. ft.	5545	1500	50	0
	110' x 64.5' = 7095 SFT (deck). 110' x 61.5' = 6765 SFT (wearing surface).						
510 - Wearing Surfaces		6765	sq. ft.	6715	50	0	0
	110.0 FT x 61.5 FT = 6765 SF						
110 - Reinforced Concrete Open Girder/Beam	2 - Low	1100	ft.	980	100	20	0
	110 x 10 = 1100 LFT						
210 - Reinforced Concrete Pier Wall	2 - Low	136	ft.	126	10	0	0
	68 x 2 = 136						
215 - Reinforced Concrete Abutment	2 - Low	133	ft.	113	20	0	0
	66.5 x 2 = 133						
301 - Pourable Joint Seal	2 - Low	133	ft.	123	0	10	0
	66.5 x 2 = 133						
311 - Movable Bearing	2 - Low	20	each	20	0	0	0
	1 x 20 = 20						
313 - Fixed Bearing	2 - Low	40	each	40	0	0	0
	1 x 40 = 40						
321 - Reinforced Concrete Approach Slab	2 - Low	3690	sq. ft.	3690	0	0	0
	2 x 30 x 61.5 = 3690						
331 - Reinforced Concrete Bridge Railing	2 - Low	220	ft.	220	0	0	0
	110 x 2 = 220						

PHOTO 1

Description Westbound alignment.

PHOTO 2

Description South elevation.

PHOTO 3

Description North elevation.

PHOTO 4

Description East deck overall condition looking west.

PHOTO 5

Description West Terminal Joint overall condition.

PHOTO 6

Description West Approach Slab overall condition.

PHOTO 7

Description West Approach Slab in eastbound lanes has and isolated moderate width transverse crack.

PHOTO 8

Description West Type 1A joint overall condition.

PHOTO 9

Description Moderate width transverse crack in the eastbound lanes over Intermediate Pier.

PHOTO 10

Description East Type 1A Joint overall condition.

PHOTO 11

Description East Approach Slab overall condition.

PHOTO 12

Description East Approach Slab in the westbound lane has an isolated moderate width crack that is perpendicular to the sku of the joint.

PHOTO 13

Description East terminal joint.

PHOTO 14

Description Span A overall condition.

PHOTO 15

Description Bay 1 in Span A has extensive spalling with heavy section loss exposing reinforcement. Areas of transverse cracking near Pier 2 with moderate efflorescence.

PHOTO 16

Description Span A at Pier 2. Beam ends have moderate to wide width longitudinal cracking on the bottom of the beams. This is common on all beams in this span.

PHOTO 17

Description Span A coping area has heavy spalling with section loss exposing reinforcement.

PHOTO 18

Description Typical beam end cracking in Span A at Pier 2.

PHOTO 19

Description Span A Bay 9 has heavy spalling with exposed reinforcement and several areas with delamination and impending spalling.

PHOTO 20

Description Span B overall condition.

PHOTO 21

Description Span B at Beam 1 south facia side has wide longitudinal crack with spalling and moderate section loss.

PHOTO 22

Description Span B Beam 2 at Pier 3 overall condition of cracking on beam end.

PHOTO 23

Description Span B Beam 7 has severe spalling with heavy section loss exposing primary reinforcement strands near the beam end at Pier 3. No visible signs of sheer cracking or other indications of potential beam failure.

PHOTO 24

Description Span B beam end. Typical condition of all beam ends in this span at both piers. Have been previously patched but most exhibit wide width cracking on bottom flanges with moderate section loss at several isolated beams.

PHOTO 25

Description Beam 5 north side in Span B has several areas of large spalling with reinforcement strands showing. Areas of impending spalling and delamination.

PHOTO 26

Description Span B beam ends at Pier 2 overall condition.

PHOTO 27

Description Span C overall condition.

PHOTO 28

Description Span C Bay 5 at center coping area has spalling with reinforcement showing in several locations. Several other locations have impending spalling and delamination.

PHOTO 29

Description Beam 6 in span C has impending spalling on south side of beam.

PHOTO 30

Description Beam 8 Span C has an isolated spall with reinforcement showing on the north side of the beam.

PHOTO 31

Description Abutment 1 overall condition.

PHOTO 32

Description Abutment 1 has a large spall near the bearing pad under Beam 2 in Span A. Moderate width transverse cracking in back wall between beams.

PHOTO 33

Description Bearing seat at Abutment 1 under Beam 7 has a large spall exposing a small portion of the bearing pad.

PHOTO 34

Description Abutment 1 back wall has minor to moderate width map cracking with moderate efflorescence. This is typical of several areas at this abutment.

PHOTO 35

Description Pier 2 east side overall condition. Isolated vertical cracking throughout wall some with moderate efflorescence.

PHOTO 36

Description Pier 3 east side has moderate width vertical cracking spaced approximately 10 ft apart.

PHOTO 37

Description Pier 3 east side overall condition. Moderate width vertical cracking with areas of impending spalling. These cracks are reflective of the cracking on the west side of the pier.

PHOTO 38

Description Abutment 4 overall condition.

PHOTO 39

Description Abutment 4 back wall has areas of heavy map cracking with moderate efflorescence. This is present in several bays at this abutment.

PHOTO 40

Description Abutment 4 has several areas of spalling at Bearing Seats under beams.

PHOTO 41

Description South downstream channel condition.

PHOTO 42

Description North upstream channel condition.

Miscellaneous Asset Data

021930

Asset Management

Load Rating 2:

Has the dead load or the structural condition of the primary load carrying members changed since the last inspection? No

Extended Frequency: Submittal Date:

Inspector:

INDOT Reviewer:

This bridge has been accepted into the Extended Frequency Program. Approval Date:

Joints: ** Indicate location, type, and rating of lowest rated joint.*

No Joints Present	P - Poured Silicone (narrow width, repla	5 - Fair Condition, minor noising damage, very minor leakage

Comments:

Minor edge spalling (nominally 4 LF) at West Type 1A over abutment.

Terminal Joints: **Rating of lowest rated terminal joint.* N

Comments:

Concrete Slopewall: **Rating of lowest rated slopewall.* N

Comments:

Bearings: ** Indicate type, and rating of lowest rated bearing.*

5 - Other 6

Comments:

Built-up concrete at bridge seats with thin fabric pads.

Approach Slabs: ** Indicate if present & condition rating.*

1 - Approach Slabs 7 - Good condition, minor cracking, wide spacing

Comments:

Minor longitudinal cracking throughout approach slabs

Paint: ** Indicate if paint present , year painted & condition rating.*

N - No Paint N

Comments:

Endangered Species: ** If yes, add one photo to the dropdown field*

Bats: seen or heard under structure? * N

Birds/swallows/nests seen? Empty nests present? * Y

BRIDGE Culvert Geometry:

Barrel Length:

Height:

Width:

NBI Data come from National Inventory

NBI 113: Scour Critical Bridges 8

NBI 113a Scour Critical Bridges Comments

No scour issues apparent.
Scour Channel Profile data in BIAS bridge file.

To Be Completed by Hydraulics

Scour Analysis Status 7-Bridge programmed to be rehabbed or replaced.

Scour Analysis Date

Scour Analysis Determination

Hydraulics Comments

To Be Completed by Bridge Inspection

Scour Critical Safety Status

Date of Counter Measure Placed or Field Verified

Bridge Inspectoin Comments

Scour Delineators installed

LOAD RATING - BRADIN

Load Rating Date: 22-JAN-08

National Bridge Inventory (NBI):

(65) INVENTORY RATING METHOD:	8
(66) INVENTORY RATING:	1.008
(63) OPERATING RATING METHOD:	8
(64) OPERATING RATING:	1.307
(31) DESIGN LOAD:	5
(70) BRIDGE POSTING:	5
(41) STRUCTURE OPEN/POSTED/CLOSED:	A
(66C) TONS POSTED:	
(66D) DATE POSTED/CLOSED:	

Posting Configurations:

Emergency Vehicles:

EV2: LEGAL RF:	2.403
EV3: LEGAL RF:	1.573

2-Axles:

H20-44: LEGAL RF:	2.133
ALTERNATE MILITARY: LEGAL RF:	1.689

3-Axles:

HS20: LEGAL RF:	1.75
AASHTO TYPE 3: LEGAL RF:	2.192

4-Axles:

SU4: LEGAL RF:	1.843
TOLL ROAD LOADING NO. 2: ROUTINE PERMIT RF:	

5-Axles:

AASHTO TYPE 3S2: LEGAL RF:	2.292
SU5: LEGAL RF:	1.762
TOLL ROAD LOADING NO. 1: ROUTINE PERMIT RF:	

6+-Axles:

AASHTO TYPE 3-3: LEGAL RF:	2.692
LANE TYPE: LEGAL RF:	99
SU6: LEGAL RF:	1.59
SPECIAL TOLL ROAD TRUCK: ROUTINE PERMIT RF:	
SU7: LEGAL RF:	1.502
MICHIGAN TRAIN TRUCK NO. 5: ROUTINE PERMIT RF:	
MICHIGAN TRAIN TRUCK NO. 8: ROUTINE PERMIT RF:	

Other Configurations:

H20-44: DESIGN RF:	1.585
NRL: LEGAL RF:	1.423
SUPERLOAD-11 AXLES: SPECIAL PERMIT RF:	1.963
SUPERLOAD-13 AXLES: SPECIAL PERMIT RF:	2.302
SUPERLOAD-14 AXLES: SPECIAL PERMIT RF:	1.479
SUPERLOAD-19 AXLES (152.5T): SPECIAL PERMIT RF:	2.055
SUPERLOAD-19 AXLES (240.045T): SPECIAL PERMIT RF:	1.613

Bridge/Structure Bat Assessment Form

Date & Time of Assessment: 9/1/23 3:43pm	DOT Project Number: 1900308	Route/Facility Carried: Lloyd Expressway over Carpenter Creek	County: Vanderburgh
Federal Structure ID: 21930	Structure Coordinates (latitude and longitude): 37.9776 -87.6250	Structure Height (approximate): 30 ft	Structure Length: 110 ft

Structure Type (check one)

Bridge Construction Style

(•) Cast-in-place	( ) Pre-stressed Girder
( ) Flat Slab/Box	( ) Steel I-beam
( ) Truss (Side View)	( ) Covered
( ) Parallel Box Beam	( ) Other:

Culvert Type

- ( ) Box
- ( ) Pipe/Round
- ( ) Other:

Other Structure

- ( )

Structure Material (check all that apply)

Deck Material	Beam Material	End/Back Wall Material
[ ] Metal	[ ] None	[x] Concrete
[x] Concrete	[x] Concrete	[ ] Timber
[ ] Timber	[ ] Steel	[ ] Stone/Masonry
[ ] Open grid	[ ] Timber	[ ] Other:
[ ] Other:	[ ] Other:	

Culvert Material

- [ ] Metal
- [ ] Concrete
- [ ] Plastic
- [ ] Stone/Masonry
- [ ] Other:

Creosote Evidence

- ( ) Yes (•) No
- ( ) Unknown

Notes:

Crossings Traversed (check all that apply)

[ ] Bare ground	[ ] Open vegetation
[ ] Rip-rap	[ ] Closed vegetation
[x] Flowing water	[ ] Railroad
[ ] Standing water	[ ] Road/trail - Type:
[ ] Seasonal water	[ ] Other:

Surrounding Habitat (check all that apply)

[ ] Agricultural	[x] Grassland
[x] Commercial	[ ] Ranching
[x] Residential-urban	[ ] Riparian/wetland
[ ] Residential-rural	[ ] Mixed use
[x] Woodland/forested	[ ] Other:

Areas Assessed (check all that apply)

Check all areas that apply. If an area is not present in the structure, check the "not present" box.
Document all bat indicators observed during the assessment. Include the species present, if known, and provide photo documentation as indicated.

Area (check if assessed)	Assessment Notes	Evidence of Bats (include photos if present)
[x] All crevices and cracks: **Bridges/culverts:** rough surfaces or imperfections in concrete **Other structures:** soffits, rafters, attic areas	[ ] Not present No evidence of bats observed.	[ ] Visual - live # dead # [ ] Guano [ ] Staining [ ] Audible [ ] Odor [ ] Photos Species
[x] Concrete surfaces (open roosting on concrete)	[ ] Not present No evidence of bats observed.	[ ] Visual - live # dead # [ ] Guano [ ] Staining [ ] Audible [ ] Odor [ ] Photos Species
[x] Spaces between concrete end walls and the bridge deck	[ ] Not present No evidence of bats observed.	[ ] Visual - live # dead # [ ] Guano [ ] Staining [ ] Audible [ ] Odor [ ] Photos Species
[x] Crack between concrete railings on top of the bridge deck (Gap, Railing)	[ ] Not present No evidence of bats observed.	[ ] Visual - live # dead # [ ] Guano [ ] Staining [ ] Audible [ ] Odor [ ] Photos Species
[ ] Vertical surfaces on concrete I-beams	[x] Not present	[ ] Visual - live # dead # [ ] Guano [ ] Staining [ ] Audible [ ] Odor [ ] Photos Species
[x] Spaces between walls, ceiling joists	[ ] Not present No evidence of bats observed.	[ ] Visual - live # dead # [ ] Guano [ ] Staining [ ] Audible [ ] Odor [ ] Photos Species
[x] Weep holes, scupper drains, and inlets/pipes	[ ] Not present No evidence of bats observed.	[ ] Visual - live # dead # [ ] Guano [ ] Staining [ ] Audible [ ] Odor [ ] Photos Species
[x] All guiderails	[ ] Not present No evidence of bats observed.	[ ] Visual - live # dead # [ ] Guano [ ] Staining [ ] Audible [ ] Odor [ ] Photos Species
[x] All expansion joints	[ ] Not present No evidence of bats observed.	[ ] Visual - live # dead # [ ] Guano [ ] Staining [ ] Audible [ ] Odor [ ] Photos Species

Name: Sean Langley

Signature: Sean Langley

Bridge/Structure Bat Assessment Form

Date & Time of Assessment: 9/1/23 11:42am	DOT Project Number: 1900308	Route/Facility Carried: Lloyd Expressway over Railroad	County: Vanderburgh
Federal Structure ID: 21940	Structure Coordinates (latitude and longitude): 37.97769 -87.62083	Structure Height (approximate): 30 ft	Structure Length: 108 ft

Structure Type (check one)

Bridge Construction Style

○ Cast-in-place	○ Pre-stressed Girder
○ Flat Slab/Box	◉ Steel I-beam
○ Truss (Side View)	○ Covered
○ Parallel Box Beam	○ Other:

Culvert Type: ○ Box ○ Pipe/Round ○ Other:

Other Structure: ○

Structure Material (check all that apply)

Deck Material	Beam Material	End/Back Wall Material
☐ Metal	☐ None	☒ Concrete
☒ Concrete	☒ Concrete	☐ Timber
☐ Timber	☒ Steel	☐ Stone/Masonry
☐ Open grid	☐ Timber	☐ Other:
☐ Other:	☐ Other:	

Culvert Material: ☐ Metal ☐ Concrete ☐ Plastic ☐ Stone/Masonry ☐ Other:

Creosote Evidence: ○ Yes ◉ No ○ Unknown

Notes:

Crossings Traversed (check all that apply)

☐ Bare ground	☐ Open vegetation
☐ Rip-rap	☐ Closed vegetation
☐ Flowing water	☒ Railroad
☐ Standing water	☐ Road/trail - Type:
☐ Seasonal water	☐ Other:

Surrounding Habitat (check all that apply)

☐ Agricultural	☐ Grassland
☐ Commercial	☐ Ranching
☒ Residential-urban	☐ Riparian/wetland
☐ Residential-rural	☐ Mixed use
☒ Woodland/forested	☐ Other:

Areas Assessed (check all that apply)

Check all areas that apply. If an area is not present in the structure, check the "not present" box.
Document all bat indicators observed during the assessment. Include the species present, if known, and provide photo documentation as indicated.

Area (check if assessed)	Assessment Notes	Evidence of Bats (include photos if present)		Species
☒ All crevices and cracks: **Bridges/culverts:** rough surfaces or imperfections in concrete **Other structures:** soffits, rafters, attic areas	☐ Not present No evidence of bats observed.	☐ Visual - live # dead # ☐ Guano ☐ Staining	☐ Audible ☐ Odor ☐ Photos	
☒ Concrete surfaces (open roosting on concrete)	☐ Not present	☒ Visual - live # 1 dead # ☒ Guano ☒ Staining	☐ Audible ☐ Odor ☒ Photos	Likely Eptesicus fuscus
☒ Spaces between concrete end walls and the bridge deck	☐ Not present No evidence of bats observed.	☐ Visual - live # dead # ☐ Guano ☐ Staining	☐ Audible ☐ Odor ☐ Photos	
☒ Crack between concrete railings on top of the bridge deck (Gap, Railing)	☐ Not present No evidence of bats observed.	☐ Visual - live # dead # ☐ Guano ☐ Staining	☐ Audible ☐ Odor ☐ Photos	
☒ Vertical surfaces on concrete I-beams	☐ Not present	☐ Visual - live # dead # ☒ Guano ☒ Staining	☐ Audible ☐ Odor ☒ Photos	
☒ Spaces between walls, ceiling joists	☐ Not present	☐ Visual - live # dead # ☒ Guano ☒ Staining	☐ Audible ☐ Odor ☒ Photos	
☒ Weep holes, scupper drains, and inlets/pipes	☐ Not present No evidence of bats observed.	☐ Visual - live # dead # ☐ Guano ☐ Staining	☐ Audible ☐ Odor ☐ Photos	
☒ All guiderails	☐ Not present No evidence of bats observed.	☐ Visual - live # dead # ☐ Guano ☐ Staining	☐ Audible ☐ Odor ☐ Photos	
☒ All expansion joints	☐ Not present No evidence of bats observed.	☐ Visual - live # dead # ☐ Guano ☐ Staining	☐ Audible ☐ Odor ☐ Photos	

Name: Sean Langley

Signature: Sean Langley

Bridge/Structure Bat Assessment Form

Date & Time of Assessment: 9/1/23 12:21pm	DOT Project Number: 1900308	Route/Facility Carried: Lloyd Expressway over Tekopple Avenue	County: Vanderburgh
Federal Structure ID: 21950	Structure Coordinates (latitude and longitude): 37.9776 -87.6250	Structure Height (approximate): 30 ft	Structure Length: 138 ft

Structure Type (check one)

Bridge Construction Style

- (●) Cast-in-place
- ( ) Pre-stressed Girder
- ( ) Flat Slab/Box
- ( ) Steel I-beam
- ( ) Truss (Side View)
- ( ) Covered
- ( ) Parallel Box Beam
- ( ) Other:

Culvert Type: ( ) Box ( ) Pipe/Round ( ) Other:

Other Structure: ( )

Structure Material (check all that apply)

Deck Material	Beam Material	End/Back Wall Material
[ ] Metal	[X] None	[X] Concrete
[X] Concrete	[ ] Concrete	[ ] Timber
[ ] Timber	[ ] Steel	[ ] Stone/Masonry
[ ] Open grid	[ ] Timber	[ ] Other:
[ ] Other:	[ ] Other:	

Culvert Material: [ ] Metal [ ] Concrete [ ] Plastic [ ] Stone/Masonry [ ] Other:

Creosote Evidence: ( ) Yes (●) No ( ) Unknown

Notes:

Crossings Traversed (check all that apply)

[ ] Bare ground	[ ] Open vegetation
[ ] Rip-rap	[ ] Closed vegetation
[ ] Flowing water	[ ] Railroad
[ ] Standing water	[X] Road/trail - Type: Tekopple Avenue
[ ] Seasonal water	[ ] Other:

Surrounding Habitat (check all that apply)

[ ] Agricultural	[ ] Grassland
[ ] Commercial	[ ] Ranching
[X] Residential-urban	[ ] Riparian/wetland
[ ] Residential-rural	[ ] Mixed use
[ ] Woodland/forested	[ ] Other:

Areas Assessed (check all that apply)

Check all areas that apply. If an area is not present in the structure, check the "not present" box.
Document all bat indicators observed during the assessment. Include the species present, if known, and provide photo documentation as indicated.

Area (check if assessed)	Assessment Notes	Evidence of Bats (include photos if present)
[X] All crevices and cracks: **Bridges/culverts:** rough surfaces or imperfections in concrete **Other structures:** soffits, rafters, attic areas	[ ] Not present. No evidence of bats observed.	[ ] Visual - live # dead # [ ] Guano [ ] Staining [ ] Audible [ ] Odor [ ] Photos Species
[X] Concrete surfaces (open roosting on concrete)	[ ] Not present. No evidence of bats observed.	[ ] Visual - live # dead # [ ] Guano [ ] Staining [ ] Audible [ ] Odor [ ] Photos Species
[X] Spaces between concrete end walls and the bridge deck	[ ] Not present. No evidence of bats observed.	[ ] Visual - live # dead # [ ] Guano [ ] Staining [ ] Audible [ ] Odor [ ] Photos Species
[X] Crack between concrete railings on top of the bridge deck (Gap, Railing)	[ ] Not present. No evidence of bats observed.	[ ] Visual - live # dead # [ ] Guano [ ] Staining [ ] Audible [ ] Odor [ ] Photos Species
[ ] Vertical surfaces on concrete I-beams	[X] Not present	[ ] Visual - live # dead # [ ] Guano [ ] Staining [ ] Audible [ ] Odor [ ] Photos Species
[X] Spaces between walls, ceiling joists	[ ] Not present. No evidence of bats observed.	[ ] Visual - live # dead # [ ] Guano [ ] Staining [ ] Audible [ ] Odor [ ] Photos Species
[X] Weep holes, scupper drains, and inlets/pipes	[ ] Not present. No evidence of bats observed.	[ ] Visual - live # dead # [ ] Guano [ ] Staining [ ] Audible [ ] Odor [ ] Photos Species
[X] All guiderails	[ ] Not present. No evidence of bats observed.	[ ] Visual - live # dead # [ ] Guano [ ] Staining [ ] Audible [ ] Odor [ ] Photos Species
[X] All expansion joints	[ ] Not present. No evidence of bats observed.	[ ] Visual - live # dead # [ ] Guano [ ] Staining [ ] Audible [ ] Odor [ ] Photos Species

Name: Sean Langley

Signature: Sean Langley

Bridge/Structure Bat Assessment Form

Date & Time of Assessment: 9/1/23 3:10pm	DOT Project Number: 1900308	Route/Facility Carried: Barker Avenue over Lloyd Expressway	County: Vanderburgh
Federal Structure ID: 21960	Structure Coordinates (latitude and longitude): 37.9782 -87.60973	Structure Height (approximate): 30 ft	Structure Length: 108 ft

Structure Type (check one)

Bridge Construction Style

(•) Cast-in-place	( ) Pre-stressed Girder
( ) Flat Slab/Box	( ) Steel I-beam
( ) Truss (Side View)	( ) Covered
( ) Parallel Box Beam	( ) Other:

Culvert Type	*Other Structure*
( ) Box	( )
( ) Pipe/Round	
( ) Other:	

Structure Material (check all that apply)

Deck Material	*Beam Material*	*End/Back Wall Material*
[ ] Metal	[X] None	[X] Concrete
[X] Concrete	[ ] Concrete	[ ] Timber
[ ] Timber	[ ] Steel	[ ] Stone/Masonry
[ ] Open grid	[ ] Timber	[ ] Other:
[ ] Other:	[ ] Other:	

Culvert Material

- [ ] Metal
- [ ] Concrete
- [ ] Plastic
- [ ] Stone/Masonry
- [ ] Other:

Creosote Evidence

( ) Yes (•) No ( ) Unknown

Notes:

Crossings Traversed (check all that apply)

[ ] Bare ground	[ ] Open vegetation
[ ] Rip-rap	[ ] Closed vegetation
[ ] Flowing water	[ ] Railroad
[ ] Standing water	[X] Road/trail - Type: Lloyd Expressway
[ ] Seasonal water	[ ] Other:

Surrounding Habitat (check all that apply)

[ ] Agricultural	[ ] Grassland
[X] Commercial	[ ] Ranching
[X] Residential-urban	[ ] Riparian/wetland
[ ] Residential-rural	[ ] Mixed use
[ ] Woodland/forested	[ ] Other:

Areas Assessed (check all that apply)

Check all areas that apply. If an area is not present in the structure, check the "not present" box.
Document all bat indicators observed during the assessment. Include the species present, if known, and provide photo documentation as indicated.

Area (check if assessed)	Assessment Notes	Evidence of Bats (include photos if present)
[X] All crevices and cracks: **Bridges/culverts:** rough surfaces or imperfections in concrete **Other structures:** soffits, rafters, attic areas	[ ] Not present No evidence of bats observed.	[ ] Visual - live # dead # [ ] Guano [ ] Staining [ ] Audible [ ] Odor [ ] Photos Species
[X] Concrete surfaces (open roosting on concrete)	[ ] Not present No evidence of bats observed.	[ ] Visual - live # dead # [ ] Guano [ ] Staining [ ] Audible [ ] Odor [ ] Photos Species
[X] Spaces between concrete end walls and the bridge deck	[ ] Not present No evidence of bats observed.	[ ] Visual - live # dead # [ ] Guano [ ] Staining [ ] Audible [ ] Odor [ ] Photos Species
[X] Crack between concrete railings on top of the bridge deck (Gap, Railing)	[ ] Not present No evidence of bats observed.	[ ] Visual - live # dead # [ ] Guano [ ] Staining [ ] Audible [ ] Odor [ ] Photos Species
[ ] Vertical surfaces on concrete I-beams	[X] Not present	[ ] Visual - live # dead # [ ] Guano [ ] Staining [ ] Audible [ ] Odor [ ] Photos Species
[X] Spaces between walls, ceiling joists	[ ] Not present No evidence of bats observed.	[ ] Visual - live # dead # [ ] Guano [ ] Staining [ ] Audible [ ] Odor [ ] Photos Species
[X] Weep holes, scupper drains, and inlets/pipes	[ ] Not present No evidence of bats observed.	[ ] Visual - live # dead # [ ] Guano [ ] Staining [ ] Audible [ ] Odor [ ] Photos Species
[X] All guiderails	[ ] Not present No evidence of bats observed.	[ ] Visual - live # dead # [ ] Guano [ ] Staining [ ] Audible [ ] Odor [ ] Photos Species
[X] All expansion joints	[ ] Not present No evidence of bats observed.	[ ] Visual - live # dead # [ ] Guano [ ] Staining [ ] Audible [ ] Odor [ ] Photos Species

Name: Sean Langley

Signature: Sean Langley

Bridge/Structure Bat Assessment Form

Date & Time of Assessment: 9/1/23 3:43pm	DOT Project Number: 1900308	Route/Facility Carried: Pedestrian Bridge over Lloyd Expressway	County: Vanderburgh
Federal Structure ID: 21970	Structure Coordinates (latitude and longitude): 37.97769 -87.62083	Structure Height (approximate): 30 ft	Structure Length: 62 ft

Structure Type (check one)

Bridge Construction Style

( ) Cast-in-place	( ) Pre-stressed Girder
( ) Flat Slab/Box	(•) Steel I-beam
( ) Truss (Side View)	( ) Covered
( ) Parallel Box Beam	( ) Other:

Culvert Type: ( ) Box; ( ) Pipe/Round; ( ) Other:

Other Structure: ( )

Structure Material (check all that apply)

Deck Material	Beam Material	End/Back Wall Material
[x] Metal	[ ] None	[x] Concrete
[ ] Concrete	[ ] Concrete	[ ] Timber
[ ] Timber	[x] Steel	[ ] Stone/Masonry
[ ] Open grid	[ ] Timber	[ ] Other:
[ ] Other:	[ ] Other:	

Culvert Material: [ ] Metal; [ ] Concrete; [ ] Plastic; [ ] Stone/Masonry; [ ] Other:

Creosote Evidence: ( ) Yes; (•) No; ( ) Unknown

Notes:

Crossings Traversed (check all that apply)

[ ] Bare ground	[ ] Open vegetation
[ ] Rip-rap	[ ] Closed vegetation
[ ] Flowing water	[ ] Railroad
[ ] Standing water	[x] Road/trail - Type: Lloyd Expressway
[ ] Seasonal water	[ ] Other:

Surrounding Habitat (check all that apply)

[ ] Agricultural	[ ] Grassland
[x] Commercial	[ ] Ranching
[x] Residential-urban	[ ] Riparian/wetland
[ ] Residential-rural	[ ] Mixed use
[ ] Woodland/forested	[ ] Other:

Areas Assessed (check all that apply)

Check all areas that apply. If an area is not present in the structure, check the "not present" box.
Document all bat indicators observed during the assessment. Include the species present, if known, and provide photo documentation as indicated.

Area (check if assessed)	Assessment Notes	Evidence of Bats (include photos if present)
[x] All crevices and cracks: **Bridges/culverts:** rough surfaces or imperfections in concrete **Other structures:** soffits, rafters, attic areas	[ ] Not present No evidence of bats observed.	[ ] Visual - live # dead #; [ ] Guano; [ ] Staining; [ ] Audible; [ ] Odor; [ ] Photos; Species
[x] Concrete surfaces (open roosting on concrete)	[ ] Not present No evidence of bats observed.	[ ] Visual - live # dead #; [ ] Guano; [ ] Staining; [ ] Audible; [ ] Odor; [ ] Photos; Species
[x] Spaces between concrete end walls and the bridge deck	[ ] Not present No evidence of bats observed.	[ ] Visual - live # dead #; [ ] Guano; [ ] Staining; [ ] Audible; [ ] Odor; [ ] Photos; Species
[x] Crack between concrete railings on top of the bridge deck (Gap, Railing)	[ ] Not present No evidence of bats observed.	[ ] Visual - live # dead #; [ ] Guano; [ ] Staining; [ ] Audible; [ ] Odor; [ ] Photos; Species
[x] Vertical surfaces on concrete I-beams	[ ] Not present No evidence of bats observed.	[ ] Visual - live # dead #; [ ] Guano; [ ] Staining; [ ] Audible; [ ] Odor; [ ] Photos; Species
[x] Spaces between walls, ceiling joists	[ ] Not present No evidence of bats observed.	[ ] Visual - live # dead #; [ ] Guano; [ ] Staining; [ ] Audible; [ ] Odor; [ ] Photos; Species
[x] Weep holes, scupper drains, and inlets/pipes	[ ] Not present No evidence of bats observed.	[ ] Visual - live # dead #; [ ] Guano; [ ] Staining; [ ] Audible; [ ] Odor; [ ] Photos; Species
[x] All guiderails	[ ] Not present No evidence of bats observed.	[ ] Visual - live # dead #; [ ] Guano; [ ] Staining; [ ] Audible; [ ] Odor; [ ] Photos; Species
[x] All expansion joints	[ ] Not present No evidence of bats observed.	[ ] Visual - live # dead #; [ ] Guano; [ ] Staining; [ ] Audible; [ ] Odor; [ ] Photos; Species

Name: Sean Langley

Signature: Sean Langley

Bridge/Structure Bat Assessment Form

Date & Time of Assessment	DOT Project Number	Route/Facility Carried	County
9/1/23 4:00pm	1900308	Lloyd Expressway (SR 62) over 9th Avenue	Vanderburgh

Federal Structure ID	Structure Coordinates (latitude and longitude)	Structure Height (approximate)	Structure Length
21971	37.97788 -87.59213	30 feet	62 feet

Structure Type (check one)

Bridge Construction Style

○ Cast-in-place	◉ Pre-stressed Girder
○ Flat Slab/Box	○ Steel I-beam
○ Truss (Side View)	○ Covered
○ Parallel Box Beam	○ Other:

Culvert Type	*Other Structure*
○ Box	○
○ Pipe/Round	
○ Other:	

Structure Material (check all that apply)

Deck Material	*Beam Material*	*End/Back Wall Material*
☐ Metal	☐ None	☒ Concrete
☒ Concrete	☒ Concrete	☐ Timber
☐ Timber	☐ Steel	☐ Stone/Masonry
☐ Open grid	☐ Timber	☐ Other:
☐ Other:	☐ Other:	

Culvert Material

☐ Metal
☐ Concrete
☐ Plastic
☐ Stone/Masonry
☐ Other:

Creosote Evidence

○ Yes ◉ No
○ Unknown

Notes:

Crossings Traversed (check all that apply)

☐ Bare ground	☐ Open vegetation
☐ Rip-rap	☐ Closed vegetation
☐ Flowing water	☐ Railroad
☐ Standing water	☒ Road/trail - Type: 9th Avenue
☐ Seasonal water	☐ Other:

Surrounding Habitat (check all that apply)

☐ Agricultural	☐ Grassland
☒ Commercial	☐ Ranching
☒ Residential-urban	☐ Riparian/wetland
☐ Residential-rural	☐ Mixed use
☐ Woodland/forested	☐ Other:

Areas Assessed (check all that apply)

Check all areas that apply. If an area is not present in the structure, check the "not present" box.
Document all bat indicators observed during the assessment. Include the species present, if known, and provide photo documentation as indicated.

Area (check if assessed)	**Assessment Notes**	**Evidence of Bats** (include photos if present)
☒ All crevices and cracks: **Bridges/culverts:** rough surfaces or imperfections in concrete **Other structures:** soffits, rafters, attic areas	☐ Not present No evidence of bats.	☐ Visual - live # dead # ☐ Guano ☐ Staining ☐ Audible ☐ Odor ☐ Photos Species
☒ Concrete surfaces (open roosting on concrete)	☐ Not present Possible Guano present on walls.	☐ Visual - live # dead # ☒ Guano ☐ Staining ☐ Audible ☐ Odor ☐ Photos Species
☒ Spaces between concrete end walls and the bridge deck	☐ Not present No evidence of bats.	☐ Visual - live # dead # ☐ Guano ☐ Staining ☐ Audible ☐ Odor ☐ Photos Species
☒ Crack between concrete railings on top of the bridge deck (Gap, Railing)	☐ Not present No evidence of bats.	☐ Visual - live # dead # ☐ Guano ☐ Staining ☐ Audible ☐ Odor ☐ Photos Species
☒ Vertical surfaces on concrete I-beams	☐ Not present No evidence of bats.	☐ Visual - live # dead # ☐ Guano ☐ Staining ☐ Audible ☐ Odor ☐ Photos Species
☒ Spaces between walls, ceiling joists	☐ Not present No evidence of bats	☐ Visual - live # dead # ☐ Guano ☐ Staining ☐ Audible ☐ Odor ☐ Photos Species
☒ Weep holes, scupper drains, and inlets/pipes	☐ Not present No evidence of bats.	☐ Visual - live # dead # ☐ Guano ☐ Staining ☐ Audible ☐ Odor ☐ Photos Species
☒ All guiderails	☐ Not present No evidence of bats	☐ Visual - live # dead # ☐ Guano ☐ Staining ☐ Audible ☐ Odor ☐ Photos Species
☒ All expansion joints	☐ Not present No evidence of bats.	☐ Visual - live # dead # ☐ Guano ☐ Staining ☐ Audible ☐ Odor ☐ Photos Species

Name: Sean Langley

Signature: Sean Langley

Categorical Exclusion

Appendix J

Noise Analysis

SR 62 Lloyd Expressway
Rosenberger Avenue to Wabash Avenue
Highway Noise Analysis
Evansville, Indiana
Vanderburgh County

January 17, 2023

Revised March 21, 2023

Prepared for:

INDIANA DEPARTMENT OF TRANSPORTATION

INDOT

INDOT Lead Des. No.: 1900308

LOCHMUELLER GROUP

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Evansville, Indiana 47715
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Note: A portion of the Appendices have been removed to avoid duplication and reduce file size.

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Rosenberger Avenue to Wabash Avenue
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Evansville, Indiana
Vanderburgh County
Des. No. 1900308

Indiana Department of Transportation
Federal Highway Administration

1 Introduction

The Indiana Department of Transportation (INDOT) Traffic Noise Analysis Procedure (2017) became effective July 1, 2017 and applies to all Type I Federal highway projects (as defined by 23 CFR 772) in the State of Indiana, which encompasses all Federal or Federal-aid Highway Projects authorized under title 23, United States Code, including: any highway project or multimodal project that requires Federal Highway Adminstration (FHWA) approval regardless of funding sources; any Federal-aid projects that are administered by INDOT or Local Public Agencies (LPAs); and any project on roadways leased from the State of Indiana to the private sector. The updated INDOT Traffic Noise Analysis Procedure (2022) was released in October 2022 and becomes effective January 1, 2023. Since this project is not anticipated to receive final NEPA clearance until after January 2, 2023, the new INDOT procedures have been implemented for this study.

The SR 62 Road Reconstruction Project qualifies as a Type I project due to added travel lanes and changes to the Barker Avenue interchange ramp configuration. This highway traffic noise analysis has been conducted in accordance with 23 CFR 772 (as amended) as implemented through the INDOT Traffic Noise Analysis Procedure (2022).

2 Project Description

The proposed project would involve road reconstruction along 2.06 miles of SR 62 (Lloyd Expressway) from west of Rosenberger Avenue (4.77 miles west of south junction US 41) to east of Wabash Avenue (2.71 miles west of south junction US 41) including intersection improvements and bridge replacements (Appendix A Figure 1).

2.1 SR62 Roadway Reconstruction (Des No 1900308)

SR 62 is classified as an Other Urban Principal Arterial on the National Highway System and National Truck Network. The existing roadway has two 12-foot eastbound and two 12-foot westbound lanes both east and west of Rosenberger Avenue. From immediately west of the Barker Avenue overpass to the St. Joseph Avenue intersection the lane configuration is expanded to three 12-foot eastbound and westbound lanes. This three-lane typical section continues from the St. Joseph Avenue intersection to Wabash Avenue. There are no changes to SR 62 east of the Wabash Avenue intersection. Access to SR62 within the project area is provided via signalized intersections at Rosenberger Avenue, St. Joseph Avenue, and Wabash Avenue. In addition to the signalized intersections, SR 62 can be accessed via multiple at-grade and grade-separated intersections. Access to and from SR 62 at Ingle Avenue is provided via at-grade intersections both north and south of the roadway. Access to and from Barker Avenue is via entrance and exit ramps for the grade-separated overpass. Access to and from Lemcke Avenue north of the roadway is provided via an at-grade intersection for westbound SR 62 traffic. Eastbound access to SR 62 from Pennsylvania Avenue is provided via a merging yield condition west of the St. Joseph Avenue intersection. Westbound access to SR 62 at 10th Avenue and 12th Avenue is provided via at-grade intersections between St. Joseph Avenue and Wabash Avenue.

The proposed design will include a third eastbound travel lane from Rosenberger Avenue to the Barker Avenue ramp, thus providing three eastbound lanes throughout the entire project area. A third westbound travel lane will also be added from west of the Barker Avenue overpass to the Tekoppel Avenue bridge. From the Tekoppel Avenue bridge to Rosenberger Avenue, pavement for a possible future third travel lane will be incorporated into the design, but this section will only be stripped for two lanes. The additional through lanes will be accommodated mostly through expansion of the pavement to the north and to a lesser extent to the south of the existing SR 62 pavement. Access to eastbound and westbound SR 62 from Ingle Avenue will be eliminated, as well as westbound access to Lemcke Avenue and 12th Avenue.

Westbound movements at the grade-separated Barker Avenue interchange will be modified, while eastbound movements will remain as is. Currently the westbound exit ramp to Barker Avenue east of the overpass only allows for right turns (north) onto Barker Avenue and prohibits left turns. Traffic exiting SR 62 to head southbound on Barker Avenue must use the exit loop ramp west of Barker Avenue to access Igleheart Avenue and then make a right turn onto Barker Avenue. This movement also allows a left turn to head northbound onto Barker Avenue. The proposed design will eliminate the exit loop ramp west of the Barker Avenue overpass. Northbound and southbound access to Barker Avenue will be provided through modification of the exit ramp east of Barker Avenue to allow for both left and right turns. Additionally, the abrupt right and left swerve movement at the beginning of the ramp will be straightened to provide a smoother exit from SR 62.

Access to Corbierre Avenue is currently provided via the third outside lane of westbound SR 62. Immediately west of the Barker Avenue overpass this travel lane becomes the exit lane to access Corbierre Avenue. This transition also occurs in the same short stretch of SR 62 where the entrance ramp from Igleheart Avenue merges onto SR 62. These ingress and egress movements within a confined space result in a congestion situation prone for accidents. Additionally, although signage east of Barker Avenue indicates that the outside lane is an exit lane, it is not uncommon for vehicles not intending to exit onto Corbierre Avenue to come to a complete stop in this lane in an effort to switch lanes and continue westbound on SR 62. This too increases the risk of accidents at this interchange. The proposed design will move the beginning of the exit onto Corbierre further to the west from the realigned SR 62 entrance ramp from Igleheart Avenue. The Corbierre Avenue exit ramp will split off from the third outside lane of SR 62, while other traffic in the third lane continues westward on SR 62.

The existing median varies throughout the project area. West of Rosenberger Avenue the median transitions from a depressed grassy median to a flush concrete median with steel guardrail. East of Rosenberger Avenue the median transitions from a narrow rumble strip median to a variable width flush median for drainage to Lemcke Avenue where it transitions into a raised grassy median and then a narrow concrete median at the approach to St. Joseph Avenue. A 345-foot long steel guardrail is within the median at the Ingle Avenue intersection and a 930-foot long steel guardrail is within the median from the beginning of the Corbierre Avenue exit to immediately east of the Barker Avenue overpass. Between St. Joseph Avenue and Wabash Avenue there is a 15-foot wide raised grassy median that is reduced to a narrow concrete median at the approaches to both intersections. The proposed design will include both concrete traffic control barriers (TCB) and guardrails. Specifically, a central median TCB will extend from east of the Carpentier Creek Bridge to the pedestrian overpass at Lemcke Avenue. TCBs will also be constructed along the south side of SR 62 from approximately 680 feet west of the railroad bridge to approximately 400 feet east of the Tekoppel Avenue bridge and from west of Addison Avenue to east of Tunis Avenue. On the north side of SR 62, TCBs will be included from approximately 430 feet east of Rosenberger Avenue to approximately 730 feet east of Tekoppel Avenue Bridge. Approximately 775 feet of TCB will also be included between the new Corbierre Avenue exit ramp and existing Corbierre Avenue east of the Ingle Avenue intersection. Lastly, approximately 425 feet of TCB will be include along the north side of the westbound SR 62 exit ramp to Barker Avenue. Where TCBs are not included along the south side of SR 62 between Tekoppel Avenue and Barker Avenue, steel guardrails will be installed

2.2 Intersection Improvement at Rosenberger Avenue (Des No 1900264)

The existing intersection includes two through lanes in both directions on SR 62 with westbound left and right turn lanes and eastbound left and right turn lanes. Northbound and southbound Rosenberger approaches include a single through lane with left and right turn lanes. The general intersection configuration will remain unchanged, although eastbound SR 62 east of Rosenberger will be expanded to three 12-foot travel lanes. The SR62 eastbound left turn lane will be extended approximately 300 feet, while the westbound left and right turn lanes will be extended approximately 580 and 530 feet, respectively. The turning radius for each corner will be increased to facilitate semi-truck movements. The traffic signal system will also be modified.

2.3 Intersection Improvement at St. Joseph Avenue (Des No 1900263)

The existing intersection includes three through lanes in both directions on SR 62 with westbound left and right turn lanes onto St. Joseph Avenue and an eastbound left turn lane. Eastbound right turn movements onto St. Joseph Avenue are provided via the rightmost through lane. The St. Joseph Avenue north approach includes two through lanes, dual left turn lanes and a right turn lane. The St. Joseph Avenue south approach includes two through lanes and a left turn lane, with right turn movement via the rightmost through lane. The general intersection configuration will remain unchanged. The St. Joseph Avenue southbound right turn on to SR 62 will be converted into a dual turn lane. The SR62 eastbound left turn lane will be extended approximately 200 feet, while the westbound left turn lane will be extended approximately 375 feet and the westbound right turn lane will be extended approximately 100 feet. The turning radius for each corner will be increased to facilitate semi-truck movements. The traffic signal system will also be modified.

2.4 Intersection Improvement at Wabash Avenue (Des No 2000187)

The existing intersection includes three through lanes in both directions on SR 62 with westbound left and right turn lanes onto Wabash Avenue and an eastbound left turn lane. Eastbound right turn movements onto Wabash Avenue are provided via the rightmost through lane. The Wabash Avenue north approach includes a center through lane, left turn lane and a right turn lane. The Wabash Avenue south approach includes a center through lane, a left turn lane, and a right turn lane. The general intersection configuration will remain unchanged. The SR62 eastbound left turn lane will be extended approximately 280 feet. There are no plans to change the length of the westbound left and right turn lanes approaching the Wabash Avenue intersection. The turning radius for each corner will be slightly modified to further facilitate semi-truck movements. The traffic signal system will also be modified.

2.5 Carpentier Creek Bridge (Des No 1602258)

The existing three-span Carpentier Creek Bridge will be replaced with a single-span prestressed concrete bulb-tee beam bridge.

2.6 CSX Railroad Bridge (Des No 1500041)

The existing three-span CSX Railroad Bridge will be replaced with a single-span prestressed concrete bulb-tee beam bridge.

2.7 Tekoppel Avenue Bridge (Des No 1600060)

The existing three-span Tekoppel Avenue Bridge will be replaced with a single-span prestressed concrete bulb-tee beam bridge.

3 Identification of Noise Sensitive Areas (NSA)

In 23 CFR 772 (as amended) FHWA has established seven Activity Categories to define Noise Abatement Criteria (NAC) for conducting highway noise analyses. These Activity Categories have been adopted by INDOT in their current Traffic Noise Analysis Procedure (2022). Each Activity Category is defined in terms of the type of land use that occurs on the property. Because there are differing expectations for acceptable noise levels based on land use, each Activity Category has a unique NAC noise threshold that determines the level at which roadway noise is considered to result in an impact to its designated use. Table 1 includes a listing of the Activity Categories with descriptions and the NAC threshold level.

Land use within 500 feet of the outside lanes along SR 62 throughout the project area is almost exclusively developed for residential, commercial, industrial, recreation, or other miscellaneous uses. The largest undeveloped area is within the Carpentier Creek floodplain south of SR 62. Elsewhere, smaller scattered undeveloped properties include unused parking lots and former residential parcels. Appendix A Figures 2 and 3 provide an illustration of land use by Activity Category within the SR 62 study area.

The SR 62 project area has been subdivided into nine noise sensitive areas from west of Rosenberger Avenue to east of Wabash Avenue. All potential noise receptors within the 500-foot buffer were included in the respective NSA boundaries.

3.1 NSA 1 Description

NSA 1 includes exclusively commercial development along the north and south sides of SR 62 to the west of Rosenberger Avenue and as far to the east of Rosenberger Avenue as Dorothy Drive and S. Woods Avenue. NSA 1 is comprised of a mixture of Category C, E, F, and undeveloped Category G parcels. Category C receptors include three medical clinic facilities. Category E receptors include primarily restaurants and banking institutions. Category F receptors are largely retailers (grocery stores, auto parts, office supplies, etc.) and service providers (car wash, auto lube centers, gas stations, new storage unit facility). The storage unit facility was constructed in 2022 and is not represented on the aerials used in Appendix A Figures 2 and 3. Undeveloped Category G lands include the old Walmart parking lot, cleared/wooded land north and east of Ascension medical clinic, and wooded/cleared parcels south of SR 62 within the Carpentier Creek floodplain between the shopping complex east of Rosenberger Avenue and S. Woods Avenue.

3.2 NSA 2 Description

NSA 2 is located on the north side of SR 62 between Dorothy Drive and Tekoppel Avenue. With the exception of a Category F construction business northwest of Woods Avenue and Igleheart Avenue, NSA 2 includes approximately 22 Category B single dwelling unit residential properties (15 receptors) along Dorothy Drive, Igleheart Avenue and Elm Avenue. SR 62 is elevated as much as 28 feet above the base elevation of the properties within NSA 2. The CSX Railroad bisects NSA 2 in a northwest/southeast manner.

3.3 NSA 3 Description

NSA 3 is located on the south side of SR 62 between the Carpentier Creek levee and Tekoppel Avenue. NSA 3 includes approximately 25 Category B single dwelling residential properties (20 receptors) along S. Woods Avenue, S. Elm Avenue, Ziegler Avenue, and Yuletide Avenue. SR 62 is elevated as much as 28 feet above the base elevation of the properties within NSA 3. The CSX Railroad bisects NSA 3 in a northwest/southeast manner.

3.4 NSA 4 Description

NSA 4 is located on the north side of SR 62 between Tekoppel Avenue and Barker Avenue. NSA 4 and includes Category B single dwelling residential properties (77 receptors) along Corbierre Avenue, Igleheart Avenue, and Tekoppel Avenue. The properties along Corbierre Avenue represent first row receptors, while properties along Igleheart Avenue represent second and third row receptors. The southern portion of the Tekoppel Elementary School property (Category C) along Tekoppel Avenue is also within 500 feet of SR 62. Other non-residential properties within NSA 4 include the University of Southern Indiana Theatre along Igleheart Avenue (Category D) and the Barker Brewery (Category E) within the SR 62 exit ramp loop to Igleheart Avenue west of Barker Avenue. This property was the former location of the University of Southern Indiana Theatre. The middle Corbierre Avenue residences are generally level with SR 62, while the residences closer to Tekoppel Avenue are as much as 20 feet lower that the SR 62 overpass to Tekoppel Avenue.

3.5 NSA 5 Description

NSA 5 is located on the south side of SR 62 between Tekoppel Avenue and Barker Avenue. NSA 5 includes Category B single dwelling residential properties (79 receptors) and one apartment complex (Hillside Manor Apartments) along Forest Avenue, Hillcrest Terrace, Leslie Avenue, and Barker Avenue. The properties along the north side of Forest Avenue represent first row receptors with backyards facing SR 62. Properties on the south side of Forest Avenue and Hillcrest Terrace represent second and third row receptors. Additional non-residential properties within NSA 5 include a Category E unspecified business along Tekoppel Avenue and Forest Avenue and two Category C church properties (Destiny of Faith Community Church and St. James West United Methodist Church). The Forest Avenue residences along SR 62 between Walker Avenue and Tunis Avenue are generally level with SR 62, while the residences closer to Tekoppel Avenue are as much as 20 feet lower that the SR 62 overpass to Tekoppel Avenue.

3.6 NSA 6 Description

NSA 6 is located on the north side of SR 62 between Barker Avenue and St. Joseph Avenue. NSA 6 includes a large undeveloped Category G parking lot immediately west of St. Joseph Avenue, several Category B single dwelling residential properties (7 receptors) along Indiana Street and Illinois Street, as well as Category E offices (Three I Engineering and HR Solutions Inc.) along Indiana Street. The most prominent noise receptor within NSA 6 is the Category B Hillcrest Youth Home (including the Southwest Behavioral Health Care offices) located on approximately 9.6 acres fronting SR 62 immediately east of Barker Avenue. This facility typically houses 20 permanent youth residents and at any given time there are an additional 20 youth on campus receiving care services. The residences along Indiana Street are generally level with SR 62. Portions of the Hillcrest Youth Home are located on a hill as much as 20 feet above SR 62, while administrative and activity buildings are located as much as 20 feet below the westbound Barker Avenue exit ramp.

3.7 NSA 7 Description

NSA 7 is located on the south side of SR 62 between Barker Avenue and St. Joseph Avenue. NSA 7 includes two distinct land use categories. The south side of Pennsylvania Avenue between Barker Avenue and Lemcke Avenue includes in excess of 80 Category B single dwelling residences (71 receptors) along Pennsylvania Avenue, Forest Avenue, Sonntag Avenue, Drier Avenue, and Rick Davis Way. The property between Lemcke Avenue and St. Joseph Avenue is industrial development (Mead Johnson), a large nutritional product manufacturer. The Pennsylvania Avenue first row residential properties are perched on an elevated hillside above SR 62 and are as much as 30 feet above the roadway. As Pennsylvania Avenue descends down to SR 62 to the east the residential properties west of Lemcke Avenue become more level with the adjacent roadway. Second and third row receptors behind the Pennsylvania Avenue residences are constructed into the hilly landscape.

3.8 NSA 8 Description

NSA 8 is located on the south and north side of SR 62 between St. Joseph Avenue and Wabash Avenue. The south side is exclusively Category F industrial development (Mead Johnson, George Koch and Sons, LLC, and Koch Air LLC). The north side of SR 62 includes a mixture of Category F retail, Category E restaurant/offices, Category C city parkland, and several Category

B single dwelling (11 receptors) and one multi-unit residential dwellings. The residences are generally second and third row receptors along Indiana Street and Illinois Street. The apartment building along Indiana Street is a two-story structure with four dwelling units. Additional properties within 500 feet of SR 62 north of Indiana Street include VFW Post 1114, Alexander Funeral Home, Life Choices Maternity and Youth, and Fifth Third Bank.

3.9 NSA 9 Description

NSA 9 is located on the north side of SR 62 immediately east of Wabash Avenue. While NSA 9 is beyond the eastern terminus of the project, the Category B residential properties (9 single dwelling receptors and 2 apartment dwellings) along Indiana Street and Illinois Street are within 500 feet of the Wabash Avenue intersection. The first row receptors along Indiana Street have backyards that front SR 62. Two of these structures are being used as two and four unit apartment buildings. The westernmost residences are generally level with the Wabash Avenue intersection; however, as SR 62 climbs to the east, the residences closest to 9th Avenue are as much as 20 feet below the roadway.

4 Ambient Noise Measurements

In accordance with the 2022 INDOT Traffic Noise Procedure, ambient noise measurements are required to establish the existing noise levels resulting from current traffic conditions and for use in validating the FHWA Traffic Noise Model program (TNM 2.5) set-up in conditions where roadway traffic is the predominant contributing noise source. Sound pressure levels are typically measured in decibels (dB) which are based on a logarithmic scale. INDOT has adopted the equivalent hourly sound level descriptor (Leq(h)) for measurement and use in analysis for highway noise studies in Indiana. The Leq is defined as the equivalent steady-state sound level which in a stated period of time contains the same acoustic energy as the time-varying sound level during the same time period, with Leq(h) being the hourly value of Leq. Additionally, because the human ear is differentially sensitive to varying sound frequencies, an A-weighted response curve is used to mimic our response to the range of frequencies that emanate from roadway traffic sources. A-weighted decibels are expressed as dB(A).

One ambient measurement location was selected to represent each of the nine noise sensitive areas designated throughout the study area. Measurements were conducted in accordance with the FHWA Report FHWA-PD-96-046 “Measurement of Highway-Related Noise”. These measurements are to be taken during the worst (noisiest) traffic hour under conditions that would yield the greatest Leq(h). This is typically during the greatest traffic volume periods, providing traffic is free-flowing (i.e., LOS of C or better). Since traffic on SR 62 is steady from 7:00am until 6:00pm, field measurements were conducted during this time period. Because this data is principally being used to validate the existing condition model, conducting measurements outside of absolute peak hour periods is considered acceptable.

Ambient Leq(h) measurements were obtained on April 7, 13 ,and 14, 2022 using a Larson-Davis DSP82 Type 1 Integrating sound level meter (SLM). Two measurement sessions were conducted at each location on these dates. Repeat sampling was conducted at NSA 4 location on April 20 and again on October 11, 2022. The Certificate of Calibration and Conformance for both the DSP82 and the CAL200 Acoustic Calibrator from Larson-Davis Laboratories is included in Appendix C. The SLM was calibrated with the acoustic calibrator at 94 dB(A) at the beginning of the each monitoring session and after battery changes. Each measurement period was 15 minutes in duration. During each measurement period, traffic on SR 62 and any other roadway potentially contributing to traffic volumes was video recorded using a GoPro Hero 4 mounted on a 12-foot tall mast. The video files were later converted into vehicle class volumes (automobiles, medium trucks, and heavy trucks) by individual travel lanes for later noise use in validation of the TNM 2.5 model set-up. General weather conditions and non-roadway related sources of sound in the immediate vicinity of the monitoring station were also documented. Field measurement data sheets are included in Appendix D.

The traffic data and Leq(h) measurements for the nine locations are presented in Appendix B Table 2 and on Appendix A Figure 2 . Measured sound levels ranged from 61.6 dB(A) at the Dorothy Drive residential property in NSA 2 to 73.8 dB(A) at the Corbierre Avenue residential property in NSA 4.

5 TNM 2.5 Existing Condition Model Set-Up

The SR 62 project noise analysis used the latest FHWA TNM Version 2.5 software approved for use by INDOT. Roadways, receptors, terrain lines, and barriers were constructed in TNM 2.5 to replicate the 3D relationship between SR 62 and potential noise sensitive receptors in the study area. A variety of data sources (i.e., CAD base layers, field survey surface models, Vanderburgh County Digital Elevation Model (DEM) data, Google Earth, Google Maps and aerial photographs) were utilized for the information required to set-up the current condition noise analysis. The model was constructed in the local Vanderburgh County coordinate system (NAD 1983 (2011) INGCS Vanderburgh (ftUS)). Roadway, terrain line, receptor, and barrier features were generated from ArcGIS Desktop 10.1 and imported into TNM 2.5 from ArcGIS tabular point files.

5.1 Roadways

Existing SR 62 and the following associated roadways were included in the existing condition model.

- Rosenberger Avenue
- Tekoppel Avenue
- Ingle Avenue (south of SR62)
- Igleheart Avenue (east of Barker Avenue)
- Barker Avenue
- Pennsylvania Avenue
- Lemcke Avenue
- St. Joseph Avenue
- Wabash Avenue

Each through lane and dedicated turn lane for SR 62 was included in the TNM 2.5 existing condition model as 11 or 12-foot wide lanes. Additionally, all through and turn lanes for Rosenberger Avenue, Barker Avenue, St. Joseph Avenue, and Wabash Avenue were also included as 11 or 12-foot lanes. Tekoppel Avenue, Ingle Avenue, Igleheart Avenue, and Lemcke Avenue were modeled as separate bidirectional lanes, while Corbierre Avenue, Pennsylvania Avenue and the four entrance/exit ramps for Barker Avenue were modeled as single directional lanes. The default TNM 2.5 average pavement type was used for all roadways.

SR 62 has a posted speed limit of 45 mph east of St. Joseph Avenue and increases to 50 mph west of St. Joseph Avenue. This is generally the average speed of traffic that was observed under free flow conditions between traffic signals and was therefore used for the respective through lanes on SR 62. With the exception of Corbierre Avenue, all other local roads and entrance/exit ramps were modeled with the minimum allowable 30 mph in TNM 2.5. In most instances, these intersecting roadways are under traffic control via signals or stop signs and experience repeated stop/start conditions. Corbierre Avenue was modeled at 35 mph since most vehicles main momentum along this parallel roadway after they exit off SR 62.

The traffic analysis report for the SR 62 Rosenberger Avenue to Wabash Avenue project (Lochmueller Group 2022) includes 2019 detailed am and pm peak hour turning movement data for most of the locations along SR 62 where intersecting roads result in changes to traffic volumes. Since this project was initiated in 2019, this is considered the base year for existing conditions. Because the 2019 peak hour turning movement data did not include vehicle classification data (automobiles, trucks, buses, motorcycles) classification percentages from 2020 count data were used to define respective am and pm hourly volumes for each vehicle type. These percentages were applied to the 2019 turning movement data to generate the needed hourly vehicle classification input for the TNM 2.5 model. The breakdown of truck volumes into medium and heavy trucks for the TNM 2.5 input was based on FHWA vehicle classes and Miovision descriptions for light-goods, single-unit, and articulated trucks. Class 5 vehicles were considered medium trucks, whereas Class 6 and above were considered heavy trucks.

The traffic study turning movement data and the percent truck data was used to generate total hourly vehicle volumes for each of the modeled roadway segments. The pm peak hour data was used because it exhibited the greatest volume of overall traffic and generally the largest truck volumes. For the SR 62 traffic, the total automobile traffic volume was split evenly between the lanes, whereas the bulk of the truck traffic, bus, and motorcycle traffic was placed on the outside lanes closest to the noise receptors.

Table 1 Vehicle classification percent distribution for 2-lane and 3-lane typical sections on SR 62

Vehicle Type	SR 62 = 2-lanes		SR 62 = 3-lanes		
	Outside	Inside	Outside lane	Center lane	Inside lane
Automobiles	50%	50%	34%	33%	33%
Trucks	80%	20%	70%	20%	10%
Buses	100%	0%	100%	0%	0%
Motorcycles	100%	0%	100%	0%	0%

Table 3 includes a general breakdown of the hourly traffic volumes used as input in the existing condition 2019 base year TNM 2.5 analysis. For each of the signalized intersections of Rosenberger Avenue, St. Joseph Avenue, and Wabash Avenue, the eastbound and westbound SR 62 traffic flow control was modeled as 80 percent free flow. The intersecting roads were modeled at 20 percent free flow.

5.2 Receptors

For the 2019 existing condition noise analysis, potential noise sensitive receptors were identified within 500 feet from the edge of pavement for the outside lanes of the proposed roadway configuration (Appendix A Figures 2 and 3). Except where specified otherwise, all potential receptors within 500 feet were included in the model for each NSA. In the event that impacts were occurring at locations near the 500-foot limit, the study area would have been extended to no more than 800 feet. To generate Leq(h) levels for all potential noise sensitive receptors within the study area, 360 receptor data points were included in the TNM 2.5 set-up (Appendix A Figure 2). The receptor position was determined by assessing the most likely area of exterior human occupancy at each location using aerial photographs. The elevations of the receptors were obtained using the Vanderburgh County DEM data with ArcGIS 10.1. The TNM 2.5 default receptor height elevation of 4.92 feet was used for ground level receptors.

5.2.1 NSA 1 Receptors

NSA 1 includes 28 non-residential receptors. Category C facilities medical clinics: First Podiatry, Deaconess Health System Inc., and St. Vincent Urgent Care. Category E properties include restaurants/offices/banks/service providers: Subway, Starbucks, Los Bravos, Taco Bell, Chick-fil-a, G D Ritzy's, Long John Silvers, Arby's, McDonald's, Evansville Federal Savings and Loan, First Federal Savings Bank, vacant bank building, Beltone, and Pearl Cleaners. Category F facilities include various retailers: Sherwin Williams Paint Store, Goodwill, O'Reilly's Auto Parts, Office Depot, Aldi Inc., Lucas Oil Center, Shine On Express Car Wash, Discount Tire, Thornton's and Storage Unit. Impacts to Category F receptors were assessed using the Category E NAC of 72 dB(A).

5.2.2 NSA 2 Receptors

NSA 2 included 15 single dwelling residential receptors west of Tekoppel Avenue and along Dorothy Drive. Seven residential properties beyond 400 feet from SR 62 and north of Igleheart Avenue were excluded from the analysis since these generally represent third row receptors and impacts are not anticipated to occur at this distance from SR 62 with the intervening terrain and landscape.

5.2.3 NSA 3 Receptors

NSA 3 included 20 single dwelling residential receptors west of Tekoppel Avenue on both sides of the CSX Railroad. Four residential properties at the outer edge of the 500-foot study area were excluded from the analysis since impacts are not anticipated to occur at this distance from SR 62 with the intervening terrain and landscape.

5.2.4 NSA 4 Receptors

NSA 4 included 77 single dwelling residential receptors north of SR 62 and Corbierre Avenue between Tekoppel Avenue and Barker Avenue. Tekoppel Elementary School (Category C), University of Southern Indiana Theatre (Category D), and Barker Brewery (Category E) are the only non-residential receptors for NSA 4. Front row receptors include 28 residences along Corbierre Avenue, three residences along Igleheart Avenue, and Barker Brewery within the Barker Avenue exit loop. Several receptors north of Igleheart Avenue were excluded from the analysis since these generally represent third row receptors and impacts are not anticipated to occur at this distance from SR 62 with the intervening terrain and landscape.

5.2.5 NSA 5 Receptors

NSA 5 included 79 single dwelling residential receptors, Hillside Manor apartments (12 unit apartment building along Barker Avenue), and Destiny of Faith Community Church (Category C). First row receptors include all of the residences north of Forest Avenue and the northernmost residences on Leslie Avenue and Barker Avenue. Residential properties beyond 400 feet from SR 62 along Hillcrest Terrace were excluded from the analysis since these generally represent third row receptors and impacts are not anticipated to occur at this distance from SR 62 with the intervening terrain and landscape.

5.2.6 NSA 6 Receptors

NSA 6 included seven single dwelling residential receptors and three business (Category E) receptors along Indiana Street and St. Joseph Avenue. NSA 6 also included four receptor points representing the Hillcrest Youth Home and the associated Southwest Behavioral Health Care office. Residential properties within the outer edge of the 500-foot study area were excluded from the analysis since these generally represent second row receptors and impacts are not anticipated to occur at this distance from SR 62.

5.2.7 NSA 7 Receptors

NSA 7 included 71 single dwelling residential receptors and a single receptor representing the Mead Johnson facility on the south side of SR 62 between Barker Avenue and St. Joseph Avenue. First row receptors include all of the residences along Pennsylvania Avenue which face SR 62. Several residential properties along Forest Avenue were excluded from the analysis since these generally represent third row receptors beyond 400 feet from SR 62 and impacts are not anticipated to occur at this distance from SR 62 with the intervening terrain and landscape.

5.2.8 NSA 8 Receptors

NSA 8 included eleven single dwelling residential receptors, a 4-unit apartment building, ten commercial/industrial (Category E and F) businesses, and an urban park. Several residential receptors, VFW Post 1114, Life Choices maternity and Youth, and Alexander Funeral Home north of Indiana Street that are within the 500-foot study area were excluded from the analysis since these generally represent second and third row inner city receptors beyond 300 feet from SR 62 and impacts are not anticipated to occur at this distance from SR 62 with the intervening terrain, landscape and lower traffic speeds on SR 62.

The park property located midway between 10th and 12th Avenue consists of two separate park parcels collectively referred to as Stop Light City Playground, although sometimes referred to as Little Westside Library Park. The 1.9 acre Stop Light City Playground area includes basketball courts, multiple playground features, park benches, picnic tables, and open green space. The southern 370-foot boundary of the property is immediately adjacent to the sidewalk along SR 62.

The City of Evansville Parks and Recreation Department provides maintenance and upkeep on the property and were consulted on the level of usage the park receives. While the park is more heavily used on the weekend, it is estimated that over the course of a week the park averages 30 to 50 visitors a day. Therefore, 40 daily park users was used for the purposes of determining the number of equivalent receptors for the park in accordance with INDOT policy. Based on this algorithm 15 receptors were distributed throughout the park at locations of expected activity (e.g. playground equipment, basketball counts, park benches).

$$\frac{40\ users\ per\ day}{2.65\ people\ on\ average\ per\ family}\ x\ 100\%\ within\ 500\ feet = 15\ receptors$$

5.2.9 NSA 9 Receptors

NSA 9 included nine single dwelling residential receptors and two structures used as 2-unit and 4-unit apartments on the north side of SR 62 between Wabash Avenue and 9th Avenue. Several residential properties within the 500-foot study area north of Indiana Street were excluded from this analysis since these generally represent well shielded second and third row receptors and impacts are not anticipated to occur at this distance from SR 62 with the intervening terrain and landscape.

5.3 Barriers

For the existing condition model, barriers were used in NSA 7 and NSA 8 to represent tall buildings where the structure could have an influence on sound propagation and resulting noise levels at nearby receptors. This occurs primarily at the Mead Johnson facility and the George Koch Sons LLC plant on the south side of SR 62. In the TNM set-up, the barrier line represents the general outline edge of the building adjacent to receptors that were included in the model. Additionally, barriers were used for the bridges at Carpentier Creek, the CSX Railroad, and Tekoppel Avenue bridges to model the existing traffic control barrier (TCB) structures on the north and south side of the roadway. Each TCB was modeled as a reflective surface 3.75 feet in height.

5.4 Terrain Lines

Terrain lines define where vertical topographic break line features influence the propagation of sound across the landscape. The landscape terrain of the SR 62 study area varies from flat with little or no change in elevation between the roadway and adjacent receptors to abrupt changes in relief at overpass locations where SR 62 has been elevated on fill. Terrain lines were included throughout the TNM 2.5 model for the existing condition to represent features such as roadside ditches and break lines in fill slopes where terrain is expected to have an influence on propagation pathways between roads and receptors. Terrain lines representing these topographic features were generated using the surface model data derived from land surveys and from Vanderburgh County DEM aerial data. Terrain lines were generally only utilized where abrupt changes in slope occurred between SR 62 (the source) and the receptors of concern. Gradual slope features between the edge of the right-of-way and the receptors were not modeled.

5.5 Building Rows

Building row features were not used in TNM 2.5 to account for possible shielding of second row receptors by first row receptors. Therefore, resulting noise levels generated from TNM 2.5 for second row receptors are likely slightly higher than actually experienced.

5.6 Ground Zones and Tree Zones

The default ground type set for all of the TNM 2.5 runs was lawn. Large parking lots and reflective ground surfaces in NSA 1, 6, and 8 were included in the model in locations where these surfaces were expected to have a notable effect on propagation rates. Elsewhere, smaller hard surfaces were not anticipated to have a perceptible effect on sound pathways between roadway and receptor. No tree zones were included.

6 TNM 2.5 Validation of Model Based on Field Measurements

The validation process attempts to check the predicted results from TNM 2.5 against field measurements to determine if the program appears to accurately represent the 3D acoustic conditions that exist within the noise assessment analysis area.

A single receptor location was selected for each NSA to validate the existing condition TNM 2.5 set-up (Appendix A Figure 2 and Appendix B Table 2). Single dwelling residential Category B receptors were used for NSA 2, 3, 4, 5, and 7. For NSA 1 the measurement was from the southern edge of the Arby's parking lot (Category E). For NSA 6 the measurement was from the Hillcrest Youth Home (Category B/C) at the top of the hill north of SR 62. For NSA 8 the measurement was from the swing set in Stop Light City Playground on the north side of SR 62. Appendix D includes photographs of each ambient measurement location.

For each of the nine field measurement site sessions, the traffic count data for SR 62 and other relevant roads was adjusted to an hourly volume for automobiles, medium trucks, heavy trucks, buses, and motorcycles based on the duration of the field measurement period (i.e., 15 minute traffic counts were multiplied by four). A minimum of two measurements were taken at each of the locations. Four additional measurements were taken at the NSA 5 residence in an effort to achieve model validation at this location. Vehicle class traffic volumes were assigned to each individual lane on SR 62 based on data obtained from the video recordings. Traffic volumes used in the validation run of TNM 2.5 for each field measurement location are shown in Appendix B Table 2.

For the locations at NSA 1, 2, 3, 5, 7, 8, and 9, at least one of the two field measurements recorded with the SLM was within ±3 dB(A) of the TNM predicted Leq(h) levels for the traffic volume experienced during the monitoring session (Appendix A Figure 2 and Appendix B Table 2).

6.1 NSA 1 – 4650 University Drive, Arby' Parking Lot

The monitoring session generated a field measurement of 65.7 dB(A), which was 0.7 dB(A) above the predicted TNM 2.5 level of 65.0 dB(A) for the traffic data input. During the second monitoring session in the late afternoon, eastbound traffic experienced long queues at Rosenberger Avenue and didn't represent uncongested free-flow conditions. Nonetheless, the Leq(h) recorded for this session (65.8 dB(A)) was within 0.1 dB(A) of the first session.

6.2 NSA 2 – 2 Dorothy Drive Residence

The Leq(h) levels measured during the April 7 (61.6 dB(A)) and April 14 (62.6 dB(A)) monitoring sessions were both 1.0 below the respective predicted TNM 2.5 levels. Although it is typically uncommon for measured SLM readings to be below the modeled result, the model is considered valid for this location since the difference was within ±3 dB(A).

6.3 NSA 3 – 220 Elm Street Residence

The Leq(h) level measured during the April 7 (64.9 dB(A)) monitoring session was 3.8 dB(A) greater that the predicted TNM 2.5 level. However, a backhoe was being used for maintenance on a nearby railroad track during a portion of this monitoring period that likely accounted for the elevated SLM reading. The April 14 (62.4 dB(A)) field reading was only 2.1 dB(A) above the predicted TNM 2.5 level; therefore, the model is considered valid for this location.

6.4 NSA 4 – 3309 Corbierre Avenue Residence

The Leq(h) levels measured during the April 7 (72.3 dB(A)) and April 14 (71.8 dB(A)) monitoring sessions were both greater than 3 dB(A) above the predicted TNM 2.5 levels of 68.5 dB(A) and 68.6 dB(A), respectively. Two additional measurements were taken on April 20 (AM and PM) in an attempt to generate field measurements that were within 3 dB(A) of the model predictions. Again, both of the field readings (73.0 dB(A) and 73.8 dB(A)) were 3.4 dB(A) and 4.8 dB(A) greater than the respective predicted TNM 2.5 levels. Two final measurements were taken on October 11 to resolve the discrepancy between the field measured Leq(h) and the predicted model values. Again, both of the field readings (72.6 dB(A) and 72.2 dB(A)) were consistently 3.3 dB(A) and 3.4 dB(A) above the predicted TNM 2.5 levels (69.3 dB(A) and 68.8 dB(A)). For all six monitoring sessions, there were no extraneous non-roadway noises observed that were considered to likely account for the discrepancy. Figure 1 illustrates that the field readings were consistently in the 71.8 dB(A) to 73.8 dB(A) range (2 dB(A) variance), while the TNM 2.5 levels exhibited a similar consistency between 68.5 dB(A) to 69.6 dB(A) (1.1 dB(A) variance).

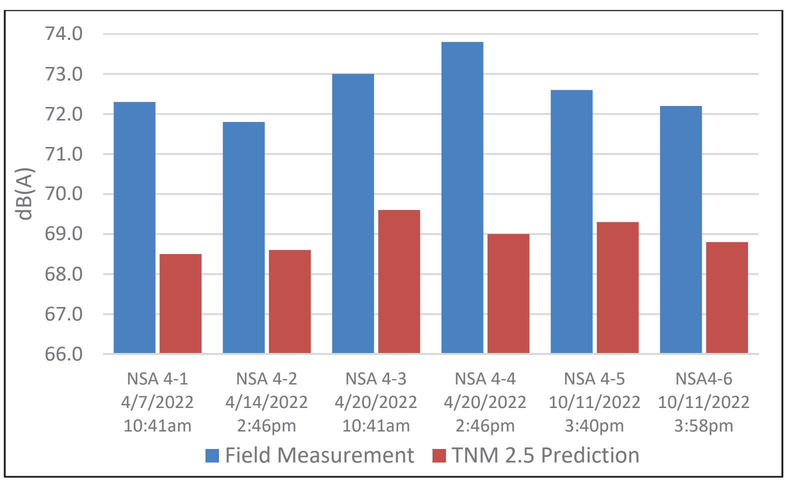

Figure 1. NSA 4 Field measurement and TNM 2.5 prediction comparison

The 3D geometry of the TNM 2.5 model was scrutinized for any anomaly in the set-up that might be resulting in the discrepancy, but no errors were observed. Considering the traffic speeds on SR 62 and the relatively low volume of heavy trucks, the 70+ dB(A) field readings seemed to be a little elevated over that which would be expected for this setting. While Corbierre Avenue is a local road relatively close to the deployed SLM, traffic volumes (mostly automobiles at 35 mph) on this roadway were included in the TNM 2.5 model setup.

One factor that is potentially attributed to the elevated field readings are prevailing winds from the southwest affecting propagation rates downwind from the roadway. Alternatively, or in combination with wind effects, the majority of the residences on the south side of SR 62 have sheds/garages in their backyards which may be serving as hard surfaces reflecting sound back across the roadway toward the Corbierre Avenue residences. Given the distance across SR 62, this is not likely to be accountable for an appreciable increase in sound levels on the north side. The 50 mph speed used for SR 62 was verified by driving the highway and matching the general traffic speed; however, there are always some vehicles traveling at speeds greater than 50 mph on this roadway, which could result in slightly higher measured levels. Finally, the westbound lanes have an inclined grade over Tekoppel Avenue which may be sufficient to increase noise levels above predicted levels due to added engine strain, especially with heavy trucks. Since the discrepancies between the measured readings and the model predictions were generally 3.2 to 3.4 dB(A) different, an adjustment of +1 dB(A) was made to all first row Corbierre Avenue receptors for the 2019 existing model results and the 2040 design year model results.

6.5 NSA 5 – 3203 Forest Avenue Residence

The Leq(h) levels measured during the April 7 (66.9 dB(A)) and April 14 (66.4 dB(A)) monitoring sessions were 1.9 dB(A) and 2.6 dB(A) below the predicted TNM 2.5 levels, respectively. Although it is typically uncommon for measured SLM readings to be below the modeled result, the model is considered valid for this location since the difference for both sessions was within ±3 dB(A).

6.6 NSA 6 – 2700 W Indiana Street, Hillcrest Youth Services

The Leq(h) levels measured during the April 7 (64.4 dB(A)) and April 13 (66.7 dB(A)) monitoring sessions were both greater than 3 dB(A) above the predicted TNM 2.5 levels of 61.1 dB(A) and 61.9 dB(A), respectively. There were no extraneous non-roadway noises observed that were considered to likely account for the greater than 3 dB(A) discrepancy. The 3D geometry of the TNM 2.5 model was scrutinized for any anomaly in the set-up that might be resulting in the discrepancy, but no errors were observed. Considering the traffic speeds on SR 62, the relatively low volume of heavy trucks, the intervening terrain, and the 215-foot distance from the receptor to SR 62, the 66.7 dB(A) field reading seemed to be a little elevated over that which would be expected for this setting. One potential factor contributing to the elevated Leq(h) field readings experienced at this location is the possibly of reflections of sound off the riprap embankment on the south of SR 62 between the roadway and Pennsylvania Avenue. Given the distance across SR 62, this is not likely to be accountable for an appreciable increase in sound levels on the north side, but could account for a minor increase. Since the discrepancy between one of the measured readings and the model predictions was only 3.3 dB(A), an adjustment of +1 dB(A) was made to all four of the receptors located at Hillcrest Youth Services for the 2019 existing model results and the 2040 design year model results. No adjustments were made to any other NSA 6 receptors.

6.7 NSA 7 – 2728 Pennsylvania Street Residence

The Leq(h) levels measured during the April 7 (64.6 dB(A)) and April 14 (62.5 dB(A)) monitoring sessions were both within 3 dB(A) of the predicted TNM 2.5 levels of 62.7 and 62.2 dB(A), respectively. Therefore, the model is considered valid for this location.

6.8 NSA 8 – 2200 W Indiana Street, Stop Light City Playground

The Leq(h) level measured during the April 7 (72.9 dB(A)) monitoring session was 4.5 dB(A) greater that the predicted TNM 2.5 level. The elevated field reading is in part attributed to a train horn and engine noise emanating from the railroad tracks to the south along Ohio Street. The April 13 (70.6 dB(A)) field reading was only 2.0 dB(A) above the predicted TNM 2.5 level; therefore, the model is considered valid for this location.

6.9 NSA 9 – 1916 Indiana Street Residence

The Leq(h) level measured during the April 7 (67.6 dB(A)) monitoring session was 2.8 dB(A) greater that the predicted TNM 2.5 level of 64.8 dB(A). However, a subsequent measurement on April 13 (67.8 dB(A)) was 4.7 dB(A) over the predicted TNM 2.5 level or 63.1 dB(A). There were no extraneous non-traffic sound sources identified during this session that might account for the disparity. However, because this site is located very near the Wabash Avenue intersection, noise associated with idling vehicles that is not necessarily accounted for in the model may have been a contributing factor in the discrepancy. Since the April 7 field reading was within 3 dB(A) of the predicted TNM 2.5 level, the model is considered valid for this location.

7 2019 Existing Condition TNM 2.5 Results

For the 358 modeled receptor points in the SR 62 study area, the existing base condition 2019 Leq(h) roadway noise levels ranged from 49.5 dB(A) to 74.1 dB(A). The 74.1 dB(A) level was predicted from the corner of the CSI Complex LLC building (Category F) immediately north of SR 62 in NSA 8. Appendix B Table 5 provides a complete listing of the 2019 TNM 2.5 Leq(h) results for each receptor and highlights the locations where the respective NAC impact criteria is met.

The TNM 2.5 2019 base year analysis indicates that under the current conditions there are Category B residential dwelling unit impacts in NSA 4, NSA 5, NSA 7, NSA 8, and NSA 9 where the TNM 2.5 Leq(h) levels approach or exceed the 67 dB(A) NAC. Additionally, the Stop Light City Playground (NSA 8 Category C) has TNM 2.5 Leq(h) which approach or exceed the 67 dB(A) NAC. Category E/F receptors in NSA 8 along both sides of SR 62 also approach the 72 dB(A) NAC. The TNM 2.5 output for the 2019 base year is included in Appendix F.

7.1 NSA 4 2019 Existing Condition Impacts

Existing condition traffic noise impacts within NSA 4 include 27 first row residential receptors along Corbierre Avenue between Tekoppel Avenue and the start of the Corbierre Avenue exit ramp. These impacts are indicated on Appendix A Figure 3 Sheet 3 as red and blue receptor points. TNM 2.5 Leq(h) impact levels range from 66.6 dB(A) at 3419 Corbierre Avenue (west end) to 70.7 dB(A) for receptors at 3121 and 3201 Corbierre Avenue near the east end at Addison Avenue (Appendix B Table 5).

7.2 NSA 5 2019 Existing condition Impacts

Existing condition traffic noise impacts within NSA 5 include 22 of the 43 first row residential receptors along Forest Avenue from west of S Walker Avenue to east of Addison Avenue. These impacts are indicated on Appendix A Figure 3 Sheet 3 as red and blue receptor points. TNM 2.5 Leq(h) impact levels range from 66.4 dB(A) at 35 S Walker Avenue to 70.4 dB(A) at 3303 Forest Avenue east end at Ingle Avenue (Appendix B Table 5).

7.3 NSA 7 2019 Existing Condition Impacts

Existing condition traffic noise impacts within NSA 7 include 25 of the 34 first row residential receptors along Pennsylvania Street between Barker Avenue and Lemcke Avenue. These impacts are indicated on Appendix A Figure 3 Sheet 4 as red receptor points. TNM 2.5 Leq(h) impact levels range from 66.1 dB(A) at 2842 Pennsylvania Street between Barker Avenue and Sonntag Avenue to 70.2 dB(A) at 2602 Pennsylvania Street immediately west of Lemcke Avenue. While there are two groupings of residences along Pennsylvania Street not indicated as existing condition impacts, several of these have TNM 2.5 Leq(h) levels above 64 dB(A) (Appendix B Table 5).

7.4 NSA 8 2019 Existing Condition Impacts

Existing condition traffic noise impacts within NSA 8 include a single residential property at the 2229 Pennsylvania Street east of 12th Avenue. These impacts are indicated on Appendix A Figure 3 Sheets 5 and 6 as red receptor points. Five receptor points representing the Stop Light City Playground (66.3 dB(A) and 71.1 dB(A)) approached or exceeded the Category C NAC of 67 dB(A). The remainder of the impacts are associated with seven Category E/F businesses that approached or exceeded the 72 dB(A) NAC. These include the large manufacturers Mead Johnson, George Koch Sons LLC, and Koch Air LLC on the south side of SR 62 and Crosseyed Cricket, CSI Complex LLC, SST Investments, and Cook Portable Warehouses on the north side of SR 62.

7.5 NSA 9 2019 Existing Condition Impacts

Existing condition traffic noise impacts within NSA 9 include three of the 11 first row residential receptors along Indiana Street Avenue east of Wabash Avenue. One of the first row residential structures in NSA 9 includes two apartment households (Receptor 356) and one includes four apartment households (Receptor 357); however, neither of these receptor points are impacted under existing conditions. NSA 9 impacts are indicated on Appendix A Figure 3 Sheet 6 as red receptor points. TNM 2.5 Leq(h) impact levels range from 59.7 dB(A) at 1900 W Indiana Street to 68.4 dB(A) at 1930 W Indiana Street (Appendix B Table 5).

8 TNM 2.5 2040 Design Year Set-Up

The TNM 2.5 set-up for the proposed SR 62 reconstruction, intersection improvement, and bridge replacement project was conducted in a similar manner as that discussed in Section 5 for the existing current condition. The 2040 design year model was developed using the current Stage 2 design plans to construct the roadway, terrain, and barrier geometry in the TNM 2.5 model.

8.1 Roadways

As with the existing condition, each travel lane for the SR 62 reconstruction design was modeled as a separate roadway. Therefore, the eastbound and westbound and 3-lane typical section for SR 62 was modeled as six separate travel lanes. From Rosenberger Avenue to east of Barker Avenue, the eastbound and westbound lanes were shifted varying distances to the north. SR 62 left and right turn lane extensions at Rosenberger Avenue, St. Joseph Avenue, and Wabash Avenue were incorporated into the model layout. Exit and entrance ramps to Barker Avenue were changed in the model to reflect the new movement patterns at this interchange. The Corbierre Avenue exit ramp was realigned to the west. The Ingle Avenue access travel lanes to SR 62 were eliminated from the design model. The Lemcke Avenue access travel lanes north of SR 62 were also eliminated. No changes were required for the existing roadway segments representing the Rosenberger Avenue, St. Joseph Avenue, or Wabash Avenue intersections. The 45 mph and 50 mph SR 62 speeds used for the existing conditions east and west of St. Joseph Avenue respectively were retained in the design year model, as were the flow control settings at the intersections. The Corbierre Avenue ramp and Corbierre Avenue were modeled at 35 mph. All other ramps and included roadways were modeled at 30 mph as with the existing condition model.

The 2040 design year traffic data for use as TNM 2.5 input was derived from pm peak hourly turning movement data available in the Lloyd Expressway (SR 62) Corridor Traffic Analysis (Lochmueller Group 2022) in the same manner as the 2019 existing condition. Vehicle classification breakdown was again based on 2020 turning movement traffic count percentages in the corridor traffic analysis report. Automobile volumes were again split equally across all SR 62 through lanes, while higher truck volumes were skewed to the outer lanes closest to the adjacent receptors. A comparison of the 2019 and 2040 pm peak hour traffic along SR 62 summarized in Figure 2 indicates that the traffic volumes are expected to increase between 10.5 to 12.2 percent over this 20 year span.

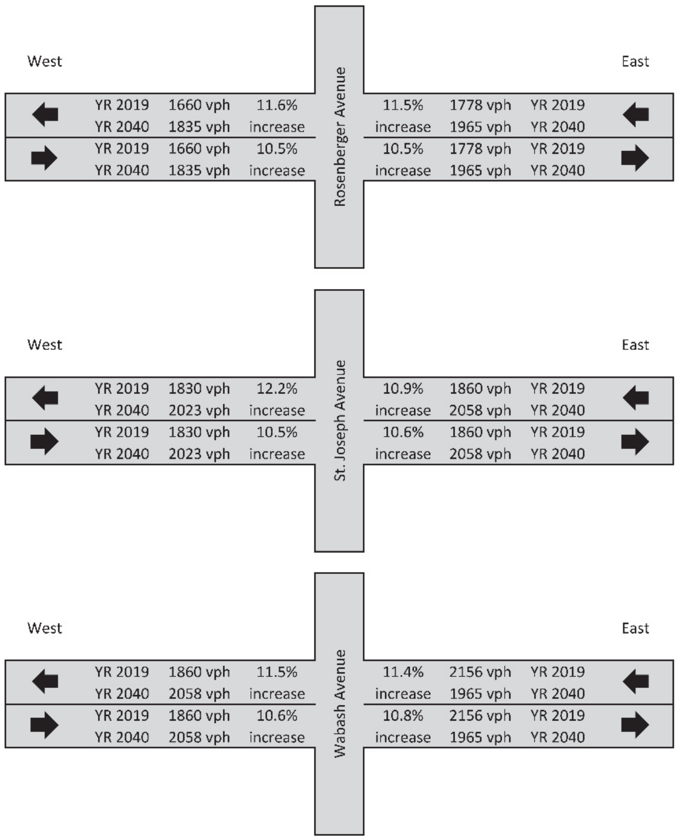

Figure 2. Predicted traffic volume increases on SR 62 from 2019 to 2040

8.2 Receptors

Since there are no residential or business relocations anticipated for the SR 62 reconstruction, intersection improvement, and bridge replacement project, all 358 receptor points included in the 2019 existing condition analysis were also included in the 2040 design year model.

8.3 Barriers

Fixed height barriers were again used in the 2040 design year model set-up as in the existing condition model to represent large buildings in NSA 8. Because the reconstruction design calls for the use of TCB at multiple locations along the north and south side, as well as within the median of SR 62, these features were also included in the 2040 design model. The TCB features were modeled as reflective surfaces with a height of 3.75 feet for all areas where potential noise abatement barriers were not anticipated. This included the median, Barker Avenue westbound exit ramp, and Corbierre Avenue westbound exit ramp.

Noise abatement test barriers were included at locations where predicted NAC impacts were identified and abatement was initially considered feasible based on results from the 2040 design year model. For NSA 4 and NSA 5, the abatement test barriers were located on the

TCBs along the north and south side of SR 62 as called for in the current Stage 2 plans. In these instances, the base height of the TCB feature in the TNM 2.5 model was set at 4 feet to allow for integer instead of fractional incremental increases in the noise barrier height during the abatement analysis process. These are described in further detail in Section 10 2040 Design Year Noise Abatement Evaluation.

8.4 Terrain Lines

All terrain lines used in the existing condition were either retained or modified in the design year set-up to reflect expansion of the roadway fill section to the north, inclusion of MSE walls, and changes along exit and entrance ramps. Terrain lines were used to the extent deemed practical to address landscape terrain changes relevant to sound propagation between roadways and receptors.

8.5 Building Rows

As with the 2019 existing condition model, building row features were not used in TNM 2.5 to account for possible shielding of second row receptors by first row receptors. Therefore, resulting noise levels generated from TNM 2.5 for second row receptors are likely slightly higher than actually experienced.

8.6 Ground Zones and Tree Zones

The default ground type set for the 2040 design TNM 2.5 model was lawn. Large parking lots and reflective ground surfaces in NSA 1, 6, and 8 from the 2019 existing condition model were retained in the 2040 design year model. No new ground zones were warranted for the proposed roadway design. No tree zones were included.

9 2040 Design Year Identification of Predicted Impacted Receptors

In 23 CFR 772, FHWA establishes two conditions under which highway traffic noise impacts can occur.

1. The predicted future noise levels approach or exceed the appropriate NAC for the land use. INDOT defines “approach” to be within 1.0 dB(A) of the appropriate noise abatement category.
2. The predicted future traffic noise levels substantially exceed the existing noise levels. INDOT defines “substantial increase” as an increase in noise levels for which the future nose levels exceed the existing noise levels (as predicted by FHWA TNM version 2.5) by 15.0 dB(A).

The results of the 2040 design year Leq(h) level prediction for the receptors within the noise sensitive areas along SR 62 are included in Appendix B Table 5 and illustrated on Appendix A Figure 3. TNM 2.5 output for each of the NSA design year model runs are included in Appendix G. Collectively, 2040 Leq(h) predicted levels range from 50.5 dB(A) at a second row receptor in NSA 7 to 74.4 dB(A) at the CSI Complex LLC immediately north of SR 62 in NSA 8. Category B and C NAC 67 dB(A) impacts would occur in NSA 4, NSA 5, NSA 7, NSA 8, and NSA 9. Category E/F NAC 72 dB(A) impacts would be limited to businesses in close proximity to SR 62 in NSA 8.

9.1 NSA 4 2040 Design Year Impacts

At NSA 4 there are 22 first row residential receptors along Corbierre Avenue that would be impacted with Leq(h) levels above 66 dB(A) in 2040. Appendix A Figure 3 Sheet 3 illustrates the 2040 impacted receptors as red data points. Despite the expected 10 to 12 percent increase in traffic along SR 62, five fewer residential impacts are anticipated in 2040 than documented from the 2019 existing condition model. Several Corbierre Avenue receptors west of Ingle Avenue are predicted to experience moderate Leq(h) level reductions of up to 3.6 dB(A) in 2040 compared to 2019 model results. This is attributed to the inclusion of the TCB between SR 62 and Corbierre Avenue that starts midway between Walker Avenue and Ingle Avenue and extends west across the Tekoppel Avenue overpass. While only 4 feet in height, this safety design feature provides a small degree of tire/pavement noise attenuation from SR 62 to the receptors that is not a factor in the existing condition. However, this small attenuation is enough to offset the increase in traffic and also reduce the predicted Leq(h) to levels below 66 dB(A) for five of the residences west of Walker Avenue.

9.2 NSA 5 2040 Design Year Impacts

At NSA 5 there are 18 first row residential receptors along Forest Avenue that would be impacted with Leq(h) levels above 66 dB(A) in 2040. Appendix A Figure 3 Sheet 3 illustrates the 2040 impacted receptors as red data points. As with NSA 4, despite the increase in traffic along SR 62, four fewer residential impacts are anticipated in 2040 than documented from the 2019 existing condition model. Again, the Leq(h) reduction is attributed to the inclusion of TCBs at two locations along the south side of SR 62. The receptors that drop below the impact threshold include one residence west of Walker Avenue and three residences east and west of Addison Avenue. The 18 impacted residences are all located between Walker Avenue and Addison Avenue.

9.3 NSA 7 2040 Design Year Impacts

At NSA 7 there are 25 first row residential receptors along Pennsylvania Street that would be impacted with Leq(h) levels above 66 dB(A) in 2040. Appendix A Figure 3 Sheet 4 illustrates the 2040 impacted receptors as red data points. These are the same 25 receptors identified as impacts from the 2019 existing condition TNM 2.5 model. Despite the anticipated 10 to 12 percent increase in hourly traffic, the predicted 2040 Leq(h) levels generally remained the same or only increased slightly compared to 2019 model results. This lack of increase in the predicted design year Leq(h) is attributed primarily to a minor shift in the eastbound lanes to the north away from Pennsylvania Street and the receptors. There are no TCBs proposed along this portion of SR 62 that would provide tire/pavement noise attenuation. While the top of the embankment along the north edge of Pennsylvania Street provides a break in line-of-site between some of the SR 62 lanes and receptors, the lack of ground attenuation between SR 62 and these elevated receptors results in increased propagation rates between the source and receiver. A TNM 2.5 model excluding the close proximity traffic on Pennsylvania Street showed that even in the absence of traffic noise generated from Pennsylvania Street there would still be impacts to 23 of the 25 residences resulting from noise emanating from SR 62.

9.4 NSA 8 2040 Design Year Impacts

At NSA 8 there is one residential receptor (northeast corner of 12th Avenue and SR 62) that would be impacted with a 2040 predicted Leq(h) level of 72 dB(A). Five of the fifteen receptor points at Stop Light City Playground would also continue to be impacted locations under Category C in the park with predicted Leq(h) levels from 66.0 dB(A) and 71.3 dB(A). Category

E/F NAC 72 dB(A) impacted business include the same locations identified as impacts for the 2019 existing condition where the receptor point is at the proximal edge of the property along SR 62: Mead Johnson, George Koch Sons, LLC, Koch Air, LLC, CSI Complex LLC, Crosseyed Cricket, SST Investments, and Cook Portable Warehouses. Appendix A Figure 3 Sheets 5 and 6 illustrates the 2040 impacted receptors as red data points.

9.5 NSA 9 2040 Design Year Impacts

At NSA 9 there are three first row residential receptors along Indiana Street that would be impacted with Leq(h) levels above 66 dB(A) in 2040. Appendix A Figure 3 Sheet 6 illustrates the 2040 impacted receptors as red data points. These are the same three receptors identified as impacts from the 2019 existing condition TNM 2.5 model. Predicted Leq(h) levels are generally the same or only show a minor increase over 2019 existing condition results.

10 2040 Design Year Noise Abatement Evaluation

In instances where roadway noise impacts are predicted as a result of a Type I project action, FHWA and INDOT require that consideration be given to noise abatement measures. This process involves an evaluation of the feasibility (both acoustic and engineering feasibility) of implementing abatement that can achieve a 5 dB(A) reduction in predicted Leq(h) levels at the majority of the impacted receptors and do so without compromises to public safety and engineering standards. In situations where mitigation appears to be feasible, this process also requires a reasonableness evaluation based on the views of residents and property owners, the maximum square footage of abatement criteria, and the ability to achieve INDOT's substantial noise reduction goal of 7.0 dB(A) at the majority of impacted first row receptors through implementation of the abatement measure.

10.1 Consideration of Abatement

Noise abatement measures typically considered for mitigating impacted receptors include, but are not necessarily limited to, traffic control measures, alteration of vertical or horizontal alignment of the roadway(s), acquisition of buffering land, noise insulations of public use or non-profit institutional structures, and/or construction of traffic noise barriers (i.e., berms or walls). Traffic control measures in the form of traffic signals are already present on SR 62 and reduced operating speeds to reduce noise emissions on SR 62 is contrary to the project objective to maintain free-flow traffic operating speeds along this principal east-west travel corridor through Evansville.

Although changes in the vertical and horizontal alignment of a roadway can result in reduced noise levels at specific receptors, the SR 62 reconstruction project will only involve minor horizontal alignment shifts to accommodate the added travel lanes between St. Joseph Avenue and Rosenberger Avenue. With regards to vertical alignment alteration as a measure to abate traffic noise at impacted receptors, the greatest changes in vertical alignment would only occur at the CSX Railroad and Tekoppel Avenue overpasses to better improve sight distance. There are other opportunities to depress or elevate the existing roadway to change the propagation pathways and provide added noise attenuation. To lower or raise the entire roadway to adequately change the elevation of the existing roadway to achieve a 5 dB(A) reduction would require a substantial and costly change in vertical alignment, which is not anticipated to be feasible from an engineering perspective.

Because the majority of the frontage space along SR 62 is already developed, acquisition of buffering land would require the displacement of multiple business and/or residential receptors which is not compatible with the project objectives to minimize hardships beyond the required right-of-way.

There are no public use or non-profit institutional structures impacted within the study area where insulation of the structure to reduce interior noise levels requires consideration.

Considering the landscape circumstances associated with the SR 62 project area, the use of barriers (berms or walls) is considered to be the most practical and potentially feasible measure to use for abatement at the NSAs where 2040 impacts have been identified.

10.2 Feasibility and Reasonableness Assessment of Barrier Walls

According to the INDOT 2022 Traffic Noise Policy the feasibility of noise abatement at impacted receptors must be analyzed. If a barrier cannot be shown to be feasible, then it does not warrant further considered. Feasibility must be analyzed from an acoustic and engineering perspective. INDOT requires that abatement measures achieve a 5 dB(A) reduction at a majority (greater than 50 percent) of the impacted receptors in order to be considered acoustically feasible. The noise abatement measure must also be capable of achieving this criteria with an design that compatible with the roadway design and does not compromise engineering integrity.

Reasonableness is in part determined by INDOT in terms of the maximum square footage of abatement per benefited receptor. In instances where the majority of nearby receptors in a common noise environment were <u>not</u> constructed prior to the roadway, INDOT considers a barrier to be reasonable if the square footage per benefited receptor is 1000 square feet per benefited receptor or less. Where the majority of the nearby receptors were constructed prior to the roadway the maximum allowable square footage per benefited receptor is 1250 square feet per benefited receptor. For the SR 62 barrier noise analysis, the 1250 square feet per benefited receptor was used. INDOT has also established a noise abatement reasonableness design goal of 7dB(A) noise reduction for a majority (greater than 50 percent) of the benefited first row receptors.

Noise abatement in the form of barrier walls was investigated for each of the five NSA locations where Category B and C receptors were predicted to have Leq(h) levels equal to or above the NAC for the respective category.

The use of earthen berms instead of structural walls to provide abatement was not considered to be feasible because the width of the base for such berms that are over 12 feet in height is greater than the available space that exists along SR 62 between the roadway and the impacted receptors.

10.2.1 NSA 4 Corbierre Avenue Residences

Design year impacted receptors in NSA 4 include 22 first row residences located along Corbierre Avenue east of Tekoppel Avenue. Therefore, the focus of the abatement barrier analysis was impacted receptors and any additional first row non-impacted receptors where a 5 dB(A) benefit could be achieved. Since these properties face Corbierre Avenue and SR 62, the receptor point was placed in the front yards.

There are multiple proposed typical sections along Corbierre Avenue representing the access changes to Corbierre Avenue from SR 62. At the west end for a distance of approximately 644 feet (Sta. 50+16 to Sta. 56+60), the two-lane one-way Corbierre Avenue section has a short MSE wall along the south side between Corbierre Avenue and SR 62 (Figure 3). The adjacent SR 62 typical section includes a TCB along the north side of SR 62 that starts at the west end of the gore between Walker Avenue and Ingle Avenue and extends west over the Tekoppel Avenue bridge. From Ingle Avenue to approximately Addison Avenue (Sta. 59+06 to Sta. 63+48), the Corbierre Avenue typical section includes a single on-way westbound lane to provide local residents access to Tekoppel Avenue. The adjacent SR 62 typical section for this area also includes a TCB that starts at the gore zone and extends east along the north side of SR 62 between the roadway and Corbierre Avenue (Figure 4). The 170-foot gap between these two TCB features carries the new proposed SR 62 exit ramp that provides access to Corbierre Avenue and Tekoppel Avenue.

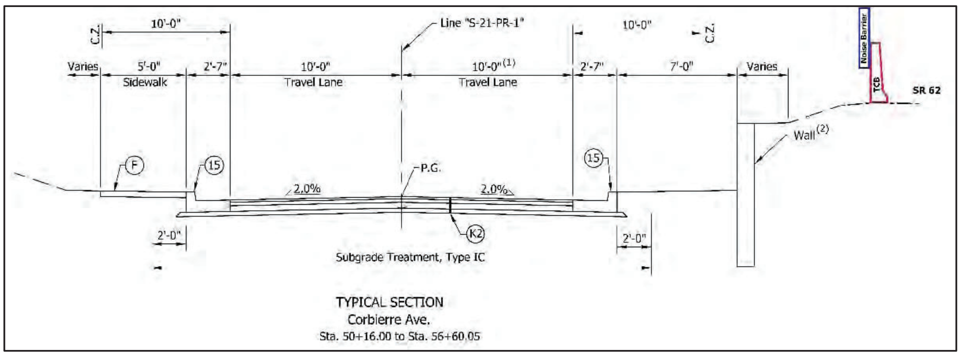

Figure 3 MSE wall, TCB, and attached noise barrier wall typical section between SR 62 and Corbierre Avenue east of Tekoppel Avenue

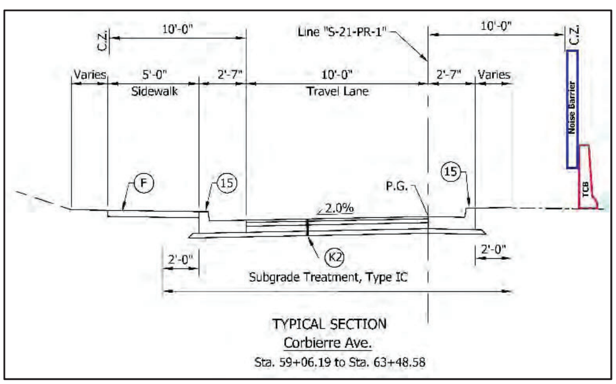

Figure 4 Corbierre Avenue typical section with TCB and attached noise barrier wall between Ingle Avenue and Addison Avenue

For the NSA 4 barrier noise analysis, a test barrier was placed at both TCBs. However, due to the exit ramp alignment from SR 62 to Corbierre Avenue, the 170-foot gap leaves a void through which SR 62 roadway noise would pass unabated to a few residential receptors on the north side of Corbierre Avenue. The use of overlapping parallel barriers to eliminate the gap is not feasible due to the tight confines of the ramp transition and the need to maintain clear zones for safety. Additionally, INDOT clear zone requirements would restrict attachment of a noise barrier on the back of the eastern TCB to 300 feet (Sta. 357+00 to 360+00 along SR 62). This would prevent use of the approximately 118 feet of the TCB east of the gore zone for barrier attachment. Furthermore, the two-way typical section of Corbierre Avenue east of Addison Avenue does not include sufficient space to install a noise barrier wall between the two abutting TCBs between SR 62 and Corbierre Avenue (Figure 5). For these reasons, the use of a noise barrier wall between SR 62 and Corbierre Avenue east of Ingle Avenue is not feasible from an engineering perspective. Therefore, the barrier analysis was conducted using two separate barrier wall sections to investigate the potential of providing 5dB(A) benefits where possible and assess design goal and reasonableness criteria primarily between Tekoppel Avenue and Addison Avenue.

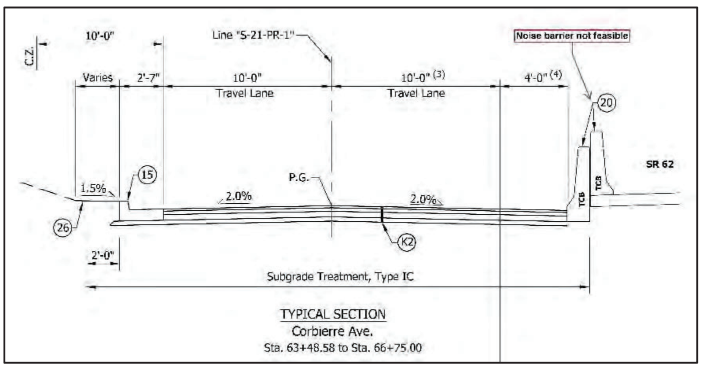

Figure 5 Corbierre Avenue typical section where noise barrier wall is not feasible east of Addison Avenue

Appendix A Figures 4A through 4D show the locations and heights of the test barriers. Appendix H includes the TNM 2.5 test barrier output. Appendix B Table 6 provides the individual receptor Leq(h) levels and insertion loss values for each test barrier. Table 2 summarizes the barrier performance in terms of the design goal, feasibility, and reasonableness criteria.

NSA 4 Barrier 4-1 (12ft)
Both sections of this split barrier totaling 950 feet (600 feet west of ramp, 350 east of ramp) have a uniform height of 12 feet. Barrier 4-1 design would benefit (≥5dB(A) insertion loss) 6 of the 22 impacted receptors. Barrier 4-1 is not considered reasonable in terms of square footage per benefited receptor and has the highest ratio of the four barriers evaluated. It would also not provide a ≥7dB(A) design goal insertion loss for any of the Corbierre Avenue receptors.

NSA 4 Barrier 4-2 (14ft)
Both sections of this split barrier totaling 950 have a uniform height of 14 feet. Barrier 4-2 would benefit (≥5dB(A) insertion loss) 10 of the 22 impacted receptors. Barrier 4-2 is considered reasonable in terms of square footage per benefited receptor, but only if the square footage of the TCB it is attached to is subtracted from the total barrier square footage. Barrier 4-2 has the lowest ratio of the four barriers evaluated.

However, it would only provide a ≥7dB(A) design goal insertion loss for 20 percent (2 of 10) of the benefited receptors.

NSA 4 Barrier 4-3 (16ft)
Both sections of this split barrier totaling 950 have a uniform height of 16 feet. Barrier 4-3 would benefit (≥5dB(A) insertion loss) the same 10 impacted receptors as Barrier 4-2, and one additional non-impacted receptor west of Walker Avenue. Barrier 4-3 is considered reasonable in terms of square footage per benefited receptor, but only if the square footage of the TCB it is attached to is subtracted from the total barrier square footage. Barrier 4-3 has the second lowest ratio of the four barriers evaluated. However, it would only provide a ≥7dB(A) design goal insertion loss for 36 percent (4 of 11) of the benefited receptors.

NSA 4 Barrier 4-4 (18ft)
Both sections of this split barrier totaling 950 have a uniform height of 18 feet. Barrier 4-4 would benefit (≥5dB(A) insertion loss) the same 10 impacted receptors as Barrier 4-2 and 4-3, and two additional non-impacted receptors west of Walker Avenue. Barrier 4-4 is considered reasonable in terms of square footage per benefited receptor, but only if the square footage of the TCB it is attached to is subtracted from the total barrier square footage. Barrier 4-4 has the second highest ratio of the four barriers evaluated. However, it would only provide a ≥7dB(A) design goal insertion loss for the same four benefited receptors (4 of 12 = 33 percent) as Barrier 4-3.

Table 2 NSA 4 barrier evaluation summary

Abatement Analysis Criteria		Barrier 4-1 12-ft	Barrier 4-2 14-ft	Barrier 4-3 16-ft	Barrier 4-4 18-ft
Feasible	Number of impacted receptors	22	22	22	22
	Number of impacted benefited receptors IL>5dB(A)	6	10	10	10
	Percent impacted with IL>5dB(A)	27%	45%	45%	45%
Reasonableness	Number of design goal receptors IL>7dB(A)	0	2	4	4
	Number of all benefited receptors IL>5dB(A)	6	10	11	12
	Percent benefited with IL>7dB(A)	0%	20%	36%	33%
	Barrier total square footage	11,400	13,300	15,200	17,100
	Barrier total square footage minus TCB square footage	8,550	10,450	12,350	14,250
	Square footage per benefited receptor (total footage)	1,900	1,330	1,382	1,425
	Square footage per benefited receptor (total footage minus TCB)	1,425	1,045	1,123	1,118

Green and red shaded values indicate the feasible, design goal, or reasonableness criteria (1,250 square feet per benefited receptor) is either met or not met by the test barrier.

Due to the limitations for barrier placement along the entire length of the Corbierre Avenue NSA imposed by the roadway design (i.e., split barrier for exit ramp, inability for parallel overlapping barriers, and clear zone restrictions), a barrier solution that meets the 5dB(A) reduction feasibility criteria, the 7dB(A) reduction design goal, and the square footage per benefited receptor reasonableness threshold is not possible for this location.

10.2.2 NSA 5 Forest Avenue Residences

Design year impacted receptors in NSA 5 include 18 first row residences located between Walker Avenue and Addison Avenue. Therefore, the focus of the abatement barrier analysis was impacted receptors and any additional first row non-impacted receptors to the east and west where a 5 dB(A) benefit could be achieved. Since these properties face Forest Avenue, the receptor point was placed in the backyard near the alley that runs between these properties and SR 62. The alley will remain as is following completion of the SR 62 reconstruction.

Based on the proposed typical section along the south side of SR 62, barrier placement/installation is proposed in two fashions. East of the Tekoppel Avenue bridge, the design includes an MSE wall with a TCB to Sta. 350+69, immediately west of Walker Avenue (Figure 6). The design includes a similar typical section with a MSE wall and TCB along the eastbound exit ramp to Barker Avenue (Line "SWR-1" Ramp) from Sta. 12+30 to Sta. 18+20. The design will include approximately 905 feet of steel guardrail between these two sections of TCB and approximately 735 feet of steel guardrail along the ramp from Sta. 18+20 to Sta. 25+54 (Figure 7). In those areas where the MSE wall and TCB occur, the noise abatement barrier would be attached to the back side of the TCB. Figure 8 illustrates this concept as it was used for the recently installed noise barrier walls along I-69 at Martinsville. For those areas where noise barrier is needed along steel guardrail, the noise barrier would be ground mounted and offset 4 feet from the guardrail for meet INDOT clearance standards.

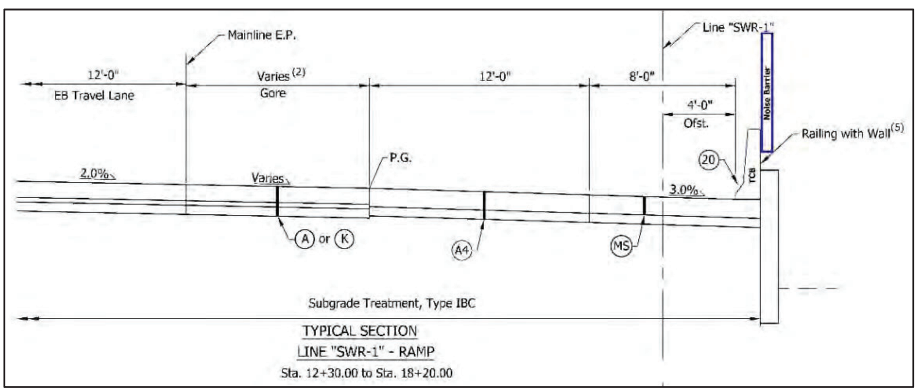

Figure 6. MSE wall and TCB typical section along south side of SR 62

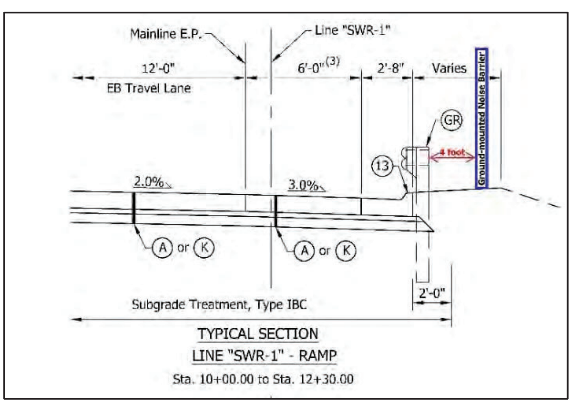

Figure 7. Guardrail typical section along Barker Avenue eastbound exit ramp

Figure 8. Noise barrier mounted to TCB on I-69 at Martinsville

Five different barrier height scenarios were evaluated to assess barrier performance in terms of insertion loss at impacted and non-impacted receptors in NSA 5. For Barriers 5-1 through 5-4, barrier heights were kept at constant heights and only varied when the barrier changed from TCB mounted to ground mounted along guardrails. Four of the test barriers included different combinations of 8-foot and 10-foot noise walls from the east side of the Tekoppel Avenue bridge to Barker Avenue. The fifth barrier focused on revisions to optimize barrier performance for the maximum number of benefited receptors. Because the barrier would be mounted to the backside of TCBs in some areas, the lower portion of the effective barrier square footage is a part of the roadway design regardless if barriers are used or not. Therefore, for the purposes of evaluating square footage per benefited receptor for reasonableness, two approaches are provided. The first calculates the square footage per benefited receptor as if the entire barrier wall is ground mounted. The second subtracts the lower 3 feet of the barrier from the calculation where the barrier is mounted to the back of the TCB.

Appendix A Figures 5A through 5E show the locations and heights of the test barriers. Appendix I includes the TNM 2.5 test barrier output. Appendix B Table 7 provides the individual receptor Leq(h) levels and insertion loss values for each test barrier. Table 3 summarizes the barrier performance in terms of the feasibility and reasonableness criteria.

NSA 5 Barrier 5-1 (8ft-8ft-8ft-8ft)
Barrier 5-1 has a uniform height of 8 feet along the entire 2,356 feet between Tekoppel Avenue and Barker Avenue. The Barrier 5-1 design would benefit (≥5dB(A) insertion loss) all 18 of the impacted receptors and one non-impacted receptor west of Walker Avenue and three non-impacted receptors east and west of Addison Avenue. The barrier is considered reasonable in terms of square footage per benefited receptor and has the second highest ratio of the five barriers evaluated. However, it only provides a ≥7dB(A) reasonableness design goal insertion loss for 32 percent (7 of 22) of the benefited receptors.

NSA 5 Barrier 5-2 (8ft-10ft-8ft-8ft)
For Barrier 5-2 the ground mounted section directly in front of the impacted receptors was elevated to 10 feet to increase the number of impacted receptors that would receive a 5 dB(A) insertion loss. The remaining sections of the barrier were retained at a base height of 8 feet. The Barrier 5-2 design would benefit (≥5dB(A) insertion loss) all 18 of the impacted receptors, one non-impacted receptor west of Walker Avenue and three non-impacted receptors east and west of Addison Avenue. The barrier is considered reasonable in terms of square footage per benefited receptor and has the highest ratio of the five barriers evaluated. It would also provide a ≥7dB(A) reasonableness design goal insertion loss for 73 percent (16 of 22) of the benefited receptors.

NSA 5 Barrier 5-3 (8ft-10ft-10ft-8ft)
For Barrier 5-3 the ground mounted section directly in front of the impacted receptors and the TCB mounted section between Addison Avenue and Tunis Avenue were elevated to 10 feet to increase the number of benefited/non-impacted receptors to the east. The two sections at the west end and east end were retained at a base height of 8 feet. The Barrier 5-3 design would benefit (≥5dB(A) insertion loss) all 18 of the impacted receptors, one non-impacted receptor west of Walker Avenue, six non-impacted receptors east and west of Addison Avenue, and one non-impacted receptor west of Leslie Avenue. Barrier 5-3 is considered reasonable in terms of square footage per benefited receptor and has the third highest ratio of the five barriers evaluated. Barrier 5-3 would also provide a ≥7dB(A) reasonableness design goal insertion loss for 69 percent (18 of 26) of the benefited receptors.

NSA 5 Barrier 5-4 (8ft-10ft-10ft-10ft)
For Barrier 5-4 the ground mounted section directly in front of the impacted receptors, the TCB mounted section between Addison Avenue and Tunis Avenue, and the ground mounted section along the Barker Avenue exit ramp were elevated to 10 feet to further increase the number of benefited/non-impacted receptors along the ramp. The TCB mounted western section was retained at a base height of 8 feet. The Barrier 5-4 design would benefit (≥5dB(A) insertion loss) all 18 of the impacted receptors, the same non-impacted receptors as Barrier 5-3 and two additional non-impacted receptors between Tunis Avenue and Leslie Avenue. Although the model only showed three receptors along the ramp with an insertion loss of ≥5dB(A), there were two additional receptors close to this threshold with predicted insertion losses

of 4.9 dB(A). Barrier 5-4 is considered reasonable in terms of square footage per benefited receptor and has the second lowest ratio of the five barriers evaluated. Barrier 5-4 would also provide a ≥7dB(A) reasonableness design goal insertion loss for 64 percent (18 of 28) of the benefited receptors.

NSA 5 Barrier 5-5 (8ft-10ft-14ft-12ft)
For Barrier 5-5, Barrier 5-4 was revised to optimize performance and produce 5 dB(A) insertion loss for as many non-impacted receptors between Addison Avenue and Leslie Avenue as possible. At the west end, 200 feet of barrier was eliminated since it did not provide 5 dB(A) insertion loss for receptors at the far west end of Forest Avenue. Raising barrier heights to 12 and 14 feet between Addison Avenue and east of Leslie Avenue yielded a total of 17 non-impacted benefited receptors from west of Addison Avenue to west of Leslie Avenue. For the residential receptor at 3103 Forest Avenue, TNM only predicted an insertion losses of 4.7 dB(A) for the 14-foot tall barrier at these locations. However, for the purposes of determining benefited receptors, the insertion loss was rounded to 5 dB(A) for this non-impacted receptor. Therefore, Barrier 5-5 provides 5 dB(A) reduction for a total of 36 first row receptors and a 7 dB(A) reduction for 19 receptors. Barrier 5-5 is considered reasonable in terms of square footage per benefited receptor and has the lowest ratio of the five barriers evaluated.

Table 3 NSA 5 barrier evaluation summary

Abatement Analysis Criteria		Barrier 5-1 8-8-8-8	Barrier 5-2 8-10-8-8	Barrier 5-3 8-10-10-8	Barrier 5-4 8-10-10-10	Barrier 5-5 8-10-14-12
Feasible	Number of impacted receptors	18	18	18	18	18
	Number of impacted benefited receptors IL>5dB(A)	18	18	18	18	18
	Percent impacted with IL>5dB(A)	100%	100%	100%	100%	100%
Reasonableness	Number of design goal receptors IL>7dB(A)	7	16	18	18	19
	Number of all benefited receptors IL>5dB(A)	22	22	26	28	36
	Percent benefited with IL>7dB(A)	32%	72%	69%	64%	53%
	Barrier total square footage	18,812	20,606	21,795	22,763	22,676
	Barrier total square footage minus TCB square footage	16,085	17,879	19,068	20,036	19,949
	Square footage per benefited receptor (total footage)	855	937	838	813	630
	Square footage per benefited receptor (total footage minus TCB)	731	813	733	716	554

Green and red shaded values indicate the feasible, design goal, or reasonableness criteria (1,250 square feet per benefited receptor) is either met or not met by the test barrier.

While Barriers 5-2, 5-3, and 5-4 each meet the benefited receptor feasible criteria as well as the reasonableness ≥7 dB(A) design goal and square footage per benefited receptor threshold, Barrier 5-5 is the recommended barrier design since it provides a 5 dB(A) insertion loss for 36 of the first row receptors (impacted and non-impacted). Barrier 5-5 ranges from 8 feet at the east and west ends to 14 feet in height along the lower portion of the Barker Avenue exit ramp. Between Walker Avenue and Addison Avenue the barrier is a consistent 10 feet in height. The barrier extends from midway between the Tekoppel Avenue bridge and Walker Avenue to approximately Leslie Avenue, for a length of 2,006 feet. Barrier 5-5 has the lowest square footage per benefited receptor value (630 square feet per benefited receptor). Portions of Barrier 5-5 would be mounted on TCBs while other areas will be ground-mounted.

NSA 5 Barrier 5-5 - Forest Avenue Owner/Tenant Resident Coordination

From Walker Avenue to Leslie Avenue there are 38 parcels along Forest Avenue, including one parcel located on Walker Avenue immediately west of Walker Avenue, that are included in the NSA 5 Barrier 5-5 range of benefitted receptors. The parcel at 3315 Forest Avenue owned by Destiny of Faith Community Church is vacant (i.e., lacks any occupied structures) and is not used for any exterior use that warrants the parcel be considered as a receptor. The parcel at 3017 Forest Avenue lacks a residential structure and is owned by the residents at 3015 Forest Avenue, therefore this parcel is not considered a separate receptor. Additionally, there is a parcel that includes a residential structure used as a duplex (3105 and 3107 Forest Avenue) that constitutes two receptors. Therefore, a total of 37 receptors comprise the NSA 5 Barrier 5-5 area. Of the 37 receptors, 23 are owner occupied, while the remaining 14 are rental properties with tenants. The NSA 5 Barrier 5-5 area includes a total of 51 owners and tenants for the 37 receptors. Five of the rental receptors are owned by the same landlord.

On January 30, 2023, coordination packets were mailed to 50 of the Forest Avenue owner/tenants. An additional packet was provided to the resident at 3105 Forest Avenue in the field. The packets included a cover letter, a survey form, map showing NSA 5 benefited receptors, the INDOT noise barrier brochure, and a self-addressed stamped envelope for returning the survey form (Appendix L). The cover letter explained the intent and importance of the public outreach to solicit the opinions of the benefited receptors concerning their support or lack of support for the proposed noise barrier along SR 62 for the Forest Avenue properties. February 23, 2023 was the deadline for return of the surveys.

In an effort to confirm receipt of the coordination packets, encourage residents to return the survey forms, and answer any questions concerning the proposed noise barrier, an attempt to contact benefited receptor residents door-to-door was conducted on February 4, 13, and 27, 2023. A total of 20 owners/tenants were contacted in person from this effort.

On February 15, 2023 from 5:30pm to 7:30pm (CST), Forest Avenue benefited receptor residents were invited to an informational meeting on the proposed noise barrier at the Red Bank Library. One of the Forest Avenue residents attended the meeting along with two other non-Forest Avenue local residents.

Of the 51 survey forms distributed, a total of 31 survey forms (61 percent) were returned: 19 owner occupied responses, 10 landlord responses, and 2 tenant response. Appendix M provides a listing of individual properties and survey results. The opinions of the residents/owners concerning their favorability or lack of favor for the proposed noise barrier are summarized as follows:

- 26 responses in favor of the noise barrier (84 percent)
    - 16 owner occupied responses
    - 1 tenant response
    - 9 landlord responses
- 4 responses with no opinion (13 percent)

  - 3 owner occupied responses
  - 1 landlord response
- 1 response (tenant) opposed to noise barrier (3 percent)

Since more than 50 percent of the benefited receptor owners/tenants responded and more than 50 percent of the respondents are in favor of implementation of the noise barrier, the public involvement component of the reasonableness criteria for the Forest Avenue NSA 5 Barrier 5-5 has been satisfied.

10.2.3 NSA 7 Pennsylvania Street Residences

Design year impacted receptors in NSA 7 include 25 first row residences located along Pennsylvania Street between Barker Avenue and Lemcke Avenue. Therefore, the focus of the abatement barrier analysis was impacted receptors and the eight additional first row non-impacted receptors where a 5 dB(A) benefit could be achieved. Since these properties face Pennsylvania Street and SR 62, the receptor point has been placed in the front yard.

Based on the proposed existing and typical section along the south side of SR 62, barrier placement/installation was considered in two locations: A) offset 4 feet to the south of the proposed steel guardrail along the south side of SR 62 between Barker Avenue and the Pennsylvania Street tie-in, B) offset 4 feet to the north of the existing guardrail along Pennsylvania Street. The base of the barrier wall along SR 62 would be at the approximate elevation as the roadway, whereas the Pennsylvania Street barrier would be at the top of the cut slope up to 25 feet above SR 62.

Appendix A Figure 6 shows the location and height of the test barriers. Appendix 7 includes the TNM 2.5 test barrier output. Appendix B Table 8 provides the individual receptor Leq(h) levels and insertion loss values for each test barrier.

NSA 7 Barrier 7A

Barrier 7A is along the back side of the guardrail on the south side of SR 62 between the Barker Avenue overpass and the Pennsylvania Street tie-in to SR 62. Because Barrier 7A is located at the base of a cut slope with the Pennsylvania Street receptors elevated above the SR 62 roadways, it was anticipated that a relatively tall barrier would be required to achieve feasibility criteria and reasonableness design goals in terms of benefited receptors. Three fixed height barriers (16-foot, 18-foot, and 20-foot) were evaluated along this 1,672-foot long barrier. The 20-foot tall barrier only resulted in a 5dB(A) insertion loss at 11 of the 25 impacted receptors (44 percent) and therefore did not meet the feasible criteria. With 14 benefited receptors, the 20-foot tall barrier is 2,388 square foot per benefited receptor and does not meet the reasonableness criteria of ≤1,250 square feet per benefited receptor. Furthermore, none of these tall barriers were able to achieve a 7dB(A) reasonableness design goal reduction. Table 4 summarizes the Barrier 7A performance in terms of the feasibility and reasonableness criteria.

Table 4 NSA 7A barrier evaluation summary

Abatement Analysis Criteria		Barrier 7A-1 16-foot	Barrier 7A-2 18-foot	Barrier 7A-3 20-foot
Feasible	Number of impacted receptors	25	25	25
	Number of impacted benefited receptors IL>5dB(A)	4	9	11
	Percent impacted with IL>5dB(A)	16%	36%	44%
Reasonableness	Number of design goal receptors IL>7dB(A)	0	0	0
	Number of all benefited receptors IL>5dB(A)	4	11	14
	Percent benefited with IL>7dB(A)	0%	0%	0%
	Barrier total square footage	26,746	30,089	33,432
	Square footage per benefited receptor (total footage)	6,687	2,735	2,388

Green and red shaded values indicate the feasible, design goal, or reasonableness criteria (1,250 square feet per benefited receptor) is either met or not met by the test barrier.

NSA 7 Barrier 7B

Barrier 7B is offset 4 feet from the guardrail along the north side of Pennsylvania Street and elevated above SR 62. Low height (8 and 10-foot) barriers were initially evaluated for insertion loss performance along this 1,672-foot long barrier; however, the 10-foot barrier only resulted in 5dB(A) reduction at seven of the impacted receptors. Taller 12-foot, 14-foot, and 16-foot barriers were elevated in terms of feasible and reasonableness design goal criteria. Each of these test barriers were capable of 5dB(A) insertion loss at 12 of 25 impacted receptors (48 percent); however, the 16-foot barrier would only result in a 7dB(A) reasonableness design goal reduction at 5 of the 19 benefited receptors (26 percent). The 12-foot and 14-foot barriers would both benefit 17 total receptors; however, only the lower 12-foot barrier has a square footage per benefited receptor (1,165 square feet per benefited receptor) within the reasonableness criteria. Raising the barrier height further would continue to improve the insertion loss performance for the receptors located in the central portion of Pennsylvania Street; however, receptors at the west end (2856 through 2830 Pennsylvania Street) and receptors at the east end (2612 through 2600 Pennsylvania Street) would still be subjected to roadway noise wrapping around the ends of the barriers. From an engineering perspective, extending the barrier length to the east is not practical due to sight distance safety concerns with merging traffic from Pennsylvania Street. Table 5 summarizes the Barrier 7B performance in terms of the feasibility and reasonableness criteria.

Installing a noise barrier wall along the north edge of Pennsylvania Street at the top of the cut section for SR 62 also poses a notable engineering concern. Immediately north of the Pennsylvania Street guardrail, the cut slope drops abruptly down to SR 62 and most of this length includes riprap for stabilization of the bank. Under the current road reconstruction design, there is no plan to regrade or alter this cut slope embankment. However, any effort to install a noise wall at the top of the embankment along Pennsylvania Street would require that the entire embankment be reshaped or possibly installation of an MSE wall from Barker Avenue down to the Pennsylvania Street tie-in. For this reason, Barrier 7B along Pennsylvania Street is not considered reasonable based on engineering concerns. Lastly, the Pennsylvania Street residences currently have a front yard view that looks out over the St. Joseph Avenue and Franklin Street landscape. Installation of a barrier wall along Pennsylvania Street would eliminate this vista and the wall might be perceived as more of a visual impact than the traffic is a noise impact.

Table 5 NSA 7B barrier evaluation summary

Abatement Analysis Criteria		Barrier 7B-1 12-foot	Barrier 7B-2 14-foot	Barrier 7B-3 16-foot
Feasible	Number of impacted receptors	25	25	25
	Number of impacted benefited receptors IL>5dB(A)	12	12	12
	Percent impacted with IL>5dB(A)	48%	48%	48%
Reasonableness	Number of design goal receptors IL>7dB(A)	0	1	5
	Number of all benefited receptors IL>5dB(A)	17	17	19
	Percent benefited with IL>7dB(A)	0%	6%	26%
	Barrier total square footage	19,805	23,106	26,406
	Square footage per benefited receptor (total footage)	1,165	1,359	1,390

Green and red shaded values indicate the feasible, design goal, or reasonableness criteria (1,250 square feet per benefited receptor) is either met or not met by the test barrier.

Based on the analysis for Barriers 7A and 7B, no noise abatement barrier wall is recommended for consideration.

10.2.4 NSA 8 Stop Light City Playground

Stop Light City Playground is a 1.9 acre park with 370 feet of the perimeter facing SR 62. The 2040 TNM 2.5 model predicts Leq(h) levels from 60.0 dB(A) to 71.3 dB(A) at the 15 receptors representing the playground. Based on these results, only the southern portion of the park closest to SR 62 represented by five of the 15 receptors would likely experience impact noise levels above 66 dB(A) in 2040. Nonetheless, a 370 foot long barrier along the southern property boundary (edge of sidewalk) was assessed for performance.

Appendix A Figure 7 shows the location and height of the test barriers. Appendix K includes the TNM 2.5 test barrier output. Appendix B Table 9 provides the individual receptor Leq(h) levels and insertion loss values for each test barrier. Table 5 summarizes the barrier performance in terms of the feasibility and reasonableness criteria.

NSA 8 Barrier 8-1 (8ft)

For Barrier 8-1, a barrier 8 feet in height would provide a 7+ dB(A) insertion loss at three receptors and a 5+ dB(A) insertion loss at one additional receptor in the southeastern portion of the park. However, the maximum insertion loss in the southwestern portion of the park would only be 4.3 dB(A). Based on INDOT policy, an 8-foot height barrier would in part be feasible since it achieves a 5 dB(A) reduction at a majority of the impacted receptor points. It would also be reasonable because it meets the design goal of a 7 dB(A) reduction for the majority of the benefited first row receptor points.

NSA 8 Barrier 8-2 (12ft)

For Barrier 8-2, a 12-foot barrier would increase the insertion loss in the southeast to as much as 12.3 dB(A) with a total of eight benefited receptors above 5 dB(A) insertion loss, including four of the five impacted receptors. However, the higher barrier would only result in one additional benefited receptor in the southwest. The better performance of the barrier in the southeastern area is attributed to the receptors being closer to the barrier, but more importantly the abatement provided by the building to the east which eliminates sound wrapping around the east end of the barrier. Conversely, the southwestern receptors are further back from the barrier and are exposed to traffic noise that wraps around the west end of the barrier.

Table 6 NSA 8 barrier evaluation summary

Abatement Analysis Criteria		Barrier 8-1 8-foot	Barrier 8-2 12-foot
Feasible	Number of impacted receptors	5	5
	Number of impacted benefited receptors IL>5dB(A)	3	4
	Percent impacted with IL>5dB(A)	60%	80%
Reasonableness	Number of design goal receptors IL>7dB(A)	3	4
	Number of all benefited receptors IL>5dB(A)	4	8
	Percent benefited with IL>7dB(A)	60%	80%
	Barrier total square footage	2,964	4,447
	Square footage per benefited receptor	741	556

Green and red shaded values indicate the feasible, design goal, or reasonableness criteria (1,250 square feet per benefited receptor) is either met or not met by the test barrier.

For either the 8-foot or the 12-foot barrier scenario, only the southeast quarter of the park would be benefited. A 370-foot long barrier (Barrier 8-1 or Barrier 8-2) in this urban environment is not considered feasible or practical from a landscape setting perspective. Installation of even a short 8-foot noise barrier wall along the entire southern boundary of the park would require trimming of limbs or possible removal of mature trees near the southern edge. It would prevent access to the park from the SR 62 sidewalk where there are currently two gates in the chain link fence. Because the park has a southern exposure, any wall constructed would cast shadows into the park and would block welcomed southwest winds during the summer months. Such a barrier wall may also pose maintenance issues for the utility pole at the southern boundary with east-west and north-south transmission lines. Visibility of the park from SR 62 provides a certain level of passive monitoring of activities within the park, which would be lost through installation of a noise wall. From a safety perspective, a barrier wall at this location would create a secluded and darkened area in the park. Playgrounds are typically noisy environments on their own with youth activities. Since the northern portion of the park would only experience design year Leq(h) in the low 60s dB(A), any visitors desiring a “quieter” setting could utilize this portion of the park for activities such a picnics. The park currently has an open landscape atmosphere to its setting. The addition of a noise wall would lessen the visual perception of the park from SR 62. Based on this assessment, installation of a noise wall is believed to compromise too many of the favorable attributes of the park for the gain of a moderate degree of noise reduction along the southern edge; therefore, it is not considered feasible.

10.2.5 NSA 9 Indiana Street Residences

Of the eleven single dwelling and multi-unit residential properties along Indiana Street to the north of SR 62 and east of Wabash Avenue, only three would be impacted with 2040 predicted Leq(h) levels of 67.1 dB(A) to 68.5 dB(A) that approach or exceed the

67 dB(A) Category B NAC. All three of these receptors are at the western end of the first row of residences. A noise barrier wall was not modeled for this location because it is not acoustically feasible to construct a barrier wall along the north side of SR 62 that terminates at Wabash Avenue. Any such barrier would still allow roadway noise to wrap around the western end of the wall and would therefore not be capable of achieving a 5 dB(A) reduction. From an engineering perspective, sight distance between SR 62 and Wabash Avenue would also likely be compromised by a barrier wall extending too far to the west in the northeast corner of the intersection. Turning the wall to the north along Wabash Avenue is also not possible due to the conflict with the alley access between the residences and SR 62.

10.3 Statement of Likelihood

Based on the studies completed to date, the State of Indiana has identified 79 impacted receptors and has determined that noise abatement is likely, but not guaranteed, at one location (Table 7).

Table 7 Characteristics or recommended barriers for SR 62

Noise Barrier	Preliminary General Location	GIS Location Start/End (Lat./Long.)	Average Height (feet)	Length (feet)	Area (square feet)	Material (Construction Material, Surface Texture, Foundation)
NSA 5-5	South side of SR 62 between Tekoppel Avenue overpass and Barker Avenue	Start 37.977439 -87.617946 End 37.977518 -87.611210	10.9	2,006	22,676[1] 19,949[2]	Precast Concrete Absorptive TCB and Ground Mounted

[1] Total square footage of barrier, ground to top of barrier.
[2] Total square footage of barrier minus 3-foot at base for TCB mounted barriers.

Noise abatement at this location is based upon preliminary design criteria. Noise abatement in this location at this time has been estimated to reduce the noise level by a minimum of 7dB(A) at a majority of the identified impacted receptors. A reevaluation of the noise analysis will occur during final design. If during final design it has been determined that conditions have changed such that noise abatement is not feasible and reasonable, the abatement measures might not be provided. The final decision on the installation of any abatement measure(s) will be made upon the completion of the project's final design and the public involvement process. The viewpoints of the benefited residents and property owners were sought and were considered in determining the reasonableness of highway traffic noise abatement measures for proposed highway construction projects. INDOT will incorporate highway traffic noise consideration in on-going activities for public involvement in the highway program.

11 Construction Noise

Construction of the SR 62 Improvement Project will result in unavoidable construction noise from equipment such as excavators, backhoes, pavement saws, graders, pavers, concrete trucks, compressors and other miscellaneous equipment. When and where possible, construction noise for this project should be controlled or minimized by measures including, but not limited to:

- Contractors should adhere to all federal, state and local noise abatement and control requirements.

- Limit construction activities in the vicinity of residences to the hours between 7:00 am and 7:00 pm, or as directed by local ordinances.
- Establish a responsive communication process with local residents that provides a contact number where inquiries concerning construction activities can be addressed.
- Enclose equipment such as generators when in operation during periods of residential occupancy in the immediate vicinity.
- Maintain construction equipment in good working order with manufacturer recommended mufflers.
- Coordinate the location of staging areas and other noise generating activities away from residential areas whenever possible.

These measures should be included in the National Environmental Policy Act (NEPA) document as For Further Consideration Commitments.

12 Noise Compatible Future Development

The roadway traffic noise environment along busy thoroughfares is an important element for consideration in the planning of development within travel corridors. Information concerning the anticipated noise levels adjacent to roadways can assist local governments, planners and developers in the appropriate type, location and layout of future development on land that is currently undeveloped. With this information available, less noise sensitive uses such as commercial, industrial, recreational, or green space development can be targeted for areas immediately adjacent to roadways, while future noise impacts to more sensitive development such as housing areas can be avoided.

Currently, the urban study area is largely developed with only a few undeveloped parcels along SR 62 between Rosenberger Avenue and Wabash Avenue. The partially wooded parcel south of SR 62 immediately east of Carpentier Creek has remained undeveloped for decades and has previously been used to deposit fill material. Direct access to this parcel from SR 62 will remain as is in the proposed design. Although there are no current plans for development, it is foreseeable, that over the next 20 years this property may eventually become commercially developed. The two unused parking lots on the north side of SR 62 between St. Joseph Avenue and Lemcke Avenue and west of Lemcke Avenue were once parking facilities for the Mead Johnson Nutrition Company. Several years ago, these parcels were purchased by INDOT and are now only used periodically for F. J. Reitz football game parking and West Side Nut Club Fall Festival Parking. As such, these parcels and not considered to be available for any foreseeable future development.

To plan for future development, a basic understanding of where potential noise impacts are predicted along the corridor is helpful. In an effort to provide assistance to the City of Evansville planners in understanding where such impacts can be expected, TNM 2.5 was utilized to estimate a 66 dB(A) impact zone along SR 62 at the Carpentier Creek location where undeveloped Category G properties are located.

The 66 dB(A) zone identifies an area within which Leq(h) levels are expected to be at 66 dB(A) or higher. This was accomplished through the use of receptor data points oriented in rows perpendicular to the SR 62 roadway at 10-foot intervals. Two receptor rows were included within the parcel for this purpose. The resulting TNM 2.5 data was reviewed to determine the distance from the roadway at which the design year Leq(h) is anticipated to be equal or greater than 66 dB(A) based on 2040 traffic volumes. In general, Leq(h) levels at or above 66 dB(A) are predicted to occur at up to 100 feet from the edge of the outside eastbound travel lane (Appendix A Figure 8).

13 Summary

The proposed SR 62 improvements include added travel lanes, intersection improvements (Rosenberger Avenue, St. Joseph Avenue, and Wabash Avenue), and three bridge replacements. along approximately 1.9 miles of existing SR 62. As a result of these improvements, SR 62 will be a six-lane roadway throughout this section. The horizontal alignment will be shifted slightly to the north between St. Joseph Avenue and Rosenberger and the vertical alignment will only be slightly changed to improve sight distance at the Tekoppel Avenue and CSX Railroad overpasses.

Within 500 feet of the SR 62 roadway, the project area consists of a mixture of various single-family and apartment residential areas, commercial businesses, industrial plants, and a few undeveloped parcels. The project will require the minor acquisition of new right-of-way; however, no relocations are anticipated. The project area was divided into nine noise sensitive areas.

Ambient roadway traffic noise was monitored at nine locations and used to validate the TNM 2.5 models that were developed for the study analysis. The existing condition model was validated at all but two of the ambient monitoring sites. A total of 358 receptor points were included in the existing condition model to represent 298 Category B residential dwellings, various 21 Category C locations, one Category D facility, and 40 Category E and F properties. Using 2019 base condition traffic data from the Lloyd Expressway (SR 62) Corridor Traffic Analysis, the existing condition TNM 2.5 model results indicate that roadway traffic noise impacts are currently being experienced at 78 single-family residential dwellings, Stop Light City Playground, and seven commercial/industrial properties.

The proposed SR 62 reconstructed lane configurations were modeled using TNM 2.5 and 2040 peak hour traffic volumes from the Lloyd Expressway (SR 62) Corridor Traffic Analysis to predict the Leq(h) levels for the project in the design year. The analysis predicted that Category B impacts (approach or greater than the 67 dB(A) NAC threshold) can be expected at 69 single-family residential dwellings within NSA 4, NSA 5, NSA 7, NSA 8, and NSA 9. Additionally, the Stop Light City Playground along the north side of SR 62 between 12th Avenue and 10th Avenue would continue to be impacted. Category E/F impacts (approach or greater than the 72 dB(A) NAC threshold) to commercial and industrial facilities between St. Joseph Avenue and Wabash Avenue would remain unchanged.

Noise barrier analyses were conducted for NSA 4, NSA 5, NSA 7, and the Stop Light City Playground in NSA 8 to determine if abatement measures would be feasible and reasonable in accordance with INDOT criteria. From this analysis, a proposed design barrier that meets the feasibility criteria of 5dB(A) insertion loss for 50 percent of impacted receptors, the reasonableness design goal insertion loss of 7dB(A) for 50 percent of the benefited receptors, and the barrier area threshold of 1,250 square feet per benefited receptor was developed and is recommended for residential receptors along Forest Avenue in NSA 5. Barrier 5-5 is 2,006 feet long, would range from 8- to 14-foot tall, and would benefit all 18 impacted receptors, plus 18 additional non-impacted receptors. The 7dB(A) design goal insertion loss would be achieved at approximately 50 percent of the benefited receptors. The Public Involvement component of the reasonableness criteria included a survey of the benefited receptors along Forest Avenue. Greater than 50 percent of the benefited receptor residents/owners responded to the survey and greater than 50 percent of the responses were in favor of proposed NSA 5-5 noise barrier.

A noise abatement barrier at NSA 4 along Corbierre Avenue would not be possible due to poor barrier performance attributed to engineering design restrictions. A noise barrier at NSA 7 along Pennsylvania Street would not be feasible and reasonable due to terrain and engineering considerations. Lastly, although a noise barrier to reduce roadway noise at Stop Light City Playground (NSA 8) meets INDOT design goal, feasible, and reasonable criteria, installation of a noise barrier at this location is not considered compatible with the landscape and urban setting of the park, and is therefore not recommended for further consideration.

A final determination on noise abatement for the SR 62 Improvement Project will be made during the final design phase. At such time, if design elements have changed that warrant a re-evaluation of the predicted noise levels, additional noise analysis will be performed to determine if impacts are anticipated, and if so, noise abatement measures will be further evaluated.

14 Literature Cited

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15 List of Preparers

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Appendix A
Figures

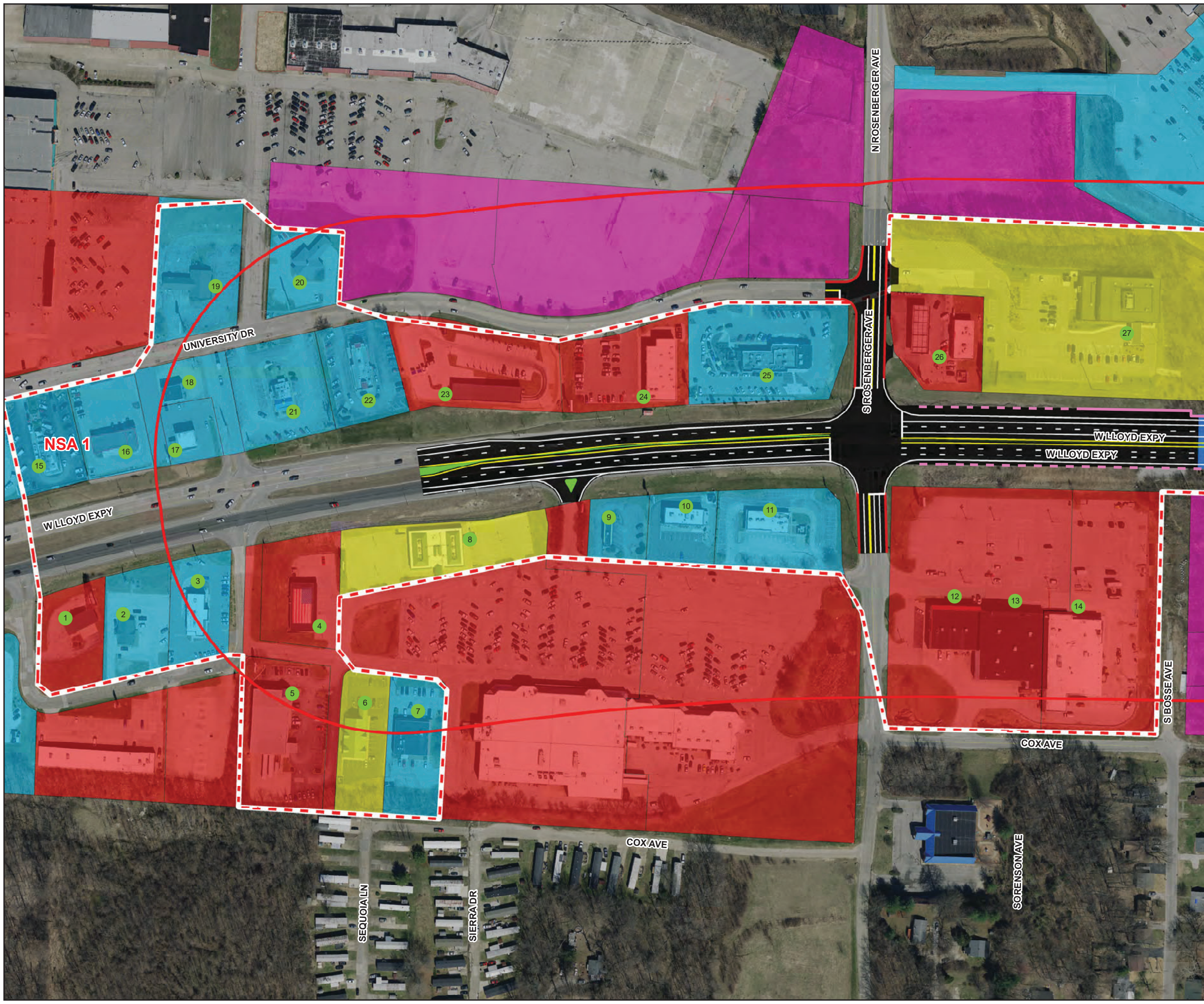

Figure 3 (Sheet 1 of 6)
2019 Existing and 2040 Design Year Results

Legend

- Pavement
- Bridge
- Curb/Gutter
- Median
- Design guardrail
- Design traffic control barrier
- 500 Foot Buffer Study Area

TNM 2019 and 2040 Impacts

- 2019 Impact / 2040 Impact
- 2019 Impact / 2040 No Impact
- 2019 No Impact / 2040 No Impact
- Noise Senstive Area Limits

Activity Category

- Category B (NAC = 67 dBA)
- Category C (NAC = 67 dBA)
- Category D (NAC = 52 dBA interior)
- Category E (NAC = 72 dBA)
- Category F (NAC = 72 dBA)
- Category G (No NAC)

SR62 Road Reconsruction, Intersection Improvements and Bridge Replacements
Rosenberger Ave. to Wabash Ave.
Lead Des. No. 1900308
Highway Noise Analysis

N W E S

Base Map:
Vanderburgh County 2019 Aerial Photo

1:2,400

Created by: R. Yeager
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Figure 3 (Sheet 2 of 6)
2019 Existing and 2040 Design Year Results

Legend

- Pavement
- Bridge
- Curb/Gutter
- Median
- Design guardrail
- Design traffic control barrier
- 500 Foot Buffer Study Area

TNM 2019 and 2040 Impacts

- 2019 Impact / 2040 Impact
- 2019 Impact / 2040 No Impact
- 2019 No Impact / 2040 No Impact
- Noise Senstive Area Limits

Activity Category

- Category B (NAC = 67 dBA)
- Category C (NAC = 67 dBA)
- Category D (NAC = 52 dBA interior)
- Category E (NAC = 72 dBA)
- Category F (NAC = 72 dBA)
- Category G (No NAC)

SR62 Road Reconsruction, Intersection Improvements and Bridge Replacements
Rosenberger Ave. to Wabash Ave.
Lead Des. No. 1900308
Highway Noise Analysis

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Base Map:
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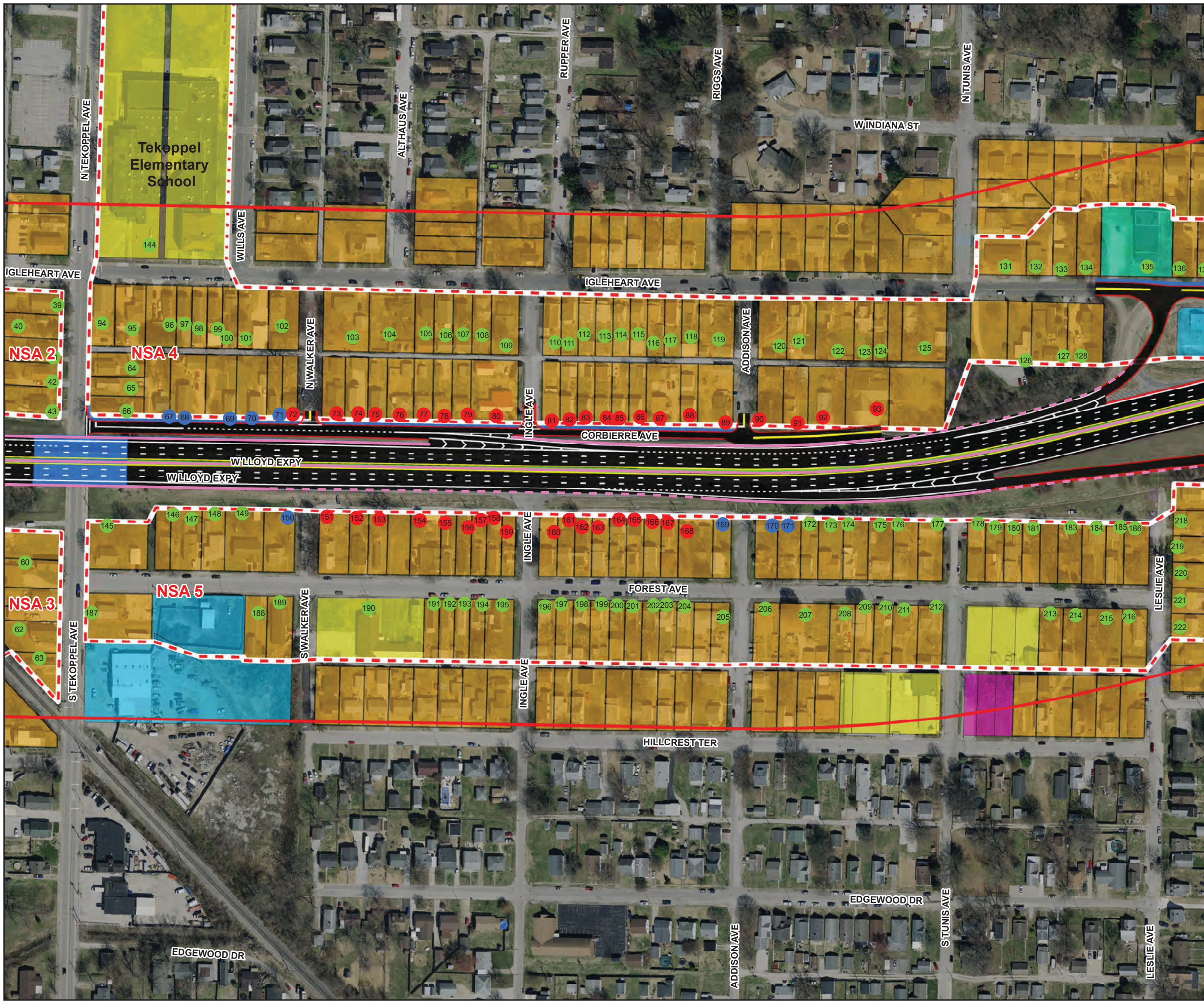

Figure 3 (Sheet 3 of 6)
2019 Existing and 2040 Design Year Results

Legend

- Pavement
- Bridge
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- Median
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TNM 2019 and 2040 Impacts

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- 2019 Impact / 2040 No Impact
- 2019 No Impact / 2040 No Impact
- Noise Senstive Area Limits

Activity Category

- Category B (NAC = 67 dBA)
- Category C (NAC = 67 dBA)
- Category D (NAC = 52 dBA interior)
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- Category F (NAC = 72 dBA)
- Category G (No NAC)

SR62 Road Reconsruction, Intersection Improvements and Bridge Replacements
Rosenberger Ave. to Wabash Ave.
Lead Des. No. 1900308
Highway Noise Analysis

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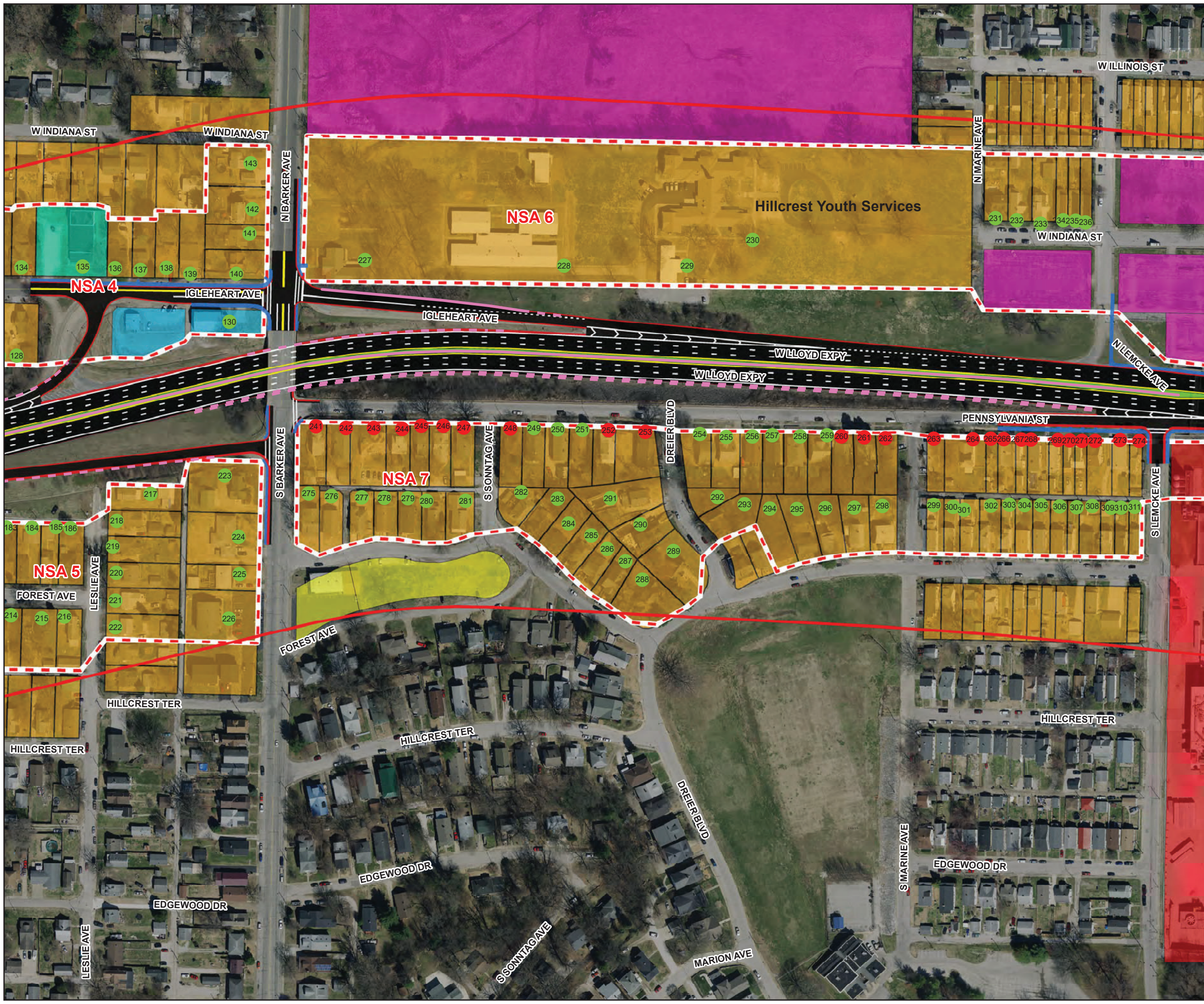

Figure 3 (Sheet 4 of 6)
2019 Existing and 2040 Design Year Results

Legend

- Pavement
- Bridge
- Curb/Gutter
- Median
- Design guardrail
- Design traffic control barrier
- 500 Foot Buffer Study Area

TNM 2019 and 2040 Impacts

- 2019 Impact / 2040 Impact
- 2019 Impact / 2040 No Impact
- 2019 No Impact / 2040 No Impact
- Noise Senstive Area Limits

Activity Category

- Category B (NAC = 67 dBA)
- Category C (NAC = 67 dBA)
- Category D (NAC = 52 dBA interior)
- Category E (NAC = 72 dBA)
- Category F (NAC = 72 dBA)
- Category G (No NAC)

SR62 Road Reconsruction, Intersection Improvements and Bridge Replacements
Rosenberger Ave. to Wabash Ave.
Lead Des. No. 1900308
Highway Noise Analysis

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Base Map:
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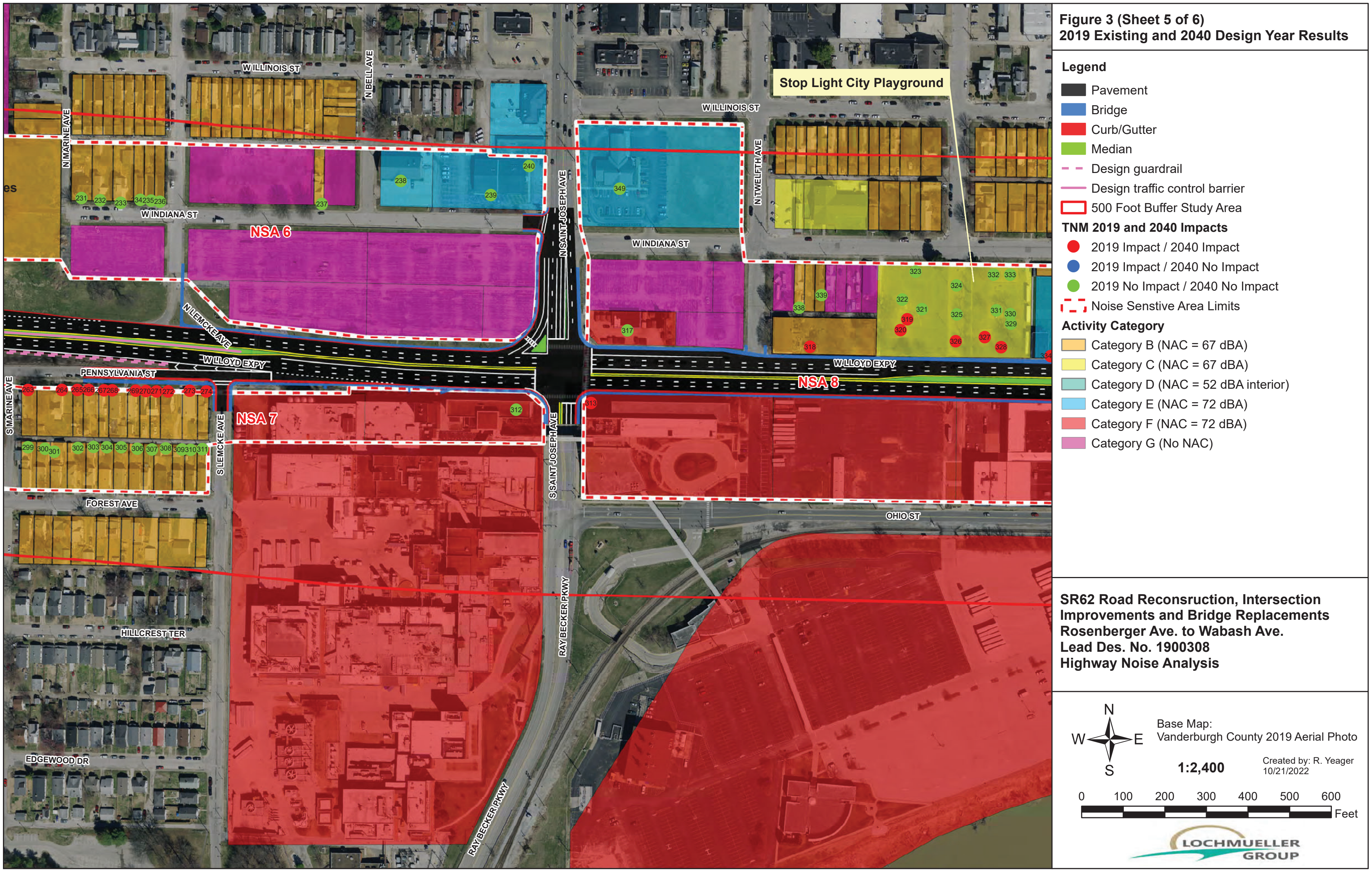
Figure 3 (Sheet 5 of 6)
2019 Existing and 2040 Design Year Results
Legend
Pavement
Bridge
Curb/Gutter
Median
Design guardrail
Design traffic control barrier
500 Foot Buffer Study Area
TNM 2019 and 2040 Impacts
2019 Impact / 2040 Impact
2019 Impact / 2040 No Impact
2019 No Impact / 2040 No Impact
Noise Senstive Area Limits
Activity Category
Category B (NAC = 67 dBA)
Category C (NAC = 67 dBA)
Category D (NAC = 52 dBA interior)
Category E (NAC = 72 dBA)
Category F (NAC = 72 dBA)
Category G (No NAC)
SR62 Road Reconsruction, Intersection Improvements and Bridge Replacements
Rosenberger Ave. to Wabash Ave.
Lead Des. No. 1900308
Highway Noise Analysis
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Feet
Stop Light City Playground
NSA 6
NSA 7
NSA 8
W ILLINOIS ST
W INDIANA ST
W LLOYD EXPY
PENNSYLVANIA ST
FOREST AVE
HILLCREST TER
EDGEWOOD DR
OHIO ST
N MARINE AVE
S MARINE AVE
N BELL AVE
N LEMCKE AVE
S LEMCKE AVE
N SAINT JOSEPH AVE
S SAINT JOSEPH AVE
N TWELFTH AVE
RAY BECKER PKWY

Figure 3 (Sheet 6 of 6)
2019 Existing and 2040 Design Year Results

Legend

- Pavement
- Bridge
- Curb/Gutter
- Median
- Design guardrail
- Design traffic control barrier
- 500 Foot Buffer Study Area

TNM 2019 and 2040 Impacts

- 2019 Impact / 2040 Impact
- 2019 Impact / 2040 No Impact
- 2019 No Impact / 2040 No Impact
- Noise Senstive Area Limits

Activity Category

- Category B (NAC = 67 dBA)
- Category C (NAC = 67 dBA)
- Category D (NAC = 52 dBA interior)
- Category E (NAC = 72 dBA)
- Category F (NAC = 72 dBA)
- Category G (No NAC)

SR62 Road Reconsruction, Intersection Improvements and Bridge Replacements
Rosenberger Ave. to Wabash Ave.
Lead Des. No. 1900308
Highway Noise Analysis

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Abatement Analysis Criteria		Barrier 4-1 12-ft
Feasible	Number of impacted receptors	22
	Number of impacted benefited receptors IL>5dB(A)	6
	Percent impacted with IL>5dB(A)	27%
Design Goal	Number of design goal receptors IL>7dB(A)	0
	Number of all benefited receptors IL>5dB(A)	6
	Percent benefited with IL>7dB(A)	0%
Reasonableness	Barrier total square footage	11,400
	Barrier total square footage minus TCB square footage	8,550
	Square footage per benefited receptor (total footage)	1,900
	Square footage per benefited receptor (total footage minus TCB)	1,425

Figure 4A
2040 Design Year NSA 4 Barrier 4-1

Legend

- 7 Impacted with >=7dBA benefit
- 5 Impacted with >= 5dBA benefit
- Impacted with no 5dBA benefit
- 5 Not impacted with >=5dBA benefit
- 3 Not impacted with >=3dBA reduction
- Not impacted with <3dBA reduction
- Barrier 4-1 TCB-mounted
- Design traffic control barrier
- Pavement
- Bridge
- Curb/Gutter
- Median
- 500 Foot Buffer Study Area
- Noise Senstive Area Limits

Activity Category

- Category B (NAC = 67 dBA)
- Category C (NAC = 67 dBA)
- Category D (NAC = 52 dBA interior)
- Category E (NAC = 72 dBA)
- Category F (NAC = 72 dBA)
- Category G (No NAC)

SR62 Road Reconsruction, Intersection Improvements and Bridge Replacements
Rosenberger Ave. to Wabash Ave.
Lead Des. No. 1900308
Highway Noise Analysis

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Abatement Analysis Criteria		Barrier 4-2 14-ft
Feasible	Number of impacted receptors	22
	Number of impacted benefited receptors IL>5dB(A)	10
	Percent impacted with IL>5dB(A)	45%
Design Goal	Number of design goal receptors IL>7dB(A)	2
	Number of all benefited receptors IL>5dB(A)	10
	Percent benefited with IL>7dB(A)	20%
Reasonableness	Barrier total square footage	13,300
	Barrier total square footage minus TCB square footage	10,450
	Square footage per benefited receptor (total footage)	1,330
	Square footage per benefited receptor (total footage minus TCB)	1,045

Figure 4B
2040 Design Year NSA 4 Barrier 4-2

Legend

- 7 Impacted with >=7dBA benefit
- 5 Impacted with >= 5dBA benefit
- Impacted with no 5dBA benefit
- 5 Not impacted with >=5dBA benefit
- 3 Not impacted with >=3dBA reduction
- Not impacted with <3dBA reduction
- Barrier 4-2 TCB-mounted
- Design traffic control barrier
- Pavement
- Bridge
- Curb/Gutter
- Median
- 500 Foot Buffer Study Area
- Noise Senstive Area Limits

Activity Category

- Category B (NAC = 67 dBA)
- Category C (NAC = 67 dBA)
- Category D (NAC = 52 dBA interior)
- Category E (NAC = 72 dBA)
- Category F (NAC = 72 dBA)
- Category G (No NAC)

SR62 Road Reconsruction, Intersection Improvements and Bridge Replacements
Rosenberger Ave. to Wabash Ave.
Lead Des. No. 1900308
Highway Noise Analysis

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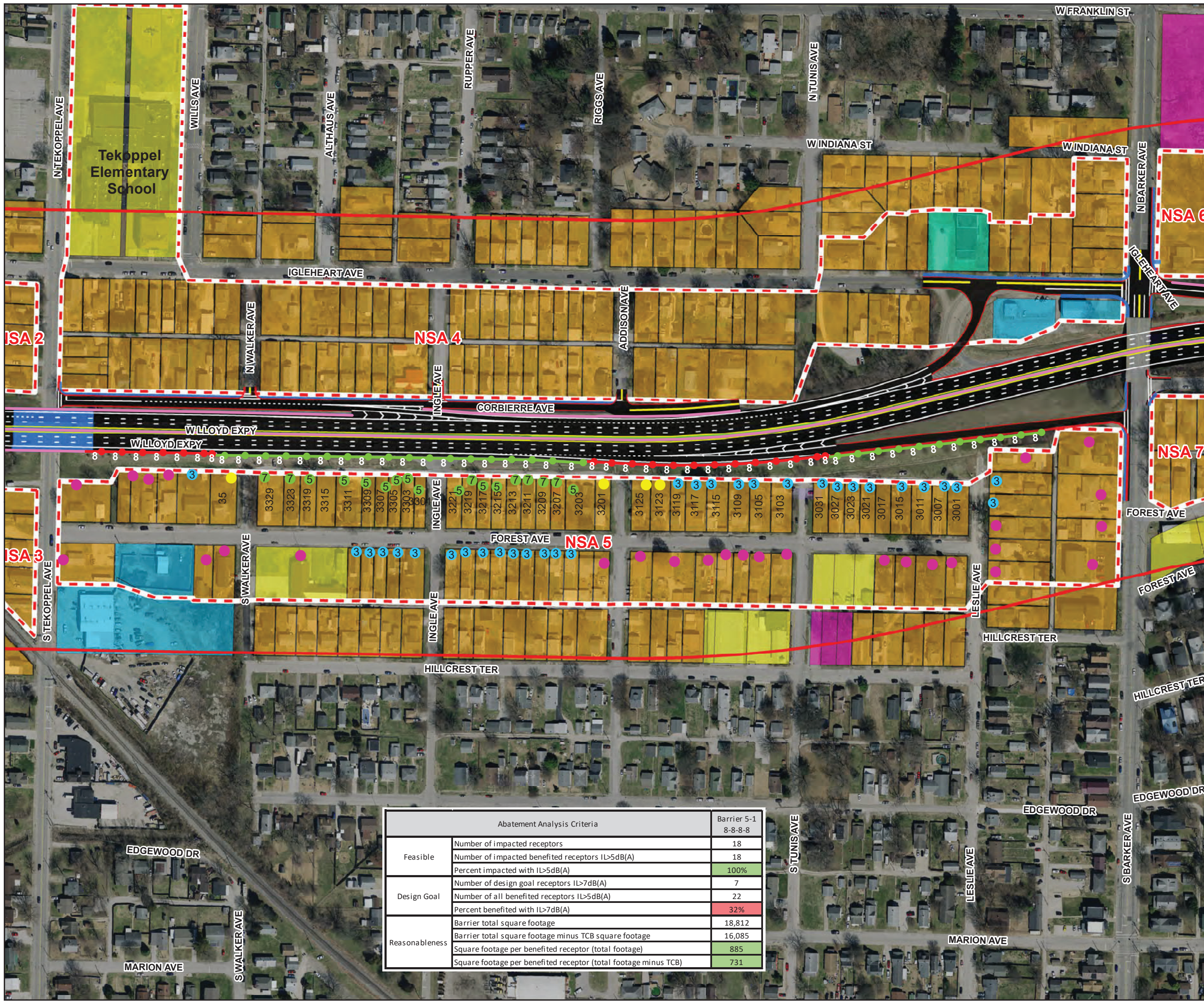
Figure 5A
2040 Design Year NSA 5 Barrier 5-1



Abatement Analysis Criteria		Barrier 5-1 8-8-8-8
Feasible	Number of impacted receptors	18
	Number of impacted benefited receptors IL>5dB(A)	18
	Percent impacted with IL>5dB(A)	100%
Design Goal	Number of design goal receptors IL>7dB(A)	7
	Number of all benefited receptors IL>5dB(A)	22
	Percent benefited with IL>7dB(A)	32%
Reasonableness	Barrier total square footage	18,812
	Barrier total square footage minus TCB square footage	16,085
	Square footage per benefited receptor (total footage)	885
	Square footage per benefited receptor (total footage minus TCB)	731

Legend

- Impacted with >= 5dBA IL
- Impacted with >= 7dBA IL
- Impacted with no IL 5dBA benefit
- Not impacted with 5dBA benefit
- Not impacted with no 5dBA benefit
- Not impacted with <3dBA reduction
- Barrier 5-1 TCB-mounted
- Barrier 5-1 ground-mounted
- Design traffic control barrier
- Pavement
- Bridge
- Curb/Gutter
- Median
- 500 Foot Buffer Study Area
- Noise Senstive Area Limits

Activity Category

- Category B (NAC = 67 dBA)
- Category C (NAC = 67 dBA)
- Category D (NAC = 52 dBA interior)
- Category E (NAC = 72 dBA)
- Category F (NAC = 72 dBA)
- Category G (No NAC)

SR62 Road Reconsruction, Intersection Improvements and Bridge Replacements Rosenberger Ave. to Wabash Ave.
Lead Des. No. 1900308
Highway Noise Analysis

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0 100 200 300 400 500 600 Feet

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Figure 4C
2040 Design Year NSA 4 Barrier 4-3

Abatement Analysis Criteria		Barrier 4-3 16-ft
Feasible	Number of impacted receptors	22
	Number of impacted benefited receptors IL>5dB(A)	10
	Percent impacted with IL>5dB(A)	45%
Design Goal	Number of design goal receptors IL>7dB(A)	4
	Number of all benefited receptors IL>5dB(A)	11
	Percent benefited with IL>7dB(A)	36%
Reasonableness	Barrier total square footage	15,200
	Barrier total square footage minus TCB square footage	12,350
	Square footage per benefited receptor (total footage)	1,382
	Square footage per benefited receptor (total footage minus TCB)	1,123

Legend

- 7 Impacted with >=7dBA benefit
- 5 Impacted with >= 5dBA benefit
- Impacted with no 5dBA benefit
- 5 Not impacted with >=5dBA benefit
- 3 Not impacted with >=3dBA reduction
- Not impacted with <3dBA reduction
- Barrier 4-3 TCB-mounted
- Design traffic control barrier
- Pavement
- Bridge
- Curb/Gutter
- Median
- 500 Foot Buffer Study Area
- Noise Senstive Area Limits

Activity Category

- Category B (NAC = 67 dBA)
- Category C (NAC = 67 dBA)
- Category D (NAC = 52 dBA interior)
- Category E (NAC = 72 dBA)
- Category F (NAC = 72 dBA)
- Category G (No NAC)

SR62 Road Reconsruction, Intersection Improvements and Bridge Replacements
Rosenberger Ave. to Wabash Ave.
Lead Des. No. 1900308
Highway Noise Analysis

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Figure 4D
2040 Design Year NSA 4 Barrier 4-4

Abatement Analysis Criteria		Barrier 4-4 18-ft
Feasible	Number of impacted receptors	22
	Number of impacted benefited receptors IL>5dB(A)	10
	Percent impacted with IL>5dB(A)	45%
Design Goal	Number of design goal receptors IL>7dB(A)	4
	Number of all benefited receptors IL>5dB(A)	12
	Percent benefited with IL>7dB(A)	33%
Reasonableness	Barrier total square footage	17,100
	Barrier total square footage minus TCB square footage	14,250
	Square footage per benefited receptor (total footage)	1,425
	Square footage per benefited receptor (total footage minus TCB)	1,118

Legend

- 7 Impacted with >=7dBA benefit
- 5 Impacted with >= 5dBA benefit
- Impacted with no 5dBA benefit
- 5 Not impacted with >=5dBA benefit
- 3 Not impacted with >=3dBA reduction
- Not impacted with <3dBA reduction
- Barrier 4-4 TCB-mounted
- Design traffic control barrier
- Pavement
- Bridge
- Curb/Gutter
- Median
- 500 Foot Buffer Study Area
- Noise Senstive Area Limits

Activity Category

- Category B (NAC = 67 dBA)
- Category C (NAC = 67 dBA)
- Category D (NAC = 52 dBA interior)
- Category E (NAC = 72 dBA)
- Category F (NAC = 72 dBA)
- Category G (No NAC)

SR62 Road Reconsruction, Intersection Improvements and Bridge Replacements
Rosenberger Ave. to Wabash Ave.
Lead Des. No. 1900308
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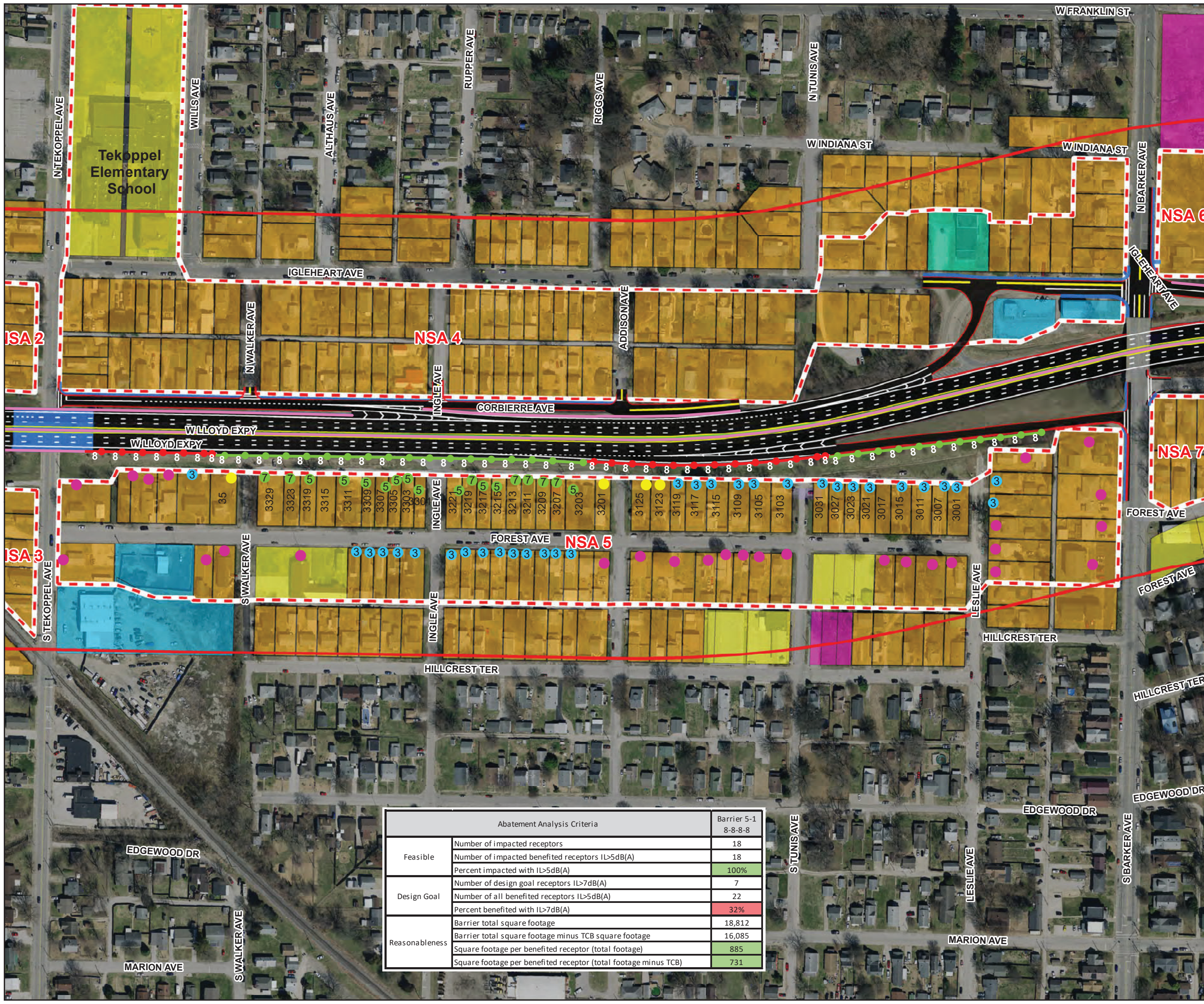
Figure 5A
2040 Design Year NSA 5 Barrier 5-1



Abatement Analysis Criteria		Barrier 5-1 8-8-8-8
Feasible	Number of impacted receptors	18
	Number of impacted benefited receptors IL>5dB(A)	18
	Percent impacted with IL>5dB(A)	100%
Design Goal	Number of design goal receptors IL>7dB(A)	7
	Number of all benefited receptors IL>5dB(A)	22
	Percent benefited with IL>7dB(A)	32%
Reasonableness	Barrier total square footage	18,812
	Barrier total square footage minus TCB square footage	16,085
	Square footage per benefited receptor (total footage)	885
	Square footage per benefited receptor (total footage minus TCB)	731

Legend

- Impacted with >= 5dBA IL
- Impacted with >= 7dBA IL
- Impacted with no IL 5dBA benefit
- Not impacted with 5dBA benefit
- Not impacted with no 5dBA benefit
- Not impacted with <3dBA reduction
- Barrier 5-1 TCB-mounted
- Barrier 5-1 ground-mounted
- Design traffic control barrier
- Pavement
- Bridge
- Curb/Gutter
- Median
- 500 Foot Buffer Study Area
- Noise Senstive Area Limits

Activity Category

- Category B (NAC = 67 dBA)
- Category C (NAC = 67 dBA)
- Category D (NAC = 52 dBA interior)
- Category E (NAC = 72 dBA)
- Category F (NAC = 72 dBA)
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SR62 Road Reconsruction, Intersection Improvements and Bridge Replacements
Rosenberger Ave. to Wabash Ave.
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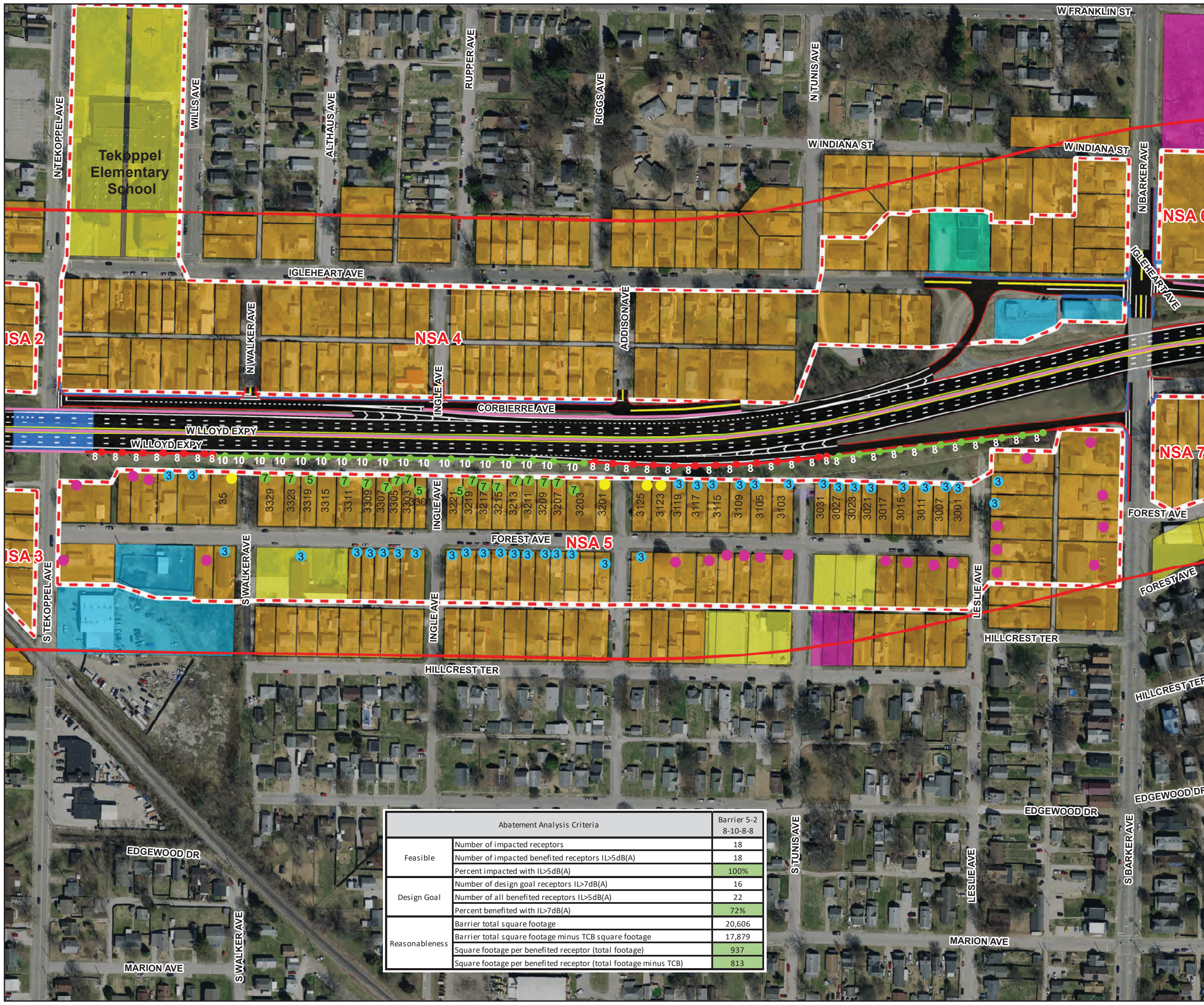

Abatement Analysis Criteria		Barrier 5-2 8-10-8-8
Feasible	Number of impacted receptors	18
	Number of impacted benefited receptors IL>5dB(A)	18
	Percent impacted with IL>5dB(A)	100%
Design Goal	Number of design goal receptors IL>7dB(A)	16
	Number of all benefited receptors IL>5dB(A)	22
	Percent benefited with IL>7dB(A)	72%
Reasonableness	Barrier total square footage	20,606
	Barrier total square footage minus TCB square footage	17,879
	Square footage per benefited receptor (total footage)	937
	Square footage per benefited receptor (total footage minus TCB)	813

Figure 5B
2040 Design Year NSA 5 Barrier 5-2

Legend

- Impacted with >= 5dBA IL
- Impacted with >= 7dBA IL
- Impacted with no IL 5dBA benefit
- Not impacted with 5dBA benefit
- Not impacted with no 5dBA benefit
- Not impacted with <3dBA reduction
- Barrier 5-2 TCB-mounted
- Barrier 5-2 ground-mounted
- Design traffic control barrier
- Pavement
- Bridge
- Curb/Gutter
- Median
- 500 Foot Buffer Study Area
- Noise Senstive Area Limits

Activity Category

- Category B (NAC = 67 dBA)
- Category C (NAC = 67 dBA)
- Category D (NAC = 52 dBA interior)
- Category E (NAC = 72 dBA)
- Category F (NAC = 72 dBA)
- Category G (No NAC)

SR62 Road Reconsruction, Intersection Improvements and Bridge Replacements
Rosenberger Ave. to Wabash Ave.
Lead Des. No. 1900308
Highway Noise Analysis

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0 100 200 300 400 500 600 Feet

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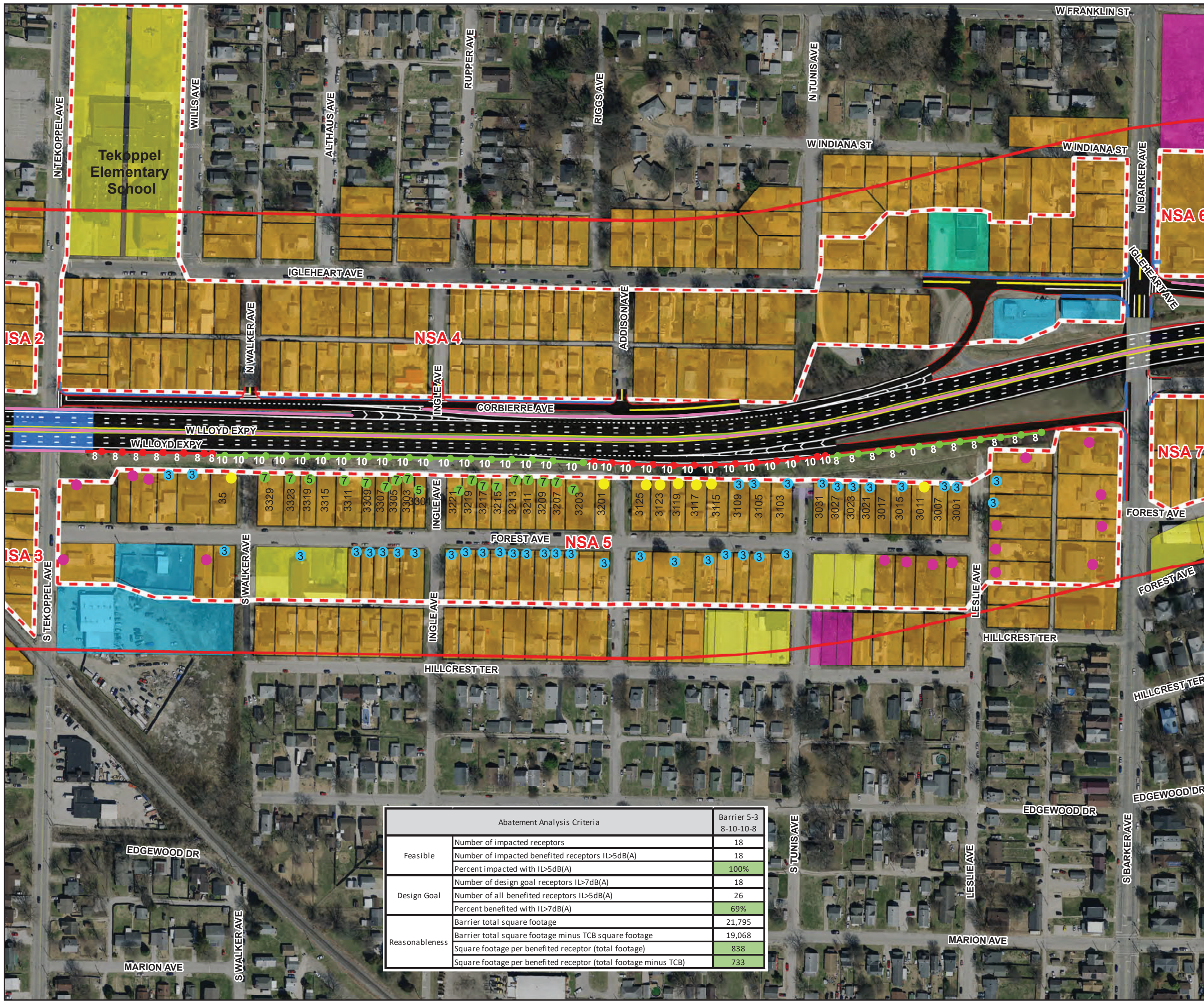
Figure 5C
2040 Design Year NSA 5 Barrier 5-3



Abatement Analysis Criteria		Barrier 5-3 8-10-10-8
Feasible	Number of impacted receptors	18
	Number of impacted benefited receptors IL>5dB(A)	18
	Percent impacted with IL>5dB(A)	100%
Design Goal	Number of design goal receptors IL>7dB(A)	18
	Number of all benefited receptors IL>5dB(A)	26
	Percent benefited with IL>7dB(A)	69%
Reasonableness	Barrier total square footage	21,795
	Barrier total square footage minus TCB square footage	19,068
	Square footage per benefited receptor (total footage)	838
	Square footage per benefited receptor (total footage minus TCB)	733

Legend

- 5 Impacted with >= 5dBA IL
- 7 Impacted with >= 7dBA IL
- Impacted with no IL 5dBA benefit
- Not impacted with 5dBA benefit
- 3 Not impacted with no 5dBA benefit
- Not impacted with <3dBA reduction
- Barrier 5-3 TCB-mounted
- Barrier 5-3 ground-mounted
- Design traffic control barrier
- Pavement
- Bridge
- Curb/Gutter
- Median
- 500 Foot Buffer Study Area
- Noise Senstive Area Limits

Activity Category

- Category B (NAC = 67 dBA)
- Category C (NAC = 67 dBA)
- Category D (NAC = 52 dBA interior)
- Category E (NAC = 72 dBA)
- Category F (NAC = 72 dBA)
- Category G (No NAC)

SR62 Road Reconsruction, Intersection Improvements and Bridge Replacements Rosenberger Ave. to Wabash Ave.
Load Des. No. 1900308
Highway Noise Analysis

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0 100 200 300 400 500 600 Feet

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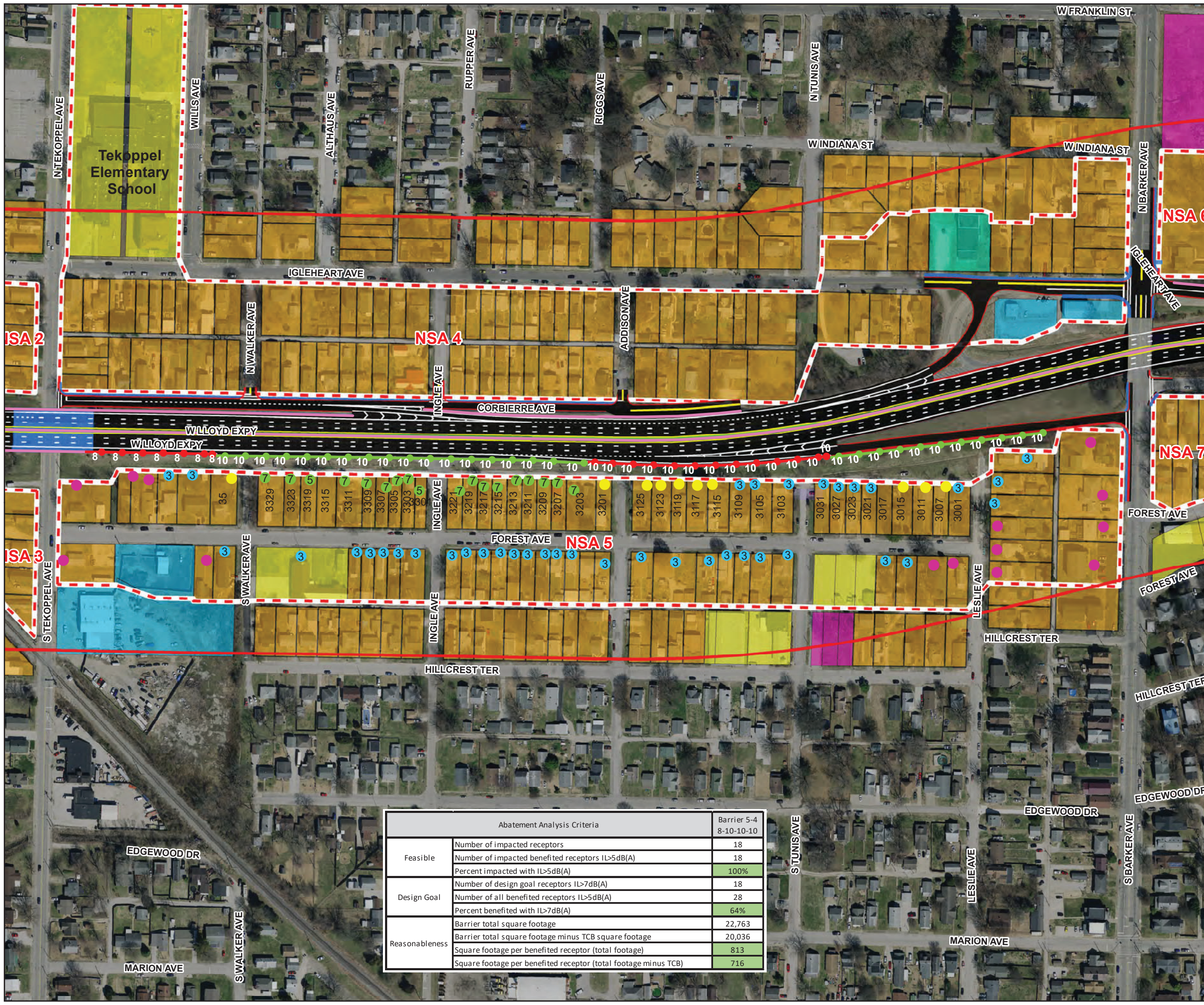
Figure 5D
2040 Design Year NSA 5 Barrier 5-4



Abatement Analysis Criteria		Barrier 5-4 8-10-10-10
Feasible	Number of impacted receptors	18
	Number of impacted benefited receptors IL>5dB(A)	18
	Percent impacted with IL>5dB(A)	100%
Design Goal	Number of design goal receptors IL>7dB(A)	18
	Number of all benefited receptors IL>5dB(A)	28
	Percent benefited with IL>7dB(A)	64%
Reasonableness	Barrier total square footage	22,763
	Barrier total square footage minus TCB square footage	20,036
	Square footage per benefited receptor (total footage)	813
	Square footage per benefited receptor (total footage minus TCB)	716

Legend

- 5 Impacted with >= 5dBA IL
- 7 Impacted with >= 7dBA IL
- Impacted with no IL 5dBA benefit
- Not impacted with 5dBA benefit
- 3 Not impacted with no 5dBA benefit
- Not impacted with <3dBA reduction
- Barrier 5-4 TCB-mounted
- Barrier 5-4 ground-mounted
- Design traffic control barrier
- Pavement
- Bridge
- Curb/Gutter
- Median
- 500 Foot Buffer Study Area
- Noise Senstive Area Limits

Activity Category

- Category B (NAC = 67 dBA)
- Category C (NAC = 67 dBA)
- Category D (NAC = 52 dBA interior)
- Category E (NAC = 72 dBA)
- Category F (NAC = 72 dBA)
- Category G (No NAC)

SR62 Road Reconsruction, Intersection Improvements and Bridge Replacements Rosenberger Ave. to Wabash Ave.
Lead Des. No. 1900308
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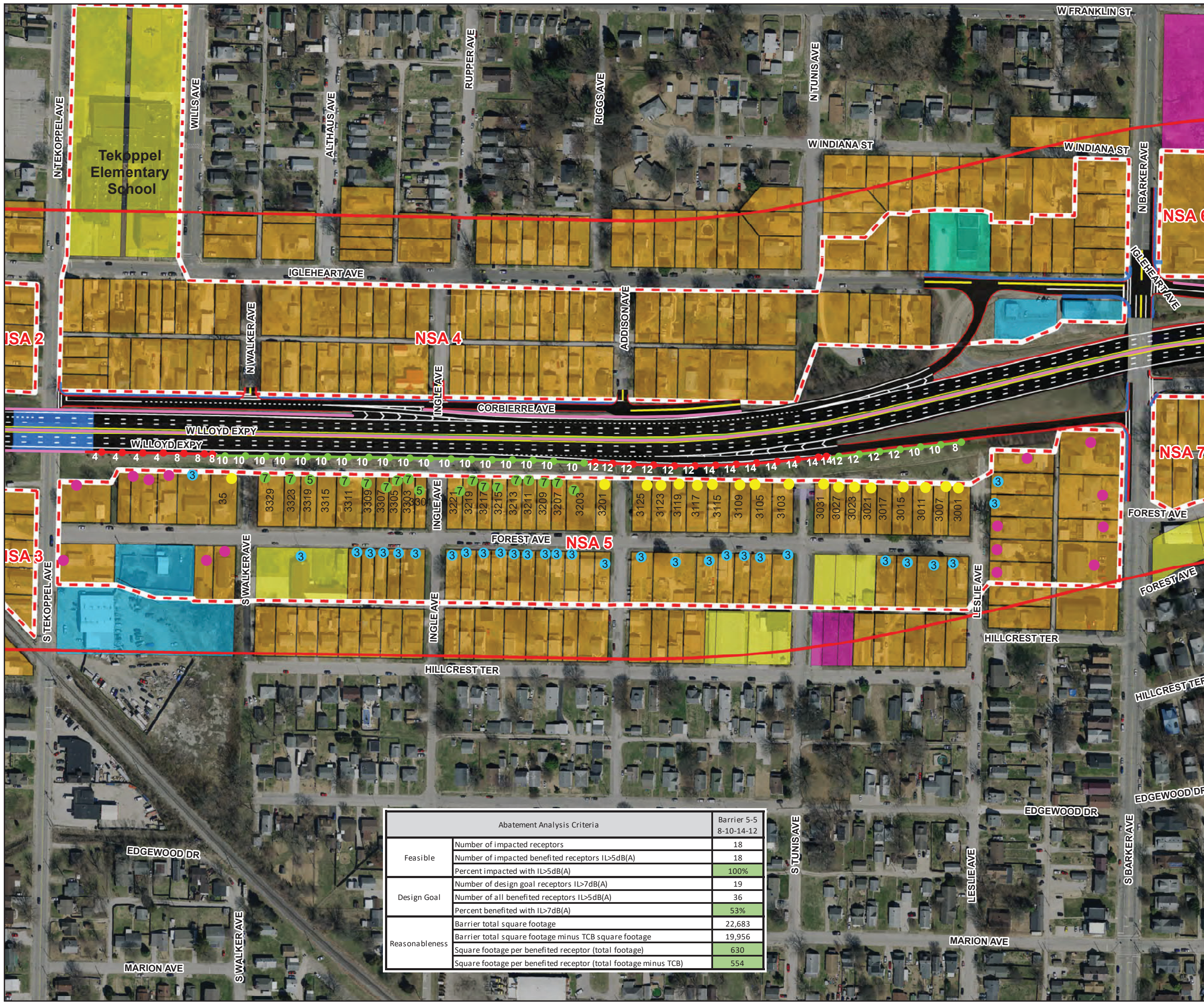

Abatement Analysis Criteria		Barrier 5-5 8-10-14-12
Feasible	Number of impacted receptors	18
	Number of impacted benefited receptors IL>5dB(A)	18
	Percent impacted with IL>5dB(A)	100%
Design Goal	Number of design goal receptors IL>7dB(A)	19
	Number of all benefited receptors IL>5dB(A)	36
	Percent benefited with IL>7dB(A)	53%
Reasonableness	Barrier total square footage	22,683
	Barrier total square footage minus TCB square footage	19,956
	Square footage per benefited receptor (total footage)	630
	Square footage per benefited receptor (total footage minus TCB)	554

Figure 5E
2040 Design Year NSA 5 Barrier 5-5

Legend

- Impacted with >= 5dBA IL
- Impacted with >= 7dBA IL
- Impacted with no IL 5dBA benefit
- Not impacted with 5dBA benefit
- Not impacted with no 5dBA benefit
- Not impacted with <3dBA reduction
- Barrier 5-6 TCB-mounted
- Barrier 5-6 ground-mounted
- Design traffic control barrier
- Pavement
- Bridge
- Curb/Gutter
- Median
- 500 Foot Buffer Study Area
- Noise Senstive Area Limits

Activity Category

- Category B (NAC = 67 dBA)
- Category C (NAC = 67 dBA)
- Category D (NAC = 52 dBA interior)
- Category E (NAC = 72 dBA)
- Category F (NAC = 72 dBA)
- Category G (No NAC)

SR62 Road Reconsruction, Intersection Improvements and Bridge Replacements Rosenberger Ave. to Wabash Ave.
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0 100 200 300 400 500 600 Feet

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Figure 6A
2040 Design Year NSA 7 Barrier 7A-1

Abatement Analysis Criteria		Barrier 7A-1 16-foot
Feasible	Number of impacted receptors	25
	Number of impacted benefited receptors IL>5dB(A)	4
	Percent impacted with IL>5dB(A)	16%
Design Goal	Number of design goal receptors IL>7dB(A)	0
	Number of all benefited receptors IL>5dB(A)	4
	Percent benefited with IL>7dB(A)	0%
Reasonableness	Barrier total square footage	26,746
	Square footage per benefited receptor (total footage)	6,687

Legend

- 7 Impacted with >=7dBA benefit
- 5 Impacted with >=5dBA benefit
- Impacted with no >= 5dBA benefit
- 5 Not impacted with >=5dBA benefit
- 3 Not impacted with >=3dBA reduction
- Not impacted with <=3dBA reduction
- Barrier 7A-1 ground-mounted
- Design traffic control barrier
- Pavement
- Bridge
- Curb/Gutter
- Median
- 500 Foot Buffer Study Area
- Noise Senstive Area Limits

Activity Category

- Category B (NAC = 67 dBA)
- Category C (NAC = 67 dBA)
- Category D (NAC = 52 dBA interior)
- Category E (NAC = 72 dBA)
- Category F (NAC = 72 dBA)
- Category G (No NAC)

SR62 Road Reconsruction, Intersection Improvements and Bridge Replacements
Rosenberger Ave. to Wabash Ave.
Lead Des. No. 1900308
Highway Noise Analysis

N W E S

Base Map:
Vanderburgh County 2019 Aerial Photo

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Created by: R. Yeager
11/7/2022

0 100 200 Feet

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Figure 6B
2040 Design Year NSA 7 Barrier 7A-2

Abatement Analysis Criteria		Barrier 7A-2 18-foot
Feasible	Number of impacted receptors	25
	Number of impacted benefited receptors IL>5dB(A)	9
	Percent impacted with IL>5dB(A)	36%
Design Goal	Number of design goal receptors IL>7dB(A)	0
	Number of all benefited receptors IL>5dB(A)	11
	Percent benefited with IL>7dB(A)	0%
Reasonableness	Barrier total square footage	30,089
	Square footage per benefited receptor (total footage)	2,735

Legend

- Impacted with >=7dBA benefit
- Impacted with >=5dBA benefit
- Impacted with no >= 5dBA benefit
- Not impacted with >=5dBA benefit
- Not impacted with >=3dBA reduction
- Not impacted with <=3dBA reduction
- Barrier 7A-2
- Design traffic control barrier
- Pavement
- Bridge
- Curb/Gutter
- Median
- 500 Foot Buffer Study Area
- Noise Senstive Area Limits

Activity Category

- Category B (NAC = 67 dBA)
- Category C (NAC = 67 dBA)
- Category D (NAC = 52 dBA interior)
- Category E (NAC = 72 dBA)
- Category F (NAC = 72 dBA)
- Category G (No NAC)

SR62 Road Reconsruction, Intersection Improvements and Bridge Replacements
Rosenberger Ave. to Wabash Ave.
Lead Des. No. 1900308
Highway Noise Analysis

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0 100 200 Feet

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Figure 6C
2040 Design Year NSA 7 Barrier 7A-3

Abatement Analysis Criteria		Barrier 7A-3 20-foot
Feasible	Number of impacted receptors	25
	Number of impacted benefited receptors IL>5dB(A)	11
	Percent impacted with IL>5dB(A)	44%
Design Goal	Number of design goal receptors IL>7dB(A)	0
	Number of all benefited receptors IL>5dB(A)	14
	Percent benefited with IL>7dB(A)	0%
Reasonableness	Barrier total square footage	33,432
	Square footage per benefited receptor (total footage)	2,388

Legend

- 7 Impacted with >=7dBA benefit
- 5 Impacted with >=5dBA benefit
- Impacted with no >= 5dBA benefit
- 5 Not impacted with >=5dBA benefit
- 3 Not impacted with >=3dBA reduction
- Not impacted with <=3dBA reduction
- Barrier 7A-3
- Design traffic control barrier
- Pavement
- Bridge
- Curb/Gutter
- Median
- 500 Foot Buffer Study Area
- Noise Senstive Area Limits

Activity Category

- Category B (NAC = 67 dBA)
- Category C (NAC = 67 dBA)
- Category D (NAC = 52 dBA interior)
- Category E (NAC = 72 dBA)
- Category F (NAC = 72 dBA)
- Category G (No NAC)

SR62 Road Reconsruction, Intersection Improvements and Bridge Replacements
Rosenberger Ave. to Wabash Ave.
Lead Des. No. 1900308
Highway Noise Analysis

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0 100 200 Feet

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Abatement Analysis Criteria		Barrier 7B-1 12-foot
Feasible	Number of impacted receptors	25
	Number of impacted benefited receptors IL>5dB(A)	12
	Percent impacted with IL>5dB(A)	48%
Design Goal	Number of design goal receptors IL>7dB(A)	0
	Number of all benefited receptors IL>5dB(A)	17
	Percent benefited with IL>7dB(A)	0%
Reasonableness	Barrier total square footage	19805
	Square footage per benefited receptor	1165

Figure 6D
2040 Design Year NSA 7 Barrier 7B-1

Legend

- 7 Impacted with >=7dBA benefit
- 5 Impacted with >=5dBA benefit
- Impacted with no >= 5dBA benefit
- 5 Not impacted with >=5dBA benefit
- 3 Not impacted with >=3dBA reduction
- Not impacted with <=3dBA reduction
- Barrier 7B-1 ground-mounted
- Design traffic control barrier
- Pavement
- Bridge
- Curb/Gutter
- Median
- 500 Foot Buffer Study Area
- Noise Senstive Area Limits

Activity Category

- Category B (NAC = 67 dBA)
- Category C (NAC = 67 dBA)
- Category D (NAC = 52 dBA interior)
- Category E (NAC = 72 dBA)
- Category F (NAC = 72 dBA)
- Category G (No NAC)

SR62 Road Reconsruction, Intersection Improvements and Bridge Replacements
Rosenberger Ave. to Wabash Ave.
Lead Des. No. 1900308
Highway Noise Analysis

N W E S

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0 100 200
Feet

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Figure 6E
2040 Design Year NSA 7 Barrier 7B-2

Abatement Analysis Criteria		Barrier 7B-2 14-foot
Feasible	Number of impacted receptors	25
	Number of impacted benefited receptors IL>5dB(A)	12
	Percent impacted with IL>5dB(A)	48%
Design Goal	Number of design goal receptors IL>7dB(A)	1
	Number of all benefited receptors IL>5dB(A)	17
	Percent benefited with IL>7dB(A)	6%
Reasonableness	Barrier total square footage	23,106
	Square footage per benefited receptor	1,359

Legend

- 7 Impacted with >=7dBA benefit
- 5 Impacted with >=5dBA benefit
- Impacted with no >= 5dBA benefit
- 5 Not impacted with >=5dBA benefit
- 3 Not impacted with >=3dBA reduction
- Not impacted with <=3dBA reduction
- Barrier 7B-2 ground-mounted
- Design traffic control barrier
- Pavement
- Bridge
- Curb/Gutter
- Median
- 500 Foot Buffer Study Area
- Noise Senstive Area Limits

Activity Category

- Category B (NAC = 67 dBA)
- Category C (NAC = 67 dBA)
- Category D (NAC = 52 dBA interior)
- Category E (NAC = 72 dBA)
- Category F (NAC = 72 dBA)
- Category G (No NAC)

SR62 Road Reconsruction, Intersection Improvements and Bridge Replacements Rosenberger Ave. to Wabash Ave.
Lead Des. Nos. 1900308
Highway Noise Analysis

N W E S

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0 100 200 Feet

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Figure 6F
2040 Design Year NSA 7 Barrier 7B-3

Abatement Analysis Criteria		Barrier 7B-3 16-foot
Feasible	Number of impacted receptors	25
	Number of impacted benefited receptors IL>5dB(A)	12
	Percent impacted with IL>5dB(A)	48%
Design Goal	Number of design goal receptors IL>7dB(A)	5
	Number of all benefited receptors IL>5dB(A)	19
	Percent benefited with IL>7dB(A)	26%
Reasonableness	Barrier total square footage	26,406
	Square footage per benefited receptor	1,390

Legend

- Impacted with >=7dBA benefit
- Impacted with >=5dBA benefit
- Impacted with no >= 5dBA benefit
- Not impacted with >=5dBA benefit
- Not impacted with >=3dBA reduction
- Not impacted with <=3dBA reduction
- Barrier 7B-2 ground-mounted
- Design traffic control barrier
- Pavement
- Bridge
- Curb/Gutter
- Median
- 500 Foot Buffer Study Area
- Noise Senstive Area Limits

Activity Category

- Category B (NAC = 67 dBA)
- Category C (NAC = 67 dBA)
- Category D (NAC = 52 dBA interior)
- Category E (NAC = 72 dBA)
- Category F (NAC = 72 dBA)
- Category G (No NAC)

SR62 Road Reconsruction, Intersection Improvements and Bridge Replacements
Rosenberger Ave. to Wabash Ave.
Lead Des. Nos. 1900308
Highway Noise Analysis

N W E S

Base Map:
Vanderburgh County 2019 Aerial Photo

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0 100 200 Feet

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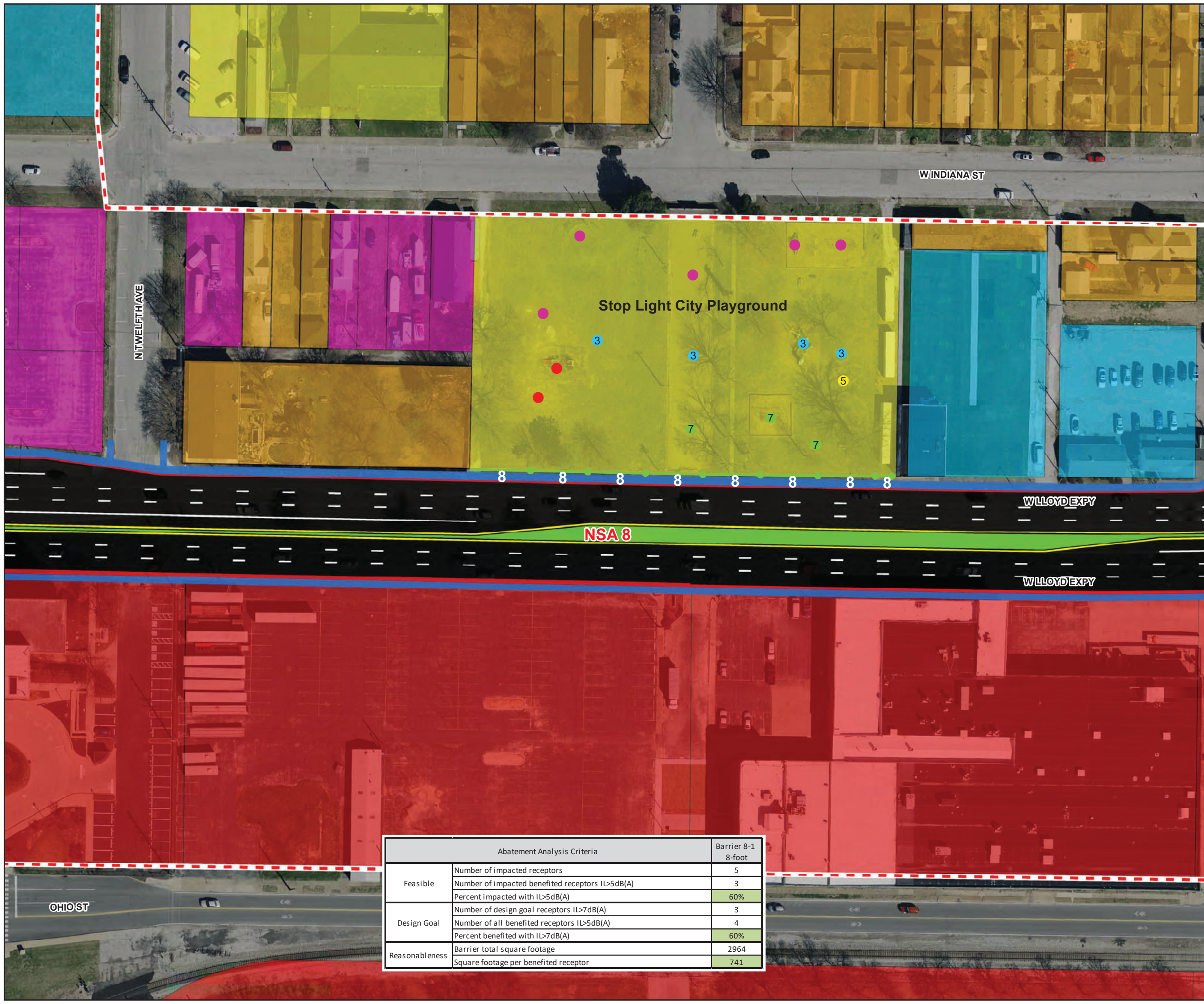

Abatement Analysis Criteria		Barrier 8-1 8-foot
Feasible	Number of impacted receptors	5
	Number of impacted benefited receptors IL>5dB(A)	3
	Percent impacted with IL>5dB(A)	60%
Design Goal	Number of design goal receptors IL>7dB(A)	3
	Number of all benefited receptors IL>5dB(A)	4
	Percent benefited with IL>7dB(A)	60%
Reasonableness	Barrier total square footage	2964
	Square footage per benefited receptor	741

Figure 7A
2040 Design Year NSA 8 Barrier 8-1

Legend

- 7 Impacted with >=7dBA benefit
- 5 Impacted with >=5dBA benefit
- Impacted with no >= 5dBA benefit
- 5 Not impacted with >=5dBA benefit
- 3 Not impacted with >=3dBA reduction
- Not impacted with <3dBA reduction
- Barrier 8-1 ground-mounted
- Pavement
- Bridge
- Curb/Gutter
- Median
- 500 Foot Buffer Study Area
- Noise Senstive Area Limits

Activity Category

- Category B (NAC = 67 dBA)
- Category C (NAC = 67 dBA)
- Category D (NAC = 52 dBA interior)
- Category E (NAC = 72 dBA)
- Category F (NAC = 72 dBA)
- Category G (No NAC)

SR62 Road Reconsruction, Intersection Improvements and Bridge Replacements
Rosenberger Ave. to Wabash Ave.
Lead Des. No. 1900308
Highway Noise Analysis

N W E S

Base Map:
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0 100 200 Feet

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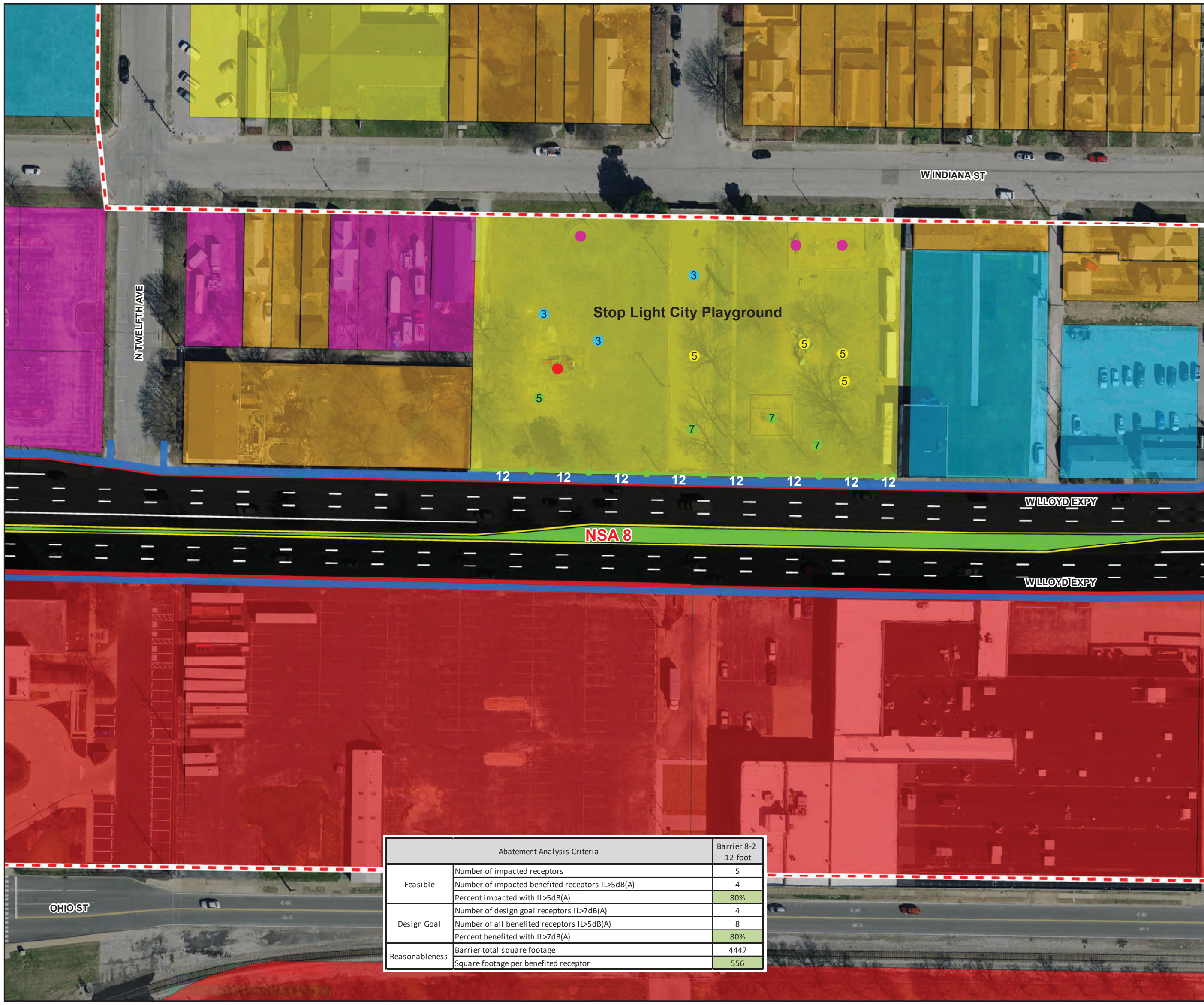
Figure 7B
2040 Design Year NSA 8 Barrier 8-2



Abatement Analysis Criteria		Barrier 8-2 12-foot
Feasible	Number of impacted receptors	5
	Number of impacted benefited receptors IL>5dB(A)	4
	Percent impacted with IL>5dB(A)	80%
Design Goal	Number of design goal receptors IL>7dB(A)	4
	Number of all benefited receptors IL>5dB(A)	8
	Percent benefited with IL>7dB(A)	80%
Reasonableness	Barrier total square footage	4447
	Square footage per benefited receptor	556

Legend

- 7 Impacted with >=7dBA benefit
- 5 Impacted with >= 5dBA benefit
- Impacted with no>= 5dBA benefit
- 5 Not impacted with >=5dBA benefit
- 3 Not impacted with >=3dBA reduction
- Not impacted with <3dBA reduction
- Barrier 8-2 ground-mounted
- Pavement
- Bridge
- Curb/Gutter
- Median
- 500 Foot Buffer Study Area
- Noise Senstive Area Limits

Activity Category

- Category B (NAC = 67 dBA)
- Category C (NAC = 67 dBA)
- Category D (NAC = 52 dBA interior)
- Category E (NAC = 72 dBA)
- Category F (NAC = 72 dBA)
- Category G (No NAC)

SR62 Road Reconsruction, Intersection Improvements and Bridge Replacements
Rosenberger Ave. to Wabash Ave.
Leadd Des. No. 1900308
Highway Noise Analysis

N W E S

Base Map:
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0 100 200 Feet

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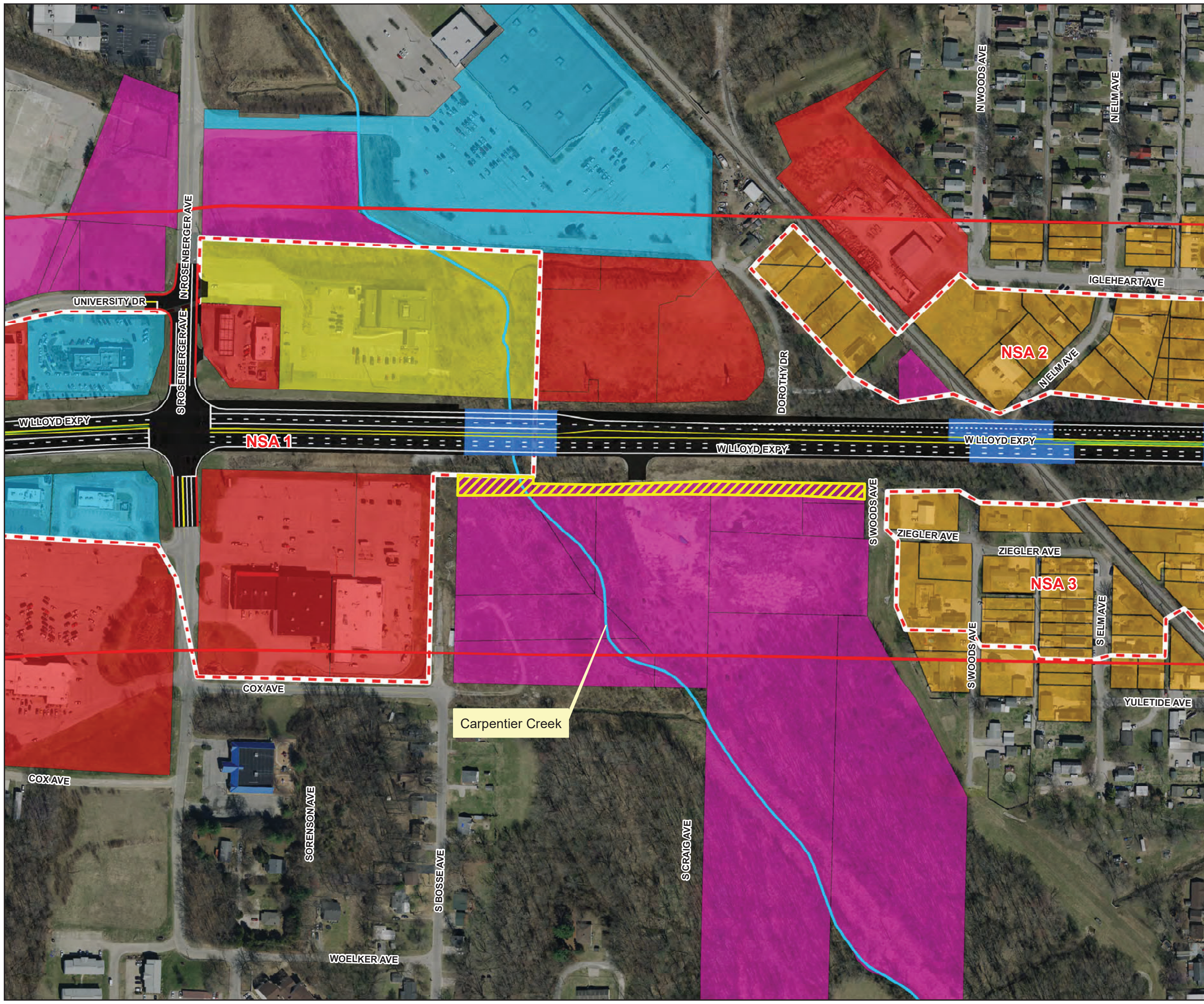
Figure 8
2040 Design Year 66dB(A) Limits at Carpentier Creek Parcel



Legend

- 2040 design year 66dB(A) limits
- Pavement
- Bridge
- Curb/Gutter
- Median
- 500 Foot Buffer Study Area
- Noise Senstive Area Limits
- Carpentier Creek

Activity Category

- Category B (NAC = 67 dBA)
- Category C (NAC = 67 dBA)
- Category D (NAC = 52 dBA interior)
- Category E (NAC = 72 dBA)
- Category F (NAC = 72 dBA)
- Category G (No NAC)

SR62 Road Reconsruction, Intersection Improvements and Bridge Replacements
Rosenberger Ave. to Wabash Ave.
Lead Des. No. 1900308
Highway Noise Analysis

N W E S

Base Map:
Vanderburgh County 2019 Aerial Photo

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11/7/2022

0 100 200 300 400 500 600 Feet

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Appendix I
TNM 2.5 2040 NSA 5 Forest Avenue
Barrier Assessment Results

INDOT/Lochmueller Group						21 March 2023						
Rusty Yeager						TNM 2.5						
						Calculated with TNM 2.5						
RESULTS: SOUND LEVELS												
PROJECT/CONTRACT:	119-0072											
RUN:	SR62 2040 NSA 5 barrier											
BARRIER DESIGN:	8TCB,8G,8TCB,8G						Average pavement type shall be used unless a State highway agency substantiates the use of a different type with approval of FHWA.					
ATMOSPHERICS:	68 deg F, 50% RH											
Receiver												
Name	No.	#DUs	Existing	No Barrier					With Barrier			
			LAeq1h	LAeq1h		Increase over existing		Type	Calculated	Noise Reduction		
				Calculated	Crit'n	Calculated	Crit'n Sub'l Inc	Impact	LAeq1h	Calculated	Goal	Calculated minus Goal
			dBA	dBA	dBA	dB	dB		dBA	dB	dB	dB
145 - 38 S Tekoppel Ave - Single residenc	145	1	61.6	62.2	66	0.6	15	----	59.8	2.4	7	-4.6
146 - 3417 Forest Ave - Single residence -	146	1	62.7	62.0	66	-0.7	15	----	57.7	4.3	7	-2.7
147 - 3415 Forest Ave - Single residence -	147	1	63.1	62.0	66	-1.1	15	----	57.6	4.4	7	-2.6
148 - 3413 Forest Ave - Single residence -	148	1	63.5	62.2	66	-1.3	15	----	57.5	4.7	7	-2.3
149 - 3407 Forest Ave - Single residence -	149	1	64.2	62.9	66	-1.3	15	----	58.0	4.9	7	-2.1
150 - 35 S Walker Ave - Single residence -	150	1	66.4	66.4	66	0.0	15	Snd Lvl	59.7	6.7	7	-0.3
151 - 3329 Forest Ave - Single residence -	151	1	70.0	68.4	66	-1.6	15	Snd Lvl	61.0	7.4	7	0.4
152 - 3323 Forest Ave - Single residence -	152	1	69.9	68.4	66	-1.5	15	Snd Lvl	61.0	7.4	7	0.4
153 - 3319 Forest Ave - Single residence -	153	1	69.7	68.1	66	-1.6	15	Snd Lvl	62.5	5.6	7	-1.4
154 - 3311 Forest Ave - Single residence -	154	1	69.4	67.8	66	-1.6	15	Snd Lvl	60.9	6.9	7	-0.1
155 - 3309 Forest Ave - Single residence -	155	1	69.2	67.6	66	-1.6	15	Snd Lvl	61.3	6.3	7	-0.7
156 - 3307 Forest Ave - Single residence -	156	1	68.9	67.0	66	-1.9	15	Snd Lvl	61.0	6.0	7	-1.0
157 - 3305 Forest Ave - Single residence -	157	1	70.0	68.1	66	-1.9	15	Snd Lvl	61.5	6.6	7	-0.4
158 - 3303 Forest Ave - Single residence -	158	1	70.4	68.5	66	-1.9	15	Snd Lvl	61.8	6.7	7	-0.3
159 - 3301 Forest Ave - Single residence -	159	1	68.4	66.5	66	-1.9	15	Snd Lvl	60.6	5.9	7	-1.1
160 - 3221 Forest Ave - Single residence -	160	1	68.1	66.6	66	-1.5	15	Snd Lvl	60.6	6.0	7	-1.0
161 - 3219 Forest Ave - Single residence -	161	1	70.0	68.7	66	-1.3	15	Snd Lvl	61.5	7.2	7	0.2
162 - 3217 Forest Ave - Single residence -	162	1	68.5	67.4	66	-1.1	15	Snd Lvl	60.8	6.6	7	-0.4
163 - 3215 Forest Ave - Single residence -	163	1	68.3	67.3	66	-1.0	15	Snd Lvl	60.5	6.8	7	-0.2
164 - 3213 Forest Ave - Single residence -	164	1	69.9	68.7	66	-1.2	15	Snd Lvl	61.0	7.7	7	0.7
165 - 3211 Forest Ave - Single residence -	165	1	70.1	68.8	66	-1.3	15	Snd Lvl	61.0	7.8	7	0.8
166 - 3209 Forest Ave - Single residence -	166	1	69.8	68.3	66	-1.5	15	Snd Lvl	60.9	7.4	7	0.4
167 - 3207 Forest Ave - Single residence -	167	1	69.7	68.2	66	-1.5	15	Snd Lvl	60.8	7.4	7	0.4
168 - 3203 Forest Ave - Single residence -	168	1	68.5	67.2	66	-1.3	15	Snd Lvl	60.4	6.8	7	-0.2

169 - 3201 Forest Ave - Single residence -	169	1	69.2	67.2	66	-2.0	15	Snd Lvl	60.1	7.1	7	0.1
170 - 3125 Forest Ave - Single residence -	170	1	67.2	65.5	66	-1.7	15	----	58.6	6.9	7	-0.1
171 - 3123 Forest Ave - Single residence -	171	1	67.0	65.0	66	-2.0	15	----	58.1	6.9	7	-0.1
172 - 3119 Forest Ave - Single residence -	172	1	65.6	63.2	66	-2.4	15	----	57.1	6.1	7	-0.9
173 - 3117 Forest Ave - Single residence -	173	1	64.4	62.2	66	-2.2	15	----	56.5	5.7	7	-1.3
174 - 3115 Forest Ave - Single residence -	174	1	63.8	62.0	66	-1.8	15	----	56.2	5.8	7	-1.2
175 - 3109 Forest Ave - Single residence -	175	1	62.9	61.2	66	-1.7	15	----	55.6	5.6	7	-1.4
176 - 3105/3107 Forest Ave - Single reside	176	2	62.7	60.9	66	-1.8	15	----	55.4	5.5	7	-1.5
177 - 3103 Forest Ave - Single residence -	177	1	62.0	60.4	66	-1.6	15	----	55.3	5.1	7	-1.9
178 - 3031 Forest Ave - Single residence -	178	1	61.3	59.9	66	-1.4	15	----	55.1	4.8	7	-2.2
179 - 3027 Forest Ave - Single residence -	179	1	60.5	59.2	66	-1.3	15	----	54.8	4.4	7	-2.6
180 - 3023 Forest Ave - Single residence -	180	1	60.0	58.9	66	-1.1	15	----	54.6	4.3	7	-2.7
181 - 3021 Forest Ave - Single residence -	181	1	59.5	59.1	66	-0.4	15	----	54.6	4.5	7	-2.5
183 - 3015 Forest Ave - Single residence -	182	1	58.7	59.0	66	0.3	15	----	54.3	4.7	7	-2.3
184 - 3001 Forest Ave - Single residence -	183	1	58.1	59.4	66	1.3	15	----	54.5	4.9	7	-2.1
185 - 3007 Forest Ave - Single residence -	184	1	58.0	58.9	66	0.9	15	----	54.3	4.6	7	-2.4
186 - 3001 Forest Ave - Single residence -	185	1	57.4	59.0	66	1.6	15	----	54.6	4.4	7	-2.6
187 - 100 S Tekoppel Ave - Single residen	186	1	57.5	59.3	66	1.8	15	----	57.1	2.2	7	-4.8
188 - 3404 Forest Ave - Single residence -	187	1	59.5	59.3	66	-0.2	15	----	56.2	3.1	7	-3.9
189 - 3400 Forest Ave - Single residence -	188	1	60.2	60.1	66	-0.1	15	----	56.7	3.4	7	-3.6
190 - 3312 Forest Ave - Destiny of Faith C	189	1	61.3	60.0	66	-1.3	15	----	56.7	3.3	7	-3.7
191 - 3310 Forest Ave - Single residence -	190	1	61.9	60.1	66	-1.8	15	----	56.8	3.3	7	-3.7
192 - 3308 Forest Ave - Single residence -	191	1	62.0	60.0	66	-2.0	15	----	56.8	3.2	7	-3.8
193 - 3306 Forest Ave - Single residence -	192	1	62.1	60.0	66	-2.1	15	----	56.8	3.2	7	-3.8
194 - 3304 Forest Ave - Single residence -	193	1	62.1	59.9	66	-2.2	15	----	56.7	3.2	7	-3.8
195 - 3300 Forest Ave - Single residence -	194	1	62.2	59.9	66	-2.3	15	----	56.8	3.1	7	-3.9
196 - 100 Ingle Aveue - Single residence -	195	1	62.1	59.7	66	-2.4	15	----	56.6	3.1	7	-3.9
197 - 3218 Forest Ave - Single residence -	196	1	62.3	59.8	66	-2.5	15	----	56.6	3.2	7	-3.8
198 - 3216 Forest Ave - Single residence -	197	1	61.8	59.8	66	-2.0	15	----	56.5	3.3	7	-3.7
199 - 3214 Forest Ave - Single residence -	198	1	61.5	59.8	66	-1.7	15	----	56.5	3.3	7	-3.7
200 - 3212 Forest Ave - Single residence -	199	1	61.0	59.7	66	-1.3	15	----	56.4	3.3	7	-3.7
201 - 3210 Forest Ave - Single residence -	200	1	60.8	59.6	66	-1.2	15	----	56.4	3.2	7	-3.8
202 - 3208 Forest Ave - Single residence -	201	1	60.5	59.8	66	-0.7	15	----	56.4	3.4	7	-3.6
203 - 3206 Forest Ave - Single residence -	202	1	60.6	59.8	66	-0.8	15	----	56.4	3.4	7	-3.6
204 - 3204 Forest Ave - Single residence -	203	1	60.7	59.7	66	-1.0	15	----	56.2	3.5	7	-3.5
205 - 3200 Forest Ave - Single residence -	204	1	60.1	59.3	66	-0.8	15	----	55.8	3.5	7	-3.5
206 - 3128 Forest Ave - Single residence -	205	1	59.7	58.9	66	-0.8	15	----	55.8	3.1	7	-3.9
207 - 3122 Forest Ave - Single residence -	206	1	59.5	58.5	66	-1.0	15	----	55.2	3.3	7	-3.7
208 - 3116 Forest Ave - Single residence -	207	1	58.7	58.0	66	-0.7	15	----	54.9	3.1	7	-3.9
209 - 3112 Forest Ave - Single residence -	208	1	58.3	58.5	66	0.2	15	----	55.0	3.5	7	-3.5
210 - 3108 Forest Ave - Single residence -	209	1	58.4	57.9	66	-0.5	15	----	54.8	3.1	7	-3.9

S:_2019\119-0072\Enviro\Noise\TNM\SR62 Barriers\SR62 NSA 5 barrier **2** **21 M**

211 - 3104 Forest Ave - Single residence -	210	1	58.2	57.9	66	-0.3	15	----	54.7	3.2	7	-3.8
212 - 3100 Forest Ave - Single residence -	211	1	58.1	57.8	66	-0.3	15	----	54.7	3.1	7	-3.9
213 - 3016 Forest Ave - Single residence -	212	1	58.1	55.5	66	-2.6	15	----	53.2	2.3	7	-4.7
214 - 3014 Forest Ave - Single residence -	213	1	56.3	55.1	66	-1.2	15	----	52.9	2.2	7	-4.8
215 - 3010 Forest Ave - Single residence -	214	1	55.6	54.7	66	-0.9	15	----	52.6	2.1	7	-4.9
216 - 3000 Forest Ave - Single residence -	215	1	54.9	54.7	66	-0.2	15	----	52.5	2.2	7	-4.8
217 - 102 Leslie Ave - Single residence - N	216	1	54.7	57.4	66	2.7	15	----	54.8	2.6	7	-4.4
218 - 114 Leslie Ave - Single residence - N	217	1	56.7	58.8	66	2.1	15	----	54.9	3.9	7	-3.1
219 - 116 Leslie Ave - Single residence - N	218	1	57.5	57.8	66	0.3	15	----	54.5	3.3	7	-3.7
220 - 118 Leslie Ave - Single residence - N	219	1	57.0	56.4	66	-0.6	15	----	53.9	2.5	7	-4.5
221 - 102 Leslie Ave - Single residence - N	220	1	56.0	54.6	66	-1.4	15	----	52.7	1.9	7	-5.1
222 - 124 Leslie Ave - Single residence - N	221	1	54.5	53.6	66	-0.9	15	----	52.1	1.5	7	-5.5
223 - 5 S Barker Ave - Single residence - N	222	1	53.7	63.0	66	9.3	15	----	62.7	0.3	7	-6.7
224 - 15 S Barker Ave - Single residence -	223	1	63.2	59.8	66	-3.4	15	----	59.4	0.4	7	-6.6
225 - 19 S Barker Ave - Single residence -	224	1	59.5	58.8	66	-0.7	15	----	58.5	0.3	7	-6.7
226 - 51 S Barker Ave - Hillside Manor Apa	225	1	57.9	56.3	66	-1.6	15	----	56.0	0.3	7	-6.7

Dwelling Units	**# DUs**	**Noise Reduction**		
		Min	**Avg**	**Max**
		dB	**dB**	**dB**
All Selected	82	0.3	4.3	7.8
All Impacted	20	5.6	6.8	7.8
All that meet NR Goal	8	7.1	7.4	7.8

INDOT/Lochmueller Group							21 March 2023					
Rusty Yeager							TNM 2.5					
							Calculated with TNM 2.5					
RESULTS: SOUND LEVELS												
PROJECT/CONTRACT:		119-0072										
RUN:		SR62 2040 NSA 5 barrier										
BARRIER DESIGN:		8TCB,10G,8TCB,8G						Average pavement type shall be used unless				
								a State highway agency substantiates the use				
ATMOSPHERICS:		68 deg F, 50% RH						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
145 - 38 S Tekoppel Ave - Single residenc	145	1	61.6	62.2	66	0.6	15	----	59.7	2.5	7	-4.5
146 - 3417 Forest Ave - Single residence -	146	1	62.7	62.0	66	-0.7	15	----	57.5	4.5	7	-2.5
147 - 3415 Forest Ave - Single residence -	147	1	63.1	62.0	66	-1.1	15	----	57.4	4.6	7	-2.4
148 - 3413 Forest Ave - Single residence -	148	1	63.5	62.2	66	-1.3	15	----	57.2	5.0	7	-2.0
149 - 3407 Forest Ave - Single residence -	149	1	64.2	62.9	66	-1.3	15	----	57.6	5.3	7	-1.7
150 - 35 S Walker Ave - Single residence -	150	1	66.4	66.4	66	0.0	15	Snd Lvl	58.5	7.9	7	0.9
151 - 3329 Forest Ave - Single residence -	151	1	70.0	68.4	66	-1.6	15	Snd Lvl	59.9	8.5	7	1.5
152 - 3323 Forest Ave - Single residence -	152	1	69.9	68.4	66	-1.5	15	Snd Lvl	59.9	8.5	7	1.5
153 - 3319 Forest Ave - Single residence -	153	1	69.7	68.1	66	-1.6	15	Snd Lvl	61.8	6.3	7	-0.7
154 - 3311 Forest Ave - Single residence -	154	1	69.4	67.8	66	-1.6	15	Snd Lvl	59.9	7.9	7	0.9
155 - 3309 Forest Ave - Single residence -	155	1	69.2	67.6	66	-1.6	15	Snd Lvl	60.2	7.4	7	0.4
156 - 3307 Forest Ave - Single residence -	156	1	68.9	67.0	66	-1.9	15	Snd Lvl	60.0	7.0	7	0.0
157 - 3305 Forest Ave - Single residence -	157	1	70.0	68.1	66	-1.9	15	Snd Lvl	60.5	7.6	7	0.6
158 - 3303 Forest Ave - Single residence -	158	1	70.4	68.5	66	-1.9	15	Snd Lvl	60.7	7.8	7	0.8
159 - 3301 Forest Ave - Single residence -	159	1	68.4	66.5	66	-1.9	15	Snd Lvl	59.7	6.8	7	-0.2
160 - 3221 Forest Ave - Single residence -	160	1	68.1	66.6	66	-1.5	15	Snd Lvl	59.7	6.9	7	-0.1
161 - 3219 Forest Ave - Single residence -	161	1	70.0	68.7	66	-1.3	15	Snd Lvl	59.6	9.1	7	2.1
162 - 3217 Forest Ave - Single residence -	162	1	68.5	67.4	66	-1.1	15	Snd Lvl	59.2	8.2	7	1.2
163 - 3215 Forest Ave - Single residence -	163	1	68.3	67.3	66	-1.0	15	Snd Lvl	58.8	8.5	7	1.5
164 - 3213 Forest Ave - Single residence -	164	1	69.9	68.7	66	-1.2	15	Snd Lvl	58.9	9.8	7	2.8
165 - 3211 Forest Ave - Single residence -	165	1	70.1	68.8	66	-1.3	15	Snd Lvl	59.1	9.7	7	2.7
166 - 3209 Forest Ave - Single residence -	166	1	69.8	68.3	66	-1.5	15	Snd Lvl	59.0	9.3	7	2.3
167 - 3207 Forest Ave - Single residence -	167	1	69.7	68.2	66	-1.5	15	Snd Lvl	59.0	9.2	7	2.2
168 - 3203 Forest Ave - Single residence -	168	1	68.5	67.2	66	-1.3	15	Snd Lvl	59.5	7.7	7	0.7

169 - 3201 Forest Ave - Single residence -	169	1	69.2	67.2	66	-2.0	15	Snd Lvl	59.5	7.7	7	0.7
170 - 3125 Forest Ave - Single residence -	170	1	67.2	65.5	66	-1.7	15	----	58.3	7.2	7	0.2
171 - 3123 Forest Ave - Single residence -	171	1	67.0	65.0	66	-2.0	15	----	57.9	7.1	7	0.1
172 - 3119 Forest Ave - Single residence -	172	1	65.6	63.2	66	-2.4	15	----	57.0	6.2	7	-0.8
173 - 3117 Forest Ave - Single residence -	173	1	64.4	62.2	66	-2.2	15	----	56.4	5.8	7	-1.2
174 - 3115 Forest Ave - Single residence -	174	1	63.8	62.0	66	-1.8	15	----	56.1	5.9	7	-1.1
175 - 3109 Forest Ave - Single residence -	175	1	62.9	61.2	66	-1.7	15	----	55.5	5.7	7	-1.3
176 - 3105/3107 Forest Ave - Single reside	176	2	62.7	60.9	66	-1.8	15	----	55.3	5.6	7	-1.4
177 - 3103 Forest Ave - Single residence -	177	1	62.0	60.4	66	-1.6	15	----	55.2	5.2	7	-1.8
178 - 3031 Forest Ave - Single residence -	178	1	61.3	59.9	66	-1.4	15	----	55.1	4.8	7	-2.2
179 - 3027 Forest Ave - Single residence -	179	1	60.5	59.2	66	-1.3	15	----	54.8	4.4	7	-2.6
180 - 3023 Forest Ave - Single residence -	180	1	60.0	58.9	66	-1.1	15	----	54.6	4.3	7	-2.7
181 - 3021 Forest Ave - Single residence -	181	1	59.5	59.1	66	-0.4	15	----	54.6	4.5	7	-2.5
183 - 3015 Forest Ave - Single residence -	182	1	58.7	59.0	66	0.3	15	----	54.3	4.7	7	-2.3
184 - 3001 Forest Ave - Single residence -	183	1	58.1	59.4	66	1.3	15	----	54.5	4.9	7	-2.1
185 - 3007 Forest Ave - Single residence -	184	1	58.0	58.9	66	0.9	15	----	54.3	4.6	7	-2.4
186 - 3001 Forest Ave - Single residence -	185	1	57.4	59.0	66	1.6	15	----	54.6	4.4	7	-2.6
187 - 100 S Tekoppel Ave - Single residen	186	1	57.5	59.3	66	1.8	15	----	57.1	2.2	7	-4.8
188 - 3404 Forest Ave - Single residence -	187	1	59.5	59.3	66	-0.2	15	----	55.9	3.4	7	-3.6
189 - 3400 Forest Ave - Single residence -	188	1	60.2	60.1	66	-0.1	15	----	56.3	3.8	7	-3.2
190 - 3312 Forest Ave - Destiny of Faith C	189	1	61.3	60.0	66	-1.3	15	----	56.2	3.8	7	-3.2
191 - 3310 Forest Ave - Single residence -	190	1	61.9	60.1	66	-1.8	15	----	56.3	3.8	7	-3.2
192 - 3308 Forest Ave - Single residence -	191	1	62.0	60.0	66	-2.0	15	----	56.3	3.7	7	-3.3
193 - 3306 Forest Ave - Single residence -	192	1	62.1	60.0	66	-2.1	15	----	56.3	3.7	7	-3.3
194 - 3304 Forest Ave - Single residence -	193	1	62.1	59.9	66	-2.2	15	----	56.3	3.6	7	-3.4
195 - 3300 Forest Ave - Single residence -	194	1	62.2	59.9	66	-2.3	15	----	56.3	3.6	7	-3.4
196 - 100 Ingle Aveue - Single residence -	195	1	62.1	59.7	66	-2.4	15	----	56.1	3.6	7	-3.4
197 - 3218 Forest Ave - Single residence -	196	1	62.3	59.8	66	-2.5	15	----	56.1	3.7	7	-3.3
198 - 3216 Forest Ave - Single residence -	197	1	61.8	59.8	66	-2.0	15	----	56.0	3.8	7	-3.2
199 - 3214 Forest Ave - Single residence -	198	1	61.5	59.8	66	-1.7	15	----	56.0	3.8	7	-3.2
200 - 3212 Forest Ave - Single residence -	199	1	61.0	59.7	66	-1.3	15	----	55.9	3.8	7	-3.2
201 - 3210 Forest Ave - Single residence -	200	1	60.8	59.6	66	-1.2	15	----	55.9	3.7	7	-3.3
202 - 3208 Forest Ave - Single residence -	201	1	60.5	59.8	66	-0.7	15	----	56.0	3.8	7	-3.2
203 - 3206 Forest Ave - Single residence -	202	1	60.6	59.8	66	-0.8	15	----	55.9	3.9	7	-3.1
204 - 3204 Forest Ave - Single residence -	203	1	60.7	59.7	66	-1.0	15	----	55.8	3.9	7	-3.1
205 - 3200 Forest Ave - Single residence -	204	1	60.1	59.3	66	-0.8	15	----	55.5	3.8	7	-3.2
206 - 3128 Forest Ave - Single residence -	205	1	59.7	58.9	66	-0.8	15	----	55.6	3.3	7	-3.7
207 - 3122 Forest Ave - Single residence -	206	1	59.5	58.5	66	-1.0	15	----	55.1	3.4	7	-3.6
208 - 3116 Forest Ave - Single residence -	207	1	58.7	58.0	66	-0.7	15	----	54.8	3.2	7	-3.8
209 - 3112 Forest Ave - Single residence -	208	1	58.3	58.5	66	0.2	15	----	54.9	3.6	7	-3.4
210 - 3108 Forest Ave - Single residence -	209	1	58.4	57.9	66	-0.5	15	----	54.7	3.2	7	-3.8

211 - 3104 Forest Ave - Single residence -	210	1	58.2	57.9	66	-0.3	15	----	54.7	3.2	7	-3.8
212 - 3100 Forest Ave - Single residence -	211	1	58.1	57.8	66	-0.3	15	----	54.6	3.2	7	-3.8
213 - 3016 Forest Ave - Single residence -	212	1	58.1	55.5	66	-2.6	15	----	53.1	2.4	7	-4.6
214 - 3014 Forest Ave - Single residence -	213	1	56.3	55.1	66	-1.2	15	----	52.8	2.3	7	-4.7
215 - 3010 Forest Ave - Single residence -	214	1	55.6	54.7	66	-0.9	15	----	52.6	2.1	7	-4.9
216 - 3000 Forest Ave - Single residence -	215	1	54.9	54.7	66	-0.2	15	----	52.5	2.2	7	-4.8
217 - 102 Leslie Ave - Single residence - N	216	1	54.7	57.4	66	2.7	15	----	54.8	2.6	7	-4.4
218 - 114 Leslie Ave - Single residence - N	217	1	56.7	58.8	66	2.1	15	----	54.9	3.9	7	-3.1
219 - 116 Leslie Ave - Single residence - N	218	1	57.5	57.8	66	0.3	15	----	54.5	3.3	7	-3.7
220 - 118 Leslie Ave - Single residence - N	219	1	57.0	56.4	66	-0.6	15	----	53.8	2.6	7	-4.4
221 - 102 Leslie Ave - Single residence - N	220	1	56.0	54.6	66	-1.4	15	----	52.7	1.9	7	-5.1
222 - 124 Leslie Ave - Single residence - N	221	1	54.5	53.6	66	-0.9	15	----	52.0	1.6	7	-5.4
223 - 5 S Barker Ave - Single residence - N	222	1	53.7	63.0	66	9.3	15	----	62.7	0.3	7	-6.7
224 - 15 S Barker Ave - Single residence -	223	1	63.2	59.8	66	-3.4	15	----	59.4	0.4	7	-6.6
225 - 19 S Barker Ave - Single residence -	224	1	59.5	58.8	66	-0.7	15	----	58.4	0.4	7	-6.6
226 - 51 S Barker Ave - Hillside Manor Apa	225	1	57.9	56.3	66	-1.6	15	----	55.9	0.4	7	-6.6

Dwelling Units	**# DUs**	**Noise Reduction**		
		Min	**Avg**	**Max**
		dB	**dB**	**dB**
All Selected	82	0.3	4.8	9.8
All Impacted	20	6.3	8.1	9.8
All that meet NR Goal	19	7.0	8.2	9.8

INDOT/Lochmueller Group							**21 March 2023**					
Rusty Yeager							**TNM 2.5**					
							Calculated with TNM 2.5					
RESULTS: SOUND LEVELS												
PROJECT/CONTRACT:		**119-0072**										
RUN:		**SR62 2040 NSA 5 barrier**										
BARRIER DESIGN:		**8TCB,10G,10TCB,8G**						**Average pavement type shall be used unless**				
								a State highway agency substantiates the use				
ATMOSPHERICS:		**68 deg F, 50% RH**						**of a different type with approval of FHWA.**				
Receiver												
Name	**No.**	**#DUs**	**Existing**	**No Barrier**					**With Barrier**			
			LAeq1h	**LAeq1h**		**Increase over existing**		**Type**	**Calculated**	**Noise Reduction**		
				Calculated	**Crit'n**	**Calculated**	**Crit'n**	**Impact**	**LAeq1h**	**Calculated**	**Goal**	**Calculated**
							Sub'l Inc					**minus**
												Goal
			dBA	dBA	dBA	dB	dB		dBA	dB	dB	dB
145 - 38 S Tekoppel Ave - Single residenc	145	1	61.6	62.2	66	0.6	15	----	59.7	2.5	7	-4.5
146 - 3417 Forest Ave - Single residence -	146	1	62.7	62.0	66	-0.7	15	----	57.6	4.4	7	-2.6
147 - 3415 Forest Ave - Single residence -	147	1	63.1	62.0	66	-1.1	15	----	57.4	4.6	7	-2.4
148 - 3413 Forest Ave - Single residence -	148	1	63.5	62.2	66	-1.3	15	----	57.3	4.9	7	-2.1
149 - 3407 Forest Ave - Single residence -	149	1	64.2	62.9	66	-1.3	15	----	57.6	5.3	7	-1.7
150 - 35 S Walker Ave - Single residence -	150	1	66.4	66.4	66	0.0	15	Snd Lvl	58.5	7.9	7	0.9
151 - 3329 Forest Ave - Single residence -	151	1	70.0	68.4	66	-1.6	15	Snd Lvl	59.9	8.5	7	1.5
152 - 3323 Forest Ave - Single residence -	152	1	69.9	68.4	66	-1.5	15	Snd Lvl	59.9	8.5	7	1.5
153 - 3319 Forest Ave - Single residence -	153	1	69.7	68.1	66	-1.6	15	Snd Lvl	61.8	6.3	7	-0.7
154 - 3311 Forest Ave - Single residence -	154	1	69.4	67.8	66	-1.6	15	Snd Lvl	59.9	7.9	7	0.9
155 - 3309 Forest Ave - Single residence -	155	1	69.2	67.6	66	-1.6	15	Snd Lvl	60.2	7.4	7	0.4
156 - 3307 Forest Ave - Single residence -	156	1	68.9	67.0	66	-1.9	15	Snd Lvl	60.0	7.0	7	0.0
157 - 3305 Forest Ave - Single residence -	157	1	70.0	68.1	66	-1.9	15	Snd Lvl	60.5	7.6	7	0.6
158 - 3303 Forest Ave - Single residence -	158	1	70.4	68.5	66	-1.9	15	Snd Lvl	60.7	7.8	7	0.8
159 - 3301 Forest Ave - Single residence -	159	1	68.4	66.5	66	-1.9	15	Snd Lvl	59.7	6.8	7	-0.2
160 - 3221 Forest Ave - Single residence -	160	1	68.1	66.6	66	-1.5	15	Snd Lvl	59.6	7.0	7	0.0
161 - 3219 Forest Ave - Single residence -	161	1	70.0	68.7	66	-1.3	15	Snd Lvl	59.5	9.2	7	2.2
162 - 3217 Forest Ave - Single residence -	162	1	68.5	67.4	66	-1.1	15	Snd Lvl	59.1	8.3	7	1.3
163 - 3215 Forest Ave - Single residence -	163	1	68.3	67.3	66	-1.0	15	Snd Lvl	58.7	8.6	7	1.6
164 - 3213 Forest Ave - Single residence -	164	1	69.9	68.7	66	-1.2	15	Snd Lvl	58.8	9.9	7	2.9
165 - 3211 Forest Ave - Single residence -	165	1	70.1	68.8	66	-1.3	15	Snd Lvl	59.0	9.8	7	2.8
166 - 3209 Forest Ave - Single residence -	166	1	69.8	68.3	66	-1.5	15	Snd Lvl	58.8	9.5	7	2.5
167 - 3207 Forest Ave - Single residence -	167	1	69.7	68.2	66	-1.5	15	Snd Lvl	58.7	9.5	7	2.5
168 - 3203 Forest Ave - Single residence -	168	1	68.5	67.2	66	-1.3	15	Snd Lvl	59.0	8.2	7	1.2

169 - 3201 Forest Ave - Single residence -	169	1	69.2	67.2	66	-2.0	15	Snd Lvl	58.4	8.8	7	1.8
170 - 3125 Forest Ave - Single residence -	170	1	67.2	65.5	66	-1.7	15	----	57.5	8.0	7	1.0
171 - 3123 Forest Ave - Single residence -	171	1	67.0	65.0	66	-2.0	15	----	57.1	7.9	7	0.9
172 - 3119 Forest Ave - Single residence -	172	1	65.6	63.2	66	-2.4	15	----	56.3	6.9	7	-0.1
173 - 3117 Forest Ave - Single residence -	173	1	64.4	62.2	66	-2.2	15	----	55.7	6.5	7	-0.5
174 - 3115 Forest Ave - Single residence -	174	1	63.8	62.0	66	-1.8	15	----	55.4	6.6	7	-0.4
175 - 3109 Forest Ave - Single residence -	175	1	62.9	61.2	66	-1.7	15	----	54.9	6.3	7	-0.7
176 - 3105/3107 Forest Ave - Single reside	176	2	62.7	60.9	66	-1.8	15	----	54.7	6.2	7	-0.8
177 - 3103 Forest Ave - Single residence -	177	1	62.0	60.4	66	-1.6	15	----	54.6	5.8	7	-1.2
178 - 3031 Forest Ave - Single residence -	178	1	61.3	59.9	66	-1.4	15	----	54.6	5.3	7	-1.7
179 - 3027 Forest Ave - Single residence -	179	1	60.5	59.2	66	-1.3	15	----	54.5	4.7	7	-2.3
180 - 3023 Forest Ave - Single residence -	180	1	60.0	58.9	66	-1.1	15	----	54.3	4.6	7	-2.4
181 - 3021 Forest Ave - Single residence -	181	1	59.5	59.1	66	-0.4	15	----	54.4	4.7	7	-2.3
183 - 3015 Forest Ave - Single residence -	182	1	58.7	59.0	66	0.3	15	----	54.2	4.8	7	-2.2
184 - 3001 Forest Ave - Single residence -	183	1	58.1	59.4	66	1.3	15	----	54.3	5.1	7	-1.9
185 - 3007 Forest Ave - Single residence -	184	1	58.0	58.9	66	0.9	15	----	54.2	4.7	7	-2.3
186 - 3001 Forest Ave - Single residence -	185	1	57.4	59.0	66	1.6	15	----	54.4	4.6	7	-2.4
187 - 100 S Tekoppel Ave - Single residen	186	1	57.5	59.3	66	1.8	15	----	57.1	2.2	7	-4.8
188 - 3404 Forest Ave - Single residence -	187	1	59.5	59.3	66	-0.2	15	----	55.9	3.4	7	-3.6
189 - 3400 Forest Ave - Single residence -	188	1	60.2	60.1	66	-0.1	15	----	56.3	3.8	7	-3.2
190 - 3312 Forest Ave - Destiny of Faith C	189	1	61.3	60.0	66	-1.3	15	----	56.2	3.8	7	-3.2
191 - 3310 Forest Ave - Single residence -	190	1	61.9	60.1	66	-1.8	15	----	56.3	3.8	7	-3.2
192 - 3308 Forest Ave - Single residence -	191	1	62.0	60.0	66	-2.0	15	----	56.3	3.7	7	-3.3
193 - 3306 Forest Ave - Single residence -	192	1	62.1	60.0	66	-2.1	15	----	56.3	3.7	7	-3.3
194 - 3304 Forest Ave - Single residence -	193	1	62.1	59.9	66	-2.2	15	----	56.2	3.7	7	-3.3
195 - 3300 Forest Ave - Single residence -	194	1	62.2	59.9	66	-2.3	15	----	56.3	3.6	7	-3.4
196 - 100 Ingle Aveue - Single residence -	195	1	62.1	59.7	66	-2.4	15	----	56.0	3.7	7	-3.3
197 - 3218 Forest Ave - Single residence -	196	1	62.3	59.8	66	-2.5	15	----	56.0	3.8	7	-3.2
198 - 3216 Forest Ave - Single residence -	197	1	61.8	59.8	66	-2.0	15	----	55.9	3.9	7	-3.1
199 - 3214 Forest Ave - Single residence -	198	1	61.5	59.8	66	-1.7	15	----	55.9	3.9	7	-3.1
200 - 3212 Forest Ave - Single residence -	199	1	61.0	59.7	66	-1.3	15	----	55.8	3.9	7	-3.1
201 - 3210 Forest Ave - Single residence -	200	1	60.8	59.6	66	-1.2	15	----	55.7	3.9	7	-3.1
202 - 3208 Forest Ave - Single residence -	201	1	60.5	59.8	66	-0.7	15	----	55.8	4.0	7	-3.0
203 - 3206 Forest Ave - Single residence -	202	1	60.6	59.8	66	-0.8	15	----	55.7	4.1	7	-2.9
204 - 3204 Forest Ave - Single residence -	203	1	60.7	59.7	66	-1.0	15	----	55.5	4.2	7	-2.8
205 - 3200 Forest Ave - Single residence -	204	1	60.1	59.3	66	-0.8	15	----	55.1	4.2	7	-2.8
206 - 3128 Forest Ave - Single residence -	205	1	59.7	58.9	66	-0.8	15	----	55.0	3.9	7	-3.1
207 - 3122 Forest Ave - Single residence -	206	1	59.5	58.5	66	-1.0	15	----	54.1	4.4	7	-2.6
208 - 3116 Forest Ave - Single residence -	207	1	58.7	58.0	66	-0.7	15	----	53.6	4.4	7	-2.6
209 - 3112 Forest Ave - Single residence -	208	1	58.3	58.5	66	0.2	15	----	53.7	4.8	7	-2.2
210 - 3108 Forest Ave - Single residence -	209	1	58.4	57.9	66	-0.5	15	----	53.4	4.5	7	-2.5

211 - 3104 Forest Ave - Single residence -	210	1	58.2	57.9	66	-0.3	15	----	53.4	4.5	7	-2.5
212 - 3100 Forest Ave - Single residence -	211	1	58.1	57.8	66	-0.3	15	----	53.4	4.4	7	-2.6
213 - 3016 Forest Ave - Single residence -	212	1	58.1	55.5	66	-2.6	15	----	52.5	3.0	7	-4.0
214 - 3014 Forest Ave - Single residence -	213	1	56.3	55.1	66	-1.2	15	----	52.3	2.8	7	-4.2
215 - 3010 Forest Ave - Single residence -	214	1	55.6	54.7	66	-0.9	15	----	52.2	2.5	7	-4.5
216 - 3000 Forest Ave - Single residence -	215	1	54.9	54.7	66	-0.2	15	----	52.2	2.5	7	-4.5
217 - 102 Leslie Ave - Single residence - N	216	1	54.7	57.4	66	2.7	15	----	54.8	2.6	7	-4.4
218 - 114 Leslie Ave - Single residence - N	217	1	56.7	58.8	66	2.1	15	----	54.7	4.1	7	-2.9
219 - 116 Leslie Ave - Single residence - N	218	1	57.5	57.8	66	0.3	15	----	54.4	3.4	7	-3.6
220 - 118 Leslie Ave - Single residence - N	219	1	57.0	56.4	66	-0.6	15	----	53.7	2.7	7	-4.3
221 - 102 Leslie Ave - Single residence - N	220	1	56.0	54.6	66	-1.4	15	----	52.5	2.1	7	-4.9
222 - 124 Leslie Ave - Single residence - N	221	1	54.5	53.6	66	-0.9	15	----	51.9	1.7	7	-5.3
223 - 5 S Barker Ave - Single residence - I	222	1	53.7	63.0	66	9.3	15	----	62.7	0.3	7	-6.7
224 - 15 S Barker Ave - Single residence -	223	1	63.2	59.8	66	-3.4	15	----	59.4	0.4	7	-6.6
225 - 19 S Barker Ave - Single residence -	224	1	59.5	58.8	66	-0.7	15	----	58.4	0.4	7	-6.6
226 - 51 S Barker Ave - Hillside Manor Ap	225	1	57.9	56.3	66	-1.6	15	----	55.9	0.4	7	-6.6

Dwelling Units	**# DUs**	**Noise Reduction**		
		Min	**Avg**	**Max**
		dB	**dB**	**dB**
All Selected	82	0.3	5.1	9.9
All Impacted	20	6.3	8.2	9.9
All that meet NR Goal	20	7.0	8.4	9.9

INDOT/Lochmueller Group							21 March 2023					
Rusty Yeager							TNM 2.5					
							Calculated with TNM 2.5					
RESULTS: SOUND LEVELS												
PROJECT/CONTRACT:	119-0072											
RUN:	SR62 2040 NSA 5 barrier											
BARRIER DESIGN:	8TCB,10G,10TCB,10G							Average pavement type shall be used unless a State highway agency substantiates the use of a different type with approval of FHWA.				
ATMOSPHERICS:	68 deg F, 50% RH											
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
145 - 38 S Tekoppel Ave - Single residenc	145	1	61.6	62.2	66	0.6	15	----	59.7	2.5	7	-4.5
146 - 3417 Forest Ave - Single residence -	146	1	62.7	62.0	66	-0.7	15	----	57.5	4.5	7	-2.5
147 - 3415 Forest Ave - Single residence -	147	1	63.1	62.0	66	-1.1	15	----	57.4	4.6	7	-2.4
148 - 3413 Forest Ave - Single residence -	148	1	63.5	62.2	66	-1.3	15	----	57.2	5.0	7	-2.0
149 - 3407 Forest Ave - Single residence -	149	1	64.2	62.9	66	-1.3	15	----	57.6	5.3	7	-1.7
150 - 35 S Walker Ave - Single residence -	150	1	66.4	66.4	66	0.0	15	Snd Lvl	58.5	7.9	7	0.9
151 - 3329 Forest Ave - Single residence -	151	1	70.0	68.4	66	-1.6	15	Snd Lvl	59.9	8.5	7	1.5
152 - 3323 Forest Ave - Single residence -	152	1	69.9	68.4	66	-1.5	15	Snd Lvl	59.9	8.5	7	1.5
153 - 3319 Forest Ave - Single residence -	153	1	69.7	68.1	66	-1.6	15	Snd Lvl	61.8	6.3	7	-0.7
154 - 3311 Forest Ave - Single residence -	154	1	69.4	67.8	66	-1.6	15	Snd Lvl	59.9	7.9	7	0.9
155 - 3309 Forest Ave - Single residence -	155	1	69.2	67.6	66	-1.6	15	Snd Lvl	60.2	7.4	7	0.4
156 - 3307 Forest Ave - Single residence -	156	1	68.9	67.0	66	-1.9	15	Snd Lvl	59.9	7.1	7	0.1
157 - 3305 Forest Ave - Single residence -	157	1	70.0	68.1	66	-1.9	15	Snd Lvl	60.5	7.6	7	0.6
158 - 3303 Forest Ave - Single residence -	158	1	70.4	68.5	66	-1.9	15	Snd Lvl	60.7	7.8	7	0.8
159 - 3301 Forest Ave - Single residence -	159	1	68.4	66.5	66	-1.9	15	Snd Lvl	59.7	6.8	7	-0.2
160 - 3221 Forest Ave - Single residence -	160	1	68.1	66.6	66	-1.5	15	Snd Lvl	59.6	7.0	7	0.0
161 - 3219 Forest Ave - Single residence -	161	1	70.0	68.7	66	-1.3	15	Snd Lvl	59.5	9.2	7	2.2
162 - 3217 Forest Ave - Single residence -	162	1	68.5	67.4	66	-1.1	15	Snd Lvl	59.1	8.3	7	1.3
163 - 3215 Forest Ave - Single residence -	163	1	68.3	67.3	66	-1.0	15	Snd Lvl	58.7	8.6	7	1.6
164 - 3213 Forest Ave - Single residence -	164	1	69.9	68.7	66	-1.2	15	Snd Lvl	58.8	9.9	7	2.9
165 - 3211 Forest Ave - Single residence -	165	1	70.1	68.8	66	-1.3	15	Snd Lvl	59.0	9.8	7	2.8
166 - 3209 Forest Ave - Single residence -	166	1	69.8	68.3	66	-1.5	15	Snd Lvl	58.8	9.5	7	2.5
167 - 3207 Forest Ave - Single residence -	167	1	69.7	68.2	66	-1.5	15	Snd Lvl	58.7	9.5	7	2.5
168 - 3203 Forest Ave - Single residence -	168	1	68.5	67.2	66	-1.3	15	Snd Lvl	58.9	8.3	7	1.3

169 - 3201 Forest Ave - Single residence -	169	1	69.2	67.2	66	-2.0	15	Snd Lvl	58.4	8.8	7	1.8
170 - 3125 Forest Ave - Single residence -	170	1	67.2	65.5	66	-1.7	15	----	57.5	8.0	7	1.0
171 - 3123 Forest Ave - Single residence -	171	1	67.0	65.0	66	-2.0	15	----	57.1	7.9	7	0.9
172 - 3119 Forest Ave - Single residence -	172	1	65.6	63.2	66	-2.4	15	----	56.3	6.9	7	-0.1
173 - 3117 Forest Ave - Single residence -	173	1	64.4	62.2	66	-2.2	15	----	55.7	6.5	7	-0.5
174 - 3115 Forest Ave - Single residence -	174	1	63.8	62.0	66	-1.8	15	----	55.4	6.6	7	-0.4
175 - 3109 Forest Ave - Single residence -	175	1	62.9	61.2	66	-1.7	15	----	54.9	6.3	7	-0.7
176 - 3105/3107 Forest Ave - Single reside	176	2	62.7	60.9	66	-1.8	15	----	54.7	6.2	7	-0.8
177 - 3103 Forest Ave - Single residence -	177	1	62.0	60.4	66	-1.6	15	----	54.6	5.8	7	-1.2
178 - 3031 Forest Ave - Single residence -	178	1	61.3	59.9	66	-1.4	15	----	54.4	5.5	7	-1.5
179 - 3027 Forest Ave - Single residence -	179	1	60.5	59.2	66	-1.3	15	----	54.1	5.1	7	-1.9
180 - 3023 Forest Ave - Single residence -	180	1	60.0	58.9	66	-1.1	15	----	53.9	5.0	7	-2.0
181 - 3021 Forest Ave - Single residence -	181	1	59.5	59.1	66	-0.4	15	----	53.9	5.2	7	-1.8
183 - 3015 Forest Ave - Single residence -	182	1	58.7	59.0	66	0.3	15	----	53.7	5.3	7	-1.7
184 - 3001 Forest Ave - Single residence -	183	1	58.1	59.4	66	1.3	15	----	53.8	5.6	7	-1.4
185 - 3007 Forest Ave - Single residence -	184	1	58.0	58.9	66	0.9	15	----	53.7	5.2	7	-1.8
186 - 3001 Forest Ave - Single residence -	185	1	57.4	59.0	66	1.6	15	----	53.9	5.1	7	-1.9
187 - 100 S Tekoppel Ave - Single residen	186	1	57.5	59.3	66	1.8	15	----	57.1	2.2	7	-4.8
188 - 3404 Forest Ave - Single residence -	187	1	59.5	59.3	66	-0.2	15	----	55.9	3.4	7	-3.6
189 - 3400 Forest Ave - Single residence -	188	1	60.2	60.1	66	-0.1	15	----	56.3	3.8	7	-3.2
190 - 3312 Forest Ave - Destiny of Faith C	189	1	61.3	60.0	66	-1.3	15	----	56.2	3.8	7	-3.2
191 - 3310 Forest Ave - Single residence -	190	1	61.9	60.1	66	-1.8	15	----	56.3	3.8	7	-3.2
192 - 3308 Forest Ave - Single residence -	191	1	62.0	60.0	66	-2.0	15	----	56.3	3.7	7	-3.3
193 - 3306 Forest Ave - Single residence -	192	1	62.1	60.0	66	-2.1	15	----	56.3	3.7	7	-3.3
194 - 3304 Forest Ave - Single residence -	193	1	62.1	59.9	66	-2.2	15	----	56.2	3.7	7	-3.3
195 - 3300 Forest Ave - Single residence -	194	1	62.2	59.9	66	-2.3	15	----	56.3	3.6	7	-3.4
196 - 100 Ingle Aveue - Single residence -	195	1	62.1	59.7	66	-2.4	15	----	56.0	3.7	7	-3.3
197 - 3218 Forest Ave - Single residence -	196	1	62.3	59.8	66	-2.5	15	----	56.0	3.8	7	-3.2
198 - 3216 Forest Ave - Single residence -	197	1	61.8	59.8	66	-2.0	15	----	55.9	3.9	7	-3.1
199 - 3214 Forest Ave - Single residence -	198	1	61.5	59.8	66	-1.7	15	----	55.9	3.9	7	-3.1
200 - 3212 Forest Ave - Single residence -	199	1	61.0	59.7	66	-1.3	15	----	55.8	3.9	7	-3.1
201 - 3210 Forest Ave - Single residence -	200	1	60.8	59.6	66	-1.2	15	----	55.7	3.9	7	-3.1
202 - 3208 Forest Ave - Single residence -	201	1	60.5	59.8	66	-0.7	15	----	55.8	4.0	7	-3.0
203 - 3206 Forest Ave - Single residence -	202	1	60.6	59.8	66	-0.8	15	----	55.7	4.1	7	-2.9
204 - 3204 Forest Ave - Single residence -	203	1	60.7	59.7	66	-1.0	15	----	55.5	4.2	7	-2.8
205 - 3200 Forest Ave - Single residence -	204	1	60.1	59.3	66	-0.8	15	----	55.1	4.2	7	-2.8
206 - 3128 Forest Ave - Single residence -	205	1	59.7	58.9	66	-0.8	15	----	55.0	3.9	7	-3.1
207 - 3122 Forest Ave - Single residence -	206	1	59.5	58.5	66	-1.0	15	----	54.1	4.4	7	-2.6
208 - 3116 Forest Ave - Single residence -	207	1	58.7	58.0	66	-0.7	15	----	53.5	4.5	7	-2.5
209 - 3112 Forest Ave - Single residence -	208	1	58.3	58.5	66	0.2	15	----	53.5	5.0	7	-2.0
210 - 3108 Forest Ave - Single residence -	209	1	58.4	57.9	66	-0.5	15	----	53.2	4.7	7	-2.3

211 - 3104 Forest Ave - Single residence -	210	1	58.2	57.9	66	-0.3	15	----	53.2	4.7	7	-2.3
212 - 3100 Forest Ave - Single residence -	211	1	58.1	57.8	66	-0.3	15	----	53.1	4.7	7	-2.3
213 - 3016 Forest Ave - Single residence -	212	1	58.1	55.5	66	-2.6	15	----	52.1	3.4	7	-3.6
214 - 3014 Forest Ave - Single residence -	213	1	56.3	55.1	66	-1.2	15	----	51.9	3.2	7	-3.8
215 - 3010 Forest Ave - Single residence -	214	1	55.6	54.7	66	-0.9	15	----	51.8	2.9	7	-4.1
216 - 3000 Forest Ave - Single residence -	215	1	54.9	54.7	66	-0.2	15	----	51.8	2.9	7	-4.1
217 - 102 Leslie Ave - Single residence - N	216	1	54.7	57.4	66	2.7	15	----	54.3	3.1	7	-3.9
218 - 114 Leslie Ave - Single residence - N	217	1	56.7	58.8	66	2.1	15	----	54.3	4.5	7	-2.5
219 - 116 Leslie Ave - Single residence - N	218	1	57.5	57.8	66	0.3	15	----	53.9	3.9	7	-3.1
220 - 118 Leslie Ave - Single residence - N	219	1	57.0	56.4	66	-0.6	15	----	53.3	3.1	7	-3.9
221 - 102 Leslie Ave - Single residence - N	220	1	56.0	54.6	66	-1.4	15	----	52.2	2.4	7	-4.6
222 - 124 Leslie Ave - Single residence - N	221	1	54.5	53.6	66	-0.9	15	----	51.6	2.0	7	-5.0
223 - 5 S Barker Ave - Single residence - I	222	1	53.7	63.0	66	9.3	15	----	62.6	0.4	7	-6.6
224 - 15 S Barker Ave - Single residence -	223	1	63.2	59.8	66	-3.4	15	----	59.3	0.5	7	-6.5
225 - 19 S Barker Ave - Single residence -	224	1	59.5	58.8	66	-0.7	15	----	58.4	0.4	7	-6.6
226 - 51 S Barker Ave - Hillside Manor Apa	225	1	57.9	56.3	66	-1.6	15	----	55.8	0.5	7	-6.5

Dwelling Units	**# DUs**	**Noise Reduction**		
		Min	**Avg**	**Max**
		dB	**dB**	**dB**
All Selected	82	0.4	5.2	9.9
All Impacted	20	6.3	8.2	9.9
All that meet NR Goal	20	7.0	8.4	9.9

INDOT/Lochmueller Group **21 March 2023**
Rusty Yeager **TNM 2.5**
Calculated with TNM 2.5

RESULTS: SOUND LEVELS
PROJECT/CONTRACT: **119-0072**
RUN: **SR62 2040 NSA 5 barrier**
BARRIER DESIGN: **8TCB,10G,14TCB,12G**

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

ATMOSPHERICS: **68 deg F, 50% RH**

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
145 - 38 S Tekoppel Ave - Single residenc	145	1	61.6	62.2	66	0.6	15	----	60.2	2.0	7	-5.0
146 - 3417 Forest Ave - Single residence -	146	1	62.7	62.0	66	-0.7	15	----	59.3	2.7	7	-4.3
147 - 3415 Forest Ave - Single residence -	147	1	63.1	62.0	66	-1.1	15	----	59.0	3.0	7	-4.0
148 - 3413 Forest Ave - Single residence -	148	1	63.5	62.2	66	-1.3	15	----	58.6	3.6	7	-3.4
149 - 3407 Forest Ave - Single residence -	149	1	64.2	62.9	66	-1.3	15	----	58.2	4.7	7	-2.3
150 - 35 S Walker Ave - Single residence -	150	1	66.4	66.4	66	0.0	15	Snd Lvl	58.6	7.8	7	0.8
151 - 3329 Forest Ave - Single residence -	151	1	70.0	68.4	66	-1.6	15	Snd Lvl	60.0	8.4	7	1.4
152 - 3323 Forest Ave - Single residence -	152	1	69.9	68.4	66	-1.5	15	Snd Lvl	60.0	8.4	7	1.4
153 - 3319 Forest Ave - Single residence -	153	1	69.7	68.1	66	-1.6	15	Snd Lvl	61.8	6.3	7	-0.7
154 - 3311 Forest Ave - Single residence -	154	1	69.4	67.8	66	-1.6	15	Snd Lvl	59.9	7.9	7	0.9
155 - 3309 Forest Ave - Single residence -	155	1	69.2	67.6	66	-1.6	15	Snd Lvl	60.3	7.3	7	0.3
156 - 3307 Forest Ave - Single residence -	156	1	68.9	67.0	66	-1.9	15	Snd Lvl	60.0	7.0	7	0.0
157 - 3305 Forest Ave - Single residence -	157	1	70.0	68.1	66	-1.9	15	Snd Lvl	60.5	7.6	7	0.6
158 - 3303 Forest Ave - Single residence -	158	1	70.4	68.5	66	-1.9	15	Snd Lvl	60.7	7.8	7	0.8
159 - 3301 Forest Ave - Single residence -	159	1	68.4	66.5	66	-1.9	15	Snd Lvl	59.7	6.8	7	-0.2
160 - 3221 Forest Ave - Single residence -	160	1	68.1	66.6	66	-1.5	15	Snd Lvl	59.6	7.0	7	0.0
161 - 3219 Forest Ave - Single residence -	161	1	70.0	68.7	66	-1.3	15	Snd Lvl	59.5	9.2	7	2.2
162 - 3217 Forest Ave - Single residence -	162	1	68.5	67.4	66	-1.1	15	Snd Lvl	59.1	8.3	7	1.3
163 - 3215 Forest Ave - Single residence -	163	1	68.3	67.3	66	-1.0	15	Snd Lvl	58.7	8.6	7	1.6
164 - 3213 Forest Ave - Single residence -	164	1	69.9	68.7	66	-1.2	15	Snd Lvl	58.8	9.9	7	2.9
165 - 3211 Forest Ave - Single residence -	165	1	70.1	68.8	66	-1.3	15	Snd Lvl	58.9	9.9	7	2.9
166 - 3209 Forest Ave - Single residence -	166	1	69.8	68.3	66	-1.5	15	Snd Lvl	58.7	9.6	7	2.6
167 - 3207 Forest Ave - Single residence -	167	1	69.7	68.2	66	-1.5	15	Snd Lvl	58.6	9.6	7	2.6
168 - 3203 Forest Ave - Single residence -	168	1	68.5	67.2	66	-1.3	15	Snd Lvl	58.7	8.5	7	1.5

RESULTS: SOUND LEVELS **119-0072**

169 - 3201 Forest Ave - Single residence -	169	1	69.2	67.2	66	-2.0	15	Snd Lvl	57.9	9.3	7	2.3
170 - 3125 Forest Ave - Single residence -	170	1	67.2	65.5	66	-1.7	15	----	56.9	8.6	7	1.6
171 - 3123 Forest Ave - Single residence -	171	1	67.0	65.0	66	-2.0	15	----	56.6	8.4	7	1.4
172 - 3119 Forest Ave - Single residence -	172	1	65.6	63.2	66	-2.4	15	----	55.8	7.4	7	0.4
173 - 3117 Forest Ave - Single residence -	173	1	64.4	62.2	66	-2.2	15	----	55.1	7.1	7	0.1
174 - 3115 Forest Ave - Single residence -	174	1	63.8	62.0	66	-1.8	15	----	54.8	7.2	7	0.2
175 - 3109 Forest Ave - Single residence -	175	1	62.9	61.2	66	-1.7	15	----	54.2	7.0	7	0.0
176 - 3105/3107 Forest Ave - Single reside	176	2	62.7	60.9	66	-1.8	15	----	54.0	6.9	7	-0.1
177 - 3103 Forest Ave - Single residence -	177	1	62.0	60.4	66	-1.6	15	----	53.8	6.6	7	-0.4
178 - 3031 Forest Ave - Single residence -	178	1	61.3	59.9	66	-1.4	15	----	53.6	6.3	7	-0.7
179 - 3027 Forest Ave - Single residence -	179	1	60.5	59.2	66	-1.3	15	----	53.4	5.8	7	-1.2
180 - 3023 Forest Ave - Single residence -	180	1	60.0	58.9	66	-1.1	15	----	53.3	5.6	7	-1.4
181 - 3021 Forest Ave - Single residence -	181	1	59.5	59.1	66	-0.4	15	----	53.4	5.7	7	-1.3
183 - 3015 Forest Ave - Single residence -	182	1	58.7	59.0	66	0.3	15	----	53.3	5.7	7	-1.3
184 - 3001 Forest Ave - Single residence -	183	1	58.1	59.4	66	1.3	15	----	53.5	5.9	7	-1.1
185 - 3007 Forest Ave - Single residence -	184	1	58.0	58.9	66	0.9	15	----	53.6	5.3	7	-1.7
186 - 3001 Forest Ave - Single residence -	185	1	57.4	59.0	66	1.6	15	----	53.7	5.3	7	-1.7
187 - 100 S Tekoppel Ave - Single residen	186	1	57.5	59.3	66	1.8	15	----	57.6	1.7	7	-5.3
188 - 3404 Forest Ave - Single residence -	187	1	59.5	59.3	66	-0.2	15	----	56.6	2.7	7	-4.3
189 - 3400 Forest Ave - Single residence -	188	1	60.2	60.1	66	-0.1	15	----	56.9	3.2	7	-3.8
190 - 3312 Forest Ave - Destiny of Faith C	189	1	61.3	60.0	66	-1.3	15	----	56.5	3.5	7	-3.5
191 - 3310 Forest Ave - Single residence -	190	1	61.9	60.1	66	-1.8	15	----	56.5	3.6	7	-3.4
192 - 3308 Forest Ave - Single residence -	191	1	62.0	60.0	66	-2.0	15	----	56.4	3.6	7	-3.4
193 - 3306 Forest Ave - Single residence -	192	1	62.1	60.0	66	-2.1	15	----	56.4	3.6	7	-3.4
194 - 3304 Forest Ave - Single residence -	193	1	62.1	59.9	66	-2.2	15	----	56.3	3.6	7	-3.4
195 - 3300 Forest Ave - Single residence -	194	1	62.2	59.9	66	-2.3	15	----	56.3	3.6	7	-3.4
196 - 100 Ingle Aveue - Single residence -	195	1	62.1	59.7	66	-2.4	15	----	56.0	3.7	7	-3.3
197 - 3218 Forest Ave - Single residence -	196	1	62.3	59.8	66	-2.5	15	----	56.0	3.8	7	-3.2
198 - 3216 Forest Ave - Single residence -	197	1	61.8	59.8	66	-2.0	15	----	55.8	4.0	7	-3.0
199 - 3214 Forest Ave - Single residence -	198	1	61.5	59.8	66	-1.7	15	----	55.7	4.1	7	-2.9
200 - 3212 Forest Ave - Single residence -	199	1	61.0	59.7	66	-1.3	15	----	55.6	4.1	7	-2.9
201 - 3210 Forest Ave - Single residence -	200	1	60.8	59.6	66	-1.2	15	----	55.4	4.2	7	-2.8
202 - 3208 Forest Ave - Single residence -	201	1	60.5	59.8	66	-0.7	15	----	55.4	4.4	7	-2.6
203 - 3206 Forest Ave - Single residence -	202	1	60.6	59.8	66	-0.8	15	----	55.3	4.5	7	-2.5
204 - 3204 Forest Ave - Single residence -	203	1	60.7	59.7	66	-1.0	15	----	55.0	4.7	7	-2.3
205 - 3200 Forest Ave - Single residence -	204	1	60.1	59.3	66	-0.8	15	----	54.4	4.9	7	-2.1
206 - 3128 Forest Ave - Single residence -	205	1	59.7	58.9	66	-0.8	15	----	54.1	4.8	7	-2.2
207 - 3122 Forest Ave - Single residence -	206	1	59.5	58.5	66	-1.0	15	----	53.4	5.1	7	-1.9
208 - 3116 Forest Ave - Single residence -	207	1	58.7	58.0	66	-0.7	15	----	52.9	5.1	7	-1.9
209 - 3112 Forest Ave - Single residence -	208	1	58.3	58.5	66	0.2	15	----	52.9	5.6	7	-1.4
210 - 3108 Forest Ave - Single residence -	209	1	58.4	57.9	66	-0.5	15	----	52.6	5.3	7	-1.7

S:_2019\119-0072\Enviro\Noise\TNM\SR62 Barriers\SR62 NSA 5 barrier **2** **21 M**

211 - 3104 Forest Ave - Single residence -	210	1	58.2	57.9	66	-0.3	15	----	52.5	5.4	7	-1.6
212 - 3100 Forest Ave - Single residence -	211	1	58.1	57.8	66	-0.3	15	----	52.4	5.4	7	-1.6
213 - 3016 Forest Ave - Single residence -	212	1	58.1	55.5	66	-2.6	15	----	51.5	4.0	7	-3.0
214 - 3014 Forest Ave - Single residence -	213	1	56.3	55.1	66	-1.2	15	----	51.4	3.7	7	-3.3
215 - 3010 Forest Ave - Single residence -	214	1	55.6	54.7	66	-0.9	15	----	51.5	3.2	7	-3.8
216 - 3000 Forest Ave - Single residence -	215	1	54.9	54.7	66	-0.2	15	----	51.5	3.2	7	-3.8
217 - 102 Leslie Ave - Single residence - N	216	1	54.7	57.4	66	2.7	15	----	55.7	1.7	7	-5.3
218 - 114 Leslie Ave - Single residence - N	217	1	56.7	58.8	66	2.1	15	----	55.5	3.3	7	-3.7
219 - 116 Leslie Ave - Single residence - N	218	1	57.5	57.8	66	0.3	15	----	54.3	3.5	7	-3.5
220 - 118 Leslie Ave - Single residence - N	219	1	57.0	56.4	66	-0.6	15	----	53.3	3.1	7	-3.9
221 - 102 Leslie Ave - Single residence - N	220	1	56.0	54.6	66	-1.4	15	----	52.1	2.5	7	-4.5
222 - 124 Leslie Ave - Single residence - N	221	1	54.5	53.6	66	-0.9	15	----	51.4	2.2	7	-4.8
223 - 5 S Barker Ave - Single residence - N	222	1	53.7	63.0	66	9.3	15	----	62.8	0.2	7	-6.8
224 - 15 S Barker Ave - Single residence -	223	1	63.2	59.8	66	-3.4	15	----	59.3	0.5	7	-6.5
225 - 19 S Barker Ave - Single residence -	224	1	59.5	58.8	66	-0.7	15	----	58.4	0.4	7	-6.6
226 - 51 S Barker Ave - Hillside Manor Apa	225	1	57.9	56.3	66	-1.6	15	----	55.8	0.5	7	-6.5

Dwelling Units	**# DUs**	**Noise Reduction**		
		Min	**Avg**	**Max**
		dB	**dB**	**dB**
All Selected	82	0.2	5.3	9.9
All Impacted	20	6.3	8.3	9.9
All that meet NR Goal	24	7.0	8.2	9.9

Appendix M
NSA 5 Forest Avenue Noise Barrier
Resident/Land Owner Responses

Tenant Response	Owner Response	Address
Unoccupied	YES	35 S Walker Avenue – rental property
Unoccupied	No response	3329 Forest Avenue – rental property
No response	No response	3323 Forest Avenue – rental property
	YES	3319 Forest Avenue
	YES	3311 Forest Avenue
	YES	3309 Forest Avenue
No response	No Opinion	3307 Forest Avenue – rental property
No response	YES	3305 Forest Avenue – rental property
	YES	3303 Forest Avenue
	YES	3301 Forest Avenue
No response	YES	3221 Forest Avenue – rental property
	YES	3219 Forest Avenue
	YES	3217 Forest Avenue
	No response	3215 Forest Avenue
	YES	3213 Forest Avenue
	No response	3211 Forest Avenue
No response	YES	3209 Forest Avenue – rental property
	YES	3207 Forest Avenue
	YES	3203 Forest Avenue
	YES	3201 Forest Avenue
No response	YES	3125 Forest Avenue – rental property
No response	YES	3123 Forest Avenue – rental property
Yes	No response	3119 Forest Avenue – rental property
	YES	3117 Forest Avenue
	YES	3115 Forest Avenue
No	YES	3109 Forest Avenue – rental property
No response	YES	3107 Forest Avenue – rental property
No response	YES	3105 Forest Avenue – rental property
	YES	3103 Forest Avenue
	No response Recently sold	3031 Forest Avenue
	No response	3027 Forest Avenue
No response	No response	3023 Forest Avenue – rental property
	No Opinion	3021 Forest Avenue
	YES	3015 Forest Avenue
	YES	3011 Forest Avenue
	No Opinion	3007 Forest Avenue
	No Opinion	3001 Forest Avenue

Green = In favor of sound barrier
Red = Not in favor of sound barrier
Yellow = No opinion on sound barrier

From: Passmore, Andrew D <APassmore@indot.IN.gov>
Sent: Friday, April 14, 2023 1:07 PM
To: Rusty Yeager <RYeager@lochgroup.com>; Bales, Ronald <rbales@indot.IN.gov>; Foheybreting, Nicole K <NFoheyBreting@indot.IN.gov>; Arnold, Troy <TArnold1@indot.IN.gov>; Bullock, Matthew K <MBullock1@indot.IN.gov>
Cc: Daniel Townsend <DTownsend@lochgroup.com>; Jason DuPont <jdupont@lochgroup.com>; Jeremy Kieffner <jkieffner@lochgroup.com>; Nicole Minton <Nicole.Minton@lochgroup.com>; Jeff Whitaker <jwhitaker@lochgroup.com>; Passmore, Andrew D <APassmore@indot.IN.gov>
Subject: RE: SR 62 (Lloyd Expressway) Des No 1900308 - Revised Highway Noise Analysis INDOT ESD Approval

EXTERNAL

A traffic noise analysis report was completed by Lochmueller Group in March 2023 to evaluate potential traffic noise impacts for the proposed SR 62 Added Travel Lanes project in Vanderburgh County, Indiana. Traffic noise was evaluated at all receptors within 500 feet of edge of pavement within the study area. Traffic noise levels were evaluated for the existing and projected (2040) traffic volumes for the build alternative.

This report evaluated potential noise impacts for the proposed improvements in compliance with the Federal Highway Administration's (FHWA) Procedures for Abatement of Highway Traffic Noise and Construction Noise as presented in the Code of Federal Regulations, Title 23 Part 772 (23 CFR 772) and the Indiana Department of Transportation (INDOT) *Traffic Noise Analysis Procedure* (2022).

Predicted design year (2040) noise levels would approach or exceed the Noise Abatement Criteria (NAC) at 69 receptors resulting in the need to evaluate noise abatement. Noise abatement was analyzed at four noise barrier locations. Three noise barrier locations either did not meet feasibility and/or reasonableness criterion. One noise barrier (Noise Barrier 5-5) meets both feasibility and reasonableness criterion. The noise barrier design for Noise Barrier 5-5 provides benefit for 18 residences (receiving 5 dBA or more reduction) for the single-family residential community, and an additional 18 non-impacted receptors.

Based on the studies thus far accomplished, the State of Indiana has identified that noise abatement is likely, but not guaranteed at one location. Noise abatement at this location is based on preliminary design costs and design criteria. Noise abatement in this location has been estimated to be below 1,250 square feet per benefited receptor and will reduce the noise level by a minimum of 7 dB(A) at a majority of the identified impacted receptors. A re-evaluation of the noise analysis will occur during final design. If during final design it has been determined that conditions have changed such that noise abatement is feasible and reasonable, the abatement measures might be provided. The final decision on the installation of any abatement measure(s) will be made upon the completion of the project's final design and the public involvement process.

This email will serve as INDOT's approval of the traffic noise analysis report for the proposed SR 62 Added Travel Lanes project (Des 1900308).

Drew Passmore
NEPA Review Team Lead
Environmental Services Division
Indiana Department of Transportation
Phone: (317) 439-7500

Categorical Exclusion

Appendix K

SR 62/ Lloyd Expressway Corridor Study

Lloyd Expressway (SR 62/66) Corridor Study

Des. No. 1592406

October 1, 2018

Executive Summary

Introduction

The Lloyd Expressway (SR 62/SR 66) Corridor study was conducted by the Indiana Department of Transportation (INDOT) and the Evansville Metropolitan Planning Organization (EMPO). The study examines the need for and types of improvements necessary along the corridor, focusing on the area beginning in the west at St. Phillips Road in Posey County, passing through Vanderburgh County, and ending in the east at the SR 261 intersection in Warrick County. **Figure A** below provides an overview of the study area. Through a collaborative effort with the public, local government agencies, and the business community, this study will recommend a set of alternatives aimed at accommodating access in a responsible manner and will ultimately result in a plan that can be implemented to facilitate future access management opportunities.

The purpose of the study is to develop a plan to address current and projected traffic demands as well as safety concerns for both motorists and pedestrians to ensure future mobility along and around the corridor.

Activities performed included:

- Compiling an inventory of existing conditions
- Preparing a red flag summary, conducting traffic data counts
- Traffic forecasting (short-term 10-year forecasts as well as long-term, 20-year forecasts)
- Traffic simulation modeling
- Analyzing and proposing alternatives as well as cost estimates
- Conducting stakeholder involvement activities
- Producing a compilation of the findings

Figure A - Study Area

Existing Conditions

For the purpose of this study, the Lloyd Expressway Corridor has been categorized into four distinct sections based on the existing road and area conditions. The four sections include:

- Suburban Development from St. Phillips Road to Barker Avenue (5.5 miles)
- Downtown City Street from Barker Avenue to Fulton Avenue (1.5 miles)
- Expressway from Fulton Avenue to Vann Avenue (4.0 miles)
- Signalized Arterial from Vann Avenue to SR 261 (8.0 miles)

Several intersections have approach levels of service (LOS) of E or worse. These included Schutte Road, Rosenberger Avenue, Joseph Avenue, Burkhardt Road, Green River Road, and Cross Pointe Boulevard. The approaches where LOS values are less than desirable are mainly the side streets since they are typically penalized to keep the traffic flow on the Lloyd Expressway moving during the peak periods. No other intersections or segments are currently operating below LOS D. However, there are intersections operating at LOS D as well as specific movements that are at or below LOS D.

A three-year crash analysis was performed with crash data provided by the EMPO for the years 2014 through 2016. The data was viewed spatially in GIS, where crashes were attributed to appropriate intersections. Next, the crashes were separated in relation to various conditions, most importantly, by the following severity categories: fatal and incapacitating injury, injury, and property damage only. The data was analyzed with RoadHAT version 3.0, which produced an Index of Crash Frequency measure as well as an Index of Crash Severity measure. For intersections which exceeded a value of 1.00 for both measures, detailed crash diagrams were created for further analysis. After completion of the existing conditions inventory, the following intersections warranted further investigation based on their statistical crash analysis and/or LOS results:

- SR 62 / Schutte Road
- SR 62 / Boehne Camp Road
- SR 62 / Middle Mount Vernon Road
- SR 62 / Red Bank Road
- SR 62 / Rosenberger Avenue
- SR 62 / Igleheart Avenue Entrance Ramp
- SR 62 / Wabash Avenue
- SR 62 / St. Joseph Avenue
- SR 66 / Vann Avenue
- SR 66 / Stockwell Road
- SR 66 / Green River Road
- SR 66 / Fielding Road
- SR 66 / Brentwood Drive
- SR 66 / Burkhardt Road
- SR 66 / Cross Pointe Boulevard
- SR 66 / Epworth Road
- SR 66 / Country Place Drive
- SR 66 / Bell Road

University Parkway and Grimm Road were also investigated based on feedback in the initial stakeholder meetings. No roadway segments of SR 62 / 66 showed substandard crash or level of service performance warranting additional investigation.

Future Conditions

The EMPO Regional Travel Demand Model served as the basis for development of traffic forecasts and evaluation of alternatives. A set of microscopic traffic simulation models was developed for the purpose of evaluating the improvement alternatives. The TransModeler® traffic simulation software by Caliper© Corporation was used to examine AM and PM peak period traffic conditions for the following scenarios:

- Existing (year 2017) conditions
- Future (year 2025/2045) No Build conditions (where "No Build" means no additional projects beyond those that are already committed)
- Future (year 2025/2045) anticipated conditions associated with the various improvement alternatives that were considered

The EMPO Regional Travel Demand Model estimates two growth rates for the study area. The growth rates for both the Suburban Development and the Downtown City Street sections on the Lloyd Expressway were calculated to be 0.5% per year which represents lower growth portions of the corridor. The growth rates for both the Expressway and Signalized Arterial sections on the Lloyd Expressway were calculated to be 1.0% per year which represents higher growth portions of the corridor.

Recommendations

The Lloyd Expressway study resulted in several improvement alternatives recommended for future implementation. These improvement concepts focus on areas with existing safety concerns and other transportation deficiencies identified by the study team. The nature and likely causes of problems identified over the course of the study were examined through field reconnaissance, and improvement concepts were developed to address the identified problems. This study focused on short-term improvements (concepts that can be quickly and effectively implemented and that address current mobility and safety issues) and long-term improvements (concepts requiring more significant resources to implement or concepts that address future mobility issues). Improving safety throughout the corridor by providing greater visibility for left-turn vehicles, additional warning signage, providing pedestrian signals and a crosswalk at signalized intersections, eliminating weave movements, and alternative intersection design will improve both vehicular and pedestrian safety.

A range of concepts was developed based on the existing conditions analysis (i.e. traffic, crash history, and environmental overview) and input received from the study team and stakeholders/ local officials. It should be noted that these improvements are purely conceptual and that further details must be examined in subsequent project phases. The various alternatives have not completed the full National Environmental Policy Act (NEPA) process. **Table A** below presents the short-term and long-term recommendations:

Table A – Short and Long-Term Recommendations

Intersection	Priority	Short Term (S) Long Term (L)	Recommendations	Crash Reduction Factor	2018 Estimated Cost
SR 62 / Schutte Rd	Medium	S	Signal Warning Signs/ Flashing Beacons	36.0%	$65,000
SR 62 / Schutte Rd	Medium	L	Positive Offset Left Turn Lanes with Flashing Yellow Arrows	33.8%	$910,000
SR 62 / Middle Mt. Vernon Rd	Low	S	Add Flashing Beacons	N/A	$15,000
SR 62 / Middle Mt. Vernon Rd	Low	L	Right-in / Right-out	72.0%	$200,000
SR 62 / Boehne Camp Rd	Medium	S	Signal Warning Signs/ Flashing Beacons	36.0%	$65,000
SR 62 / Boehne Camp Rd	Medium	L	Positive Offset Left Turn Lanes with Flashing Yellow Arrows	33.8%	$910,000
SR 62 / Red Bank Rd	Medium	S	Signal Warning Signs/ Flashing Beacons	36.0%	$65,000
SR 62 / Red Bank Rd	Medium	S	Reconfiguration of WB Left Turn Lanes	57.0%	$45,000
SR 62 / Rosenberger Ave	Medium	L	Positive Offset Left Turn Lanes with Flashing Yellow Arrows	33.8%	$910,000
SR 62 / Igleheart Ave. Ramp	Medium	S	Improve Exit Guide & Warning Signage	40.8%	$25,000
SR 62 / Igleheart Ave. Ramp	Medium	L	Geometric Configuration of Ramps	25.0%	$1,240,000
SR 62 / St. Joseph Ave	Low	L	Reconfigure southbound approach	20.0%	$35,000
SR 62 / Wabash Ave	Low	L	Lengthen SR 62 left turn lanes	25.2%	$240,000
SR 66 / Vann Ave	High	L	Construct Right-in/Right-out	72.0%	$120,000
SR 66 / Stockwell Road	Medium	L	Construct Displaced Left Turn Intersection	36.0%	$3,150,000
SR 66 / Green River Road	High	S	Include WB SR 66 Exit Ramp right – turn in interchange traffic signal	94.0%	$230,000
SR 66 / Fielding Road	Medium	S	Flashing Beacons / Near-Side Signals	27.0%	$75,000
SR 66 / Brentwood Drive	Low	S	Replace EB 3-section head signals with single green arrows	N/A	$10,000
SR 66 / Burkhardt Road	High	L	Construct Displaced Left Turn Intersection	36.0%	$3,250,000
SR 66 / Cross Pointe Blvd	High	L	Construct Hybrid Displaced Left Turn / Boulevard Left Turn Intersection	24.0%	$2,900,000
SR 66 / Epworth Rd	High	L	Construct Hybrid Displaced Left Turn / Boulevard Left Turn Intersection	24.0%	$3,000,000
SR 66 / Grimm Road	Low	L	Construct Right-in/Right-out	72.0%	$120,000
SR 66 / Country Place Drive	Low	S	Add Warning Signs / Flashing Beacons	N/A	$15,000
SR 66 / Country Place Drive	Low	L	Right-in / Right-out	72.0%	$200,000
SR 66 / Bell Road	Low	S	Flashing Beacons / Near-Side Signals	27.0%	$75,000

Green shading denotes projects that are already programmed.

In the AM and PM peak period for the near future, 2025, analysis of the concepts above results in all average approach delays operating at LOS D or better, except for the minor approach on Joseph Avenue. Average travel speed decreases by 1 or 2 mph in the AM and PM peak periods. Travel times with alternative recommendations in 2025 remained less than 30 minutes per direction per peak period across the entire corridor.

Pedestrian indications and crosswalks are recommended at the signalized intersections where engineering judgement indicates the need for provisions for a given pedestrian movement, particularly those crossing the Lloyd Expressway.

Alternative sheets in **Appendix C** more fully outline each of the recommendations.

Next Steps

The Lloyd Expressway Study resulted in several alternatives recommended for future implementation. These improvement concepts focus on areas with existing safety concerns and other transportation deficiencies identified by the study team. The nature and likely causes of problems identified over the course of the study were examined through field reconnaissance, and improvement alternatives were developed to address the identified problems. This study focused on short-term improvements (projects that can be quickly and effectively implemented and that address current mobility and safety issues) and long-term improvements (projects requiring more significant resources to implement or concepts that address future mobility issues). Improving safety throughout the corridor by providing greater visibility for left-turn vehicles, additional warning signage, providing pedestrian signals and a crosswalk at signalized intersections, eliminating weave movements and alternative intersection design will improve both vehicular and pedestrian safety.

The next steps will be deliberating the recommended alternatives at each intersection in the future state-wide call for projects. The alternatives will be scored against all other project submitted in the call with the highest scoring projects receiving funding.

Table of Contents

Tables

NOTE: Appendices have been removed to avoid duplication and reduce document size.

~~Appendix A - Red Flag Investigation~~

~~Appendix B – Crash Analysis~~

~~Appendix C – Alternative Recommendation Sheets~~

1. Introduction

The Lloyd Expressway (SR 62/SR 66) Corridor study was conducted by the Indiana Department of Transportation (INDOT) and the Evansville Metropolitan Planning Organization (EMPO). The study examines the need for and types of improvements necessary along the corridor, focusing on the area beginning in the west at St. Phillips Road in Posey County, passing through Vanderburgh County, and ending in the east at the SR 261 intersection in Warrick County. A map of the study area is shown in Error! Reference source not found.. Through a collaborative effort with the public, local government agencies, and the business community, this study will recommend a set of concepts aimed at improving safety and mobility for all modes in a responsible manner.

Figure 1.1 Study Area

With construction spanning over three decades, the Lloyd Expressway corridor consists of a combination of at-grade intersections and grade-separated interchanges. The study area carries a heavy mix of local and regional traffic. The Expressway currently has traffic volumes ranging from 20,000 to 59,000 vehicles per day. It not only serves as a primary east-west connector, but also provides access to numerous businesses, industries, governmental organizations, and homes.

The study objectives are as follows:

1. Evaluate crash history to determine locations for potential crash countermeasure treatments.
2. Evaluate possible improvement concepts and strategies for the SR 62 / SR 66 corridor. Estimate potential impacts and costs for improvement options.
3. Consider future traffic demand within the corridor as well as traffic pattern changes that may result from the completion of the I-69 corridor.
4. Conduct stakeholder involvement activities and summarize the findings.

An analysis of existing conditions was performed. This included an inventory of existing conditions, traffic counts, analysis of crash records, and a red flag summary to establish a baseline for comparison when evaluating impacts of potential alternative improvements. The existing conditions analysis was replicated using microscopic traffic simulation (using Transmodeler simulation software) to provide system-wide performance measures. These analytical tools were used to evaluate and compare existing and future traffic conditions for alternatives.

INDOT and the EMPO were interested in identifying intersections with existing safety and operational issues that result from the combination of heavy traffic volumes, signalized intersections, interchanges, and access management concerns. The goal of the Lloyd Expressway Corridor Study is to assess existing conditions, identify future conditions, and develop a plan for the EMPO and INDOT to implement, making the corridor a safer and more efficient transportation facility.

2. Existing Conditions

Roadway Characteristics

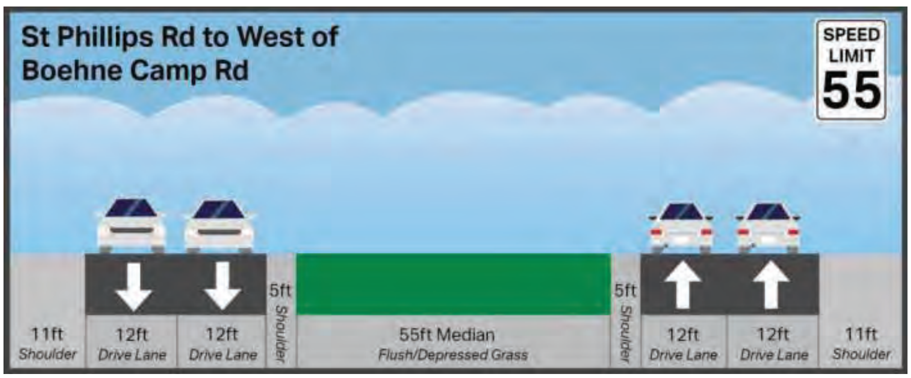
The Lloyd Expressway Corridor has been categorized into four distinct sections based on the existing road and area conditions. The four sections are shown in Error! Reference source not found. and from west to east include Section 1: Suburban Development, Section 2: Downtown City Street, Section 3: Expressway, and Section 4: Signalized Arterial.

Figure 2.1 Corridor Sections

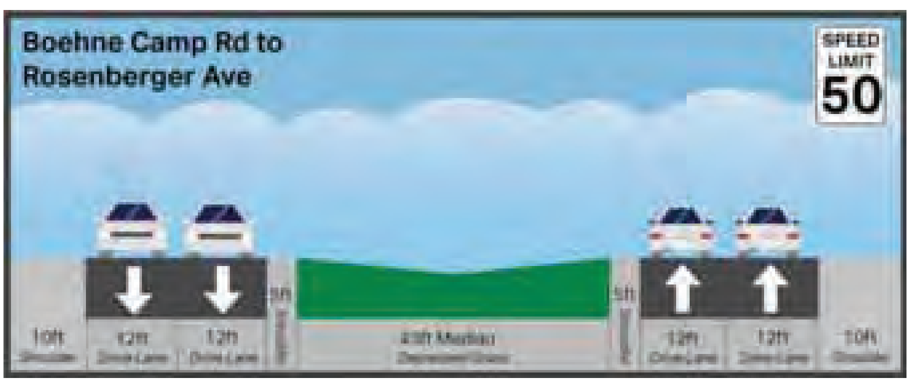
Roadway Configuration

SECTION 1 – SUBURBAN DEVELOPMENT

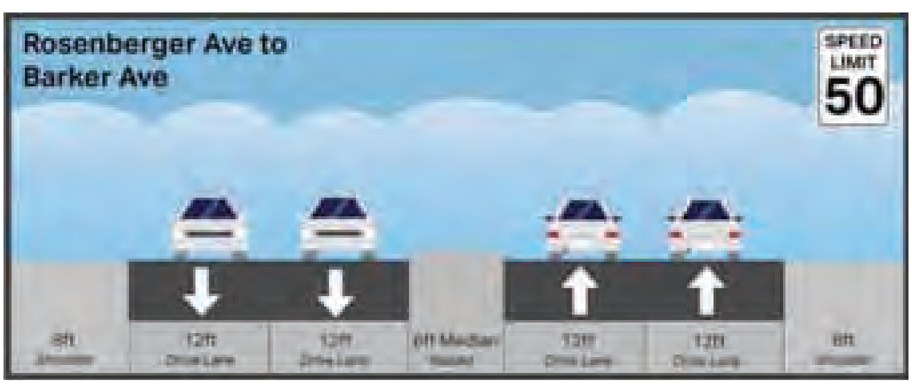
Section 1 of the Lloyd Expressway, from St. Phillips Road to Barker Avenue, is a 5.5-mile arterial section with typical suburban development patterns and an estimated 20,000 to 45,000 vehicles per day. Traffic volumes are lower at the western end in Posey County and higher to the east of Rosenberger Avenue. There are two driving lanes in each direction typically including paved shoulders with lanes separated by a wide grass median. The posted speed limit is 55 miles per hour from Posey County Line Road to Red Bank Road and 50 miles per hour from Red Bank Road eastward. There are two interchanges – a diamond interchange at University Parkway and a partial cloverleaf at Barker Avenue connecting to Igleheart Avenue. There are four signalized intersections and five non-signalized intersections with spacing at approximately one-half mile or greater. Three right-in / right-out approaches and one restricted crossing intersection exists between Red Bank Road and Rosenberger Avenue, but there are no other driveway access points.



Driveways
N/A
Access Points
St Phillips Rd, Fox Hollow Dr (north) and
E Pine Hill Dr (south), McDowell Rd, Schutte Rd, Felstead Rd, Middle Mount Vernon Rd, S Boehne Camp Rd
Interchanges
University Blvd



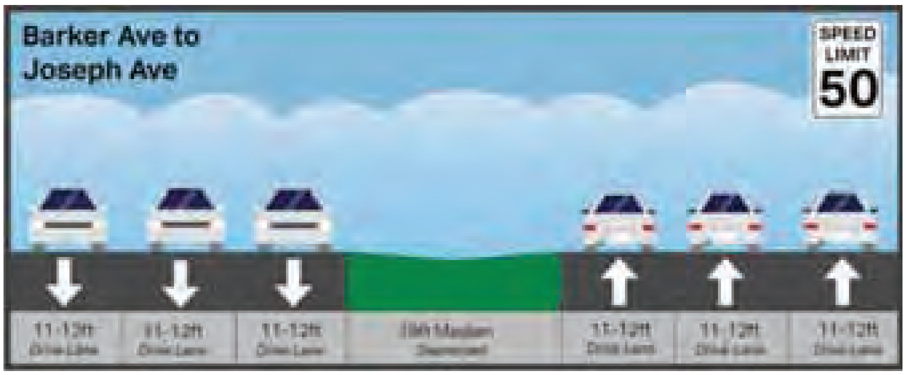
Driveways
There are three southern entrances to a shopping center between Red Bank Rd and Rosenberger Ave
Access Points
Red Bank Rd, Access to University Dr between Red Bank Rd and Rosenberger Ave
Interchanges
N/A



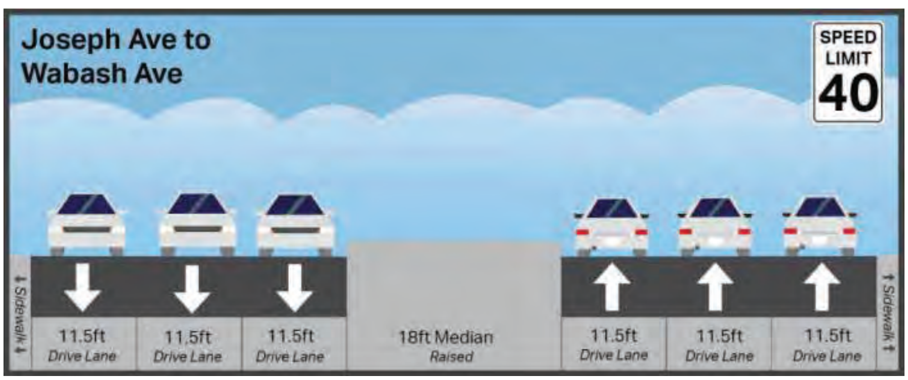
Driveways
N/A
Access Points
Ingle Ave
Interchanges
Barker Ave

SECTION 2 – DOWNTOWN CITY STREET

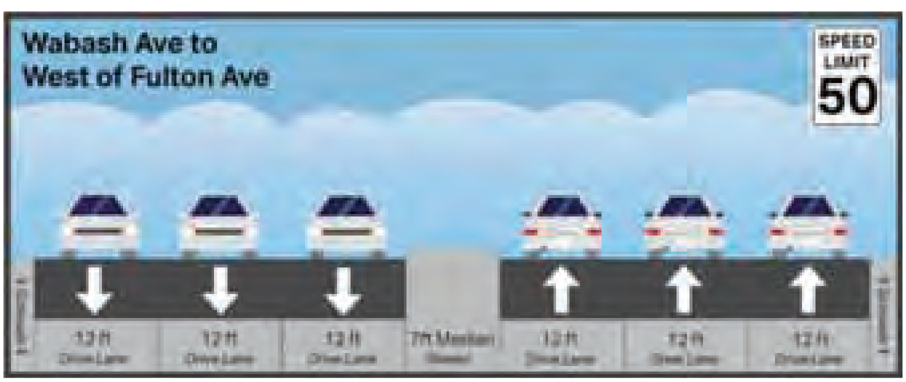
Section 2 of the Lloyd Expressway from Barker Avenue to Fulton Avenue is a 1.5-mile arterial section with typical downtown block spacing and development patterns. The section carryies an estimated 45,000 vehicles per day. There are three driving lanes in each direction typically including sections with sidewalks and separated by a narrow grass median. The posted speed limit is 50 miles per hour from Barker Avenue to Lemcke Avenue and is 40 miles per hour from eastward to Fulton Avenue. There are two signalized intersections and five right-in / right-out approaches with four of those between St. Joseph Avenue and Wabash Avenue of Flags. There are seven right-in / right-out driveway access points.



Driveways
N/A
Access Points
Lemcke Ave, St. Joseph Ave
Interchanges
N/A



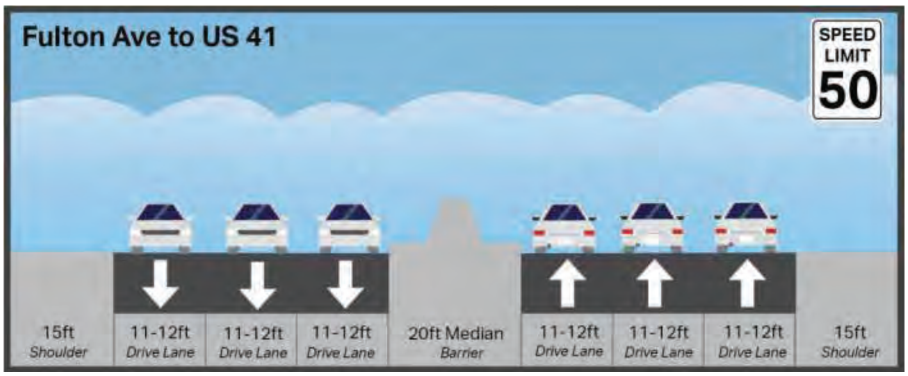
Driveways
N/A
Access Points
11th Ave (south), 10th Ave, Wabash Ave
Interchanges
N/A



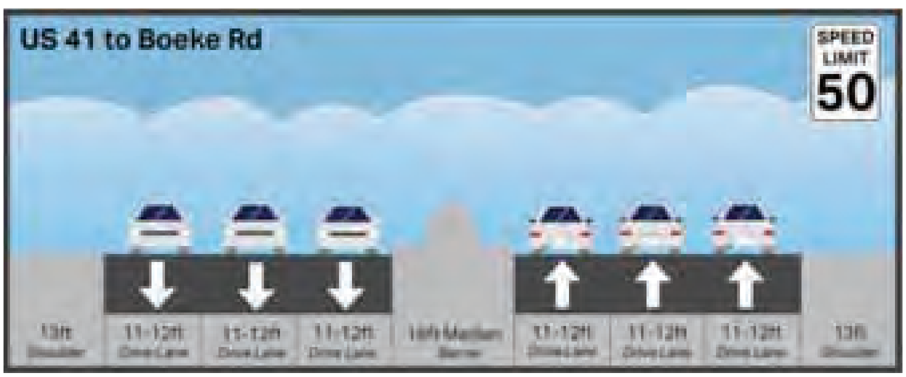
Driveways
N/A
Access Points
N/A
Interchanges
N/A

SECTION 3 – EXPRESSWAY

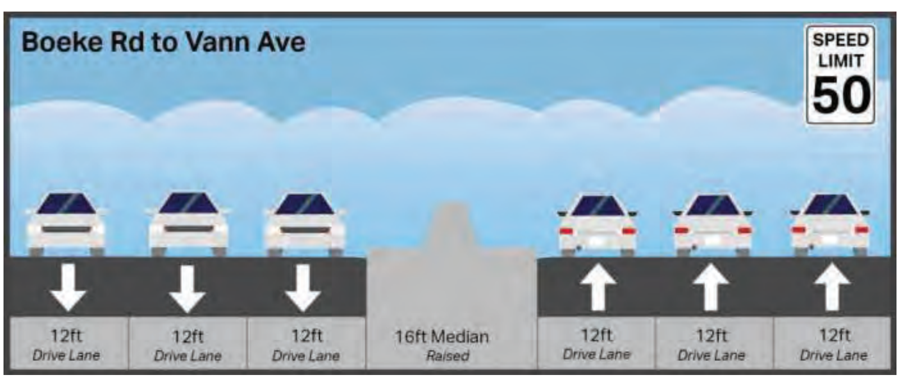
Section 3 of the Lloyd Expressway from Fulton Avenue to Vann Avenue is a four-mile expressway section with an estimated 45,000 to 63,000 vehicles per day. The section is grade-separated with three driving lanes in each direction typically including paved shoulders and separated by a median barrier wall. The posted speed limit is 50 miles per hour from Fulton Avenue eastward. There are six interchanges – diamond interchanges at Fulton Avenue, Main Street, Garvin Street, Weinbach Avenue, Boeke Road, and a cloverleaf at US 41. All vehicles enter or exit this segment of the Lloyd Expressway via ramps. Much of this section has frontage roads parallel to the expressway that helps collect local traffic.



Driveways
N/A
Access Points
First Ave/3rd St/4th St
Interchanges
Fulton Ave, Main St via John St, US 41



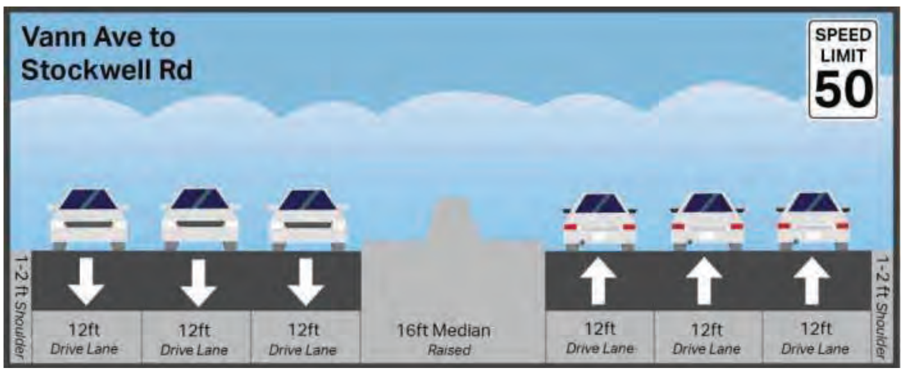
Driveways
N/A
Access Points
N/A
Interchanges
Weinback Ave, Boeke Rd



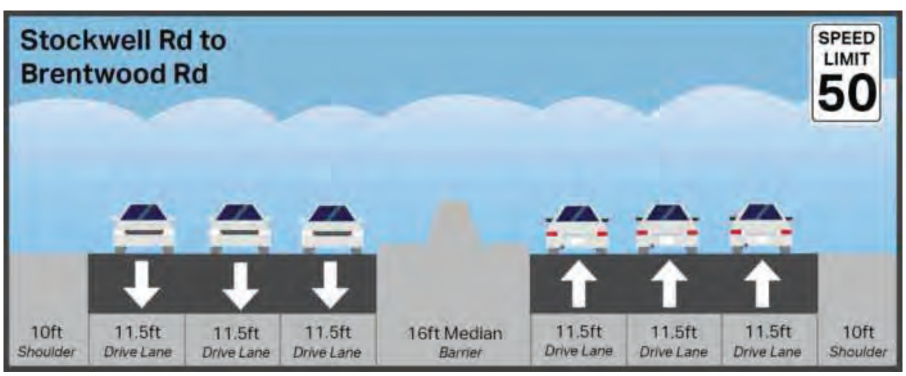
Driveways
N/A
Access Points
Vann Ave
Interchanges
N/A

SECTION 4 – SIGNALIZED ARTERIAL

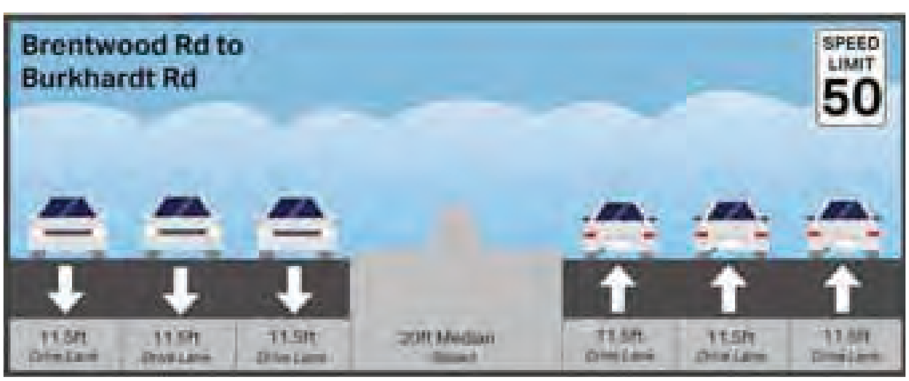
Section 4 of the Lloyd Expressway from Vann Avenue to SR 261 is an eight-mile arterial section with major commercial development or, in some areas, opportunities for future commercial development. This signalized section carries an estimated 34,000 to 58,000 vehicles per day with the lower traffic volumes near the east end approaching SR 261. There are three driving lanes in each direction typically including paved shoulders and separated by a raised curbed median. The posted speed limit is 50 miles per hour from Vann Avenue to Bell Road and 45 miles per hour from Bell Road eastward. There are two interchanges – a single point urban interchange at Green River Road and a cloverleaf at I-69. There are ten signalized intersections and two non-signalized intersections with full access at Grimm Road and County Place Drive. There are numerous right-in / right-out side streets as well as right-in / right-out driveway access points.



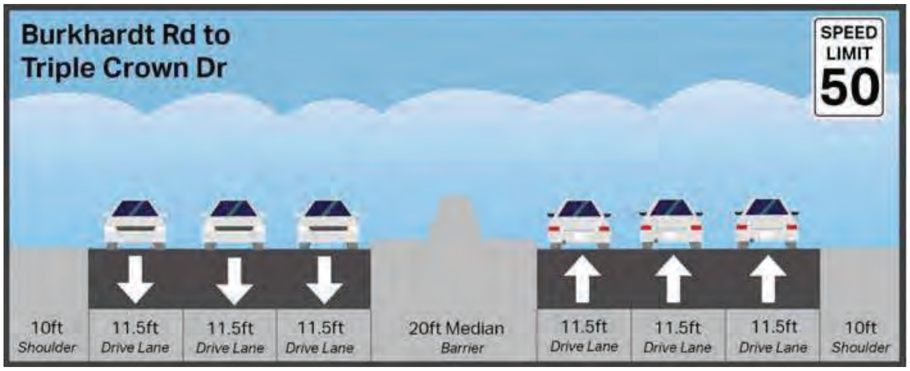
Driveways
N/A
Access Points
Unnamed entrance road between Vann and Stockwell Rd, Stockwell Rd
Interchanges
N/A



Driveways
N/A
Access Points
Cullen Ave, Fielding Rd, Brentwood Rd
Interchanges
Green River Rd



Driveways
N/A
Access Points
Burkhardt Rd
Interchanges
N/A



Driveways

Lloyd Crossing Shopping Center (north), Target Entrance (south), 4 driveways on the south side of the road between Country Pl Dr and Libbert Rd

Access Points

Epworth Rd, Grimm Rd. Trinity Dr, Country Pl Dr, Frame Rd/Libbert Rd, Triple Crown Dr

Interchanges

I-69

Driveways

7 (south) and 5 (north) driveways between Bell Rd and Wyntree Dr, 3 (south) between Wyntree Dr and US-261, 1 (north) between Park Pl Dr and Orchard Dr

Access Points

Bell Rd, Park Pl Dr, Wyntree Dr, Orchard Dr, SR 261

Interchanges

N/A

Pedestrian and Bicycle Accommodations

Bicycle and pedestrian facilities exist within the study corridor.

shows the locations of existing facilities within the corridor.

Table 2.1 **Bike and Pedestrian Facilities within the Lloyd Expressway Corridor**

Location	Description
Barker Avenue Overpass	Sidewalks
Lemcke Avenue	Pedestrian / Bicycle Overpass
Lemcke Avenue to Wabash Avenue	Adjacent Sidewalks & Crosswalks
9th Avenue Underpass	Sidewalks
Pigeon Creek	Multi-Use Path Underpass
Fulton Avenue Underpass	Sidewalks
First Avenue Underpass	Sidewalks
Martin Luther King Jr. Blvd. Underpass	Sidewalks
Main Street Underpass	Sidewalks
Heidelbach Avenue Underpass	Sidewalks
Governor Street Underpass	Sidewalks
Garvin Street Underpass	Sidewalks
US 41 Interchange	Multi-Use Path Overpass
Weinbach Avenue Underpass	Sidewalks
Alvord Blvd	Pedestrian / Bicycle Overpass
Boeke Road Underpass	Sidewalks
Vann Avenue	Multi-Use Path Overpass
Green River Road Interchange	Sidewalks
Cullen Avenue	Pedestrian / Bicycle Overpass

indicates no pedestrian or bicycle facilities exist east of Cullen Avenue. At other locations listed in the table, pedestrians and bicyclists must share the roadway to cross the corridor, which can be exacerbated by left and right turn movements at signals. The Evansville Bicycle and Pedestrian Connectivity Master Plan and the Vanderburgh County Bicycle and Pedestrian System Plan proposes several projects that impact the corridor.

Table 2.1 below includes proposed projects overlapping the study area, with those highlighted in green intersecting the Lloyd Expressway at the same grade. and Error! Reference source not found. are maps from each of the previously referenced plans depicting existing and planned non-motorized facilities. The plans include bike lanes and shared paths for pedestrians and bicyclists. These non-motorized facilities, both existing and planned, were utilized while developing recommendations to assure pedestrian and bike connections can exist in conjunction with the roadway improvements.

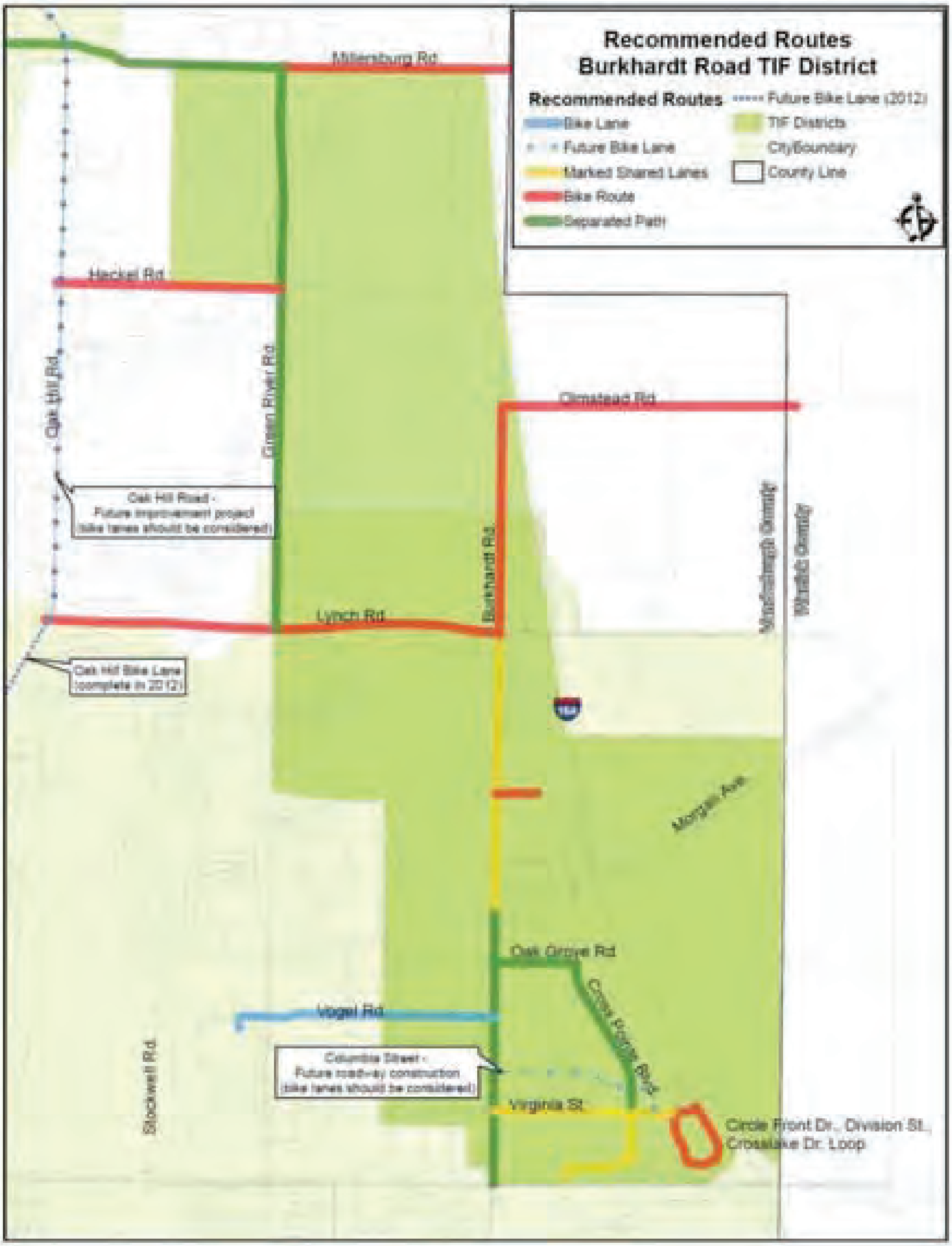
Table 2.1 Bike and Pedestrian Plans
Intersecting the Lloyd Expressway Corridor

Projects found in the Evansville and Vanderburgh County Bicycle and Pedestrian Plans	
Burkhardt Road	Side Path
Projects found in the Evansville Bicycle and Pedestrian Plan	
Cross Pointe Boulevard	Side Path
Green River Road	Side Path
Rosenberger Avenue	Side Path
Stockwell Road	Side Path
Tekoppel Avenue	Side Path
Main Street	Cycle Track
Mary Street	Cycle Track
St Joseph Avenue	Cycle Track
Garvin Street	Buffered Bike Lanes
Governor Street	Buffered Bike Lanes
Barker Avenue	Standard Bike Lanes
Boeke Road	Standard Bike Lanes
Weinback Avenue	Standard Bike Lanes
Cullen Avenue	Standard Bike Lanes
Rotherwood Avenue	Bike Boulevard

Figure 2.2 Evansville Bicycle and Pedestrian Recommendations

Evansville Bicycle and Pedestrian Connectivity Master Plan

Figure 2.1 Vanderburgh County Bicycle and Pedestrian Recommendations



Vanderburgh County Burkhardt Road + US 41 TIF Districts Bicycle + Pedestrian System Plan

Land Use Information

Purpose

Land use has a direct connection to transportation, particularly as it relates to the need for access. The Federal Highway Administration notes that "coordinating (or integrating) land use and transportation planning and development is commonly considered today as one facet of 'smart growth' and sustainable development."[1] Land use decisions can have a dramatic effect on the transportation system, not only affecting traffic demand, but also affecting the need for viable options for people to access opportunities, goods, services, and other resources.

This section reviews the existing land use patterns within the study area and includes discussion of future land uses.

Methodology

Land use data was obtained from the Evansville MPO for use in this study. Local comprehensive plans, government policies, and land use plans were also reviewed along with other existing planning documents and development trends.

Results

Existing land use in the western portion of the study corridor is shown on **Figure 2.2.** The most prevalent land use categories in western Vanderburgh County include institutional (University of Southern Indiana is located on University Parkway), residential, and commercial. The commercial land uses tend to be focused in the area between Boehne Camp Road and Rosenberger Avenue. There are significant areas of agricultural land use both north and south of the Lloyd Expressway corridor.

The University Parkway corridor contains a significant amount of undeveloped agricultural land. A parallel study effort is underway to examine likely changes along the corridor and how those potential changes in land use may affect travel patterns.

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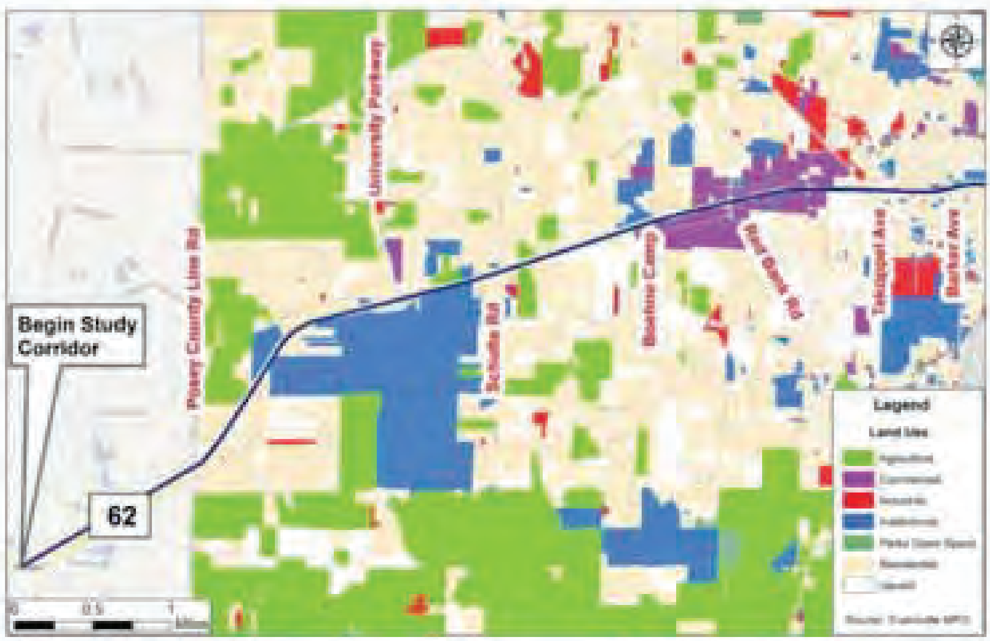
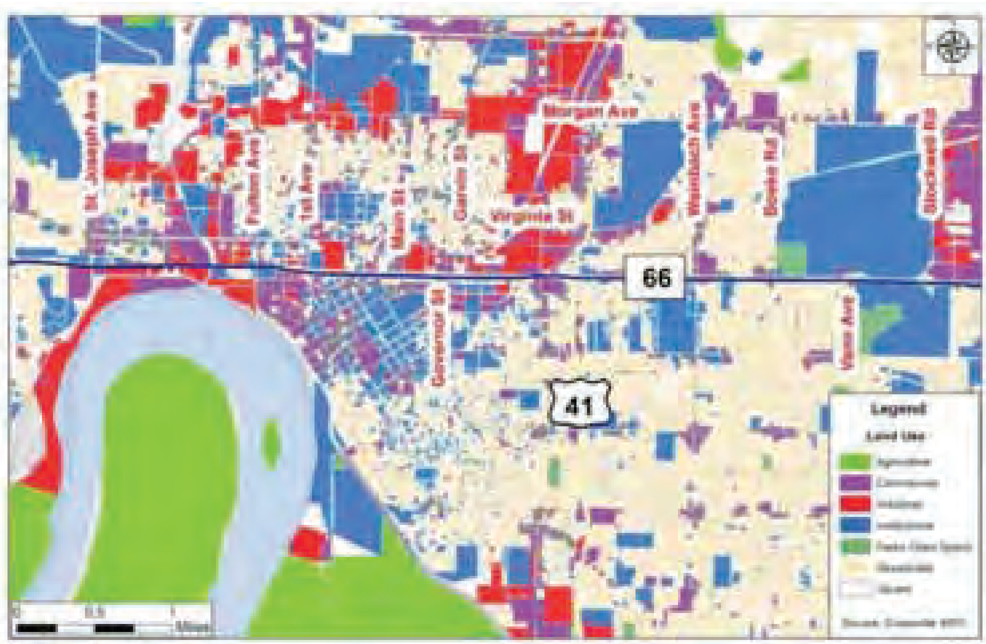
[1] https://www.fhwa.dot.gov/planning/processes/land_use/

Figure 2.2 Existing Land Use - West



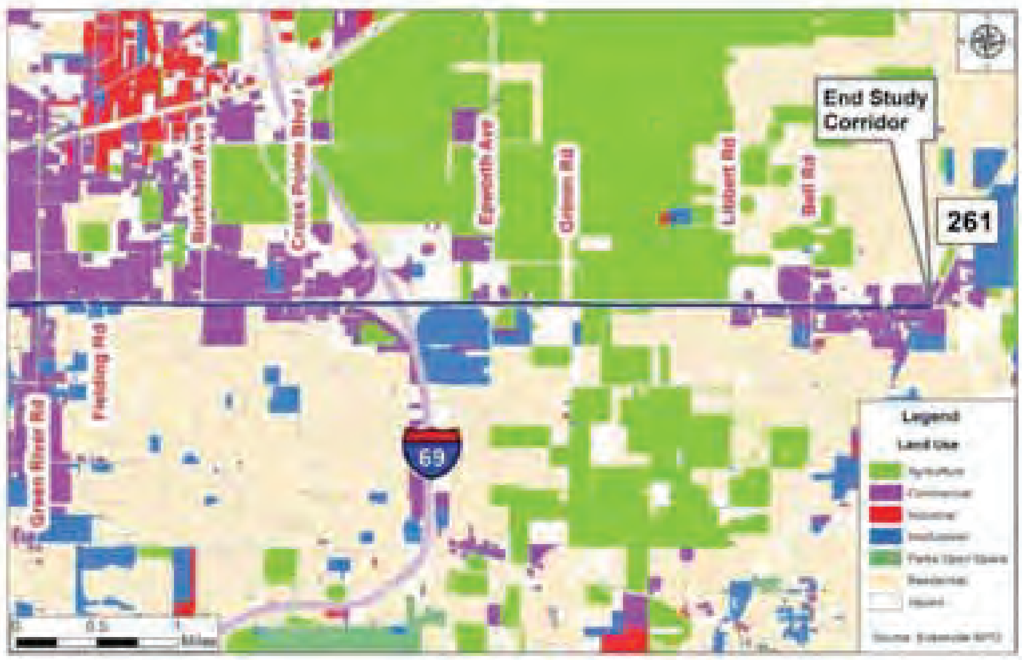
Existing land use in the central portion of the Lloyd Expressway corridor is shown on **Figure 2.3**. The central portion of the study corridor includes the "Downtown City Street" and "Expressway" character sections of the Lloyd Expressway corridor. As such, prominent land use categories include industrial and institutional uses. There are pockets of commercial and residential land use, with more residential uses located east of US 41. Because the environment is largely developed, there is no agricultural land and little vacant land in this portion of the study corridor.

Figure 2.3 Existing Land Use - Central



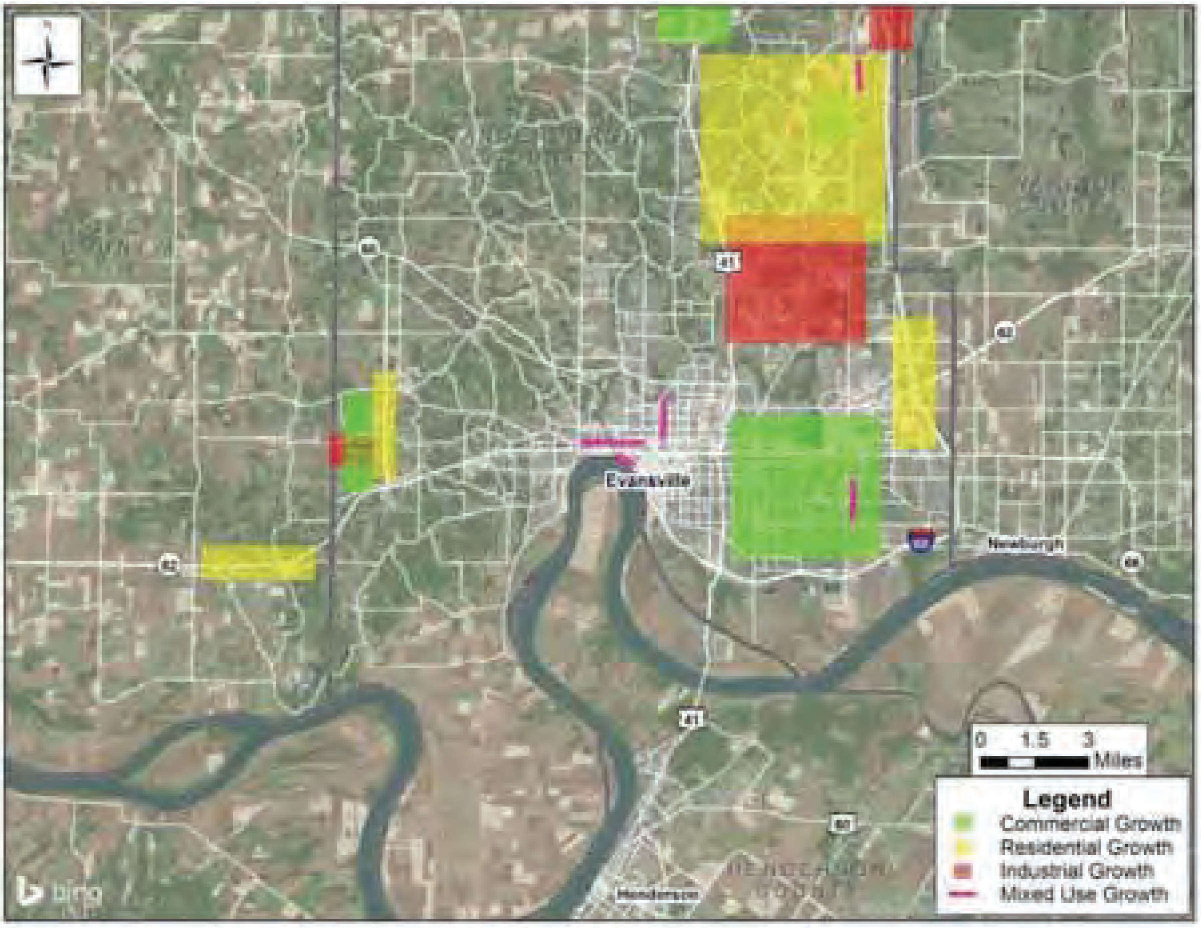
Existing land use in the eastern portion of the study corridor is shown on **Figure 2.4**. West of I-69, land use immediately adjacent to the Lloyd Expressway corridor is largely commercial with some residential located on the south side east of Green River Road. East of I-69 and in western Warrick County, much of the land use is classified as agricultural, but that is quickly transitioning. The southeast quadrant of the I-69 interchange is shown as institutional because of Deaconess Gateway Hospital and The Women's Hospital which were developed in the early to mid-2000's. Commercial land use is found along the east end of the study corridor approaching SR 261 with pockets also found along Epworth Road.

Figure 2.4 Existing Land Use - East



As part of the I-69 Ohio River Crossing (ORX) Project, consultant and EMPO staff have worked with local officials to identify anticipated growth areas. The I-69 ORX Project is currently evaluating options to provide a new interstate crossing of the Ohio River between Evansville and Henderson, Kentucky, EMPO staff and local officials were consulted to identify anticipated growth areas. The general findings from these discussions are shown on **Figure 2.5.**

Figure 2.5 Identified Growth Areas



In Posey County, population is expected to be most stable within municipal centers while declines are expected to be greatest in rural areas. There is some available land within the study corridor that may see limited growth in new housing on larger tracts of land.

In Vanderburgh and Warrick counties, some proposed or prospective developments were specifically identified, and the general trends of regional growth were continued going forward. Vanderburgh County grows slightly with new development located at the periphery of the county, while more rapid suburban development in Warrick County continues to expand from the southwest. This portion of the study corridor is experiencing rapid growth, and Warrick County provided information on a multitude of developments that are underway or currently proposed both north and south of the Lloyd Expressway. These developments include limited residential development along Grimm Road, commercial land use near Libbert Road, and additional institutional land uses along Warrick Trail.

Environmental Red Flag Analysis

Purpose

An abbreviated environmental review was conducted to identify red flags throughout the study area. This review identifies known resources of significance, potential jurisdictional features, and other issues of concern that need to be considered in the development of alternatives and avoidance / minimization of impacts. More detailed environmental studies may be required as individual concepts are further developed. If a future project is federally-funded, the National Environmental Policy Act (NEPA) requires that potential environmental impacts to jurisdictional wetlands, archaeological sites, cultural historic sites, and federally endangered species must be avoided if possible. If not, then minimization efforts are required. Mitigation for the impacts, if unavoidable, may also be necessary.

Methodology

The study team completed a Red Flag Investigation, following INDOT's template, identifying and quantifying items in the following categories: Infrastructure, Water and Ecological Resources, Air Quality and Noise, Threatened and Endangered Species, Mining/Mineral Exploration, and Hazardous Material Concerns. Data from INDOT's open data portal and GIS server connection was utilized. The resources within a half mile were identified spatially in GIS and mapped to produce footprint maps for each category.

Results

Red flags from each category listed previously were identified throughout the study area. These red flags range from items such as religious facilities and historic places to land area which could be inhabited by threatened or endangered species. The items and areas of potential environmental impact are briefly summarized below. Additional details about the Red Flag Report findings can be found in **Appendix A**, where each category is explored geographically and listed in tables.

Infrastructure

The infrastructure portion of this analysis identified the following: religious facilities, airports, cemeteries, hospitals, schools, historic places, historic structures, recreational facilities, pipelines, railroad companies, trails, managed lands, and historic districts. The highest concentration of infrastructure-related items is located between Tekoppel Avenue and Stockwell Road, with schools and recreational facilities evenly scattered throughout the corridor.

Water and Ecological Resources

The water and ecological resources portion of the Red Flag Report identified varying quantities of the following: historic canal structures and routes, NWI lines and wetlands, Indiana Department of Environmental Management (IDEM) 303d listed rivers, rivers and streams, lakes, an urbanized area boundary, floodplain, and waterwells. The Ohio River is found in the southern central portion of the corridor and connects to Pigeon Creek, which passes under the Lloyd Expressway in the central portion of the project area. The project area is primarily found within the floodplain and various lakes, rivers, and streams are found primarily in the western portion of the corridor.

Air Quality
The Red Flag Report requires identification of potential air quality impacts in project areas. The study area along the Lloyd Expressway is located within attainment areas, and therefore no further analysis is needed.

Threatened and Endangered Species
Endangered and threatened species in the three-county study area include species which are typically found within the tree canopy of the project area. Tree canopy covers approximately 4.2 mi^2 of the total 19.5 miles of land in the project area. Therefore, 21.5% of the project area could contain threatened and endangered species. The tree canopy is primarily found in the western portion of the corridor. Further details regarding the tree canopy cover and the endangered and threatened species can be found in **Appendix A**.

Mining/Mineral Exploration
The Red Flag Report requires the project team to identify petroleum wells and fields, as well as the surface and underground mines. Surface mines were not identified within the study area, but varying quantities of the other items were identified. Mining and mineral exploration areas of significance are found almost completely west of Pigeon Creek, with only one petroleum well and one underground coal mine found east of Pigeon Creek. In total 152 petroleum wells were identified, as well as two petroleum fields and five underground mines.

Hazardous Material Concerns
Hazardous materials found within the study area included brownfield sites, leaking underground storage tanks (LUSTs), underground storage tanks (USTs), a manufactured gas plant site, National Pollutant Discharge Elimination System (NPDES) pipe locations, state cleanup sites, voluntary remediation program sites, a superfund site, and institutional control sites. These items are primarily found in the central area of the corridor and in the central east area, mostly within the City of Evansville.

Environmental Justice Analysis

Purpose
An environmental justice review was conducted to identify the extent to which environmental justice populations and other groups of concern reside in or near the study area and may be impacted by proposed concepts resulting in this study. An environmental justice analysis is required for any project that may result in a disproportionately high adverse impact on a minority or low-income population in or near the project area. The affected populations must be identified very early in the decision-making process to assure that the impacted populations are involved in decision-making. Subsequent actions (determination of disproportionately high and adverse effects; proposing measures to avoid, minimize, and/or mitigate such effects; and providing specific opportunities for public involvement) may be undertaken as appropriate, contingent upon the results of the demographic analysis.

Methodology

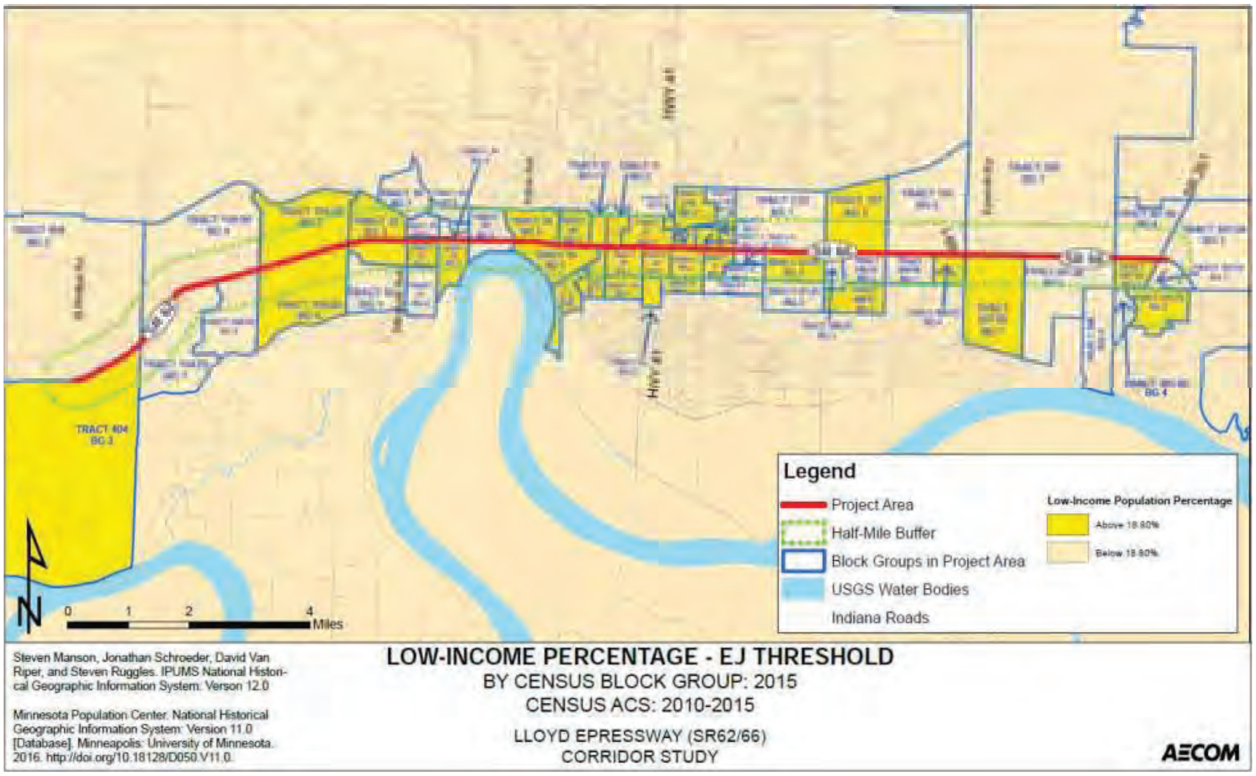
The requirements for environmental justice analysis depend on the level of document as well as the types of impacts. The environmental justice assessment for this study centers on identifying populations and groups of concern that may be disproportionately impacted by future improvement alternatives. A demographic analysis was completed with the use of geographic boundaries from the 2015 TIGER Shapefiles and five-year demographic data from the 2011-2015 American Community Survey, both from the U.S. Census Bureau. Maps and tables, developed with the previously referenced data, were used to indicate minority status and persons with low-income. Results from each block group were compared to 125% of the weighted county average. Block groups with numbers higher than 15.46% minority population or 18.8% low-income population were considered above the environmental justice threshold.

Results

The study area included 30 census tracts and 60 block groups. Demographic analysis indicated that nine census tracts and 18 census block groups were above the minority population environmental justice threshold, as well as 11 census tracts and 28 census block groups above the low-income environmental justice threshold. Typically, the higher numbers and percentages of minority individuals are found closer to downtown Evansville, while higher numbers and percentages of low-income individuals are found throughout the study area. **Figure 2.6** and **Figure** 2.7 show the areas with environmental justice populations which are above the threshold in yellow. These areas need special consideration in order to assure that disproportionately adverse impact is not taken here.

Figure 2.6 Environmental Justice Analysis, Minority Population

Figure 2.7 Environmental Justice Analysis, Low-Income Population



Crash History Analysis

Purpose

Identifying crash hot spots and high cost crash locations allowed the study team to prioritize intersection improvements from the perspective of safety countermeasures. Studying crash patterns allowed the project team to determine appropriate countermeasures during alternative development for mitigating crash severity and a reduction in crash rates.

Methodology

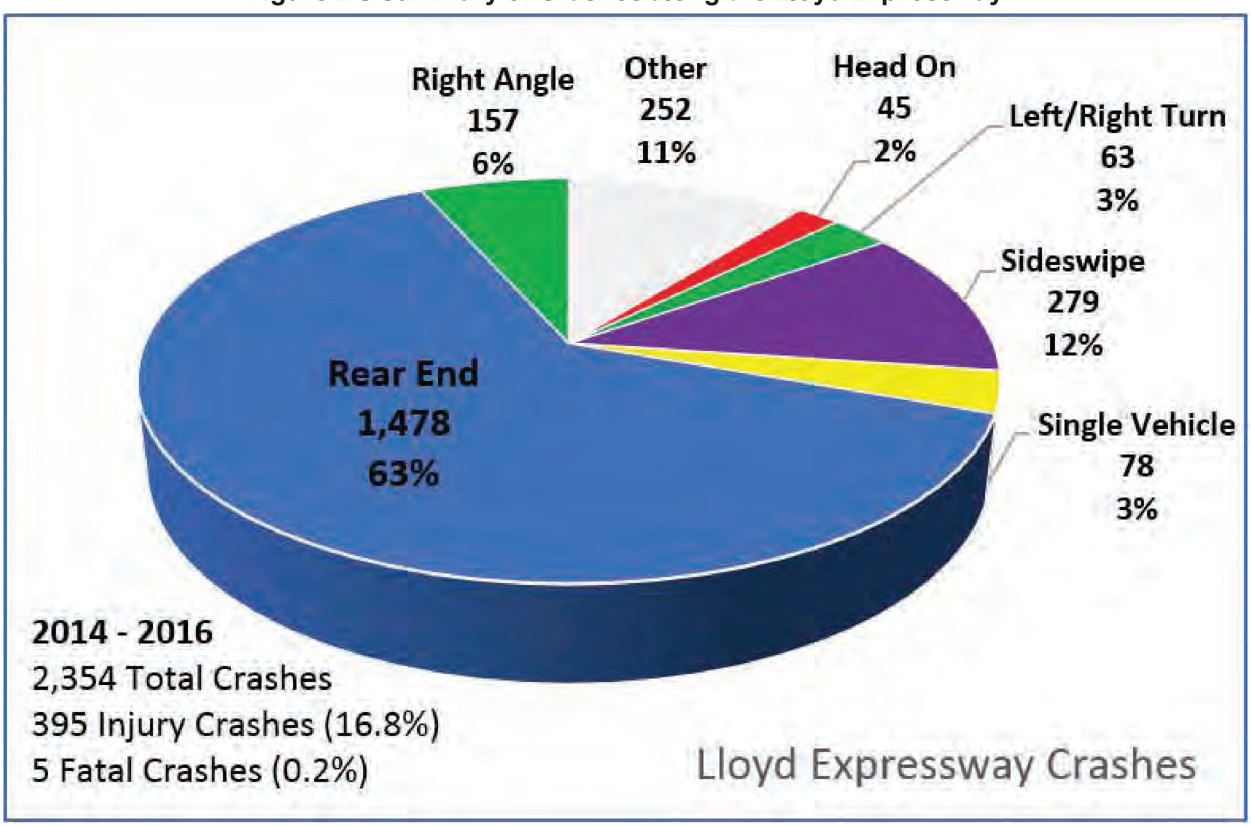
Historical crash data from the EMPO was obtained for a three-year period between 2014 through 2016. The data was viewed spatially in GIS, where crashes were attributed to appropriate intersections. To better understand the crash history along the corridor, the crash types were examined. Finally, the crashes were separated in relation to various conditions, most importantly, by the following severity categories: fatal and incapacitating injury, injury, and property damage only. Crash data analysis was performed using the RoadHAT software; version 3.0. RoadHAT provides a prediction of how the intersection compares to other similar intersections given the geometric configuration and traffic volumes. Index of Crash Frequency, I_{CF}, measures the difference between expected and reported number of crashes divided by the standard deviation of the difference. Index of Crash Cost, I_{CC}, measures the difference between expected and estimated crash cost at the location divided by the standard deviation of the difference. A value below zero of either of these factors indicates the intersection is performing better than average for the intersection type and traffic projections. It should be noted that I_{CF} and I_{CC} cannot be used to compare alternatives between signalized and unsignalized intersection types. The predictive equations are different for these two types. Since this study area is urbanized with higher traffic volumes for the side roads, the state-to-state intersection was used in RoadHAT to allow the entry of traffic volume for the side road. RoadHAT produced abnormally high results when the intersections were analyzed as minor side roads.

To prioritize the analysis, intersection crash diagrams were developed in accordance with Exhibit 5-4 in the American Association of State Highway and Transportation Officials (AASHTO) Highway Safety Manual. Where I_{CF} and I_{CC} exceeded a value of 1.00, detailed crash qualitative analysis of the diagrams has been provided to determine the likely causes for the predominant crash types. These diagrams are shown in **Appendix B.** For intersections that did not meet these criteria but have I_{CF} and I_{CC} values greater than zero, INDOT and EMPO should monitor these intersections for future problems.

Results

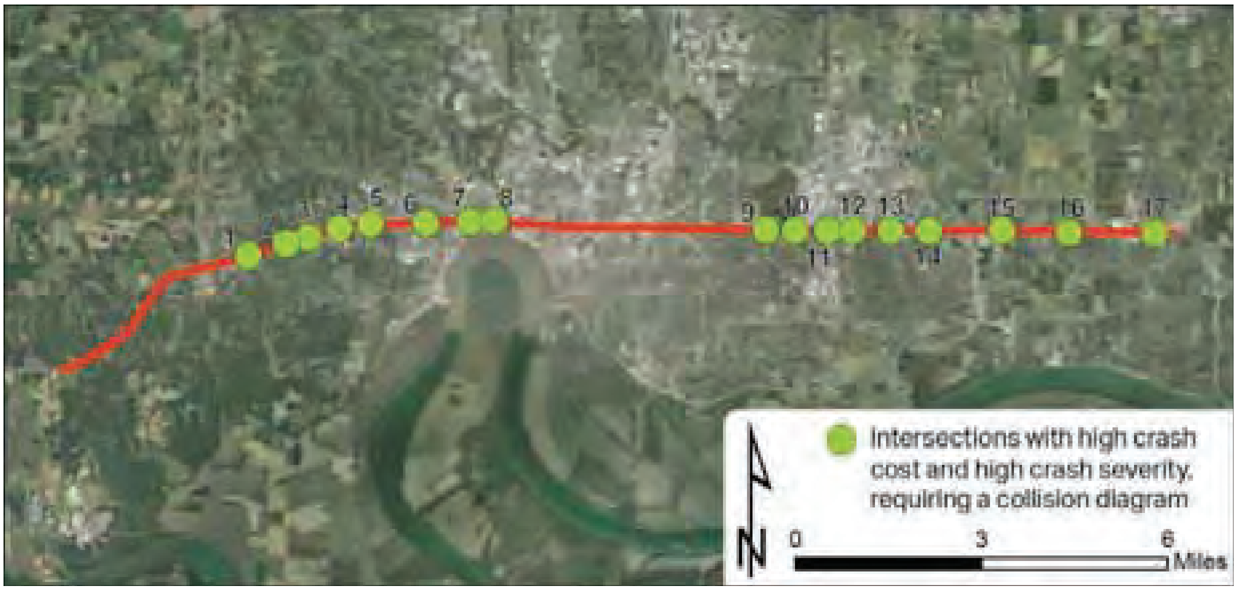
Over the three-year period between January 2014 and December 2016, there were 2,354 crashes reported along the Lloyd Expressway corridor, which includes 395 injury crashes (16.8 percent) and five fatal crashes (0.2 percent). Rear end crashes made up 63 percent of the crashes, right angle crashes made up six percent of the crashes, and left/right turn crashes made up three percent of the crashes. These crashes, which can generally be attributed to congestions and/or access issues, total 71 percent of all the crashes along the study corridor.

Figure 2.8 Summary of Crashes along the Lloyd Expressway



Along the corridor, eleven intersections required further crash analysis beyond the RoadHAT report. To prioritize the analysis along the corridor, intersections with I_{CF} and I_{CC} values above 1.00 required further analysis. Future investigation is recommended for intersection where only one value exceeded 1.00. These intersections saw statistically high crash frequency rates and high crash cost rates. **Figure 2.9** demonstrates the intersections which were prioritized based on their RoadHAT output. For more detailed information for each intersection, including the crash diagrams and RoadHAT output by intersection, please refer to **Appendix B**.

Figure 2.9 Intersections that Required Analysis through Crash Diagrams



Location	I_{CC}	I_{CF}
1. Schutte Road	5.21	2.94
2. Boehne Camp Road	2.64	1.95
3. Middle Mt Vernon Rd	2.00	1.75
4. Red Bank Road	2.30	3.33
5. Rosenberger Road	3.03	3.92
6. Igleheart Avenue	3.59	1.76
7. St. Joseph Avenue	1.64	1.11
8. Wabash Avenue	3.50	3.17
9. Vann Avenue	2.76	4.44

Location	I_{CC}	I_{CF}
10. Stockwell Road	2.11	3.52
11. Green River Road	2.00	2.89
12. Fielding Road	2.55	2.19
13. Burkhardt Road	1.87	1.26
14. Cross Pointe Boulevard	2.37	1.41
15. Epworth Road	2.89	2.06
16. Country Place Drive	1.08	1.61
17. Bell Road	1.60	2.60

Existing Traffic Volumes and Operations Analysis

Methodology

Current, accurate traffic data were essential elements of the traffic analysis. INDOT provided several types of observable data, which was reviewed by the study team and incorporated into the study analysis.

Transmodeler® traffic simulation software by Caliper© Corporation was used to simulate and evaluate the corridor. Traffic simulation models must be calibrated to replicate observed traffic conditions within the acceptable limits prior to testing alternatives. Conventional metrics collected in the field that can be compared to model results are intersection queue lengths, posted speed limits and traffic volumes. Using existing traffic count inputs and signal timing plans from INDOT, ten simulation runs were performed for each peak period, averages were calculated, and the results were compiled.

Results

The latest average daily traffic (ADT) volumes published by INDOT count stations are summarized on **Figure 2.10** for the study area. Traffic volumes on the Lloyd Expressway range from just under 20,000 to more than 60,000 vehicles per day (VPD). Turning movement traffic counts were collected in April and May 2017 at numerous locations along the corridor and were summarized for use by the study team. From the turning movement counts, an AM peak (7-8 AM) and PM peak (4:30-5:30 PM) was established.

Current information on intersection control was another important element of the traffic analysis. INDOT provided signal timing plans for signalized intersections within the study area.

Volume-to-Capacity (V/C) ratios were estimated using 2015 output from the EMPO regional travel demand model. The V/C ratio indicates where roadway segments approach or exceed the daily volume of traffic they can accommodate. This is one methodology for evaluating the adequacy of roadway segments. The target design year V/C ratio is 1.0 for urban areas. A V/C greater than this indicates the road is congested (i.e. operating above its design capacity). In the case of the Lloyd Expressway, numerous roadway segments are currently approaching or exceed capacity with V/C ratios between 0.5 and 1.34. The most congested segments are between Red Bank Road and St. Joseph Avenue with a V/C ratio of 1.26 and between Weinbach Avenue and Green River Road with a V/C ratio of 1.34.

Figure 2.10 Latest Average Daily Traffic (ADT) Counts and Volume to Capacity (V/C) Ratios

Level of service (LOS) is a qualitative measure describing operational conditions within a traffic stream, based on service measures such as speed and travel time, freedom to maneuver, traffic interruptions, comfort, and convenience. There are six levels of service, which include letter grade scoring of A through F. LOS A is associated with free-flow conditions, high freedom to maneuver, and little or no delay. Conditions at or near capacity typically are associated with LOS E. At LOS F, traffic conditions are oversaturated and exceed capacity, with low travel speeds, little or no freedom to maneuver, and high delays. In urban areas, LOS D or better is desirable.

AM and PM LOS values along the corridor were estimated using 2015 output from the simulation model and are shown on **Figure 2.11** through **Figure** 2.16. As shown, most of the corridor currently operates at LOS C or better for both AM and PM existing peaks. There are sections primarily between University Parkway and Epworth Road that operate at LOS D or worse.

Figure 2.11 Existing AM Levels of Service (West)

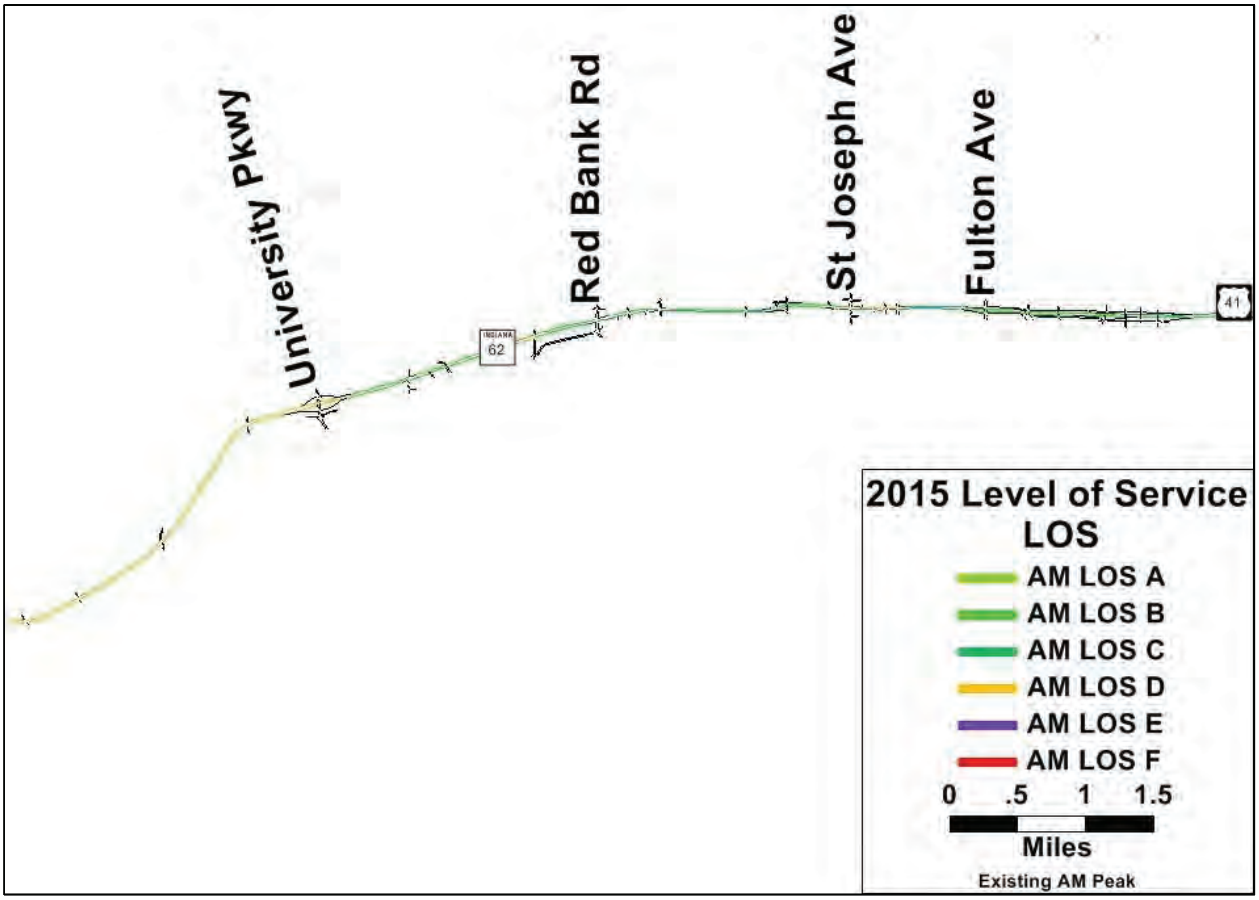


Figure 2.12 Existing AM Levels of Service (Middle)

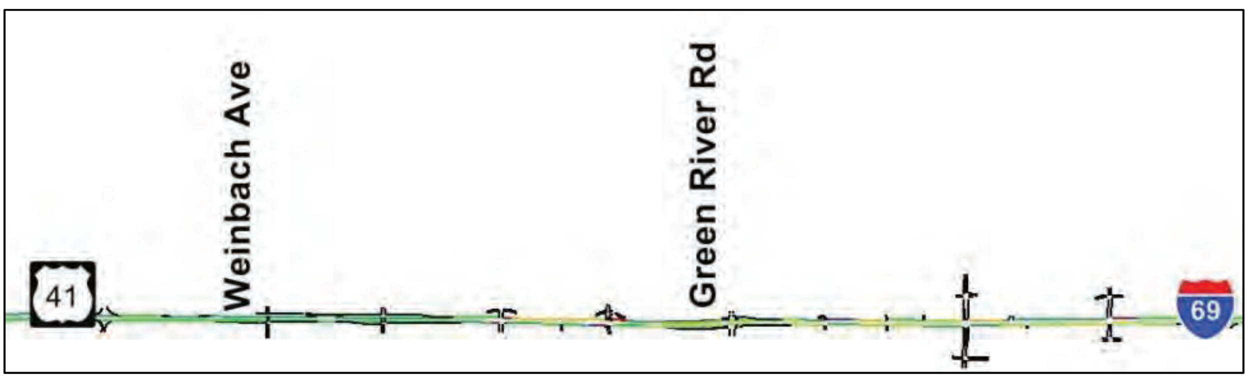


Figure 2.13 Existing PM Levels of Service (West)

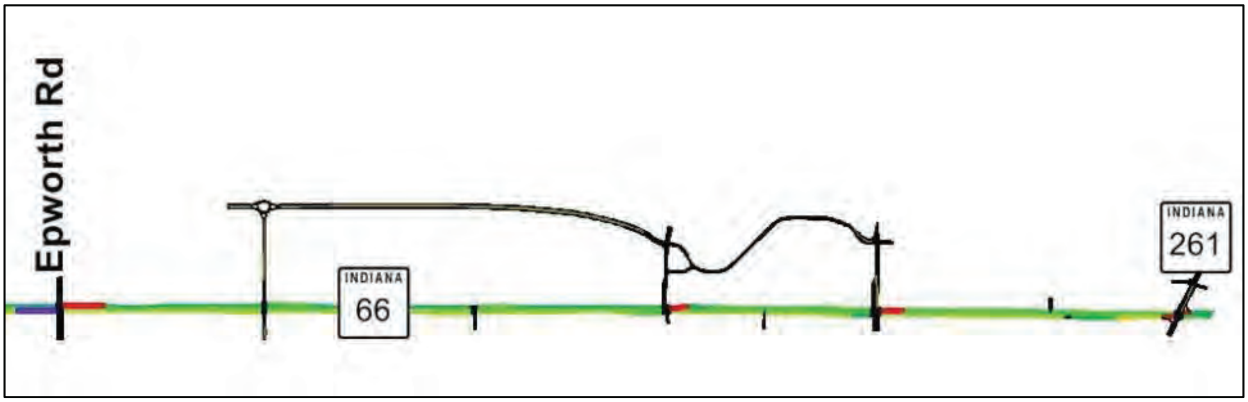


Figure 2.14 Existing PM Levels of Service (West)

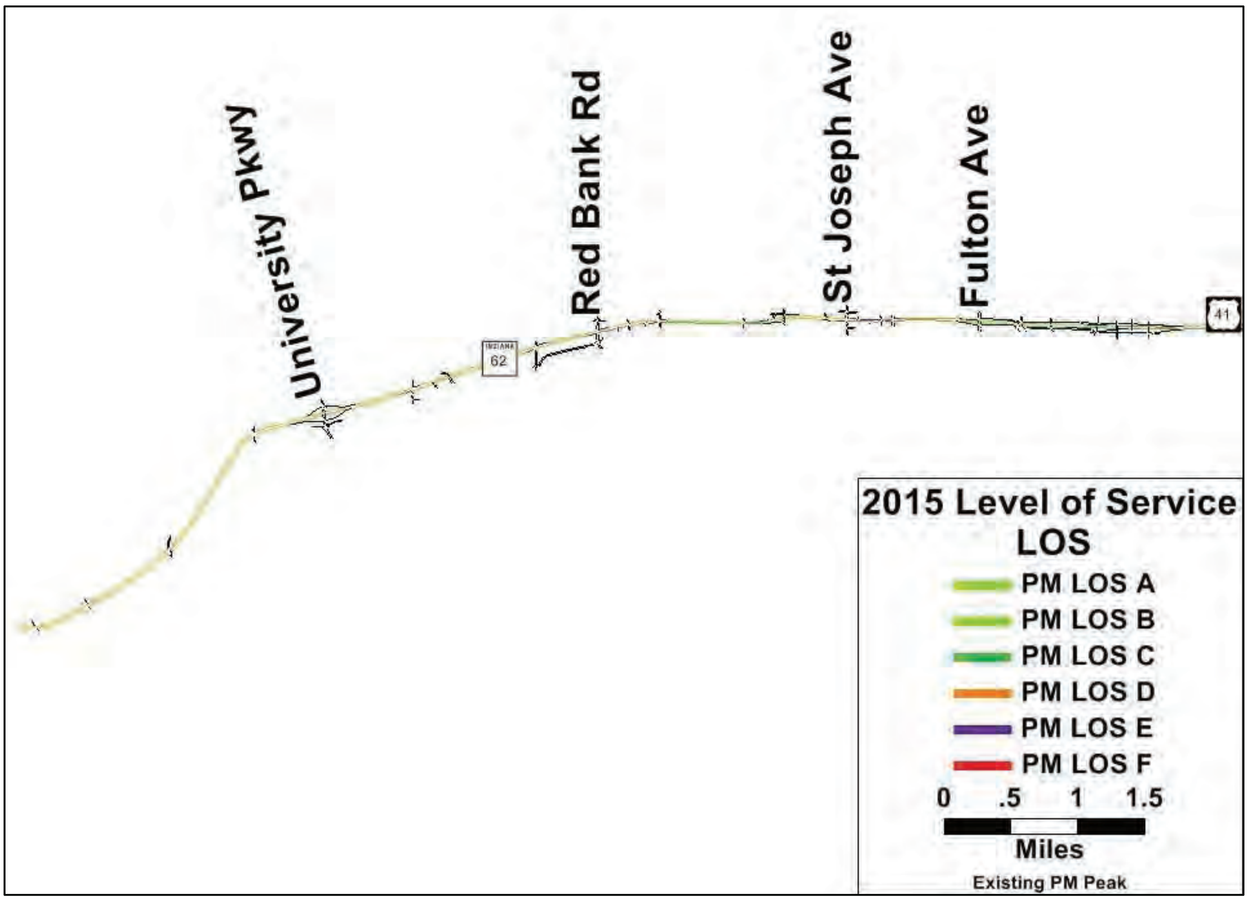


Figure 2.15 Existing PM Levels of Service (Middle)

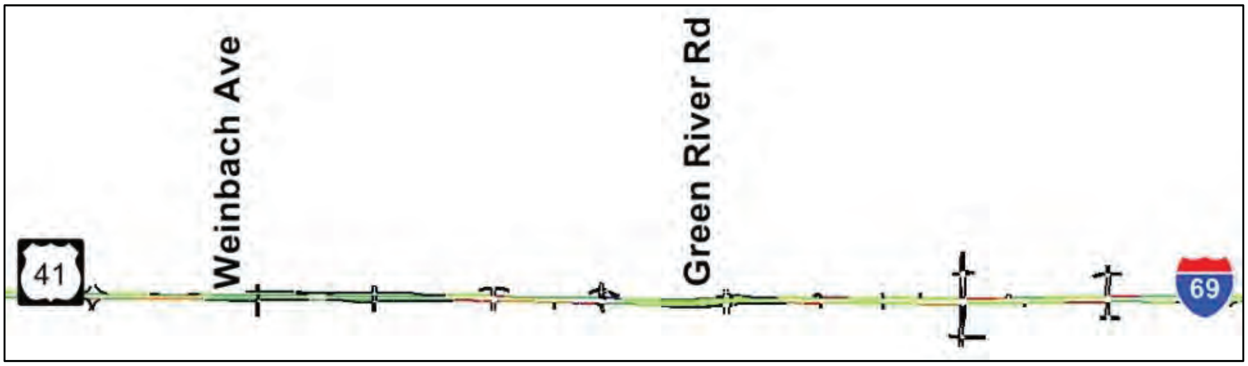
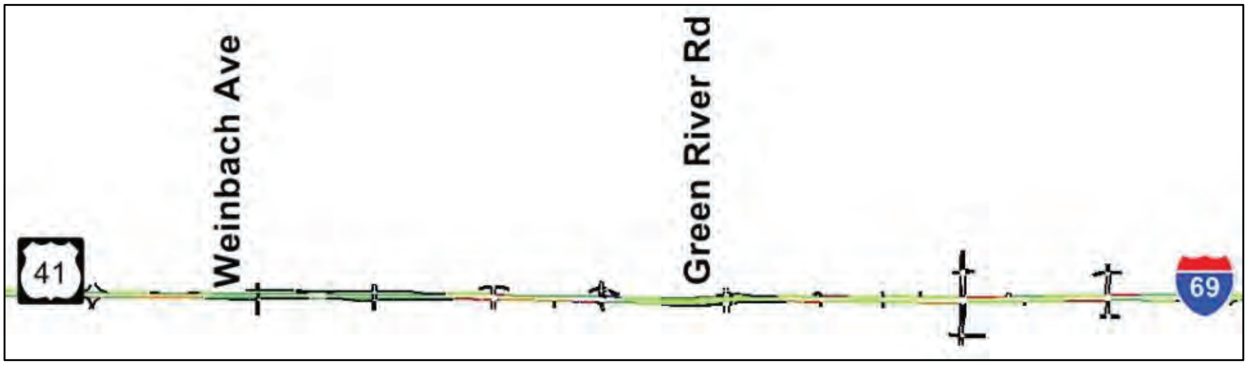


Figure 2.16 Existing PM Levels of Service (East)



Facility-based performance measures, such as average delay and LOS are displayed in **Table 2.2** and **Table** 2.3**.** More so in the PM peak, rather than the AM peak, several intersections have approach LOS as E or worse. Existing average travel speeds are 26 mph for the AM peak and 27 mph for the PM peak. Existing travel times along the corridor were less than 30 minutes either direction for both peaks.

Table 2.2 2017 Existing AM Peak Average Delays and Levels of Service

2017 Existing AM Peak										
Intersection	**Total Intersection**		**Northbound**		**Southbound**		**Eastbound**		**Westbound**	
	Avg. Delay	**LOS**	**Avg. Delay**	**LOS**	**Avg. Delay**	**LOS**	**Avg. Delay**	**LOS**	**Avg. Delay**	**LOS**
SR 62/66 at:										
St. Phillips Road	14	B	6	A	17	B	16	B	14	B
Schutte Road	27	C	28	C	58	E	21	C	19	B
Boehne Camp Road	15	B	29	C	37	D	12	B	15	B
Red Bank Road	27	C	30	C	42	D	27	C	23	C
Rosenbarger Avenue	21	C	31	C	43	D	17	B	18	B
Joseph Avenue	39	D	54	D	57	E	35	D	30	C
Wabash Avenue	10	A	36	D	41	D	8	A	8	A
Vann Avenue	19	B	34	C	33	C	21	C	17	B
Stockwell Road	29	C	45	D	28	C	29	C	28	C
Fielding Road	14	B	27	C	31	C	16	B	11	C
Brentwood Drive	2	A	10	C			1	A	2	A
Burkhardt Road	51	D	81	F	166	F	25	C	18	B
Cross Pointe Boulevard	35	D	36	D	37	D	28	C	38	D
Epworth Road	26	C	49	D	43	D	20	C	21	C
Libbert Road	16	B	43	D	34	C	7	A	14	B
Bell Road	19	B	31	C	51	D	9	A	15	B
SR 261	22	C	24	C	10	B	20	B	34	C
Additional Intersections:										
Green River	13	B	7	A	7	A	33	C	40	D

Table 2.3 2017 Existing PM Peak Average Delays and Levels of Service

2017 Existing PM Peak										
Intersection	**Total Intersection**		**Northbound**		**Southbound**		**Eastbound**		**Westbound**	
	Avg. Delay	**LOS**	**Avg. Delay**	**LOS**	**Avg. Delay**	**LOS**	**Avg. Delay**	**LOS**	**Avg. Delay**	**LOS**
SR 62/66 at:										
St. Phillips Road	16	B	6	A	17	B	17	B	16	B
Schutte Road	30	C	53	D	59	E	26	C	21	C
Boehne Camp Road	25	C	33	C	48	D	23	C	20	B
Red Bank Road	43	D	42	D	52	D	43	D	41	D
Rosenbarger Avenue	29	C	40	D	55	E	22	C	25	C
Joseph Avenue	32	C	51	D	76	E	32	C	22	C
Wabash Avenue	12	B	43	D	41	D	9	A	10	B
Vann Avenue	23	C	39	D	45	D	27	C	14	B
Stockwell Road	38	D	47	D	25	C	35	C	33	C
Fielding Road	26	C	30	C	39	D	31	C	17	B
Brentwood Drive	1	A	16	B			1	A	1	A
Burkhardt Road	50	D	129	F	99	F	23	C	35	D
Cross Pointe Boulevard	47	D	37	D	56	E	31	C	64	E
Epworth Road	32	C	47	D	44	D	32	C	20	B
Libbert Road	19	B	28	C	31	C	19	B	13	B
Bell Road	26	C	32	C	61	E	19	C	25	C
SR 261	20	C	17	B	12	B	16	B	39	D
Additional Intersections:										
Green River	17	B	7	A	7	A	50	D	78	E

3. Future Conditions

Forecasted Traffic Volumes and Operations

Purpose

The purpose of developing forecasted traffic volumes is to estimate the future needs of the Lloyd Expressway corridor. Based on 10-year and 20-year estimates, major and minor impacts to the corridor in the future can be identified. The purpose of a traffic simulation model is to predict congestion states of the Lloyd Expressway and then propose improvements in the traffic network. To estimate future traffic volumes along the corridor, the study team examined the EMPO regional travel demand model and developed 2025 and 2045 traffic forecasts.

Methodology

The EMPO Regional Travel Demand Model served as the basis for development of traffic forecasts and evaluation of alternatives. The EMPO maintains the model that estimates and projects traffic volumes on roadway links within Gibson, Posey, Vanderburgh, and Warrick County in southwest Indiana and Henderson County in Kentucky. The model uses socioeconomic data, namely households and employment, to estimate traffic demand. INDOT and the Kentucky Transportation Cabinet (KYTC) are currently evaluating options to provide a new I-69 crossing of the Ohio River, referred to as the I-69 ORX project. As part of the NEPA study, the EMPO model was updated in 2017 to include a 2015 base year and 2045 future horizon year. A toll diversion model was also implemented within the existing modeling procedures to evaluate various tolling scenarios for the project. This version of the model was installed for use in subsequent study tasks.

The I-69 ORX project will have a significant effect on cross-river traffic and will impact travel demand on routes on both sides of the river. Three build alternatives are under consideration concurrently with the execution of this study, and a variety of tolling scenarios have been studied to estimate both traffic impacts and revenue potential. The NEPA process does not determine toll policies or business plans related to tolling, and the I-69 ORX project team has focused on potentially feasible tolling options for evaluation in the Draft Environmental Impact Statement (DEIS). Therefore, a single set of forecasts are not available for any build alternative. Because a Preferred Alternative has not been determined and a recommended tolling scheme will not be determined by the NEPA study, traffic forecasts for the Lloyd Expressway corridor had to consider multiple I-69 ORX options. Traffic forecasts for the variety of options that are under evaluation in the DEIS were all considered, and average growth rates were calculated for each character section of the Lloyd Expressway.

Applying the growth percentages to the latest ADT volumes, traffic forecasts for 10-year projections (2025) and 20-year projections (2045) were calculated for the Lloyd Expressway.
A set of microscopic traffic simulation models was developed for evaluating the improvement alternatives. The TransModeler® traffic simulation software by Caliper© Corporation was used to analyze peak period traffic conditions for the following future scenarios:

- Future (year 2025/2045) No Build conditions (where "No Build" means no additional projects beyond those that are already committed).
- Future (year 2025/2045) anticipated conditions associated with the various improvement alternatives that were considered.

Results

The growth rates for the four distinct sections on the Lloyd Expressway are summarized in the table below.

Table 3.1 Growth Rates

Sections (limits)	Annual Growth	2015 AADT (VPD)	2025 AADT (VPD)	2045 AADT (VPD)
Suburban Development (St. Phillips Road to Barker Avenue - 5.5 miles)	0.50%	20,000 - 45,000	21,000 - 47,000	22,000 - 52,000
Downtown City Street (Barker Avenue to Fulton Avenue - 1.5 miles)		45,000	47,000	52,000
Expressway (Fulton Avenue to Vann Avenue - 4.0 miles)	1.00%	45,000 - 63,000	47,000 - 66,000	49,000 - 72,500
Signalized Arterial (Vann Avenue to SR 261 - 8.0 miles)		34,000 - 58,000	37,000 - 63,000	40,000 - 76,000

The forecasted traffic volumes for future design years were installed into the traffic simulation model, and the model was again used to calculate average delay and LOS at the signalized intersections along the corridor, based on the existing lane configuration, traffic controls, optimized signal timing, and future peak hour volumes. In general, signal timings favor the through movement along SR 62/66 which results in generally acceptable overall intersection LOS with some minor approaches having an unacceptable LOS. As shown in the tables below, even more of the approaches of intersections on the corridor would operate at either LOS E or LOS F. Average travel speed had a slight increase compared to existing at 27 mph for AM and 28 mph for PM.

Table 3.2 2025 No Build AM Peak Average Delays and Levels of Service

2025 No Build AM Peak										
Intersection	Total Intersection		Northbound		Southbound		Eastbound		Westbound	
	Avg. Delay	LOS	Avg. Delay	LOS	Avg. Delay	LOS	Avg. Delay	LOS	Avg. Delay	LOS
SR 62/66 at:										
St. Phillips Road	15	B	5	A	16	B	18	B	15	B
Schutte Road	27	C	30	C	58	E	21	C	18	B
Boehne Camp Road	17	B	29	C	34	C	13	B	18	B
Red Bank Road	28	C	31	C	44	D	27	C	25	C
Rosenbarger Avenue	21	C	32	C	45	D	17	B	17	B
Joseph Avenue	40	D	60	E	58	E	36	D	32	C
Wabash Avenue	10	B	38	D	41	D	8	A	9	A
Vann Avenue	20	B	34	C	33	C	22	C	17	B
Stockwell Road	30	C	45	D	27	C	29	C	30	C
Fielding Road	15	B	30	C	33	C	16	B	12	B
Brentwood Drive	2	A	10	A			1	A	2	A
Burkhardt Road	53	D	135	F	181	F	27	C	19	B
Cross Pointe Boulevard	41	D	37	D	38	D	28	C	51	D
Epworth Road	30	C	55	D	46	D	22	C	26	C
Libbert Road	17	B	47	D	38	D	7	A	14	B
Bell Road	22	C	30	C	67	E	10	B	18	B
SR 261	23	C	24	C	11	B	21	C	34	C
Additional Intersections:										
Green River	13	B	7	A	7	A	33	C	39	D

Table 3.3 2025 No Build PM Peak Average Delays and Levels of Service

2025 No Build PM Peak										
Intersection	Total Intersection		Northbound		Southbound		Eastbound		Westbound	
	Avg. Delay	LOS	Avg. Delay	LOS	Avg. Delay	LOS	Avg. Delay	LOS	Avg. Delay	LOS
SR 62/66 at:										
St. Phillips Road	16	B	6	A	17	B	18	B	17	B
Schutte Road	33	C	95	F	63	E	27	C	22	C
Boehne Camp Road	27	C	35	C	54	D	25	C	22	C
Red Bank Road	48	D	45	D	57	E	47	D	48	D
Rosenbarger Avenue	30	C	41	D	59	E	23	C	26	C
Joseph Avenue	33	C	52	D	77	E	35	C	22	C
Wabash Avenue	13	B	43	D	40	D	9	A	12	B
Vann Avenue	24	C	41	D	46	D	30	C	13	B
Stockwell Road	35	D	48	D	26	C	36	D	35	D
Fielding Road	27	C	33	C	42	D	33	C	18	B
Brentwood Drive	1	A	16	B			1	A	1	A
Burkhardt Road	53	D	133	F	111	F	24	C	39	D
Cross Pointe Boulevard	73	E	37	D	60	E	33	C	129	F
Epworth Road	37	D	63	E	45	D	35	C	21	C
Libbert Road	20	C	33	C	33	C	21	C	13	B
Bell Road	28	C	32	C	74	E	18	B	27	C
SR 261	21	C	17	B	11	B	16	B	42	D
Additional Intersections:										
Green River	16	B	7	A	6	A	50	D	76	E

After analyzing the simulation models and the crash history, recommendations were made to the suggested model network. **Table 3.4** displays the recommendations that include both short and long-term alternatives at each intersection.

Table 3.4 Model Network Recommendations

Intersection	Current traffic control	Recommended Alternative
University Boulevard	stop controlled	Additional left turn lane on the WB expressway off-ramp; three way stop
Schutte Road	signalized	Offset left turn lanes with advance warning flashers and signs; flashing arrow with permissive left turns
Boehne Camp Road	signalized	Offset left turn lanes with advance warning flashers and signs; flashing arrow with permissive left turns
Red Bank Road	signalized	Change the tracking to SB Red Bank Road
Rosenbarger Road	signalized	Offset left turn lanes with advance warning flashers and signs; flashing arrow with permissive left turns
Ingle Avenue	stop controlled	Realign intersection with the ramp; eliminate Corbierre Avenue ramp
Joseph Avenue	signalized	Extend the EB left turn lane; prohibit left turn lanes from Indiana Street; flashing arrow with permissive left turns
Wabash Avenue	signalized	Permissive left turns with Flashing Yellow
Vann Avenue	signalized	Right in- right out
Stockwell Avenue	signalized	Displaced Continuous flow intersection; u-turn for EB approach
Green River Road	signalized	Signalize the NB right turn lane ramp
Fielding Road	signalized	Intersection lane assignment changes per the TIS
Brentwood Road	signalized	WB traffic signal head changes to green arrows; flashing arrow with permissive left turns
Kimber Lane	stop controlled	Right in- right out
Burkhardt Road	signalized	Displaced left turn continuous flow intersection; u-turns
Cross Pointe Boulevard	signalized	Hybrid displaced left turn/boulevard left; u-turns
Epworth Road	signalized	Hybrid displaced left turn/boulevard left; u-turns
Grimm Road	stop controlled	Right in- right out
Libbert Road	signalized	Flashing arrow with permissive left turns; EB U-turn
Bell Road	signalized	Flashing arrow with permissive left turns

The 2025 future growth was used to evaluate the recommendations as it is the nearest future year. Several intersection improvements and revised signal timing identified the model runs. In the AM and PM peak period, all LOS D or better, except for the minor approach on St. Joseph Avenue. Average travel speed on the corridor decreased to 25 mph for the recommended model for both AM and PM. Travel times with recommendations remained less than 30 minutes per direction per peak period. **Table 3.5 and Table** 3.6 shows the output results for the 2025 recommended scenario.

Table 3.5 Recommendation Results for 2025 AM Peak

2025 Recommended AM Peak										
Intersection	Total Intersection		Northbound		Southbound		Eastbound		Westbound	
	Avg. Delay	LOS	Avg. Delay	LOS	Avg. Delay	LOS	Avg. Delay	LOS	Avg. Delay	LOS
SR 62/66 at:										
St. Phillips Road	15	B	6	A	17	B	19	B	16	B
Schutte Road	33	C	16	B	27	C	27	C	38	D
Boehne Camp Road	13	B	32	C	38	D	33	C	35	C
Red Bank Road	27	C	29	C	43	D	27	C	24	C
Rosenbarger Avenue	17	B	34	C	45	D	12	B	13	B
Joseph Avenue	34	C	42	D	61	E	28	C	25	C
Wabash Avenue	19	B	21	C	28	C	20	B	18	B
Vann Avenue	5	A	32	C	18	B	4	A	4	A
Stockwell Road	20	C	35	D	26	C	14	B	21	C
Fielding Road	21	C	25	C	33	C	17	B	24	C
Brentwood Drive	6	A	13	B			1	A	8	A
Burkhardt Road	11	B	45	D	25	C	14	B	17	B
Cross Pointe Boulevard	23	C	48	D	46	D	21	C	21	C
Epworth Road	13	B	32	C	30	C	6	A	16	B
Libbert Road	20	C	48	D	28	C	18	B	16	B
Bell Road	19	B	22	C	38	D	10	B	19	B
SR 261	22	C	25	C	11	B	16	B	35	C
Additional Intersections:										
Green River	22	C	19	B	33	C	48	D	21	C

Table 3.6 Recommendation Results for 2025 PM Peak

2025 Recommended PM Peak										
Intersection	Total Intersection		Northbound		Southbound		Eastbound		Westbound	
	Avg. Delay	LOS	Avg. Delay	LOS	Avg. Delay	LOS	Avg. Delay	LOS	Avg. Delay	LOS
SR 62/66 at:										
St. Phillips Road	19	B	16	B	6	A	23	C	20	B
Schutte Road	32	C	30	C	38	D	34	C	37	D
Boehne Camp Road	20	B	36	D	49	D	14	B	18	B
Red Bank Road	35	C	29	C	48	D	33	C	34	C
Rosenbarger Avenue	27	C	43	D	46	D	20	B	28	C
Joseph Avenue	35	C	55	D	58	E	33	C	28	C
Wabash Avenue	22	C	19	B	26	C	19	B	25	C
Vann Avenue	9	A	34	C	15	B	9	A	7	A
Stockwell Road	20	C	38	D	42	D	14	B	17	B
Fielding Road	37	D	21	C	54	D	47	D	24	C
Brentwood Drive	1	A	20	C			1	A	2	A
Burkhardt Road	11	B	35	C	26	C	11	B	13	B
Cross Pointe Boulevard	24	C	48	D	45	D	24	C	20	B
Epworth Road	12	B	32	C	34	C	5	A	14	B
Libbert Road	31	C	29	C	29	C	37	D	22	C
Bell Road	24	C	26	C	36	D	13	B	34	C
SR 261	18	B	21	C	13	B	13	B	34	C
Additional Intersections:										
Green River	18	B	17	B	6	A	38	D	37	D

4. Community and Stakeholder Involvement

Overview

Over the course of the study, the study team held three meetings to reach out to stakeholders and local officials. The study team reached out to local government officials and other community groups early in the planning process.

The first stakeholder meeting was held on November 9, 2017, at the Central Library in Evansville, Indiana. The purpose of the meeting was to present background information to the stakeholders about the study, including the scope of work, basic study concepts, and crash history and traffic conditions. Additionally, example intersection concepts were presented. Future steps were shared with the stakeholders, and the questions and concerns at this time were addressed.

The second stakeholder meeting was conducted as a technical stakeholder meeting, and included representatives from INDOT, EMPO, City of Evansville, APC, and Warrick County. The meeting was held on April 14, 2018, in the Evansville Civic Center. Key discussion items included an overview of past work and analysis strategies, and an overview of each intersection with recommendations. The stakeholders were provided a comment sheet to note any concerns with the recommendations. In addition, the stakeholders provided feedback on the recommendations during and following the presentation.

A final stakeholder meeting was held on May 31, 2018, at the Central Library in Evansville, Indiana. The purpose of the meeting was a follow-up to the first stakeholder meeting in November with many of the same stakeholders as well as additional participants. The planning team presented an overview of past work and analysis strategies, followed by an overview of each intersection with recommendations. Stakeholders shared with the planning team their concerns and ideas regarding the intersection recommendations during and after the presentation. A few stakeholders expressed concern that the recommendations did not include future interchanges to eliminate more signals. Several stakeholders expressed concern about the use of boulevard left intersections. Also, several stakeholders expressed concerns that a traffic signal was not recommended at Grimm Road.

5. Recommendations – Short and Long Term

A range of concepts was developed based on the existing conditions analysis and input from the study team and stakeholders. As noted earlier, safety is a primary concern along the Lloyd Expressway. Initially all alternative solutions were subjected to initial feasibility screening according to the guidelines in the INDOT Intersection Decision Guide. The results of the screening are discussed in **Appendix C**. Some alternatives did not move forward when another alternative was shown to be substantially more cost effective. In addition, stakeholder outreach suggested the need for further consideration of providing grade separated interchanges throughout the corridor. While some intersections, such as St. Joseph Avenue and Burkhart Road, have been previously considered for reconstruction as interchanges, other types of improvement concepts can provide similar operational and safety benefits at a much lower cost. Such at-grade improvements would also be less disruptive to traffic and businesses during construction and would not preclude the future implementation of grade separation should traffic demand warrant it.

The Low-Cost Improvements offer short-term, easily implementable, relatively low-cost actions that should provide immediate benefits and improve safety. These short-term recommendations include warning signage, revising the striping at Red Bank Road to better utilize the lanes, optimizing the signal timing and replacing three eastbound signal heads with single green arrows at Brentwood Road. Given the east-west orientation of the corridor, signal back-plates are also recommended throughout the corridor where they do not already exist.

The long-term improvements are concepts requiring more significant resources to implement or concepts that address future mobility issues.

These recommendations are meant to be pieced together geographically. For example, the right-in/right-out at Vann Avenue needs to be with the displaced continuous flow intersection at Stockwell Avenue. The same continues for the other two right-in/right-out recommendations; Kimber Lane with Burkhardt Road and Grimm Road with Epworth Road. Grouping the recommendations together allows for the maximum traffic flow benefit from the alternatives. Another example would include grouping all the signalized intersections, east of I-69, together as a group of recommended alternatives. Any details of the recommendations would need to be examined in subsequent study phases. The recommended descriptions of each roadway facility with identified problems and an explanation of conceptual recommended improvements (low, medium, and high) including cost estimates are shown in the following section.

In addition to alternatives meant to improve traffic flow and safety, The *Manual on Uniform Traffic Control Devices* (MUTCD, 2009 Edition) states that the design and operation of traffic control signals shall take into consideration the needs of pedestrians as well as vehicular traffic. Therefore, pedestrian indications and crosswalks are recommended at the signalized intersections where engineering judgement indicates the need for provisions for a given pedestrian movement, particularly those crossing the Lloyd Expressway. St. Joseph Avenue is currently the only signalized intersection on the corridor with accommodations for pedestrians to cross the Lloyd. Wabash Avenue has crosswalks but no pedestrian indications. Where pedestrian indications for the movements crossing the Lloyd Expressway are installed, pedestrian push buttons should also be provided so that sufficient time to cross the roadway can be provided during those cycles when the button is pushed. Also, all pedestrian signal heads used at crosswalks where the duration of the flashing upraised hand indication is more than seven seconds shall include a pedestrian countdown display in order to inform pedestrians of the number of seconds remaining.

There were several recurring concepts considered throughout the corridor. A summary of their universal advantages and disadvantages is discussed below to reduce redundancy in the discussion of the individual intersections.

Positive Offset Left-Turns with Flashing Yellow Arrows

The positive offset left turn allows drivers to see oncoming traffic without obstruction. This practice helps improve safety and operations of the left-turn movement by improving driver acceptance of gaps in opposing through traffic and eliminating the potential for path overlap. The combination of positive offset left turn lanes and flashing yellow left turn arrows enables a permissive left-turn phase during times of day when there are sufficient gaps in oncoming traffic to safely make a left turn. A protected-only left-turn movement may still be used during higher traffic volume periods of the day if necessary. INDOT prefers to only use permissive left-turns where positive offset is provided, and a flashing yellow left-turn arrow is the INDOT standard for protected/permissive operation.

Dual-Lane Roundabout Intersection

This concept was only considered in the four-lane sections of the corridor. Through its geometry, the dual-lane roundabout alternative would force traffic to slow down when entering the roundabout and reduce the vehicle points of conflict. Due to the lower speeds navigating a roundabout, the severity of crashes is also reduced. The roundabout does not fit into the high-speed divided corridor as well as the positive offset left-turn.

Advanced Signal Warning Flashers

Advanced signal warning flashers would warn traffic of potential slowed or stopped traffic ahead. They are recommended where a high number of rear-end crashes are occurring at signalized intersections.

Signal Visibility

Given the east-west orientation of the corridor and the correlation of sunrise and sunset at peak hours at certain times of the year, there is concern that some of the rear-end accidents could be due to lack of visibility of the signal heads as shown in **Figure 5.1**.

Figure 5.1 Afternoon Sunlight at SR 66 / Bell Road

Therefore, two short-term alternatives can be considered at all signalized intersections within the corridor.

Near-Side Signal Heads would provide an alternate view that may not line up with the sunlight and may also provide better visibility around trucks. An example is shown in **Figure 5.2**.

Figure 5.2 Near-Side Signal Depiction

Double Red Signal Sections on the near-side signal could also be used. **Figure 5.3** shows an example of a double red signal configuration. Although this option is consistent with FHWA recommendations nationally, it is not currently used in Indiana.

Figure 5.3 Double Red Signal Configuration

Image Source: FHWA Publication HRT-04-09

Primary Intersection Recommendations

A snapshot of the recommended alternatives at each intersection is shown in **Table 5.1** below. For in-depth analysis, please see the discussion of each intersection that follows.

Table 5.1 Summary of Improvement Recommendations

Intersection	Description of Need	Alternatives	Delay Cost Effectiveness ($/s)	Crash Cost Effectiveness ($/% Reduction)	Short Term	Long Term	2018 Estimated Construction Cost
SR 62 Schutte Road	High number of crashes along SR 62 Sub-standard LOS of the NB and SB movements	Flashing Beacons / Near-Side Signals		$2,083			$75,000
		Positive Offset, Permissive Left Turn	$227,500	$26,923			$910,000
		Dual-Lane roundabout	$105,263	$87,977			$3,000,000
SR 62 Middle Mount Vernon Road	Frequency and severity of crashes	Add Flashing Beacons					$15,000
		EB Auxiliary Turn Lanes		$9,259			$250,000
		Right-in/Right-out		$2,778			$200,000
SR 62 Boehne Camp Road	High number of crashes along SR 62 Sub-standard LOS of the SB movement	Flashing Beacons / Near-Side Signals		$2,083			$75,000
		Dual-Lane roundabout	$150,000	$87,977			$3,000,000
		Positive Offset Left Turns	$910,000	$26,923			$910,000
SR 62 Red Bank Road	High number of crashes along SR 62 Sub-standard LOS of the SB movement	Left-Turn Reconfiguration	$7,500	$789			$45,000
		Dual-Lane roundabout	-$1,500,000	$87,977			$3,000,000
		Flashing Beacons / Near-Side Signals		$2,083			$75,000
SR 62 Rosenberger Avenue	High number of crashes along SR 62 Sub-standard LOS of the SB movement	Dual-Lane roundabout	-$666,667	$87,977			$910,000
		Positive Offset Left-Turns & Lengthened Westbound Left-Turn	$140,000	$26,923			$3,000,000
SR 62 Igleheart Avenue Ramp	Frequency and severity of crashes	Introduce Raised Median and Auxiliary Turn Channelization		$49,600			$124,000
		Additional Guide and Warning Signs		$613			$25,000

50

Intersection	Description of Need	Alternatives	Delay Cost Effectiveness ($/s)	Crash Cost Effectiveness ($/% Reduction)	Short Term	Long Term	2018 Estimated Construction Cost
SR 62 St. Joseph Avenue	Frequency and severity of crashes	Southbound Approach Improvements	$202,222	$45,500			$910,000
SR 62 Wabash Avenue	Frequency and severity of crashes	Lengthened Left-Turns and Driveway Closure	-$480,000	$9,524			$240,000
SR 66 Vann Avenue	High number of crashes along SR 66	Displaced Left-Turns	$300,000	$35,503			$1,200,000
		Bow-Tie Intersection	$95,238	$29,326			$1,000,000
		Right-in/Right-out		$1,667			$120,000
SR 66 Stockwell Road	High number of crashes along SR 66	Bow-Tie Intersection	$223,529	$52,778			$1,900,000
		Displaced Left-Turns	$387,500	$86,111			$3,100,000
WB SR 66 Exit Ramp Green River Road	High number of crashes on WB exit ramp from SR 66	Signalized Right Turn					$75,000
SR 66 Fielding Road	Frequency and severity of crashes	Flashing Beacons / Near-Side Signals		$2,083			$75,000
SR 66 Brentwood Drive	EB signal head is not compliant with MUTCD	Install Correct Signal Heads					$10,000
SR 66 Burkhardt Road	High number of crashes along SR 62 Sub-standard LOS of the SB movements	Displaced Left-Turns	$169,231	$91,667			$3,300,000
		Boulevard Left	$94,737	$150,000			$3,600,000
SR 66 Cross Pointe Boulevard	High number of crashes along SR 62 Sub-standard LOS of the SB and WB movements	Hybrid Boulevard Left / DLT	$46,970	$129,167			$3,100,000
		Boulevard Left	$53,922	$53,922			$2,750,000
		WB Dual Left-Turn Lanes	$26,471	$35,714			$900,000
SR 66 Epworth Road	High number of crashes along SR 66	Hybrid Boulevard Left / DLT	$103,448	$125,000			$3,000,000
		Bow-Tie Intersection	$252,632	$66,667			$2,400,000
SR 66 Grimm Road	No identified need (stakeholder requests)	Right-in/Right-out					$120,000

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Table 5.1 Summary of Improvement Recommendations Continued

Intersection	Description of Need	Alternatives	Delay Cost Effectiveness ($/s)	Crash Cost Effectiveness ($/% Reduction)	Short Term	Long Term	2018 Estimated Construction Cost
SR 66 Country Place Drive	Frequency and severity of crashes	Advance Warning Signs					$10,000
		Right-in/Right-out					$200,000
SR 66 Bell Road	Frequency and severity of crashes	Flashing Beacons / Near-Side Signals		$2,083			$75,000

SR 62 / University Parkway

University Parkway at SR 62 is tight diamond interchange with stop controlled ramp termini. **Table 5.2** shows the operational and safety analysis results for the current ramp termini. The westbound terminus is an unusual intersection where the exit ramp traffic does not stop. This configuration is the result of problems with the ramp queueing into the expressway when it was an all-way stop controlled intersection. Environmental concerns in the vicinity of the intersection include potential wetlands on the south side of the roadway.

Table 5.2 University Parkway Analysis Results

Intersection Alternative	Intersection Leg	2017 Existing LOS				Crash Analysis	
		AM Peak	Delay (s)	PM Peak	Delay (s)	I_{CF}	I_{CC}
WB Ramp Terminus	NB	C	21	C	27	-0.50	-0.85
	SB	B	12	C	21		
EB Ramp Terminus	EB	B	15	C	15	-1.15	-1.23

Stakeholder feedback throughout the study suggested there was a problem of finding an adequate gap for northbound traffic at the westbound ramp terminus. However, the analysis in **Table 5.2** does not indicate any substantial problems with safety or operations. One suggestion that was considered as a result of the stakeholder meetings was to make the intersection all-way stop-controlled with two left turn lanes for the exit ramp. However, the stakeholder group was not comfortable with this unusual intersection configuration. Therefore, the recommendation was to monitor the intersection to see if its safety or operational performance worsens.

SR 62 / Schutte Road

The need for improvements at the intersection of SR 62 and Schutte Road is evidenced by a high number of crashes along SR 62, as well as sub-standard LOS of the northbound and southbound movements. Schutte Road is an alternative access to the University of Southern Indiana. The I_{CF} is 5.21 while the I_{CC} is 2.94, suggesting the intersection is experiencing statistically high crash frequencies and severity. There were approximately 71 crashes at the intersection between 2014 and 2016. The crashes are predominantly rear-end with nearly twice as many crashes in the westbound direction as the eastbound direction with approximately 85% of the crashes along SR 62. Environmental concerns in the vicinity of the intersection include nearby environmental justice population areas, a potential historic structure in the northeast quadrant and a water well in the northwest quadrant.

Figure 5.4 Schutte Road Location Map

The purpose of the improvement is to reduce the number of crashes within the intersection and improve the LOS. After initial analysis, several intersection options were determined to be feasible. The array of options included no build, positive offset left-turns with flashing yellow arrows, dual-lane roundabout intersection, and placement of advanced warning flashers to reduce westbound rear-end crashes. **Table 5.3** shows the LOS results and crash modification factors for the alternatives.

Table 5.3 Schutte Road Recommendation Analysis Results

Intersection Alternative	Intersection Leg	2017 Existing LOS AM Peak	Delay (s)	PM Peak	Delay (s)	2045 Future LOS AM Peak	Delay (s)	PM Peak	Delay (s)	CMF*	Estimated Cost
Schutte Road No Build / Flashing Beacons	NB	E	56	E	68	D	33	F	86	0.00 / 0.64 1	$75,000
	SB	C	34	E	73	D	53	E	69		
	WB	B	14	C	20	B	18	C	24		
	EB	B	15	C	28	C	22	C	26		
	Total Intersection	**C**	**27**	**C**	**33**	**C**	**27**	**C**	**34**		
Schutte Road Positive Offset, Permissive Left Turn	NB					B	13	B	22	0.662 2	$910,000
	SB					D	57	D	39		
	WB					B	16	C	26		
	EB					B	15	C	32		
	Total Intersection					**C**	**23**	**C**	**30**		
Schutte Road Dual-Lane Roundabout	NB					A	1	A	3	0.659 3	$3,000,000
	SB					A	1	A	1		
	WB					A	1	A	4		
	EB					A	2	A	3		
	Total Intersection					**A**	**1**	**A**	**3**		

** Crash Modification Factor from Federal Highway Administration Clearinghouse*
1. Install Flashing Beacons as Advance Warning

2. Improve left-turn lane offset to create positive offset

3. Conversion of Intersection into High-Speed Roundabout

Table 5.4 shows the cost effectiveness of each alternative verses reduction in delay and reduction in crashes.

Table 5.4 Schutte Road Recommendation Cost Effectiveness

Intersection Alternative	Avg. Delay 2045 (s)	Delay Reduction (s)	Delay Cost Effectiveness	Crash Reduction %	Crash Cost Effectiveness $ / % Reduction
Flashing Beacon	30.5	0.0	N/A	36.0	$2,083
Positive Offset Left Turn	26.5	4.0	$227,500/s	33.8	$26,923
Dual-Lane Roundabout	2.0	28.5	$105,263/s	34.1	$87,977

The dual-lane roundabout alternative was eliminated due to the relatively high cost versus the reduction in crashes. The roundabout also does not fit into the high-speed divided corridor as well as the positive offset left turn. Therefore, the flashing beacon is a short term recommendation and the positive offset left turn is the long term recommendation.

SR 62 / Middle Mount Vernon Road

The need for improvements at the intersection of SR 62 and Middle Mount Vernon Road is evidenced by a high number of crashes along SR 62. The I_{CF} is 2.00 while the I_{CC} is 1.75, suggesting the intersection is experiencing statistically high crash frequencies and severity. There were approximately 25 crashes at the intersection between 2014 and 2016. The crashes are predominantly rear-end with some turning movement crashes from the side road. Environmental concerns in the vicinity of the intersection include nearby environmental justice population areas and a potential historic structure in the southwest quadrant.

Figure 5.5 Middle Mount Vernon Road Location Map

The purpose of the improvement is to reduce the number of crashes within the intersection. Auxiliary right and left turn lanes exist for westbound SR 62. No auxiliary lanes exist for eastbound SR 62. Warning signs exist for the intersection. It is notable that 20% of the crashes are rear-ends in the eastbound direction, possibly due to turning vehicles slowing to make a turn. After initial analysis, several intersection options were determined to be feasible. The array of options included no build, add flashing beacons to the warning signs, add auxiliary lanes in the eastbound direction, and converting the intersection to a right-in/right-out. LOS results are not necessary for these options since they have minimal impact on the operations. For the right-in/right-out option, alternative access points exist at Schutte Road and Boehne Camp Road. **Table 5.5** shows the cost effectiveness of each alternative verses reduction in crashes.

Table 5.5 Middle Mount Vernon Road Recommendation Cost Effectiveness

Intersection Alternative	Crash Reduction %	Crash Cost Effectiveness $ / % Reduction
Add Flashing Beacons	Note 1	Note 1
Auxiliary Turn Lanes	27.0	$9,259
Right-in / Right-out	72.0	$2,778

1. A Crash Modification Factor cannot be found for advance warning signs at unsignalized intersections.

Following the cost effectiveness and crash reduction analysis, the flashing beacon is a short term recommendation and the right-in / right-out redesign is the long term recommendation.

SR 62 / Boehne Camp Road

The need for improvements at the intersection of SR 62 and Boehne Camp Road is evidenced by a high number of crashes along SR 62 as well as sub-standard LOS of the southbound movements. The crashes are predominantly daytime rear-ends along the mainline. The I_{CF} is 2.64 while I_{CC} is 1.95. The higher crash indexes are likely related to congestion. There were approximately 74 crashes at the intersection between 2014 and 2016. Approximately 88% of the crashes occurred along SR 62. Environmental concerns in the vicinity of the intersection include nearby environmental justice population areas and a potential leaking underground storage tank in the southwest quadrant.

Figure 5.6 Boehne Camp Road Location Map

The purpose of the improvement is to reduce the number of crashes within the intersection and improve the LOS. After initial analysis, four intersection options were determined to be feasible. These options include no build, dual-lane roundabout intersection, and offset left turn lanes. A final option would be to improve the warning signage indicating a signalized intersection ahead. This would include dual signs with flashers. **Table 5.6** shows the LOS results and crash modification factors for the alternatives.

Table 5.6 Boehne Camp Road Recommendation Analysis Results

Intersection Alternative	Intersection Leg	2017 Existing LOS AM Peak	2017 Existing LOS Delay (s)	2017 Existing LOS PM Peak	2017 Existing LOS Delay (s)	2045 Future LOS AM Peak	2045 Future LOS Delay (s)	2045 Future LOS PM Peak	2045 Future LOS Delay (s)	CMF*	Estimated Cost
Boehne Camp Road No Build	NB	B	17	C	26	C	30	D	36	0.00	$0
	SB	C	33	F	107	C	32	E	57		
	EB	B	17	B	18	B	14	C	25		
	WB	B	13	B	16	B	17	C	21		
	Total Intersection	**B**	**15**	**C**	**23**	**B**	**17**	**C**	**26**		
Boehne Camp Road Positive Offset Left Turns	NB					C	33	D	37	0.662[1]	$910,000
	SB					C	31	E	63		
	EB					B	14	C	14		
	WB					B	12	B	25		
	Total Intersection					**B**	**16**	**C**	**25**		
Boehne Camp Road Dual-Lane Roundabout	NB					A	5	A	7	0.659[2]	$3,000,000
	SB					A	6	A	6		
	EB					A	1	A	1		
	WB					A	1	A	1		
	Total Intersection					**A**	1	**A**	2		
Boehne Camp Road Warning Signs with Flashing Beacons	NB					C	30	D	36	0.64[3]	$75,000
	SB					C	32	E	57		
	EB					B	14	C	25		
	WB					B	17	C	21		
	Total Intersection					**B**	**17**	**C**	**26**		

*Crash Modification Factor from Federal Highway Administration Clearinghouse**

1. Improve Left-Turn Lane Offset to Create Positive Offset

2. Conversion of Intersection into High-Speed Roundabout

3. Install Flashing Beacons as Advance Warning

Table 5.7 shows the cost effectiveness of each alternative verses reduction in delay and reduction in crashes.

Table 5.7 Boehne Camp Road Recommendation Cost Effectiveness

Intersection Alternative	Avg. Delay 2045 (s)	Delay Reduction (s)	Delay Cost Effectiveness	Crash Reduction %	Crash Cost Effectiveness $ / % Reduction
Flashing Beacon	21.5	0.0	N/A	36.0	$2,083
Positive Offset Left Turn	20.5	1.0	$910,000/s	33.8	$26,923
Dual-Lane Roundabout	1.5	20.0	$150,000/s	34.1	$87,977

In addition to the disadvantages discussed earlier, the dual-lane roundabout alternative has a relatively high cost versus the reduction in crashes. Therefore, the flashing beacon is a short-term recommendation and the positive offset left-turn with flashing yellow arrows is the long-term recommendation.

SR 62 / Red Bank Road

The need for improvements at the intersection of SR 62 and Red Bank Road is evidenced by a high number of crashes along SR 62, as well as, sub-standard LOS of the southbound movement. The crashes are predominantly rear-ends, with a considerable amount of eastbound and westbound left-turn crashes. The I_{CF} is 2.30 while the I_{CC} is 3.33. The higher crash indexes are likely related to congestion. There were approximately 122 crashes at the intersection between 2014 and 2016; approximately 74% of the crashes occurred along SR 62. Environmental concerns in the vicinity of the intersection include nearby environmental justice population areas.

Figure 5.7 Red Bank Road Location Map

The purpose of the improvement is to reduce the number of crashes within the intersection and improve the LOS. After initial analysis, several intersection options were determined to be feasible. These options include no build, flashing warning signals, dual-lane roundabout intersection, and left-turn lane reconfiguration. The left turn reconfiguration would help to provide more defined channelization, additional storage length, and clear delineation of the receiving lanes on the minor road as well as permit permissive left turns, which would improve the overall signal operation. **Table 5.8.** shows the LOS results and crash modification factors for the alternatives.

Table 5.8 Red Bank Road Recommendation Analysis Results

Intersection Alternative	Intersection Leg	2017 Existing LOS AM Peak	Delay (s)	PM Peak	Delay (s)	2045 Future LOS AM Peak	Delay (s)	PM Peak	Delay (s)	CMF*	Estimated Cost
Red Bank Road/No Build	NB	C	26	D	48	C	33	D	47	0.00	$0
	SB	D	40	E	68	D	41	E	70		
	EB	B	21	D	46	C	29	D	53		
	WB	C	20	D	45	C	26	D	49		
	Total Intersection	**C**	**28**	**D**	**49**	**C**	**29**	**D**	**52**		
Red Bank Road/Left-Turn Reconfiguration	NB					C	29	C	28	0.43 [1]	$45,000
	SB					D	42	E	59		
	EB					C	26	D	32		
	WB					C	22	C	36		
	Total Intersection					**C**	**26**	**D**	**43**		
Red Bank Road/Dual-Lane Roundabout	NB					E	39	C	16	0.659 [2]	$3,000,000
	SB					B	13	D	29		
	EB					A	17	B	181		
	WB					C	3	F	13		
	Total Intersection					**C**	**16**	**F**	**69**		
Red Bank Road/Flashing Warning Signals	NB					C	33	D	47	0.64 [3]	$75,000
	SB					D	41	E	70		
	EB					C	29	D	53		
	WB					C	26	D	49		
	Total Intersection					**C**	**29**	**D**	**52**		

*Crash Modification Factor from Federal Highway Administration Clearinghouse**
1. Painted Channelization of Both Major and Minor Roads
2. Conversion of Intersection into High-Speed Roundabout
3. Install Flashing Beacons as Advance Warning

Table 5.9 shows the cost effectiveness of each alternative verses reduction in delay and reduction in crashes.

Table 5.9 Red Bank Road Recommendation Cost Effectiveness

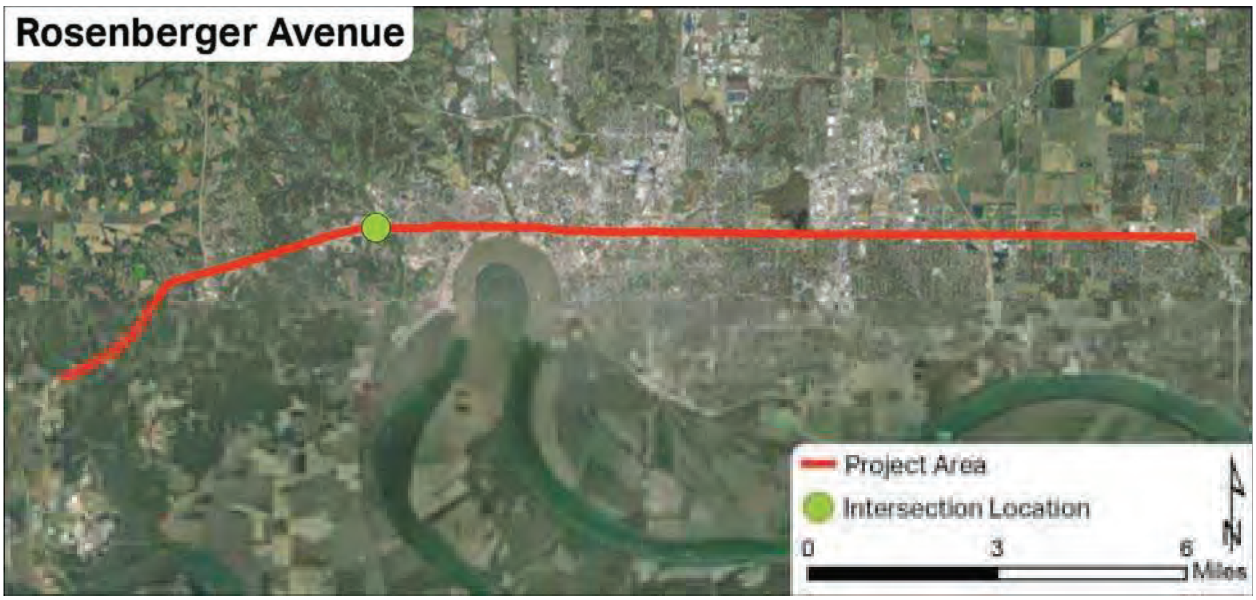
Intersection Alternative	Avg. Delay 2045 (s)	Delay Reduction (s)	Delay Cost Effectiveness	Crash Reduction %	Crash Cost Effectiveness $ / % Reduction
Flashing Beacon	40.5	0.0	N/A	36.0	$2,083
Left Turn Reconfiguration	34.5	6.0	$7,500/s	57.0	$789
Dual-Lane Roundabout	42.5	-2.0	-$1,500,000/s	34.1	$87,977

In addition to the disadvantages discussed earlier, the dual-lane roundabout alternative increased the delay. Therefore, the flashing beacon and the left turn reconfiguration are both short-term recommendations.

SR 62 / Rosenberger Avenue

The need for improvements at the intersection of SR 62 and Rosenberger Avenue is evidenced by a high number of crashes along SR 62, as well as sub-standard LOS of the southbound movements. The crashes are predominantly daytime rear-end crashes with more than two times the amount in the westbound direction. The westbound to southbound left-turn lane appears to be inadequate in length. The I_{CF} is 3.03 while the I_{CC} is 3.92. The higher crash indexes are likely related to congestion. There were approximately 121 crashes at the intersection between 2014 and 2016. Approximately 93% of the crashes occurred along SR 62. Environmental concerns in the vicinity of the intersection include nearby environmental justice population areas and a potential leaking underground storage tank in the northeast quadrant.

Figure 5.8 Rosenberger Avenue Location Map



The purpose of the improvement is to reduce the number of crashes within the intersection and improve the LOS. After initial analysis, several intersection options were determined to be feasible. These options include no build, dual-lane roundabout intersection, and left-turn lane reconfiguration. Lengthening the westbound left-turn lane would provide additional storage and decrease the likelihood of traffic queueing into the through lanes. **Table 5.10** shows the LOS results and crash modification factors for the alternatives.

Table 5.10 Rosenberger Avenue Recommendation Analysis Results

Intersection Alternative	Intersection Leg	2017 Existing LOS AM Peak	Delay (s)	PM Peak	Delay (s)	2045 Future LOS AM Peak	Delay (s)	PM Peak	Delay (s)	CMF*	Estimated Cost
Rosenberger Avenue No Build	NB	C	30	D	45	C	28	D	44	0.00	$0
	SB	D	41	E	63	D	45	E	67		
	EB	B	18	D	27	B	18	D	27		
	WB	B	17	C	45	B	17	C	41		
	Total Intersection	**C**	**21**	**D**	**36**	**B**	**21**	**D**	**38**		
Rosenberger Avenue Dual-Lane Roundabout	NB					F	92	F	83	0.659 [1]	$910,000
	SB					E	43	F	80		
	EB					A	12	F	14		
	WB					B	9	B	87		
	Total Intersection					**B**	**15**	**F**	**53**		
Rosenberger Avenue Positive Offset Left-Turns & Lengthened Westbound Left-Turn	NB					C	35	D	44	0.662 [2]	$3,000,000
	SB					D	47	D	54		
	EB					B	13	C	22		
	WB					B	13	C	21		
	Total Intersection					**B**	**18**	**C**	**28**		

** Crash Modification Factor from Federal Highway Administration Clearinghouse*
1. Conversion of Intersection into High-Speed Roundabout
2. Improve Left-Turn Lane Offset to Create Positive Offset

Table 5.11shows the cost effectiveness of each alternative verses reduction in delay and reduction in crashes.

Table 5.11 Rosenberger Avenue Recommendation Cost Effectiveness

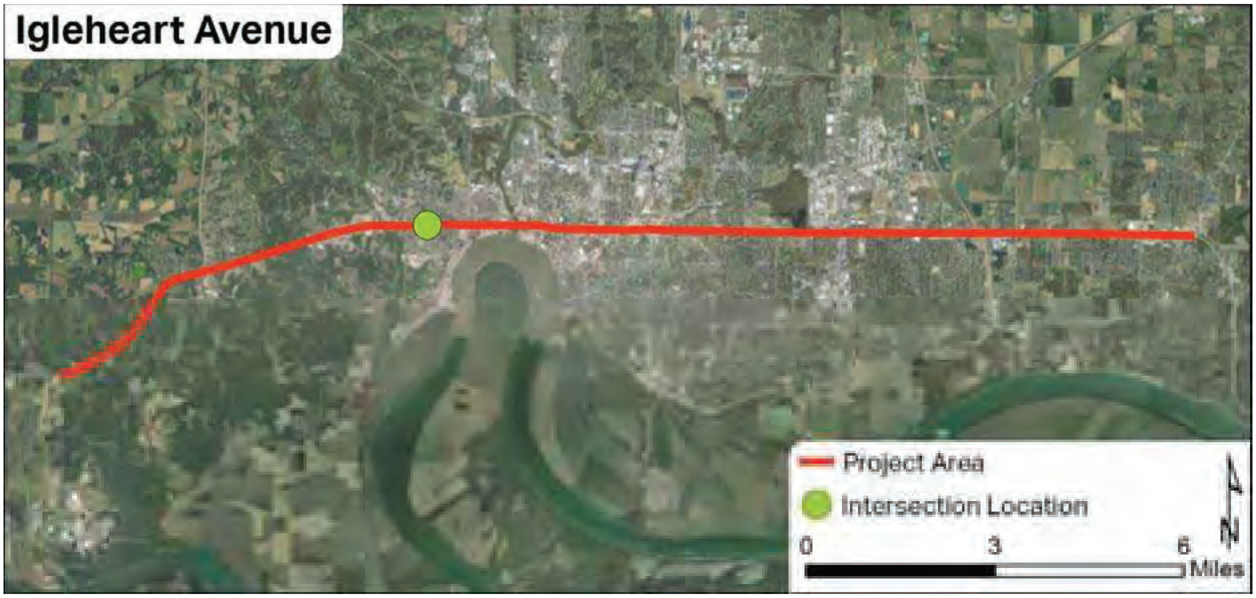
Intersection Alternative	Avg. Delay 2045 (s)	Delay Reduction (s)	Delay Cost Effectiveness	Crash Reduction %	Crash Cost Effectiveness $ / % Reduction
Positive Offset Left Turn	23.0	6.5	$140,000/s	33.8	$26,923
Dual-Lane Roundabout	34.0	-4.5	-$666,667/s	34.1	$87,977

The dual-lane roundabout alternative was eliminated due to increase in delay, which led to it being not cost effective. Therefore, the positive offset left-turn with flashing yellow left-turn arrows is the long-term recommendation. The recommended alternative should also consider the side path planned for Rosenberger Avenue in the Evansville Bicycle and Pedestrian Plan.

SR 62 / Igleheart Avenue Ramp

The need for improvements at the intersection of SR 62 and Igleheart Avenue is evidenced by the frequency and severity of the accidents at this location. The crashes were analyzed as an intersection due to the unique geometry of the ramp. The crashes at this ramp are uncharacteristically high. Sideswipes and out of control crashes are likely due to the ramp curvature or quick merging maneuver of right and left turning traffic. The I_{CF} is 3.59 while the I_{CC} is 1.76. Environmental concerns in the vicinity of the intersection include nearby environmental justice population areas and a potential historic structure in the northeast quadrant.

Figure 5.9 SR 62 / Igleheart Avenue Location Map



The purpose of the improvement is to reduce the frequency and severity of the crashes at the Igleheart Avenue ramp including sideswipes, rear-ends, and out of control crashes. After initial analysis, several intersection options were determined to be feasible. These options include creating a dedicated left-turn lane from the ramp onto Igleheart Avenue. In addition, channelizing the left and right turns at Igleheart Avenue would likely decrease sideswipe crashes. Lastly, some additional acceleration lane length would be provided for vehicles leaving Igleheart Avenue and entering onto westbound SR 66. A low-cost option for adding additional exit and warning signage along SR 62 was investigated and may mitigate some crashes at the Igleheart Ramp location. **Table 5.12** shows the LOS results and crash modification factors for the alternatives.

Table 5.12 Igleheart Avenue Ramp Recommendation Analysis Results

Intersection Alternative	Intersection Leg	2017 Existing LOS AM Peak	Delay (s)	PM Peak	Delay (s)	2045 Future LOS AM Peak	Delay (s)	PM Peak	Delay (s)	CMF*	Estimated Cost
Ingleheart Avenue No Build	NB	N/A		N/A		A		A		0.00	$0
	SB	N/A		N/A		N/A		N/A			
	WB	N/A		N/A		A		A			
	EB	A		A		A		A			
	Total Intersection	**A**		**A**		**A**		**A**			
Ingleheart Avenue Introduce Raised Median and Auxiliary Turn Channelization	NB	N/A		N/A		A		A		0.75 [1]	$1,240,000
	SB	N/A		N/A		N/A		N/A			
	WB	N/A		N/A		A		A			
	EB	A		A		A		A			
	Total Intersection	**A**		**A**		**A**		**A**			
Ingleheart Avenue Additional Guide & Warning Signs	NB	N/A		N/A		A		A		0.592 [2]	$25,000
	SB	N/A		N/A		N/A		N/A			
	WB	N/A		N/A		A		A			
	EB	A		A		A		A			
	Total Intersection	**A**		**A**		**A**		**A**			

** Crash Modification Factor from Federal Highway Administration Clearinghouse*

1. Introduce Raised Curb Left-Turn Channelization

2. Install Chevron Signs and Curve Warning Signs

Note: Delay was not modeled because crash reduction was the focus of the improvements.

Table 5.13 shows the cost effectiveness of each alternative verses reduction in delay and reduction in crashes.

Table 5.13 Igleheart Avenue Ramp Recommendation Cost Effectiveness

Intersection Alternative	Crash Reduction %	Crash Cost Effectiveness $ / % Reduction
Raised Median / Auxiliary Turn Channelization	25.0	$49,600
Additional Guide / Warning Signs	40.8	$613

Therefore, the additional guide and warning signs is a short-term recommendation and the raised median and auxiliary turn lane channelization is a long term recommendation.

SR 62 / St. Joseph Avenue

The need for improvements at the intersection of SR 62 and St. Joseph Avenue is evidenced by the frequency and severity of the crashes at this location. The I_{CF} is 1.64 while the I_{CC} is 1.11. The purpose of the improvement is to reduce the frequency and severity of the crashes at the St. Joseph Avenue. Environmental concerns in the vicinity of the intersection include a potential historic structure in the southwest quadrant and a potential leaking underground storage tank in the northwest quadrant.

Figure 5.10 St. Joseph Avenue Location Map

The surrounding land use limits the types of improvements that can reasonably be constructed at the intersection. One alternative seemed appropriate: correction of the southbound approach to the intersection. The approach currently has two through lanes and two left-turn lanes. The southbound through movement is very minor. However, the approach has awkward lane shifts due to the presence of two through lanes. Therefore, it is proposed to change the intersection to have one southbound through lane. **Table 5.14** shows the LOS results and crash modification factors for the alternatives.

Table 5.14 St. Joseph Avenue Recommendation Analysis Results

Intersection Alternative	Intersection Leg	2017 Existing LOS AM Peak	Delay (s)	PM Peak	Delay (s)	2045 Future LOS AM Peak	Delay (s)	PM Peak	Delay (s)	CMF*	Estimated Cost
St. Joseph Avenue No Build	NB	D	41	E	57	D	48	D	49	0.00	$0
	SB	E	68	E	80	E	59	E	79		
	EB	D	38	D	39	D	36	C	33		
	WB	D	28	C	26	C	31	C	25		
	Total Intersection	**D**	**38**	**D**	**37**	**D**	**39**	**C**	**34**		
St. Joseph Avenue Southbound Approach Improvements	NB					C	33	D	55	0.80 [1]	$910,000
	SB					E	48	E	79		
	EB					D	12	C	35		
	WB					C	14	C	26		
	Total Intersection					**C**	**35**	**C**	**29**		

** Crash Modification Factor from Federal Highway Administration Clearinghouse*
1. Painted Channelization of Left Turn Lane

Table 5.15 shows the cost effectiveness of each alternative verses reduction in delay and reduction in crashes.

Table 5.15 St. Joseph Avenue Recommendation Cost Effectiveness

Intersection Alternative	Avg. Delay 2045 (s)	Delay Reduction (s)	Delay Cost Effectiveness	Crash Reduction %	Crash Cost Effectiveness $ / % Reduction
Southbound Approach Improvements	32.0	4.5	$202,222/s	20.0	$45,500

The recommendation is considered a low priority due to the limited effectiveness of the alternative. The recommended alternative should also consider the cycle path planned for St. Joseph Avenue in the Evansville Bicycle and Pedestrian Plan.

SR 62 / Wabash Avenue

The need for improvements at the intersection of SR 62 and Wabash Avenue is evidenced by a high number of crashes along SR 62. The I_{CF} is 3.50 while the I_{CC} is 3.17. Higher crash indexes are likely related to congestion. There were approximately 76 crashes at the intersection between 2014 and 2016. Crashes are predominantly rear-end with a considerable amount of eastbound and westbound left turn crashes. Approximately 84% of the crashes occurred along SR 62. Based on the turning movements for the intersection, the mainline left turn lanes are inadequate in length. The red flag analysis revealed no known environmental concerns near the intersection.

Figure 5.11 Wabash Avenue Location Map

The purpose of the improvement is to reduce the number of crashes within the intersection. After initial analysis, a feasible option to correct the intersection would include lengthening of the mainline left turn lanes and closure of several driveways that are in close proximity of the intersection. Conversion of the existing 5-section signal heads to flashing yellow left-turn arrows is also a recommendation. **Table 5.16** shows the LOS results and crash modification factors for the alternatives.

Table 5.16 Wabash Avenue Recommendation Analysis Results

Intersection Alternative	Intersection Leg	2017 Existing LOS AM Peak	Delay (s)	PM Peak	Delay (s)	2045 Future LOS AM Peak	Delay (s)	PM Peak	Delay (s)	CMF*	Project Cost
Wabash Avenue No Build	NB	C	27	D	43	D	38	D	45	0.00	$0
	SB	D	41	D	42	D	37	D	38		
	WB	A	8	B	11	A	9	B	10		
	EB	A	7	B	13	A	10	A	17		
	Total Intersection	**A**	**9**	**B**	**14**	**B**	**11**	**B**	**16**		
Wabash Avenue Lengthened Left-Turns and Driveway Closure	NB					C	33	C	33	0.748 [1]	$240,000
	SB					D	48	E	59		
	WB					B	12	B	9		
	EB					B	14	A	13		
	Total Intersection					**B**	**15**	**B**	**13**		

** Crash Modification Factor from Federal Highway Administration Clearinghouse*
1. Install Left Turn Lane

Table 5.17 shows the cost effectiveness of each alternative verses reduction in delay and reduction in crashes.

Table 5.17 Wabash Avenue Recommendation Cost Effectiveness

Intersection Alternative	Avg. Delay 2045 (s)	Delay Reduction (s)	Delay Cost Effectiveness	Crash Reduction %	Crash Cost Effectiveness $ / % Reduction
Southbound Approach Improvements	14.0	-0.5	-$480,000/s	25.2	$9,524

The recommendation is considered a low priority due to the limited effectiveness of the alternative.

SR 66 / Vann Avenue

The need for improvements at the intersection of SR 66 and Vann Avenue is evidenced by a high number of crashes along SR 66. The crashes are predominantly rear-end with more than two times the amount in the eastbound direction. The I_{CF} is 2.76 while the I_{CC} is 4.44. Higher crash indexes are likely related to congestion. There were approximately 166 crashes at the intersection between 2014 and 2016. Approximately 94% of the crashes occurred along SR 66. The red flag analysis revealed no known environmental concerns near the intersection.

Figure 5.12 Vann Avenue Location Map

The purpose of the improvement is to reduce the number of crashes within the intersection. Displaced left turns and a partial bow tie are viable alternatives to reduce crashes at this location. Both options would eliminate left turning movements from the mainline. The partial bow tie would require motorists to make a right turn and pass through a roundabout instead of making left turns from the mainline. A right-in / right-out intersection would eliminate the signal completely, allowing motorists better visibility of the first signal. **Table 5.18** shows the LOS results and crash modification factors for the alternatives.

Table 5.18 Vann Avenue Recommendation Analysis Results

Intersection Alternative	Intersection Leg	2017 Existing LOS				2045 Future LOS				CMF*	Estimated Cost
		AM Peak	Delay (s)	PM Peak	Delay (s)	AM Peak	Delay (s)	PM Peak	Delay (s)		
Vann Avenue No Build	NB	D	38	D	39	D	35	D	47	0.00	$0
	SB	C	34	D	50	D	37	D	50		
	EB	B	18	B	37	B	24	B	32		
	WB	B	18	D	19	C	19	C	15		
	Total Intersection	**B**	**18**	**C**	**30**	**B**	**22**	**C**	**26**		
Vann Avenue Displaced Left-Turns	NB					C	32	C	33	0.76 [1]	$1,200,000
	SB					C	35	D	44		
	EB					B	28	A	30		
	WB					C	19	C	6		
	Total Intersection					**C**	**34**	**C**	**22**		
Vann Avenue Bow-Tie Intersection	NB					C	28	C	30	0.64 [2]	$1,000,000
	SB					B	18	B	14		
	EB					A	9	B	15		
	WB					B	15	B	12		
	Total Intersection					**B**	**13**	**B**	**14**		
Vann Avenue Right-in/Right-out	NB									0.28 [3]	$120,000
	SB										
	EB										
	WB										
	Total Intersection										

** Crash Modification Factor from Federal Highway Administration Clearinghouse*
1. FHWA-HRT-09-060 Alternative Intersections/Interchanges: Informational Report (AIIR)
2. Install Single Lane Roundabout
2. Prohibit Left Turns

Table 5.19 shows the cost effectiveness of each alternative verses reduction in delay and reduction in crashes.

Table 5.19 Vann Avenue Recommendation Cost Effectiveness

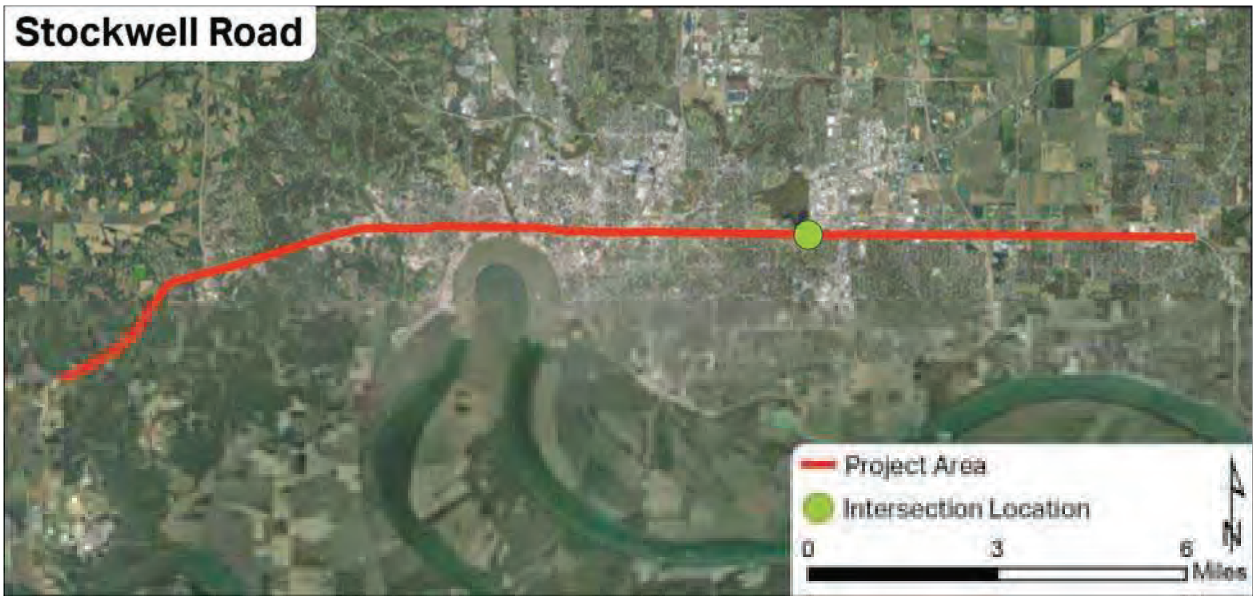
Intersection Alternative	Avg. Delay 2045 (s)	Delay Reduction (s)	Delay Cost Effectiveness	Crash Reduction %	Crash Cost Effectiveness $ / % Reduction
Displaced Left Turn	28.0	-4.0	-$300,000/s	33.8	$35,503
Partial Bow-Tie Intersection	13.5	10.5	$95,238/s	34.1	$29,326
Right-in / Right-out	N/A	N/A	N/A	72.0	$1,667

TransCAD modeling for the right-in / right-out recommendation revealed the re-routed left turn traffic did not overload surrounding streets. Due to the low cost and effectiveness in addressing the issues at the intersection, the right-in/right-out alternative is recommended. Ideally, this improvement would be implemented coincidental with improvements proposed at Stockwell Road in order to provide enhanced U-turn opportunities to offset the loss of direct left-turn access from Vann Avenue.

SR 66 / Stockwell Road

The need for improvements at the intersection of SR 66 and Stockwell Road is evidenced by a high number of crashes along SR 66. For all movements except northbound, the crashes are predominantly rear-end. The northbound leg has a small number of crashes of various types. The I_{CF} is 2.11 while the I_{CC} is 3.52. Higher crash indexes are likely related to congestion. There were approximately 112 crashes at the intersection between 2014 and 2016. Approximately 83% of the crashes occurred along SR 66. Environmental concerns in the vicinity of the intersection include the Evansville State Hospital Historic District south of the intersection and a potential leaking underground storage tank in the northeast quadrant of Stockwell Road and Division Street.

Figure 5.13 Stockwell Road Location Map



The purpose of the improvement is to reduce the number of crashes within the intersection. Construction of a bow tie intersection is a viable alternative to reduce crashes at this location. The bow tie intersection would require motorists to make a right turn and pass through a roundabout instead of making left turns from the mainline. Displaced left-turn lanes is also a viable alternative that would essentially eliminate the left turn movement from the SR 66 traffic signal phasing as well as increase storage. **Table 5.20** shows the LOS results and crash modification factors for the alternatives.

Table 5.20 Stockwell Road Recommendation Analysis Results

Intersection Alternative	Intersection Leg	2017 Existing LOS AM Peak	Delay (s)	PM Peak	Delay (s)	2045 Future LOS AM Peak	Delay (s)	PM Peak	Delay (s)	CMF*	Estimated Cost
Stockwell Road No Build	NB	D	44	D	53	E	58	E	71	0.00	$0
	SB	C	28	C	26	C	34	D	37		
	EB	C	27	D	39	C	31	D	38		
	WB	C	32	D	39	C	25	D	38		
	Total Intersection	**C**	**30**	**D**	**38**	**C**	**35**	**D**	**38**		
Stockwell Road Bow-Tie Intersection	NB					C	23	B	14	0.64 [1]	$1,900,000
	SB					B	12	B	11		
	EB					B	16	D	46		
	WB					C	25	D	45		
	Total Intersection					**C**	**21**	**C**	**35**		
Stockwell Road Displaced Left-Turns	NB					D	47	D	51	0.76 [2]	$3,100,000
	SB					C	31	C	28		
	EB					B	16	C	28		
	WB					C	32	C	33		
	Total Intersection					**C**	**26**	**C**	**31**		

** Crash Modification Factor from Federal Highway Administration Clearinghouse*
1. Install Single Lane Roundabout
2. FHWA-HRT-09-060 Alternative Intersections/Interchanges: Informational Report (AIIR)

Table 5.21 shows the cost effectiveness of each alternative verses reduction in delay and reduction in crashes.

Table 5.21 Stockwell Road Recommendation Cost Effectiveness

Intersection Alternative	Avg. Delay 2045 (s)	Delay Reduction (s)	Delay Cost Effectiveness	Crash Reduction %	Crash Cost Effectiveness $ / % Reduction
Bow-Tie Intersection	28.0	8.5	$223,529/s	36.0	$52,778
Displaced Left Turn	28.5	8.0	$387,500/s	36.0	$86,111

Despite the fact that the bow-tie intersection alternative is more cost-effective than the displaced left-turn alternative, there is concern about the ability to design and construct the bow-tie intersection given the restrictive geometry at each roundabout. There is also concern about acquiring right-of-way from the State Hospital. Therefore, the DLT is the recommended alternative. As mentioned previously, this improvement should be implemented concurrently with improvements proposed at Vann Avenue in order to provide enhanced U-turn opportunities to offset the loss of direct left-turn access from Vann Avenue. The recommended alternative should also consider the side path planned for Stockwell Road in the Evansville Bicycle and Pedestrian Plan.

WB SR 66 Exit Ramp / Green River Road

The need for improvements at the intersection of SR 66 and Green River Road is evidenced by a high number of crashes on the westbound exit ramp from SR 66. The ramp is experiencing an extremely high volume of rear-end crashes. The I_{CF} is 2.00 while the I_{CC} is 2.89. It appears a majority of the westbound rear-end crashes are caused by a yield condition before entering onto Green River Road. Traffic is forced to yield and merge into a through lane. There were approximately 201 crashes at the intersection between 2014 and 2016. Approximately 51% of the crashes occurred along the westbound exit ramp from SR 66 onto Green River Road. The red flag analysis revealed no known environmental concerns near the intersection.

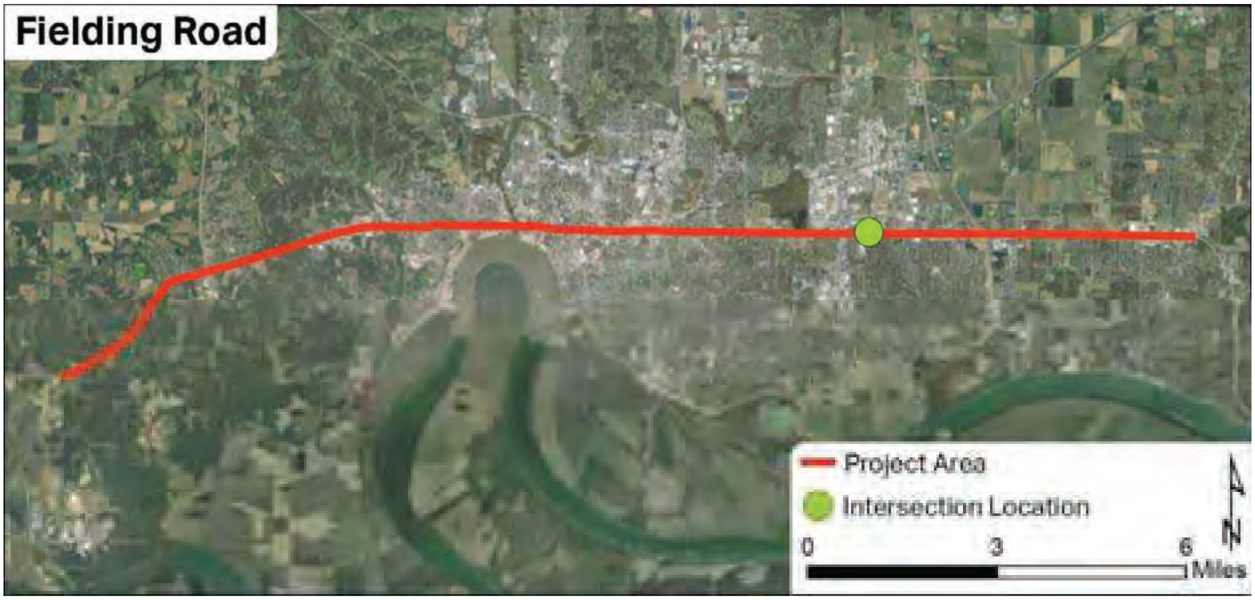
Figure 5.14 Green River Road Location Map

The purpose of the improvement is to reduce the number of crashes within the intersection. After initial analysis, two alternatives were determined to be feasible. First, the right-turn yield condition could be added into the single point traffic signal. Second, the yield condition could be removed by allowing a free-flowing right turn into the receiving lane. The signage and island would need revised in both cases. The TransCAD modeling revealed that the free-flowing right turn required too much weaving in short distance since this lane also serves as a right turn lane north of the ramp. Therefore, the recommended alternative is to include the right turn from the ramp into the traffic signal.

SR 66 / Fielding Road

The need for improvements at the intersection of SR 66 and Fielding Road is evidenced by a high number of crashes along SR 66. The I_{CF} is 2.55 while the I_{CC} is 2.19, suggesting the intersection is experiencing statistically high crash frequencies and severity. There were approximately 81 crashes at the intersection between 2014 and 2016. The crashes are predominantly rear-end crashes along the SR 66. Environmental concerns in the vicinity of the intersection include school property in the southwest quadrant.

Figure 5.15 Fielding Road Location Map



The purpose of the improvement is to reduce the number of crashes within the intersection. Auxiliary right and left turn lanes exist for both directions of SR 66. There are no identified sight distance problems for the signal. The signals already have back-plates. After initial analysis, intersection options included no build, add signal warning signs with flashing beacons and near-side signals, and converting the intersection to a right-in/right-out. However, the right-in/right-out option was rejected due to the presence of William Henry Harrison High School in the southwest quadrant. Therefore, the flashing beacon/near-side signal is a short term recommendation to reduce crashes. The intersection should be monitored to see if the crashes are effectively reduced after installation.

SR 66 / Brentwood Drive

The recommendation at Brentwood Drive is to make the eastbound signal heads compliant with Manual of Uniform Traffic Control Devices (MUTCD) standards by replacing the 3-section heads with single green arrows. This recommendation is in accordance with Section 4M of the Indiana MUTCD. Conversion of the existing 5-section signal head to a flashing yellow left-turn arrow is also a recommendation.

Figure 5.16 Brentwood Drive Location Map

SR 66 / Burkhardt Road

The need for improvements at the intersection of SR 66 and Burkhardt Road is evidenced by a high number of crashes along SR 66, as well as, sub-standard LOS of the northbound and southbound movements. The crashes at this location are predominantly rear-end. The I_{CF} is 1.87 while the I_{CC} is 2.90. Higher crash indexes are likely related to congestion. There were approximately 153 crashes at the intersection between 2014 and 2016. Approximately 65% of the crashes occurred along the SR 66 mainline. The red flag analysis revealed no known environmental concerns near the intersection.

Figure 5.17 Burkhardt Road Location Map

The purpose of the improvement is to reduce the number of crashes within the intersection and improve the LOS. Two feasible alternatives to reduce crashes are construction of boulevard lefts or displaced left-turn lanes. The addition of boulevard lefts would add left-turn storage length to SR 66. In addition, the left-turn phase at the traffic signal would be eliminated which would likely ease congestion. The displaced left turn option would have a similar effect. Left-turn storage would increase while the signal phasing would be modified to essentially eliminate the left turn movement from SR 66. **Table 5.22** shows the LOS results and crash modification factors for the alternatives.

Table 5.22 Burkhardt Road Recommendation Analysis Results

Intersection Alternative	Intersection Leg	2017 Existing LOS AM Peak	Delay (s)	PM Peak	Delay (s)	2045 Future LOS AM Peak	Delay (s)	PM Peak	Delay (s)	CMF*	Estimated Cost
Burkhardt Road No Build	NB	D	53	F	130	F	174	F	134	0.00	$0
	SB	F	129	F	119	F	196	F	115		
	EB	C	25	C	32	C	26	C	23		
	WB	B	18	D	39	C	22	D	41		
	Total Intersection	**D**	**50**	**E**	**57**	**E**	**59**	**E**	**55**		
Burkhardt Road Displaced Left-Turns	NB					F	50	E	79	0.76 [1]	$3,300,000
	SB					E	58	D	66		
	EB					A	30	A	27		
	WB					A	18	A	37		
	Total Intersection					**B**	**31**	**C**	**44**		
Burkhardt Road Boulevard Left	NB					D	88	E	60	0.49 [2]	$3,600,000
	SB					E	53	E	44		
	EB					C	6	C	8		
	WB					B	2	D	4		
	Total Intersection					**C**	**18**	**D**	**20**		

** Crash Modification Factor from Federal Highway Administration Clearinghouse*
1. FHWA-HRT-09-060 Alternative Intersections/Interchanges: Informational Report (AIIR)
2. Create Directional Median Openings to Allow Left-Turns and U-Turns

Table 5.23 shows the cost effectiveness of each alternative verses reduction in delay and reduction in crashes.

Table 5.23 Burkhardt Road Recommendation Cost Effectiveness

Intersection Alternative	Avg. Delay 2045 (s)	Delay Reduction (s)	Delay Cost Effectiveness	Crash Reduction %	Crash Cost Effectiveness $ / % Reduction
Displaced Left Turn	37.5	19.5	$169,231/s	36.0	$91,667
Boulevard Left	19.0	38.0	$94,737/s	24.0	$150,000

Although the boulevard left intersection alternative is more cost-effective than the displaced left-turn alternative, there is concern that the concept would have less public acceptance than the displaced left-turn alternative. Therefore, the DLT is the recommended alternative. The recommended alternative should also consider the side path planned for Burkhardt Road in the Evansville and Vanderburgh County Bicycle and Pedestrian Plan.

SR 66 / Cross Pointe Boulevard

The need for improvements at the intersection of SR 66 and Cross Pointe Boulevard is evidenced by a high number of crashes along SR 66, as well as, sub-standard intersection LOS. The crashes at this location are predominantly rear-end along SR 66. The I_{CF} is 2.37 while the I_{CC} is 3.05. Higher crash indexes are likely related to congestion. There were approximately 130 crashes at the intersection between 2014 and 2016. Approximately 90% of the crashes occurred along the SR 66 mainline. The intersection is located approximately 1,500 feet west of the exit ramp from southbound I-69, which results in a less than desirable weaving situation for vehicles exiting the interstate and wishing to turn left onto southbound Cross Pointe. Environmental concerns in the vicinity of the intersection include open water in the northwest quadrant, nearby environmental justice population areas and potential wetlands on the south side of the roadway.

Figure 5.18 Cross Pointe Boulevard Location Map

The purpose of the improvement is to reduce the number of crashes within the intersection and improve the LOS. Feasible alternatives to reduce crashes are construction of boulevard lefts, displaced left-turn lanes, or the placement of westbound dual left-turn lanes. After the first stakeholder meeting, the DLT alternative was replaced with a hybrid DLT / boulevard left with the southbound left turn following a boulevard left movement to provide additional weaving distance from I-69. All alternates would add left-turn storage length to SR 66. The left-turn phase at the traffic signal would be eliminated with the construction of boulevard lefts or displaced left-turn lanes which would likely ease congestion. **Table 5.24** shows the LOS results and crash modification factors for the alternatives.

Table 5.24 Cross Pointe Boulevard Recommendation Analysis Results

Intersection Alternative	Intersection Leg	2017 Existing LOS AM Peak	Delay (s)	PM Peak	Delay (s)	2045 Future LOS AM Peak	Delay (s)	PM Peak	Delay (s)	CMF*	Estimated Cost
Cross Pointe Blvd. No Build	NB	D	37	D	38	D	41	D	37	0.00	$0
	SB	D	37	E	62	D	41	E	70		
	EB	C	25	D	40	C	35	F	30		
	WB	D	51	F	83	F	81	F	174		
	Total Intersection	**D**	**41**	**E**	**59**	**E**	**59**	**C**	**91**		
Cross Pointe Blvd. Hybrid Boulevard Lt / DLT	NB					C	23	C	27	0.76 [1]	$3,100,000
	SB					C	26	B	14		
	EB					A	5	A	5		
	WB					A	4	A	6		
	Total Intersection					**A**	**9**	**A**	**9**		
Cross Pointe Blvd. Boulevard Left	NB					D	47	D	45	0.49 [2]	$2,750,000
	SB					D	37	E	79		
	EB					D	40	A	8		
	WB					B	16	B	17		
	Total Intersection					**C**	**28**	**C**	**20**		
Cross Pointe Blvd. WB Dual Left-Turn Lanes	NB					D	50	D	39	0.748 [3]	$900,000
	SB					D	49	F	92		
	EB					D	24	C	31		
	WB					C	44	D	40		
	Total Intersection					**D**	**39**	**D**	**43**		

** Crash Modification Factor from Federal Highway Administration Clearinghouse*
1. FHWA-HRT-09-060 Alternative Intersections/Interchanges: Informational Report (AIIR)
2. Create Directional Median Openings to Allow Left-Turns and U-Turns
3. Install Left-Turn Lane

Table 5.25 shows the cost-effectiveness of each alternative verses reduction in delay and reduction in crashes.

Table 5.25 Cross Pointe Boulevard Recommendation Cost Effectiveness

Intersection Alternative	Avg. Delay 2045 (s)	Delay Reduction (s)	Delay Cost Effectiveness	Crash Reduction %	Crash Cost Effectiveness $ / % Reduction
Hybrid Boulevard Lt / DLT	9.0	66.0	$46,970/s	24.0	$129,167
Boulevard Left	24.0	51.0	$53,922/s	51.0	$53,922
WB Dual Left Turn Lanes	41.0	34.0	$26,471/s	25.2	$35,714

Although the westbound dual left-turn lanes alternative is more cost-effective than the hybrid boulevard left / DLT, the dual left-turn lanes did not resolve all LOS problems in the future. In addition, the crash analysis indicated mostly rear-end crashes on the mainline. Additionally, the hybrid boulevard left / DLT option moves the westbound left turn movement further from the I-69 interchange, which requires less weaving to make the left turn. Therefore, the hybrid boulevard left / DLT is the recommended alternative. The recommended alternative should also consider the side path planned for Cross Pointe in the Evansville Bicycle and Pedestrian Plan.

SR 66 / Epworth Road

The need for improvements at the intersection of SR 66 and Epworth Road is evidenced by a high number of crashes along SR 66. The crashes are predominantly rear-end with a considerable amount of eastbound and westbound left turn crashes. The I_{CF} is 2.89 while the I_{CC} is 3.31. Higher crash indexes are likely related to congestion. There were approximately 141 crashes at the intersection between 2014 and 2016. Approximately 76% of the crashes occurred along SR 66. The intersection is located approximately 1,500 feet east of the exit ramp from northbound I-69, which results in a less than desirable weaving situation for vehicles exiting the interstate and wishing to turn left onto northbound Epworth. Environmental concerns in the vicinity of the intersection include open water in the southwest quadrant, a former mine site east of the intersection, nearby environmental justice population areas and potential wetlands on the south side of the roadway.

Figure 5.19 Epworth Road Location Map

The purpose of the improvement is to reduce the number of crashes within the intersection. Displaced left turns and a bow tie intersection are viable alternatives to reduce crashes at this location. Both options would eliminate left turning movements from the mainline. The bow tie intersection would require motorists to make a right turn and pass through a roundabout instead of making left turns from the mainline. **Table 5.26** shows the LOS results and crash modification factors for the alternatives.

Table 5.26 Epworth Road Recommendation Analysis Results

Intersection Alternative	Intersection Leg	2017 Existing LOS AM Peak	Delay (s)	PM Peak	Delay (s)	2045 Future LOS AM Peak	Delay (s)	PM Peak	Delay (s)	CMF*	Estimated Cost
Epworth Road No Build	NB	D	43	D	41	D	50	D	42	0.00	$0
	SB	C	26	C	24	C	32	C	34		
	EB	B	17	C	22	C	21	C	27		
	WB	C	34	C	31	F	85	C	23		
	Total Intersection	**C**	**28**	**C**	**26**	**E**	**56**	**C**	**27**		
Epworth Road Hybrid Boulevard Lt / DLT	NB					D	43	C	32	0.76 [1]	$3,000,000
	SB					D	38	D	55		
	EB					A	5	A	4		
	WB					A	9	A	8		
	Total Intersection					**B**	**13**	**B**	**12**		
Epworth Road Bow-Tie	NB					C	49	C	41	0.64 [2]	$2,400,000
	SB					C	46	C	37		
	EB					B	25	D	30		
	WB					C	43	C	23		
	Total Intersection					**C**	**35**	**C**	**29**		

** Crash Modification Factor from Federal Highway Administration Clearinghouse*
1. FHWA-HRT-09-060 Alternative Intersections/Interchanges: Informational Report (AIIR)
2. Install Single Lane Roundabout

Table 5.27 shows the cost effectiveness of each alternative verses reduction in delay and reduction in crashes.

Table 5.27 Epworth Road Recommendation Cost Effectiveness

Intersection Alternative	Avg. Delay 2045 (s)	Delay Reduction (s)	Delay Cost Effectiveness	Crash Reduction %	Crash Cost Effectiveness $ / % Reduction
Hybrid Boulevard lt / DLT	12.5	29.0	$103,448/s	24.0	$125,000
Bow-Tie	32.0	9.5	$252,632/s	36.0	$66,667

The hybrid boulevard left / DLT is much more effective at reducing congestion on the mainline where the majority of crashes occur and also improves the weaving conditions between I-69 and the intersection. Therefore, the hybrid boulevard left / DLT is the recommended alternative. Ideally, improvements at Epworth would coincide with the implementation of improvements proposed at Grimm Road.

SR 66 / Grimm Road

Grimm Road is currently an unsignalized intersection with the minor roads stop controlled. The I_{CF} is 0.15 while the I_{CC} is 0.38, which indicates the intersection is statistically average from a safety perspective. Environmental concerns in the vicinity of the intersection include potential wetlands on the south side of the roadway.

Figure 5.20 Grimm Road Location Map

Stakeholder feedback throughout the study suggested a traffic signal was desired at the intersection. The *Manual on Uniform Traffic Control Devices* (MUTCD, 2009 Edition) states, "The investigation of the need for a traffic control signal shall include an analysis of factors related to the existing operation and safety at the study location and the potential to improve these conditions." This analysis includes evaluating factors within the following nine signal warrants:

- Warrant 1, Eight-Hour Vehicular Volume
- Warrant 2, Four-Hour Vehicular Volume
- Warrant 3, Peak Hour
- Warrant 4, Pedestrian Volume
- Warrant 5, School Crossing
- Warrant 6, Coordinated Signal System
- Warrant 7, Crash Experience
- Warrant 8, Roadway Network
- Warrant 9, Intersection Near a Grade Crossing

Satisfying one or more warrants does not require the installation of a traffic signal but rather provides justification for its installation. Traffic turning movement counts at the intersection demonstrate it does not satisfy signal warrants. Based on Title 9, Article 21, Chapter 3 of the 2016 Indiana Code (IC 9-21-3-2), the installation of a traffic signal at the intersection of SR 62/66 and Grimm Road cannot be justified based on current traffic or the predicted future traffic.

While a significant amount of development is underway or anticipated within the vicinity of the Grimm Road intersection, an additional traffic signal along the Lloyd Expressway is not deemed necessary to meet access needs. Given the high growth rate in traffic demand forecast along SR 66 in this area and the low traffic volumes currently utilizing Grimm Road, more effort should be placed on better utilizing existing access. For example, Warrick Trail is currently an underutilized facility paralleling the Lloyd to the north and serves as a backage road for current and proposed development and provides access at the west end to the signalized SR 66 intersection with Epworth and at the east end the SR 66 intersection with Frame / Libbert Road. Lincoln Avenue provides similar access to the south, and additional connections on the south side of the study corridor should be implemented with future planned developments. As current turning movement counts at Grimm Road do not satisfy traffic signal warrants and turning movements (particularly left turns) are problematic and result in lengthy delays, a right-in / right-out intersection is recommended. This modification should be considered for implementation at the same time as improvements are constructed at Epworth Road, allowing for enhanced U-turn opportunities to the west. In addition, U-turns are legal at the Frame / Libbert Road intersection to the east, so right turns from Grimm Road followed by downstream U-turns can provide a safer alternative to unsignalized left turns from Grimm.

SR 66 / Country Place Drive

The need for improvements at the intersection of SR 66 and Country Place Drive is evidenced by a high number of crashes along SR 66. The I_{CF} is 1.08 while the I_{CC} is 1.61, suggesting the intersection is experiencing statistically high crash frequencies and severity. There were approximately 17 crashes at the intersection between 2014 and 2016. The crashes have no discernible pattern to them. There are no identified environmental concerns in the vicinity of the intersection.

Figure 5.21 Country Place Drive Location Map

The purpose of the improvement is to reduce the number of crashes within the intersection. Auxiliary right and left turn lanes already exist for SR 66 at the intersection. Warning signs do not exist for the intersection. After initial analysis, the array of options included no build, add advance warning signs, and converting the intersection to a right-in/right-out. LOS results are not necessary for these options since they have minimal impact on the operations. For the right-in/right-out option, alternative access points exist at Epworth Road and Libbert/Frame Road. **Table 5.28** shows the cost effectiveness of each alternative verses reduction in crashes.

Table 5.28 Country Place Drive Recommendation Cost Effectiveness

Intersection Alternative	Crash Reduction %	Crash Cost Effectiveness $ / % Reduction
Advance Warning Signs	Note 1	Note 1
Right-in / Right-out	72.0	$2,778

2. A Crash Modification Factor cannot be found for advance warning signs at unsignalized intersections.

After an analysis of the previously discussed alternatives, the short-term recommendation is to install advance warning signs and monitor the effectiveness. The right-in / right-out redesign is the long term recommendation.

SR 66 / Bell Road

The need for improvements at the intersection of SR 66 and Bell Road is evidenced by a high number of crashes along SR 66. The I_{CF} is 1.60 while the I_{CC} is 2.60, suggesting the intersection is experiencing statistically high crash frequencies and severity. There were approximately 94 crashes at the intersection between 2014 and 2016. The crashes are predominantly rear-end crashes along the SR 66 with a considerable amount of rear-end crashes at the northbound approach. Environmental concerns in the vicinity of the intersection include potential stream in the northwest and southwest quadrants, potential leaking underground storage tank in the southwest quadrant and potential environmental justice area in the southeast quandrant.

Figure 5.22 Bell Road Location Map

The purpose of the improvement is to reduce the number of crashes within the intersection. Auxiliary right and left turn lanes exist for all directions. There are no identified sight distance problems for the signal. The signals already have back-plates. There are no identified operations problems at the intersection. After initial analysis, intersection options included no build and adding signal warning signs with flashing beacons and near-side signals. Therefore, the flashing beacon/near-side signal is a short term recommendation to reduce crashes. The intersection should be monitored to see if the crashes are effectively reduced after installation.

6. Next Steps

The Lloyd Expressway Study resulted in several improvement alternatives recommended for future implementation. These improvement concepts focus on areas with existing safety concerns and other transportation deficiencies identified by the Project Team. The nature and likely causes of problems identified over the course of the study were examined through field reconnaissance, and improvement alternatives were developed to address the identified problems. This study focused on short-term improvements (concepts that can be quickly and effectively implemented and that address current mobility and safety issues) and long-term improvements (concepts requiring more significant resources to implement or concepts that address future mobility issues). Improving safety throughout the corridor, by providing greater visibility for left-turn vehicles, additional warning signage, providing pedestrian signals and a crosswalk at signalized intersections, eliminating weave movements, and alternative intersection design will improve both vehicular and pedestrian safety.

The next steps will be deliberating the recommended alternatives at each intersection in the future state-wide call for projects. The alternatives will be scored against all other project submitted in the call with the highest scoring projects receiving funding.

Categorical Exclusion

Appendix L

SR 62 Corridor Traffic Analysis Report

Lloyd Expressway (SR 62) Corridor Traffic Analysis

From Rosenberger Avenue to Wabash Avenue

Vanderburgh County/City of Evansville, Indiana

Des Nos: 1900308, 1900263, 1900264, 2000187

June 2021

Prepared For:

Prepared By:

6200 Vogel Road

Evansville, IN 47715

Project Number: 119-0072

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NOTE: The appendices have been removed to reduce file size.

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Executive Summary

The purpose of this study is to develop and evaluate long-term traffic flow and safety improvement alternatives along the west end of the Lloyd Expressway corridor (SR 62) in Evansville, Indiana. Currently, motorists experience significant queueing, delays, and congestion during commuter peak hours resulting in driver dissatisfaction and discomfort. Several locations in the corridor also experience a higher than expected frequency of crashes. This study identifies a single preferred alternative for each intersection and interchange along the corridor with the objective of improving traffic operations and safety along the west end of the corridor.

The study area limits include all intersections, right-in-right-out drives, and interchange ramps along SR 62 extending from Wabash Avenue to Rosenberger Avenue. The intersection of Ray Becker Parkway and Ohio Street is included in the analysis due to its close proximity to the SR 62 and St. Joseph Avenue intersection.

Traffic conditions are evaluated during the morning and afternoon commuter peak periods on a weekday. These periods represent peak times for traffic in the study area. If traffic can be accommodated at these times, it stands to reason that adequate capacity would be available the remainder of the day, as well as on the weekends.

Potential roadway and traffic improvements along the corridor were evaluated with the overarching objective of improving safety for motorists traveling along the Lloyd Expressway. The emphasis on safety was driven primarily by funding constraints that eliminated the ability to simultaneously address the major traffic operational issues. The previously completed corridor study budgeted approximately $2.185 million dollars towards professional engineering, right-of-way acquisition, utility relocation, and construction costs for improvements throughout the entire study area. This study is tasked with remaining within the previously budgeted funds, but has the ability to redistribute funds within the corridor to maximize safety and operational improvements. In May 2021 additional analysis was requested to analyze the feasibility of a quadrant road intersection at SR 62 and St. Joseph Avenue. Recommendations by location along the corridor are as follows:

SR 62 and Rosenberger Avenue

- Leave the mainline left turns as a protected ONLY phase, and prohibit right-turns-on-red from all approaches. Install right turn overlaps on all approaches to offset capacity reductions due to the right-turn-on-red restrictions.
- Extend the westbound left turn lane through the SR 62 bridge east of Rosenberger Avenue. This will allow for additional queue storage and vehicles to decelerate from free flow traffic speeds within the turn bay as opposed to decelerating in the through travel lanes.
- Extend the southbound right turn bay as far as possible to accommodate the slightly increased queue lengths.

Ingle Avenue/Corbierre Avenue

- Close the existing Corbierre Avenue westbound exit ramp along SR 62, and construct a new ramp to the west of Ingle Avenue.
- Change Corbierre Avenue from a one-way street to a two-way street east of Ingle Avenue.

- Close the Ingle Avenue right-in-right-out access points on the north and south side of SR 62.
- Create a continuous third auxiliary lane between the Corbierre Avenue westbound exit ramp and the Igleheart Avenue westbound entrance ramp.

Barker Avenue Interchange

- Close the Igleheart Avenue westbound exit loop ramp.
- Drop the third westbound through lane along SR 62 as an exit-only lane at the eastern Barker Avenue exit ramp.
- Reconfigured the east approach of the Barker Avenue and Igleheart Avenue/WB SR 62 exit ramp to allow for a single dedicated left turn lane, and a shared thru/right turn lane opposite Igleheart Avenue.

SR 62 and St. Joseph Avenue

- Install a northwest quadrant road by converting N Lemcke Avenue and W Indiana Street bordering the INDOT owned parking lot in the northwest quadrant of the intersection into an intersection quadrant roadway. The newly created quadrant road intersections on St. Joseph Avenue and SR 62 would be signalized.
- Access to St. Joseph Avenue from West Indiana Street, east of St. Joseph Avenue, would now be restricted to allow the quadrant road intersection with St. Joseph Avenue to function as a more efficient three-legged intersection.
- Access to the quadrant road from N Lemcke Avenue or N Bell Avenue to the north would not be allowed. The only access points onto the quadrant road would serve the INDOT parking lot which it encloses.
- The new signalized quadrant road sub-intersection to the north of SR 62 along St. Joseph Avenue would have a dedicated southbound right turn lane, a shared left/right eastbound turn lane, and two northbound and southbound thru lanes. Northbound left turns would not be allowed. With the northbound left turn restricted, the southbound right turn movement can be free-flow from the southbound right turn lane.
- In order to optimize lane storage, it is recommended the easternmost southbound through lane feed directly into the easternmost dual left turn lane at the intersection of SR 62 and St. Joseph Avenue. This would leave the western most southbound lane at the north quadrant road sub-intersection to feed the westernmost dual left turn lane and through movements at the intersection with SR 62 to the south. Sufficient signage would be required to direct motorists to the correct lane.
- The new signalized quadrant road sub-intersection to the west of St. Joseph Avenue along SR 62 would have a single dedicated eastbound left turn lane with only southbound right turns allowed from the quadrant roadway. Westbound right turns from SR 62 onto the quadrant road would also be allowed to provide access to the INDOT parking lot. The eastbound left turn movement would operate under protected phasing only, and run concurrently with a southbound right-turn overlap to maximize intersection efficiency. The eastbound through movement at the new quadrant road sub-

intersection to the west of St. Joseph Avenue along SR 62 would operate under free-flow conditions at all times.

- The western sub-intersection along SR 62 should be located upstream of the Pennsylvania Street on-ramp so as to minimize conflicts with eastbound vehicles entering SR 62.
- Care should be taken to ensure that westbound traffic signal heads at the western sub-intersection are visible to motorists under the re-constructed pedestrian bridge connecting the INDOT parking lot to the south side of SR 62.

SR 62 and Wabash Avenue

- Restrict mainline left turns to protected only left turn signal phasing. All signal timing plans must allow sufficient green time for the westbound left turn phase such that the maximum queue does not extend further than 200 feet.
- Clearly stripe the northbound and southbound approaches to clearly indicate one left turn lane, one through lane, and one right turn lane. Install northbound and southbound protected plus permissive left turn phases along with right turn signal overlap phases.
- Close the Pennsylvania Street access within the southeast quadrant of the intersection.

Other Improvements

- Implement a signal coordination plan along the SR 62 corridor which includes the intersections of SR 62 and Rosenberger Avenue, St. Joseph Avenue, and Wabash Avenue.
- Cross-coordinate the intersection of St. Joseph Avenue/Ray Becker Parkway and Ohio Street with St. Joseph and SR 62.
- Install a protected + permissive southbound left turn at the intersection of St. Joseph Avenue/Ray Becker Parkway and Ohio Street.
- Do nothing to the Pennsylvania Street and South Lemcke Avenue/SR 62 eastbound entrance ramp, and leave as it is configured today.
- North Lemcke Avenue will be converted into the signalized west quadrant road sub-intersection along SR 62 as part of the St. Joseph Avenue improvements.
- Close the 10th Avenue and 12th Avenue right-in, right-out access points, and all private business access drives onto SR 62 between St. Joseph Avenue and Wabash Avenue.

INTRODUCTION

Purpose

The purpose of this study is to develop and evaluate long-term traffic flow and safety improvement alternatives along the west end of the Lloyd Expressway corridor (SR 62) in Evansville, Indiana. Currently, motorists experience significant queueing, delays, and congestion during commuter peak hours resulting in driver dissatisfaction and discomfort. Several locations in the corridor also experience a higher than expected frequency of crashes. This study identifies a single preferred alternative for each intersection and interchange along the corridor with the objective of improving traffic operations and safety along the west end of the corridor.

Study Overview

The study area limits include all intersections, right-in-right-out drives, and interchange ramps along SR 62 extending from Wabash Avenue to Rosenberger Avenue. The intersection of Ray Becker Parkway and Ohio Street is included in the analysis due to its close proximity to the SR 62 and St. Joseph Avenue intersection. Due to the limited storage space along Rosenberger Avenue, University Drive to the north and commercial access drives to the south are also included in the analysis to properly capture queueing in the area. The study area map is illustrated in **Figure 1**.

Traffic conditions are evaluated during the morning and afternoon commuter peak periods on a weekday. These periods represent peak times for traffic in the study area. If traffic can be accommodated at these times, it stands to reason that adequate capacity would be available the remainder of the day, as well as on the weekends.

Figure 1: Study Area Map

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Background

Data Collection & Field Inventory

Traffic Data

Traffic counts were performed during the weekday morning (7:00 AM to 9:00 AM) and afternoon (4:00 PM to 6:00 PM) peak periods to quantify existing traffic volumes, including video-based turning movement counts at intersections and ramps of interest. All traffic counts were provided and/or collected by The Indiana Department of Transportation (INDOT) or the Metropolitan Planning Organization (MPO). From the data, the peak hours of traffic were determined to occur between 7:00 AM and 8:00 AM in the morning and from 4:15 PM to 5:15 PM during the afternoon.

MPO provided turning movement counts (collected in September 2020):

- SR 62 and St. Joseph Avenue (signalized)
- Ray Becker Parkway and Ohio Street (signalized)
- SR 62 and N Lemcke Avenue (unsignalized, right-in-right-out)
- Pennsylvania Street and S Lemcke Avenue (unsignalized, side-street stop)
- Barker Avenue and Igleheart Avenue/SR 62 WB exit ramp (unsignalized, side-street stop)
- Barker Avenue and Pennsylvania Street (unsignalized, side-street stop)
- Barker Avenue and SR 62 EB exit ramp (unsignalized, side-street stop)
- SR 62 and N Ingle Avenue (unsignalized, right-in-right-out)
- SR 62 and S Ingle Avenue (unsignalized, right-in-right-out)
- SR 62 and Rosenberger Avenue (signalized)
- Rosenberger Avenue and University Drive (unsignalized, side-street stop)
- Rosenberger Avenue and Commercial Access Drives (unsignalized, side-street stop)

INDOT provided turning movement counts:

- SR 62 and Wabash Avenue (signalized); Collected in August 2019
- SR 62 and St. Joseph Avenue (signalized); Collected in February 2019
- SR 62 and Igleheart Avenue WB entrance ramp (unsignalized, free-flow); Collected in August 2018

SR 62 and St. Joseph Avenue was included on both the MPO traffic volumes list as well as the INDOT provided list. This is because the pre COVID-19 turning movement count (provided by INDOT) was compared to the recently conducted turning movement count at SR 62 and St. Joseph Avenue to serve as a control in order to identify the influence of COVID-19 on the recent counts. The two sets of traffic counts were compared relative to total intersection traffic volume and individual turning movement volume. There were minimal differences when comparing the total intersection traffic volumes. As expected, there was much more variation when comparing individual turning movement volumes, with no discernable underlying pattern that could be directly attributed to COVID-19. Thus, it was determined that traffic volumes would not be directly adjusted for COVID-19 conditions. Rather, older traffic volume counts, which were conducted pre-COVID, would be utilized in place of 2020 traffic volume counts, where applicable.

Crash Data

Historical crash data for years 2016 through 2019 was obtained from INDOT for the entire corridor located within Vanderburgh County. The data specified crash characteristics such as number of crashes, crash severity (fatal, disabling injury, minor injury, property damage only), and type of crash (i.e., rear end, head-on).

Field Inventory

Detailed inventories of field conditions were performed to capture both physical and operational characteristics of the study area network. The physical inventory emphasized static features of the roadway and included items such as posted speed limits, number of travel lanes, lane designations at intersections, and traffic signal phasing (i.e. protected turn arrows versus permissive turning movements).

The operational inventory focused on traffic flows during the peak periods. Locations of congestion and traffic backups were identified and monitored to determine sources of constrained flows. Traffic speeds on ramps and at critical turning movements were noted. Lane changing behavior and lane utilization (the preference of drivers to use one lane over the other) were observed throughout the study area. Prevailing queue lengths at intersections were inventoried. Traffic signal operations were monitored to determine the quality of traffic progression along the SR 62 corridor and to identify locations where through traffic was consistently stopped. Maximum saturation flow rates were then field measured at various locations during the peak hours, and used to calibrate traffic flow rates in the simulation models.

Analysis Methodology

Traffic

The traffic analysis was based primarily upon a traffic simulation model developed using VISSIM 2021. VISSIM is a microsimulation tool that accurately replicates individual vehicles and their interactions within complex traffic streams, such as interchanges, freeways, and expressway corridors with signalized intersections. A robust amount of data and field observations were conducted to calibrate VISSIM to reproduce field conditions. In addition to VISSIM, a Synchro model of the study area was constructed for signal timing development and optimization, and to aid in volume balancing. HCS7, which uses methodologies based on the Highway Capacity Manual, 6^{th} Edition (HCM) published by the Transportation Research Board, was used to evaluate merge, diverge, and weaving operations as a supplement to the VISSIM model.

The traffic models evaluate conditions during the morning and afternoon peak hours and provide performance measures as outputs. The main performance measures evaluated for intersections were delay, average queue length, and maximum queue length, while the performance measure evaluated for merging/diverging/weaving areas of ramp segments was density (passenger cars per mile per lane) which is a useful indicator of traffic flow stability and the potential for congestion. The ramp segments were also graded using levels of service (LOS) in accordance with the HCM. The density criteria for freeways are summarized in **Table 1**. Levels of services (LOS), which range from LOS A (“free flow”) to LOS F (“oversaturated”), are measures of traffic flow that consider factors such as speed, delay, interruptions, safety, and driver comfort and convenience. LOS C, which is commonly used for design purposes, represents a segment with volumes utilizing approximately 70 to 80 percent of its capacity. However, LOS D is considered acceptable in urban and suburban settings.

Table 1: Freeway Level of Service Thresholds

Level of Service	Density	
	Basic Segment	Merge/Diverge/Weave Segment
A	0-11	0-10
B	> 11-18	>10-20
C	>18-26	>20-28
D	>26-35	>28-35
E	>35-45	>35
F	Over Capacity	Over Capacity

Density values expressed in passenger cars per mile per lane

Safety

The SR 62 corridor serves as one of the main thoroughfares for motorists to travel in the east and west directions across Evansville. Thus, the corridor experiences significant congestion during the morning and afternoon peak hours, which drives numerous safety issues. As stated previously, crash summary data was obtained from INDOT for years 2016 through 2019 for the safety analysis, which is the latest year of available data.

A safety analysis was performed for the corridor by implementing several methodologies. RoadHAT software was used for the initial analysis of the corridor. RoadHAT is a crash analysis tool that is compliant with the Highway Safety Manual methodology, and is calibrated for Indiana roadways. RoadHAT calculates an Index of Crash Frequency (ICF) and Index of Crash Cost (ICC) for each studied location or segment. The index values represent the number of standard deviations (+/-) away from the average for the corresponding facility type (intersection, segment, or ramp). If the location has an ICF or ICC value greater than 2, then the location may be considered a high crash or severe crash location. The higher the ICF value, the stronger the evidence for the location to classify as a high or severe crash location. Similarly, the higher the ICC value, the stronger the evidence that crashes at the location cost more than would otherwise be expected, due to the incidence of higher severity crashes. The ICF and ICC were calculated for intersections, and interchange segments along the SR 62 corridor.

For more detailed analysis, a crash dashboard was created to identify underlying patterns in crashes along SR 62 and its adjacent roadways. The dashboard was developed utilizing Tableau's data visualization software which enables a more detailed evaluation of crashes with respect to trends in crash type, crash severity, contributing circumstances, time-of-day occurrence, or lighting and surface conditions that would be indicative of a correctable safety issue.

Model Calibration

The traffic simulation model calibration process began with the development of a base model, which aims to replicate existing conditions. As previously noted, a robust data collection effort was required to support this effort, including roadway geometry, turning speeds, traffic signal timings, etc. The first step in base model development involved coding the roadway geometry (number of lanes and link lengths) with links and connectors using a recent aerial as a template. The base model extents are shown in **Figure 2**.

Once the network backbone was established, free-flow speed distributions were created. Reduced speed zones were also established for turning movements and locations in the network where the roadway geometry physically limits speeds below the free-flow speed or posted speed limits. The next steps addressed traffic control. Traffic signal timings obtained from INDOT were input into the simulation, with detectors coded where applicable. Stop-controlled movements received stop signs coded into the network. Locations where yielding or traffic control priority needed to be established (such as a right-turn-on-red) were coded with conflict areas or priority rules. Conflict areas are most commonly used unless further refinement of the gap times or yielding characteristics was necessary, in which case priority rules were deployed.

Traffic volumes were then represented in the VISSIM model as an origin-destination matrix estimated from turning movement counts. The matrix specifies the model's traffic patterns and the routes vehicles take to traverse the model network. Traffic entering the model network was coded using vehicle inputs. Vehicle inputs specify volumes and vehicle type compositions, which are grouped into passenger vehicles, trucks, light-goods, and buses. The origin-destination matrix was routed statically with routes traversing the entire network for optimum accuracy rather than simply intersection by intersection.

Since VISSIM starts with zero vehicles in the network, a warm-up period is needed to initiate the model with traffic prior to capturing data. The warm-up period is known as the seeding period and its length and volume characteristics were adjusted as part of the calibration process. Given the scale of the network, a 30-minute seeding period was used to establish background traffic before recording results.

Given the inherent stochastic nature of simulation (imposed by random seeds), multiple simulation runs using different seed numbers were required for each scenario and the reported model results were averaged across runs. Typically, 10 simulation runs are sufficient to obtain an appropriate level of confidence in the results.

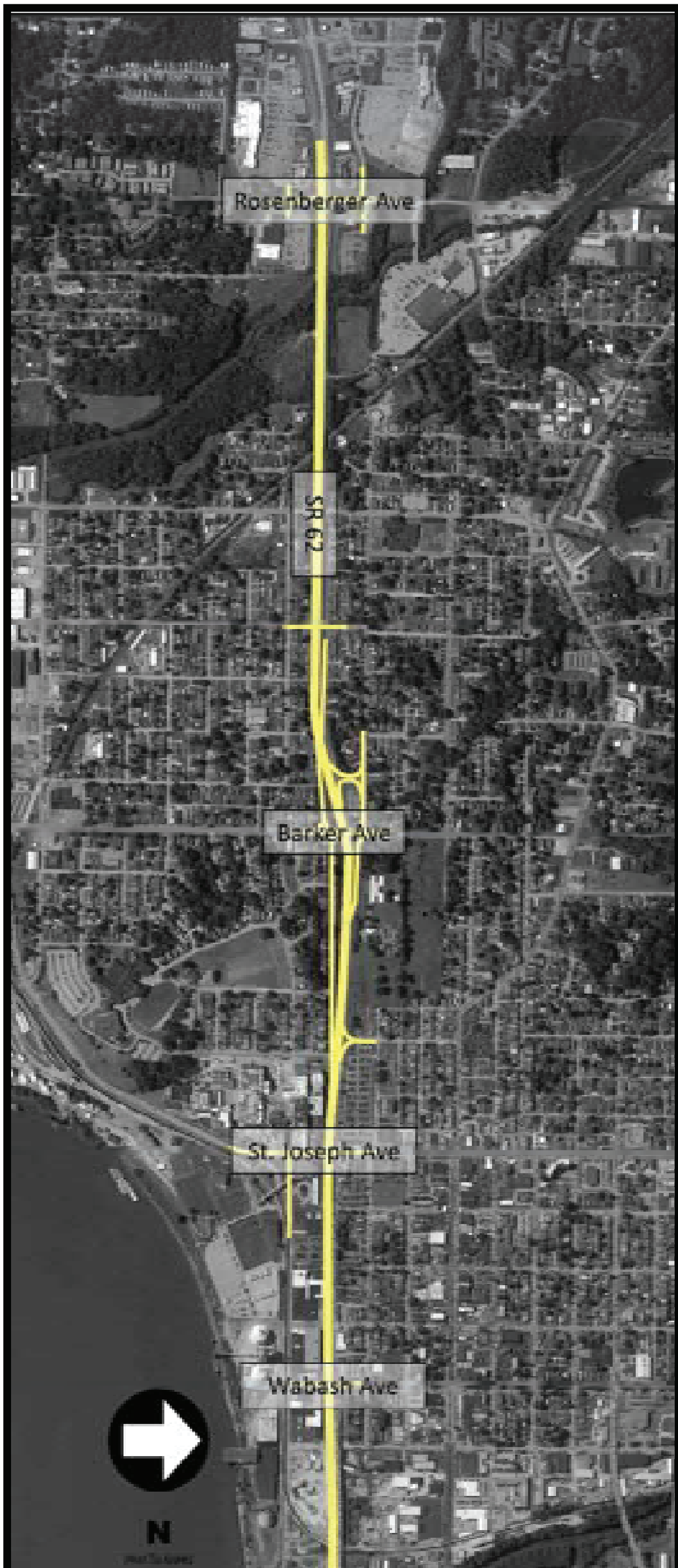

Figure 2. Base VISSIM Model Extents

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The model calibration process finished with a detailed review of model parameters and thorough consideration of adjustments to improve the model's ability to replicate field conditions. The final calibration process compared data output from the model, such as travel times and flow rates, to field measurements of the same attributes. Specific calibration measures undertaken as part of developing this model were as follows:

- A modified version of VISSIM's default "urban" link driver behavior type was employed to more realistically reflect driving behavior in the Evansville region;
- Further adjustments to the driving behavior along SR 62 were applied to reproduce saturation flow rates measured in the field. In particular, emphasis was placed on the SR 62 and Rosenberger Avenue intersection, since it runs a static signal timing plan during the morning and afternoon peak hours. The modified driving behaviors in VISSIM reproduced nearly the same number of vehicles along SR 62 flowing through the Rosenberger intersection in the eastbound and westbound directions, validating the calibration efforts. This technique is critical to replicate congestion and observed queue lengths at signalized intersections along SR 62.
- Lane change distances, which specify the position where vehicles begin to consider making a lane change in advanced of a downstream turn, were adjusted to reflect where vehicles actually change lanes based on field observations.

EXISTING CONDITIONS

Existing conditions were evaluated to quantify existing traffic flow and safety deficiencies.

Existing Traffic Analysis

Within the study area, SR 62 is a multi-lane divided highway with at-grade signalized intersections or grade separated overpasses at major cross streets. Average daily traffic (ADT) on SR 62 in the study area is approximately 42,000 vehicles per day. During the morning peak hour, volumes are slightly heavier in the eastbound direction. In the afternoon peak hour, the volumes are more evenly balanced along the corridor, although the westbound direction is slightly heavier. These patterns are consistent with the character of the corridor as a major commuter route. A summary of the existing traffic volumes and operating conditions throughout the corridor can be found in the Appendix. The analysis results pertaining to specific locations of interest are discussed in the following sections. All operating conditions tables convey Vissim simulation modeling results.

SR 62 at Rosenberger Avenue

The overall intersection performance is within an acceptable range of delay based on standard driver expectations for both the morning and afternoon peak hours, as are all intersection approaches. However, the eastbound and westbound left turning movements experience significant delays, particularly during the afternoon peak hour, as shown in **Table 2**.

The existing left turn signal phasing for these movements is protected only, meaning left turning vehicles are not allowed to make a permissive left turn across SR 62 during the eastbound and westbound through green phase, and must wait for a dedicated green arrow. Due to the heavy eastbound and westbound through volumes, most of the cycle time must be dedicated to the mainline, leaving minimal dedicated phase time for the side street or mainline left turn signal phasing. As a result, the eastbound and westbound left turns operate with high delays and experience queues that spill out of the left turn storage bays onto the mainline.

The eastbound and westbound left turn lanes are also frequently blocked by adjacent through lane queues, which is evident from the maximum queue results. The eastbound and westbound left turn movements report the same maximum queue as the adjacent through lanes, meaning that left turning vehicles are trapped at the back of the through lane queues.

Table 2: Existing Operating Conditions at SR 62 & Rosenberger Avenue (VISSIM)

Intersection / Approach	Weekday AM Peak Hour			Weekday PM Peak Hour		
	Vehicle Delay (sec)	Average Queue (ft)	Maximum Queue (ft)	Vehicle Delay (sec)	Average Queue (ft)	Maximum Queue (ft)
SR 62 and Rosenberger Ave (signalized)						
Overall Intersection	24.8			36.8		
Eastbound Left	62.5	109	547	125.0	269	1010
Eastbound Approach	22.6	109	547	34.2	270	1010
Westbound Left	63.4	160	919	103.0	568	1546
Westbound Approach	22.7	160	919	33.8	568	1546
Northbound Approach	32.8	29	146	42.9	58	252
Southbound Approach	35.5	62	266	52.5	110	344

Delay reported in seconds per vehicle

SR 62 Ramps at Corbierre/Igleheart/Barker Avenues

There are numerous ramps providing access to/from Corbierre, Igleheart, and Barker Avenues within the study area. Both SR 62 ramp terminals along Barker Avenue operate within minimal delay based on standard driver expectations for all approaches during both peak hours and maximum queues under 100 feet, as shown in **Table 3**. Operationally, the performance metrics appear to be satisfactory. However, the design of the Barker Avenue interchange is outdated.

There are two westbound exit ramps: the eastern exit ramp which only allows westbound right turns onto Barker Avenue; and the loop ramp that feeds to Igleheart Avenue prior to its junction with Barker Avenue. Field observations and traffic volume counts observed vehicles making prohibited left and through movements at the eastern exit ramp, which provides very restrictive sight distance of oncoming northbound traffic. The loop ramp has severe horizontal curvature with limited space for a vehicle to decelerate prior to exiting SR 62. The eastbound exit ramp forms an offset intersection with Pennsylvania Street and provides very limited sight distances for motorists.

The interchange ramp segments are depicted in **Figure 3**, with merge, diverge, and weaving operations described in **Table 4**. As shown, all merge, diverge, and weaving segments operate with LOS B or better during all peak hours, except for the Igleheart Avenue westbound entrance ramp merge, which operates with LOS C during the afternoon peak hour.

Table 3. Existing Operating Conditions at SR 62 & Barker Avenue Ramp Terminals (VISSIM)

Intersection / Approach	Weekday AM Peak Hour			Weekday PM Peak Hour		
	Vehicle Delay (sec)	Average Queue (ft)	Maximum Queue (ft)	Vehicle Delay (sec)	Average Queue (ft)	Maximum Queue (ft)
Barker and Igleheart Ave / SR 62 WB Off-Ramp (stop-controlled)						
Overall Intersection	1.68			1.8		
Eastbound Approach	6.8	4	74	6.3	3	61
Westbound Approach	6.2	1	67	6.2	2	76
Northbound Left	2.0	0	38	1.6	0	28
Barker and SR 62 EB Off-Ramp/Pennsylvania St (stop-controlled)						
Overall Intersection	1.3			1.6		
Eastbound Approach	4.1	1	61	8.3	3	97
Southbound Left	3.3	3	92	1.9	1	50

Delay reported in seconds per vehicle

Figure 3. Barker Interchange Ramp Segments

Table 4. Existing Merge, Diverge, and Weaving Segment Operating Conditions (HCS)

Merge, Diverge, Weaving Segment	LOS (Density in Ramp Influence Area in pc/mi/ln)	
	Weekday AM Peak Hour	Weekday PM Peak Hour
1. Igleheart Ave towards WB SR 62 Entrance MERGE	B (15.7)	C (22.3)
2. Pennsylvania Street to EB SR 62 Entrance MERGE	B (14.4)	B (14.1)
3. WB SR 62 to Barker Exit Ramp DIVERGE	B (12.7)	B (17.4)
4. WB SR 62 to Igleheart Exit Loop Ramp DIVERGE	B (12.0)	B (16.5)
5. WB SR 62 towards Corbierre Exit Ramp DIVERGE	B (12.0)	B (15.7)
6. EB SR 62 to Barker Exit Ramp DIVERGE	B (16.1)	B (18.6)
7. Igleheart WB entrance and Corbierre WB exit WEAVE	A (9.7)	B (14.9)

SR 62 at St. Joseph Avenue

The overall intersection performance is within an acceptable range of delay based on standard driver expectations for both the morning and afternoon peak hours. However, as shown in **Table 5**, the northbound and southbound intersection delay is near the acceptable limit based on standard driver expectations during one or both peak hours, indicating that these approaches are at capacity and cannot accommodate further traffic growth without improvements. The northbound and southbound left turning movements, which operate with even higher levels of delay in one or both of the peak hours, are driving the poor conditions experienced at each approach.

The eastbound and westbound left turning movements also operate with high levels of delay per vehicle during both peak hours, even though the overall eastbound and westbound approaches operate within an acceptable range of delay based on standard driver expectations. For each intersection approach, the left turn movements report the same maximum queue as the adjacent through lanes, meaning that left turning vehicles are trapped at the back of the through lanes queues and are blocked from left turn storage bays due to the magnitude of the through queues.

The northbound approach maximum queue extends over 330 feet during the morning peak hour, effectively blocking the Ohio Street signalized intersection to the south. The southbound approach maximum queue exceeds 450 feet in the morning peak hour, extending back through the Indiana Street intersection. The eastbound and westbound approach maximum queues exceed 740 and 960 feet during the morning and afternoon peak hours, respectively, extending past the 12th Avenue intersection to the east and the S Lemcke Avenue/Pennsylvania Street entrance ramp to the west. With high volumes of vehicle demand at each intersection approach, the existing configuration does not allow for the needs of one movement to be met without negatively impacting another, resulting in moderate to heavy delays on all approaches to the intersection.

Currently, the intersection of SR 62 and St. Joseph Avenue is an uncoordinated signal system, which runs free. When a traffic signal is running free, the arrival pattern of vehicles at the intersection, which drives progression along the SR 62 corridor, is independent from upstream or downstream signals. The intersection of SR 62 and Wabash Avenue is also uncoordinated and runs free. It is possible an arriving motorist may be stopped at both St. Joseph Avenue and Wabash when traveling east or west along SR 62.

Table 5. Existing Operating Conditions at SR 62 & St. Joseph Avenue (VISSIM)

Intersection / Approach	Weekday AM Peak Hour			Weekday PM Peak Hour		
	Vehicle Delay (sec)	Average Queue (ft)	Maximum Queue (ft)	Vehicle Delay (sec)	Average Queue (ft)	Maximum Queue (ft)
SR 62 and St. Joseph Ave (signalized)						
Overall Intersection	47.1			40.8		
Eastbound Left	110.3	251	742	117.9	274	711
Eastbound Approach	43.2	251	742	39.9	274	711
Westbound Left	79.4	135	571	77.1	221	967
Westbound Approach	36.5	135	571	32.7	221	967
Northbound Left	99.2	84	332	86.3	79	292
Northbound Approach	59.0	85	332	65.3	80	292
Southbound Left	95.5	177	455	71.5	120	442
Southbound Approach	66.4	177	455	53.1	120	442

Delay reported in seconds per vehicle

SR 62 at Wabash Avenue

As shown in **Table 6**, the overall intersection and all approaches operate within an acceptable range of delay based on standard driver expectations during both the morning and afternoon peak hours, with the exception of the southbound approach during the afternoon peak hour. The southbound approach delay is near the acceptable limit based on standard driver expectations during the afternoon peak hour, which is largely due to the high delay experienced by the southbound left turn movement. The northbound and southbound approaches operate under permissive phasing, meaning that a left turning motorists must yield to oncoming traffic. Due to the high volume of left turning vehicles coupled with an opposing high volume northbound right turning movement and an insufficient share of the overall cycle length to completely serve the movement, the maximum queue extends almost 400 feet and backs up through Indiana Street to the north.

As mentioned previously, the Wabash Avenue traffic signal is running free, similar to the St. Joseph Avenue intersection. The lack of a signal coordination system between these two intersections is a contributing factor to eastbound and westbound queueing along SR 62. Wabash Avenue is also the first signal eastbound motorists encounter along the corridor in over 4 miles, dictating an end of freeway traffic conditions.

Table 6. Existing Operating Condition at SR 62 & Wabash Avenue (VISSIM)

Intersection / Approach	Weekday AM Peak Hour			Weekday PM Peak Hour		
	Vehicle Delay (sec)	Average Queue (ft)	Maximum Queue (ft)	Vehicle Delay (sec)	Average Queue (ft)	Maximum Queue (ft)
SR 62 and Wabash Ave (signalized)						
Overall Intersection	16.8			21.6		
Eastbound Approach	18.5	134	872	21.2	128	841
Westbound Approach	10.9	39	312	16.9	99	586
Northbound Approach	25.2	25	222	23.5	24	218
Southbound Left	50.7	36	194	89.1	96	393
Southbound Approach	41.9	37	195	66.7	97	394

Delay reported in seconds per vehicle

Travel Time

Westbound travel times are greater than eastbound travel times in both peak hours, despite the commuter patterns of the corridor. The eastbound travel times are just over 3 minutes, while the westbound travel times approach 4 minutes for each peak period, as shown in **Table 7**. Travel times are strongly dependent on the number of stops or red lights that mainline traffic experiences at each intersection. Due to the lack of signal coordination, an eastbound or westbound motorist may have to stop at both St. Joseph Avenue and Wabash Avenue depending on side street traffic demand at that specific instance in time.

Table 7. Existing Travel Times (VISSIM)

Routes	Travel Time (sec)	
	AM Peak Hour	PM Peak Hour
EB SR 62 (Rosenberger Avenue to Wabash Avenue)	197	189
WB SR 62 (Wabash Avenue to Rosenberger Avenue)	210	239

Existing Safety Analysis

A safety analysis was completed for each major intersection throughout the study area, as well as the Barker Avenue interchange to quantify existing crash experiences. Existing conditions RoadHAT reports for each intersection and the Barker Avenue interchange can be found in the Appendix. In accordance with RoadHAT standards, a crash was attributed to an intersection if it occurred within the intersection area, or within 250 feet of the intersection along either adjacent roadway. Similarly, a crash was included in an interchange segment if it occurred within the roadway stretch whose safety is affected by the interchange or its ramps. Typically, an interchange segment includes the freeway portion between the outermost ramp terminals as well as 1,500-feet upstream and downstream of the interchange area. A heat map of crashes throughout the study area, shown in **Figure 4**, reveals a majority of crashes are occurring at major intersections or other access points along SR 62, and not along roadway segments.

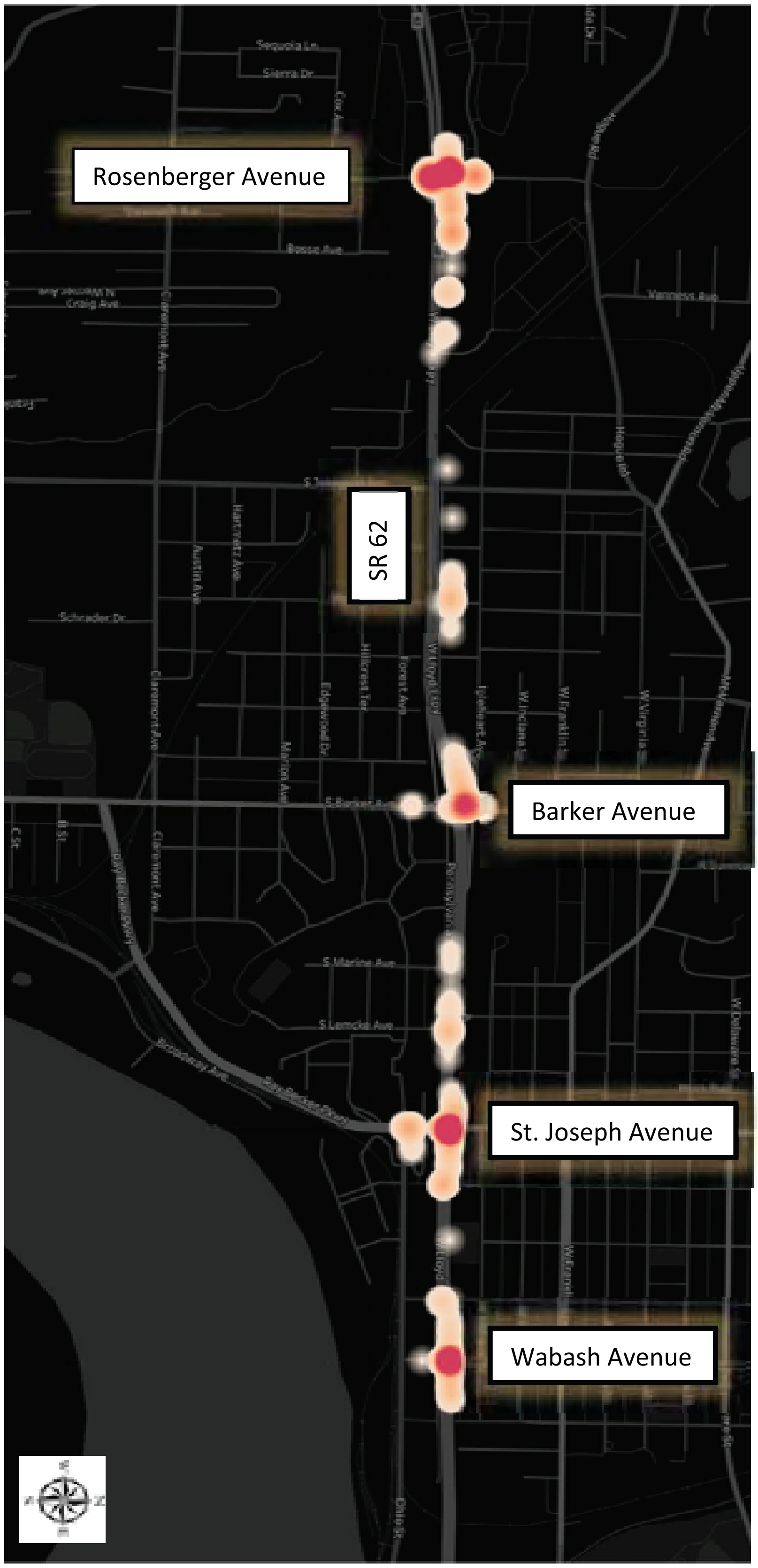

Figure 4. Study Area Crashes Heat Map

Rosenberger Avenue

Table 8 summarizes the severity of crashes at the intersection of SR 62 and Rosenberger Avenue from 2016 to 2019. Similarly, **Figure 5** shows the corresponding crash types over the same time period. The intersection has an ICF and ICC value of 5.72 and 4.47, respectively. These values are extremely high considering the RoadHAT threshold for when an intersection may be considered a high or severe crash location is any value over 2.

Most of the crashes are property damage only (PDO) rear-end crashes, although a fair amount of same direction sideswipe crashes also occur. Many times, a high number of rear end crashes can be attributed to general corridor congestion.

Other contributing circumstances may include the vertical curvature of SR 62 east of Rosenberger Avenue, which limits visibility of stopped traffic ahead for westbound traffic on SR 62. Also, westbound vehicles last encounter a signalized intersection over 1.5 miles prior to Rosenberger Avenue, so drivers may not be expecting to stop. In addition, the northbound and southbound intersection approaches contain steep upgrades, which reduce visibility and could hinder lines of sight for left turn vehicles yielding to opposing traffic and for right turning traffic yielding to east-west through traffic while making right-turns-on-red. These conditions could contribute to right turning vehicles being sideswiped or rear-ended by fast moving mainline traffic on SR 62.

Table 8. SR 62 and Rosenberger Avenue Crash Severity

Crash Type	Number of Crashes from 2016-2019
Fatal	1
Incapacitating	6
Non-Incapacitating	34
PDO	179
Grand Total	**220**

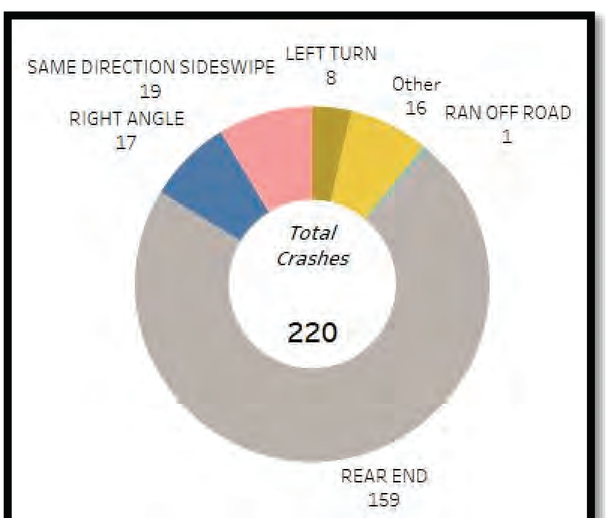

Figure 5. SR 62 and Rosenberger Avenue Crash Type

Corbierre/Igleheart/Barker Avenues

The crashes along SR 62 near the Corbierre, Igleheart, and Barker Avenues ramps were grouped together into one segment for the safety analysis due to their close proximity to and impacts upon one another. The segment also includes the Ingle Avenue right-in right-out access points to the west. Crashes occurring along the aforementioned segment can be seen in **Figure 6**. The segment has an ICF and ICC value of 1.95 and 2.20, respectively.

Figure 6. Corbierre/Igleheart/Barker Avenues Crash Map

Table 9 summarizes the severity of crashes occurring along the segment, while **Figure 7** summarizes the corresponding crash types. Most crashes are property damage only rear-end crashes. However, the number of same direction sideswipe and ran off the road crashes is not insignificant. The same direction sideswipe crashes may be attributed to the tight weaving conditions between the westbound Igleheart Avenue entrance ramp and the westbound Corbierre Avenue exit ramp. With approximately 300 feet between ramp gores, vehicles are not afforded distance to safely weave. The ran off the road crashes may be attributed to the westbound Igleheart Avenue exit loop ramp and the tight curvature on the ramp, particularly since no deceleration lane is provided on westbound SR 62. Figure 6 shows a cluster of crashes concentrated near the loop ramp, further supporting concerns with its geometry.

Table 9. Corbierre/Igleheart/Barker Avenues Segment Crash Severity

Crash Type	Number of Crashes from 2016-2019
Fatal	1
Incapacitating	3
Non-Incapacitating	12
PDO	67
Grand Total	**83**

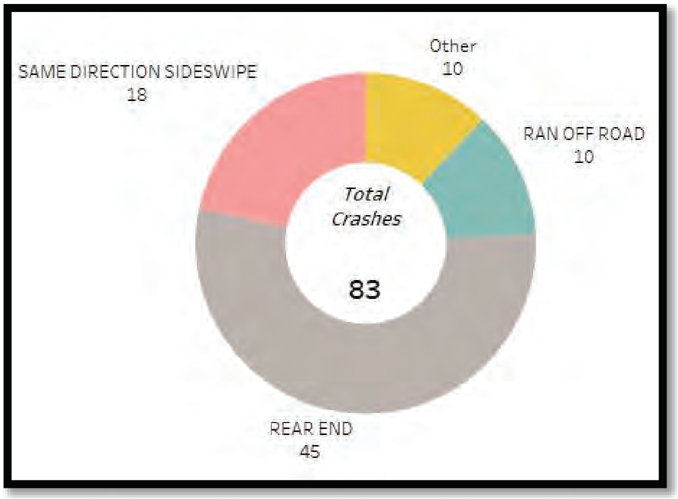

Figure 7. Corbierre/Igleheart/Barker Avenues Segment Crash Type

St. Joseph Avenue

SR 62 and St. Joseph Avenue has an ICF and ICC of 1.7 and 1.29, respectively. The ICF is approaching 2, which indicates this location is near the threshold for being considered a high or severe crash location, but the ICC indicates that the cost of crashes at this intersection may not be much higher than would otherwise be expected. This is further supported by **Table 10** and **Figure 8**, which indicate most crashes experienced at the intersection are property damage only rear end crashes.

Table 10. SR 62 and St. Joseph Avenue Crash Severity

Crash Type	Number of Crashes from 2016-2019
Incapacitating	2
Non-Incapacitating	17
PDO	130
Grand Total	**149**

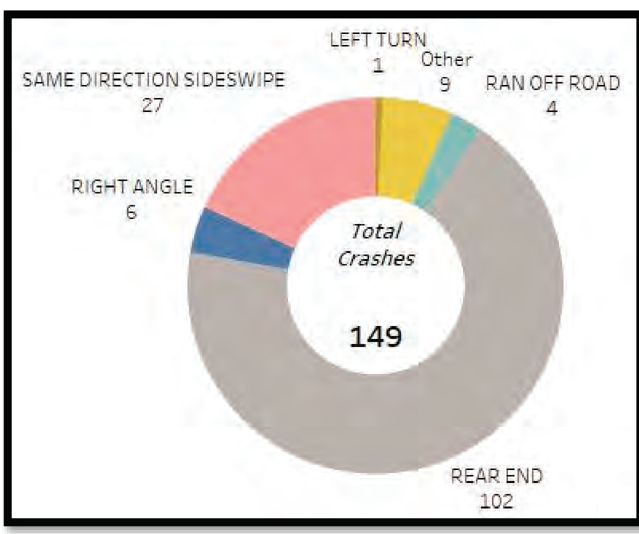

Figure 8. SR 62 and St. Joseph Avenue Crash Type

Wabash Avenue

SR 62 and Wabash Avenue has an ICF of 1.82 and an ICC of 1.82. Both indices are approaching 2, which indicates this location is near the threshold for being considered a high or severe crash location. **Table 11** and **Figure 9** show that most of the crashes at the intersection are property damage only rear-end crashes, which again is typical of intersections along congested corridors such as SR 62. The westbound approach of this intersection is descending from the vertical curvature of an elevated bridge section, making the intersection appear very quickly for arriving motorists traveling at high speeds. Additionally, Wabash Avenue is the first signalized intersection that westbound traffic encounters for over 4 miles.

However, Figure 9 also reveals a large number of right-angle crashes. These right-angle crashes are likely due to the protected + permissive left turn signal phasing in place for the eastbound and westbound left turn movements. Due to the heavy mainline traffic volumes, vehicles likely have trouble safely identifying appropriate gaps in the heavy SR 62 traffic flow and may accept shorter gaps in traffic to attempt their turn, resulting in right-angle collisions.

Table 11. SR 62 and Wabash Avenue Crash Severity

Crash Type	Number of Crashes from 2016-2019
Incapacitating	3
Non-Incapacitating	18
PDO	95
Grand Total	**116**

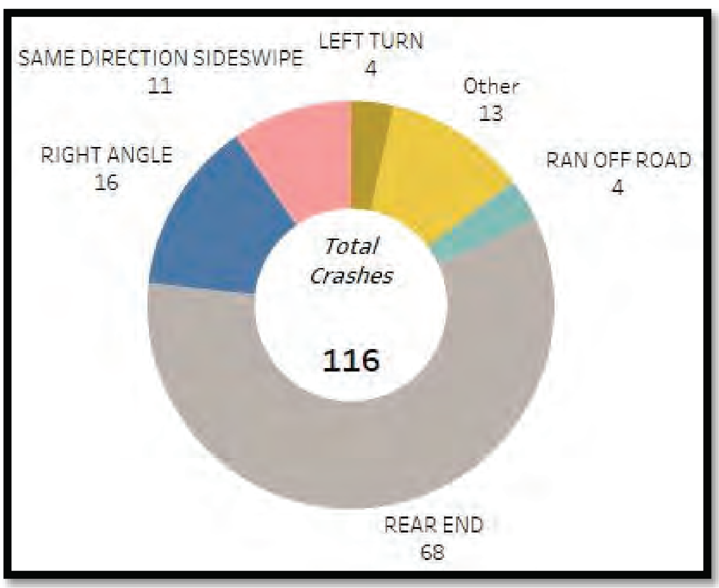

Figure 9. SR 62 and Wabash Avenue Crash Type

2040 NO-BUILD CONDITIONS

The 2040 no-build conditions were evaluated by applying forecasted traffic volumes to existing network conditions, thereby simulating future corridor conditions if no mitigations or improvements are implemented. The 2040 forecasted traffic volumes were calculated by growing the existing traffic volumes at a 0.5% annual growth rate as determined by INDOT and the MPO, and are summarized in the Appendix. A summary of the 2040 no-build operating conditions throughout the corridor can also be found in the Appendix. Utilizing the forecasted 2040 traffic volumes, traffic flow and safety deficiencies were analyzed along the corridor.

2040 No-Build Traffic Analysis

As stated previously, the SR 62 corridor is a major commuter route for motorists traveling in the east-west directions. The existing traffic analysis showed intersections, approaches, or turning movements that already function poorly or near capacity. Given the additional traffic growth in the 2040 No-Build scenario, traffic operations are expected to worsen along the corridor. **Table 12** summarizes the overall intersection delay for the morning and afternoon peak hours, which was analyzed using Vissim simulation modeling.

Despite the additional traffic growth, the morning peak hour appears to function fairly well based on the reported delays and queue lengths. During the afternoon peak hour, westbound traffic at the SR 62 and Rosenberger Avenue intersection extends back to the Barker Avenue interchange, as shown in **Figure 10**, and left turn queues at Rosenberger Avenue and St. Joseph Avenue capsize and spill out of the provided storage bays. However, the afternoon peak hour actually performs much worse than shown in Table 12. VISSIM assigns delays and congestion to intersections for vehicles within certain speed and distance thresholds. Furthermore, the acceleration and deceleration of vehicles within rolling queues are sometimes outside of VISSIM's reporting thresholds for queuing. Therefore, Table 12 significantly underrepresents the amount of congestion along the corridor.

Thus, travel times along the corridor should be the true measure of operational analysis for the 2040 no-build condition, which are presented in **Table 13**. As shown, the travel times for westbound traffic during the afternoon peak hour are significantly higher than existing conditions, nearly doubling to over 7 minutes. Still, the westbound travel times during the afternoon peak hour are likely much higher than shown in Table 13 due to the fact that vehicles which are still in the rolling queue at the end of the model run are not accounted for in the results.

Table 12. 2040 No-Build Intersection Operating Conditions (VISSIM)

Intersection / Approach	Weekday AM Peak Hour	Weekday PM Peak Hour
	Overall Intersection Vehicle Delay (seconds)	
SR 62 and Rosenberger Ave (signalized)	28.2	50.7
Barker and Igleheart Ave / SR 62 WB Off-Ramp (stop-controlled)	1.8	1.9
Barker and SR 62 EB Off-Ramp/Pennsylvania St (stop-controlled)	1.5	1.9
SR 62 and St. Joseph Ave (signalized)	58.3	45.7
SR 62 and Wabash Ave (signalized)	30.2	29.1

Table 13. 2040 No-Build Compared to Existing Travel Times (VISSIM)

Routes	Travel Time (sec)			
	Existing		2040 No-Build	
	AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour
EB SR 62 (Rosenberger Avenue to Wabash Avenue)	197	189	245	219
WB SR 62 (Wabash Avenue to Rosenberger Avenue)	210	239	205	440

Figure 10. 2040 No-Build PM Peak Period Westbound Rolling Queue (VISSIM)

The poor performance of the 2040 no-build afternoon peak hour may be attributed to the lack of a corridor signal coordination system. As mentioned previously the intersection of SR 62 and St. Joseph Avenue runs free, meaning the arrival pattern of vehicles at the intersection is independent from upstream or downstream signals. Hence, westbound vehicle platoons have random arrival patterns to the SR 62 and Rosenberger Avenue intersection. When the oncoming westbound platoon arrives before the stopped vehicles from the previous platoon have been served, the queue grows significantly.

Additionally, the performance of the side-streets along the corridor continues to worsen, most notably at Rosenberger Avenue and at St. Joseph Avenue. During the afternoon peak hour, the northbound and southbound approaches at Rosenberger Avenue spill back into University Drive to the north, and the commercial access drives to the south. Similarly, the southbound left turn queue at SR 62 and St. Joseph Avenue extends well past W Illinois Street during the morning peak hour, while the eastbound left turn bay capsizes during the afternoon peak period.

HCS7 was again used to analyze all merging, diverging, and weaving segments throughout the corridor under 2040 no-build conditions, as shown in **Table 14**. All merging, diverging, and weaving segments perform similar to existing operations, with the exception of the SR 62 to Barker Avenue eastbound exit ramp diverge, and the weaving segment between the westbound Igleheart Avenue entrance ramp and the westbound Corbierre Avenue exit ramp, which each dropped one level of service. While these decreases in level of service seem nominal, it is important to understand that HCS7 does not consider the westbound congestion and rolling queue that develops during the afternoon peak hour along SR 62. The queueing extends from Rosenberger Avenue past the Barker Avenue interchange, and would certainly impact the merge, diverge, and weaving operations in the area.

Table 14. 2040 No-Build Merge, Diverge, and Weaving Segment Operating Conditions (HCS)

Merge, Diverge, or Weaving Segment	LOS (Density in Ramp Influence Area in pc/mi/ln)	
	Weekday AM Peak Hour	Weekday PM Peak Hour
1. Igleheart Ave towards WB SR 62 Entrance MERGE	B (17.4)	C (24.0)
2. Pennsylvania Street to EB SR 62 MERGE	B (15.4)	B (15.1)
3. WB SR 62 to Barker Exit Ramp DIVERGE	B (13.7)	B (18.8)
4. WB SR 62 to Igleheart Loop Ramp DIVERGE	B (13.0)	B (18.0)
5. WB SR 62 towards Corbierre Exit Ramp DIVERGE	B (13.1)	B (17.0)
6. EB SR 62 to Barker Exit Ramp DIVERGE	B (17.7)	C (20.5)
7. Igleheart WB entrance and Corbierre WB exit WEAVE	B (11.2)	B (17.2)

2040 No-Build Safety Analysis

RoadHAT was used to forecast safety conditions in 2040. 2040 no-build RoadHAT reports for each intersection and the Barker Avenue interchange can be found in the Appendix. The traffic inputs from the existing analysis were scaled using the 0.5% annual growth rate applied to existing traffic volumes to reach the 2040 forecasted traffic volumes. Similarly, it was assumed that the number of crashes at each intersection or interchange segment would grow at the same rate, since the no-build condition does not reflect any mitigations or improvements to the corridor. This assumption may in fact underestimate the number of crashes that could be expected in 2040, since there is a tendency for crashes to increase as congestion along the corridor increases. The existing and 2040 no-build ICF and ICC indices are compared in **Table 15**. As expected, even with the conservative crash estimates, the indices do not improve, or continue to worsen over time and as traffic continues to grow along the corridor.

Table 15. 2040 No-Build Crash Indices (ROADHAT)

Intersection / Segment	Index of Crash Frequency (ICF)		Index of Crash Cost (ICC)	
	Existing	2040 No-Build	Existing	2040 No-Build
SR 62 and Rosenberger Avenue	5.72	5.86	4.47	4.71
Corbierre/Igleheart/ Barker Avenues	1.95	1.91	2.20	2.21
SR 62 and St. Joseph Avenue	1.7	1.73	1.29	1.28
SR 62 and Wabash Avenue	1.82	1.66	1.82	1.69

2040 Full Build Alternatives Analysis

Potential roadway and traffic improvements along the corridor were evaluated with the overarching objective of improving safety for motorists traveling along the Lloyd Expressway. The emphasis on safety was driven primarily by funding constraints that eliminated the ability to simultaneously address the major traffic operational issues. The previously completed corridor study budgeted approximately $2.185 million dollars towards professional engineering, right-of-way acquisition, utility relocation, and construction costs for improvements throughout the entire study area. This study is tasked with remaining within the previously budgeted funds, but has the ability to redistribute funds within the corridor to maximize safety and operational improvements. The analysis in this section documents the anticipated operational and safety performances of the selected preferred intersection or roadway segment alternatives, which were agreed upon in conjunction with INDOT.

It should be acknowledged that many of the safety problems manifested along the corridor are related to vehicle congestion and the inability of traditional intersections to accommodate high traffic volumes efficiently. To adequately address capacity limitations throughout the corridor, alternative intersection configurations should be explored. However, as alternative intersection configurations are costly to construct, they were not analyzed or considered as viable intersection alternatives for some of the corridor intersections at this time since they are outside the scale of improvements budgeted. Should funding become available in the future, alternative intersection configurations should be analyzed for implementation at SR 62 and Rosenberger Avenue.

In May 2021, INDOT requested additional analysis of a northwest quadrant road alternative at the intersection of SR 62 and St. Joseph Avenue. This quadrant road analysis will be compared to the intersection alternatives derived from the previously completed corridor study at SR 62 and St. Joseph Avenue to determine if the resulting progression, delay, and safety benefits are worth the additional investment.

Preferred Intersection and Segment Alternatives

The following improvements are recommended as the preferred corridor improvements for implementation:

SR 62 and Rosenberger Avenue

The previous corridor study recommended installing positive offset eastbound and westbound left turn lanes with a permitted flashing yellow arrow left turn phase. This recommendation was likely made with the goal of reducing delay for the eastbound and westbound left turn movements, which currently experience high delay and long queues. However, the eastbound and westbound left turns are a protected only movement under existing conditions. Converting a protected only left turn to a flashing yellow arrow left, while decreasing delay, would likely increase crashes. Crash modification factors (CMFs) associated with changing from a protected left turn phase to a protected + flashing yellow arrow are 1.338 for all crashes, and 2.242 for left turn crashes, which could correlate to an increase of 33.8% of all crashes, and 124% of left turn crashes. Safety is a priority for the recommended corridor improvements. Therefore, it is recommended to leave the mainline left turns as protected ONLY.

Right-turns-on-red are currently permitted at each intersection approach, and could be contributing to crashes at the intersection. Therefore, it is recommended to prohibit right-turns-on-red at the intersection. To offset the operational impacts of no right-turns-on-red, right turn signal overlap phases should be installed on all approaches. This would enable right turns to proceed on a green arrow which is concurrent with the complementary left turn movement. Additionally, it is recommended to extend the southbound right turn bay as far as possible to accommodate the slightly increased queue lengths.

The SR 62 pavement throughout the study area is slated for reconstruction as part of a separately funded project. As part of the pavement reconstruction, the bridge located east of the SR 62 and Rosenberger Avenue intersection is also planned for replacement and widening, which would allow for the extension of the westbound left turn lane to eliminate queue spillover into the mainline through lanes. The extension of the westbound left turn bay would also allow for vehicles to decelerate from free flow traffic speeds within the turn bay as opposed to decelerating in the through travel lanes.

The vertical curvature of the westbound approach is also expected to flatten. The CMF associated with the flattening of a vertical curve is 0.49, which could mean a reduction of up to 51% of all fatal and injury crash types. **Figure 11** shows the reconfigured Rosenberger Avenue intersection with extended westbound left turn and southbound right turn lanes.

Relocation of the University Drive eastbound approach connecting to Rosenberger Avenue should be studied in the future, and considered as a separate local project. By shifting the connection to the north, creating a four-legged intersection with the Kohl's access drive on the east side of Rosenberger Avenue, southbound queues at SR 62 and Rosenberger Avenue would no longer block access to University Drive, avoiding the potential for gridlock conditions. Additionally, vehicles would be able to queue more safely and efficiently along the southbound approach at SR 62 and Rosenberger Avenue.

Figure 11. SR 62 and Rosenberger Avenue Preferred Alternative Configuration (VISSIM)

Ingle Avenue/Corbierre Avenue

The close proximity of the Corbierre Avenue westbound exit ramp to the Igleheart Avenue westbound entrance ramp creates unsafe weaving conditions for vehicles using these ramps. The Corbierre Avenue westbound exit ramp serves as a main route for motorists to access Tekoppel Avenue, which must be maintained. To address this, it is recommended that the existing Corbierre Avenue westbound exit ramp be closed, with a new ramp constructed to the west of Ingle Avenue, as shown in **Figure 12**. The intersection of Ingle Avenue and Corbierre Avenue will not be in conflict with the new ramp if it is placed to the west of Ingle Avenue along Corbierre Avenue. Corbierre Avenue can also change from a one-way street to a two-way street east of Ingle Avenue, giving expanded access and safer parking for residents.

The shifting of the Corbierre Avenue westbound exit ramp would require the closure of the Ingle Avenue right-in, right-out access north of SR 62. The Ingle right-in, right-out access south of SR 62 should be closed as well in an effort to implement good access management practices along the corridor. While Ingle Avenue does provide access to the residential areas north and south of SR 62, the access points have relatively minor usage compared to other intersections and ramps along the corridor.

With the Barker Avenue interchange located approximately 0.3 miles to the east, traffic displaced by the Ingle Avenue right-in right-out closures is assumed to reroute to the Barker Avenue ramps for access to SR 62. Westbound right turning traffic at Ingle Avenue will reroute to the westbound Corbierre Avenue exit ramp, while southbound right turning traffic from Ingle Avenue will reroute to the Igleheart Avenue westbound entrance ramp. Eastbound right turning traffic at Ingle Avenue will reroute to the eastbound Barker Avenue exit ramp, while northbound right turning traffic will reroute to the Pennsylvania Street eastbound entrance ramp to SR 62 near S Lemcke Avenue.

The increased spacing between the Corbierre Avenue westbound exit ramp to the Igleheart Avenue westbound entrance ramp has an associated crash modification factor of 0.32, which could mean a reduction of up to 68% of all crashes. The shifting of the Corbierre Avenue westbound exit ramp would also allow for the installation of a third continuous auxiliary lane for weaving between the two ramps, which has an associated CMF of 0.79, and could further help reduce all crashes by up to 21%.

Figure 12. Ingle Avenue and Corbierre Avenue Preferred Alternative Configuration (VISSIM)

Barker Avenue Interchange

Westbound SR 62 traffic currently has two exit points at the Barker Avenue interchange: an exit ramp east of Barker Avenue, and an exit loop ramp west of Barker Avenue. It is recommended that the westbound exit loop ramp be closed due to its substandard horizontal curvature and associated crash history. This would direct all westbound exiting vehicles to use the eastern exit ramp. The current configuration of the eastern exit ramp only allows for westbound right turns at Barker Avenue, and does not allow for left turns or through movements, although some vehicles were observed making left turns and traveling straight through the intersection under existing conditions. The westbound ramp approach should be reconfigured to allow for a single dedicated left turn lane, and a shared thru/right turn lane opposite Igleheart Avenue to accommodate all westbound movements at the intersection.

Additionally, with a third continuous auxiliary lane between the Corbierre Avenue westbound exit ramp and the Igleheart Avenue westbound entrance ramp, it is recommended that the third westbound SR 62 through lane drop as an exit-only lane at the eastern Barker Avenue exit ramp. The preferred alternative lane configurations for the interchange are illustrated in **Figure 13**.

Figure 13. Barker Avenue Interchange Alternative Configuration (VISSIM)

SR 62 and St. Joseph Avenue

The intersection of SR 62 and St. Joseph Avenue is arguably the most congested intersection along the corridor. Both northbound and southbound approaches along St. Joseph Avenue are heavily utilized and compete with the mainline for green time. Two intersection alternatives were explored for SR 62 and St. Joseph Avenue with the goal of relieving congestion:

1. Southbound Lane Reconfiguration
2. Northwest Quadrant Road Intersection

Southbound Lane Reconfiguration

The previous corridor study recommended reconfiguring the southbound approach lanes through striping to better accommodate the southbound left turn movement queue. With the Mead Johnson nutrition facility to the south of SR 62, and a business occupying the northeast quadrant of the intersection, right-of-way for potential improvements is very limited.

Under the proposed lane reconfiguration alternative, the southbound approach lane configuration would be optimized so that the easternmost southbound lane along St. Joseph Avenue feeds into the dual southbound left turn lanes, while the westernmost southbound lane feeds the southbound through and right turn movements. Sufficient signage would be required to direct motorists to the correct lane. However, this would provide increased storage and should improve throughput for the southbound left turn movement, while also alleviating impacts of capsized left turn bays on the southbound through movement.

The proposed lane reconfiguration alternative also includes the installation of dual southbound right turn lanes in an attempt to minimize the southbound right turn queue and prevent it from spilling back through Indiana Street. The dual southbound right turn lanes would require lane widening into the parking lot in the northwest quadrant of the intersection. However, it is understood that INDOT owns this parking lot and acquired the right-of-way with the intention of supporting future improvements to the SR 62 and St. Joseph Avenue intersection. With the installation of the dual right turn lanes, southbound right-turns-on-red would be prohibited. A southbound right turn overlap would also be added to help offset the capacity impacts of no right-turn-on-red. The southbound lane reconfiguration and additional right turn lane, as modeled in VISSIM, is shown in **Figure 14**.

Figure 14. SR 62 and St. Joseph Avenue Alternative Configuration (VISSIM)

Northwest Quadrant Road Intersection

The proposed northwest quadrant road alternative includes the conversion of N Lemcke Avenue and W Indiana Street bordering the INDOT owned parking lot in the northwest quadrant of the intersection into an intersection quadrant roadway. The quadrant road would create two new signalized sub intersections: one west of the main intersection along SR 62 at N Lemcke Avenue; and one north of the main intersection along St. Joseph Avenue at W Indiana Street. Access to St. Joseph Avenue from West Indiana Street, east of St. Joseph Avenue, would now be restricted to allow the quadrant road intersection with St. Joseph Avenue to function as a more efficient three-legged intersection. Similarly, access to the quadrant road from N Lemcke Avenue or N Bell Avenue to the north would not be allowed. The only access points onto the quadrant road would serve the INDOT parking lot which it encloses. The proposed intersection layout is depicted in **Figure 15**.

Motorists who previously utilized the eastbound left or southbound right turning movements at the main intersection would now be rerouted through the quadrant road via the two new signalized sub-intersections, with no eastbound left or southbound right turns allowed at the main intersection. All other intersection movements would still be allowed at the main intersection.

Re-routing other movements through the quadrant road to remove additional left turn phases from the main intersection, such as the westbound left turn or northbound left turn, were considered, but ultimately not recommended as part of the northwest quadrant road intersection alternative. Re-routing northbound left turns through the quadrant road would require a northbound left turn phase at the northern quadrant road intersection with St. Joseph Avenue, diminishing the efficiency of that intersection. Additionally, there is limited room to add a northbound left turn lane to the north leg of St. Joseph Avenue at SR 62. Re-routing westbound left turns through the quadrant road would require motorists to pass St. Joseph Avenue, make a westbound right turn onto the quadrant roadway, an eastbound right turn back onto St. Joseph Avenue, and then proceed southbound through the main intersection at SR 62. This maneuver could be acceptable to passenger vehicles; however the westbound left turn movement is heavily utilized by trucks accessing the industrial land uses to south of SR 62. It would not be advisable to require heavy truck traffic to make this maneuver. Therefore, the westbound left turns remain at the main intersection of St. Joseph Avenue and SR 62.

Figure 15. SR 62 and St. Joseph Avenue Quadrant Road (VISSIM)

The new signalized quadrant road sub-intersection to the north of SR 62 along St. Joseph Avenue would have a dedicated southbound right turn lane, a shared left/right eastbound turn lane, and two northbound and southbound thru lanes. Northbound left turns would not be allowed. Vehicles wishing to access the quadrant road or the INDOT parking lot may do so via the sub-intersection to the west along SR 62. With the northbound left turn restricted, the southbound right turn movement can be free-flow from the southbound right turn lane. In order to optimize lane storage, it is recommended the easternmost southbound through lane feed directly into the easternmost dual left turn lane at the intersection of SR 62 and St. Joseph Avenue. This would leave the western most southbound lane at the north quadrant road sub-intersection to feed the westernmost dual left turn lane and through movements at the intersection with SR 62 to the south. Sufficient signage would be required to direct motorists to the correct lane.

The new signalized quadrant road sub-intersection to the west of St. Joseph Avenue along SR 62 would have a single dedicated eastbound left turn lane with only southbound right turns allowed from the quadrant roadway. Westbound right turns from SR 62 onto the quadrant road would also be allowed to provide access to the INDOT parking lot. The eastbound left turn movement would operate under protected phasing only, and run concurrently with a southbound right-turn overlap to maximize intersection efficiency. The eastbound through movement at the new quadrant road sub-intersection to the west of St. Joseph Avenue along SR 62 would operate under free-flow conditions at all times.

The western sub-intersection along SR 62 should be located upstream of the Pennsylvania Street on-ramp so as to minimize conflicts with eastbound vehicles entering SR 62. In fact, operations may improve for eastbound vehicles entering SR 62 via the Pennsylvania Street on-ramp with the eastbound left turning vehicles relocated upstream. Additionally, locating the sub-intersection with SR 62 as far west as possible significantly reduces the possibility that westbound traffic would queue back into the SR 62 and St. Joseph Avenue intersection. Care should be taken to ensure that westbound traffic signal heads at the western sub-intersection are visible to motorists under the re-constructed pedestrian bridge connecting the INDOT parking lot to the south side of SR 62.

Preferred St. Joseph Avenue Intersection Alternative

Corridor travel times were analyzed for both the Southbound Lane Reconfiguration alternative and the Northwest Quadrant Road Intersection alternative for the SR 62 and St. Joseph Avenue intersection. The resulting travel times were nearly identical, which indicates that neither alternative option would be detrimental to the overall progression of the SR 62 corridor as compared to the other. However, the Northwest Quadrant Road Intersection alternative provides reduced delays and queues for mainline traffic at St. Joseph Avenue as compared to the Southbound Lane Reconfiguration alternative. Therefore, it is recommended that the Northwest Quadrant Road Intersection alternative be implemented at the intersection of SR 62 and St. Joseph Avenue.

Even though the Northwest Quadrant Road Intersection alternative adds two signalized intersections to the roadway network, the associated signal timing and phasing plans were designed to have minimal impact to the other signalized intersections along the corridor. This is evident by the nearly identical corridor travel times when compared to the Southbound Lane Reconfiguration alternative that did not add any signalized intersections to the network.

One of the major benefits to implementing the Northwest Quadrant Road Intersection alternative is the removal of the eastbound left and southbound right turn movements from the main intersection, which eliminates the eastbound left turn phase from the main intersection signal. The additional green time from the eastbound left turn phase can be reallocated to the mainline and other side street movements that are in high demand. Similarly, the eastbound left and southbound right movements also gain green time from the relocation to the quadrant road since they can now run concurrent with the side-street phases at the SR 62 and St. Joseph Avenue main intersection, whereas before those movements were a fraction of the mainline cycle time due to the greater need to serve opposing phases.

As with many alternative intersection configurations, there is the possibility for additional stops and delays for certain movements as motorists traverse the new roadway network. In this case, a northbound left traveling motorist could get stopped at the main St. Joseph Avenue intersection with SR 62, and again at the quadrant road sub-intersection to the west. Similarly, there is a possibility that eastbound left turning motorists would get stopped at both the west and north quadrant road sub-intersections. However, the west quadrant road sub-intersection along SR 62 is coordinated with the main St. Joseph Avenue intersection such that eastbound and westbound SR 62 motorists experience minimal additional delays due to the additional quadrant road sub-intersection. So, while there are a few turning movements which may experience additional delays due to the two new quadrant road sub-intersections, a majority of the intersection movements, including mainline traffic, experiences a net benefit with reduced delays and queues.

SR 62 and Wabash Avenue

Currently, the intersection of SR 62 and Wabash Avenue has protected plus permissive eastbound and westbound left turn movements. The previous corridor study recommended eliminating these left turns altogether and diverting those motorists to the St. Joseph Avenue intersection. This would increase eastbound and westbound left turn volumes at the St. Joseph Avenue intersection, requiring expansion of the eastbound and westbound left turn storage bays at that intersection, at minimum.

In an effort to avoid further operational impacts to the St. Joseph Avenue intersection, additional alternatives were considered for SR 62 and Wabash Avenue. Eastbound and westbound left turn movements could be maintained at the intersection, but with protected left turn ONLY phasing if coupled with the implementation of signal optimization and corridor timing plans at both the Wabash Avenue and St. Joseph Avenue intersections. The associated CMF for restricting left turns from protected + permissive to protected only left turn signal phasing is 0.58, which could reduce all crashes by up to 42%. However, it must be ensured that the westbound left turn queue does not extend past its existing 200-foot storage bay, as this bay could not be extended without expanding the elevated bridge structure to the east of the intersection.

The heaviest turning movements on the Wabash Avenue approaches are the northbound right turn and southbound left turn. While there are three approach lanes on both the north and south legs of Wabash Avenue, the existing lane designation is unclear and not reinforced by signage or pavement markings. It is recommended that the northbound and southbound approaches be striped to clearly indicate one left turn lane, one through lane, and one right turn lane. Northbound and southbound protected plus permissive left turn phases should also be installed along with right turn signal overlap phases to maximize the capacity of these approaches.

The connection to Pennsylvania Street within the southeast quadrant of the intersection should be closed. This access currently has minimal utilization, and traffic would still be able to access 9th Street via Ohio Street or Indiana Street.

There has been previous interest expressed in possibly eliminating mainline left turns at the SR 62 and Wabash Avenue intersection. Preliminary analysis was conducted to determine the feasibility of prohibiting mainline left turns with the northwest quadrant road in place at St. Joseph Avenue. It was assumed that eastbound and westbound motorists who are impacted by the mainline left turn closures at Wabash Avenue would be shifted entirely to the eastbound and westbound left turns at St. Joseph Avenue and/or the quadrant road. The analysis shows that the quadrant road would be able to accommodate the additional motorists, however, the westbound approach along SR 62 and St. Joseph Avenue would require dual left turn lanes to accommodate the additional diverted westbound left turn traffic from Wabash Avenue. Removing eastbound and westbound left turns at Wabash Avenue was not included in the full build traffic analysis at this time.

Other Improvements

Currently, the intersections of SR 62 and Wabash Avenue and SR 62 and St. Joseph Avenue are uncoordinated signal systems. It is recommended to implement a signal coordination plan along the SR 62 corridor, which has an associated CMF of 0.79, and could reduce all crashes up to 21%. Despite the distance between intersections, Wabash Avenue and St. Joseph Avenue should also be coordinated with Rosenberger Avenue. This would allow for better control of westbound vehicle platoons arriving at the Rosenberger Avenue intersection. Additionally, the intersection of St. Joseph Avenue/Ray Becker Parkway and Ohio Street should be cross-coordinated with the SR 62 and St. Joseph Avenue intersection. To further facilitate the cross coordination effort, it is recommended to install protected plus permissive southbound left turn phasing at the intersection of St. Joseph Avenue/Ray Becker Parkway and Ohio Street.

Pennsylvania Street serves as the eastbound entrance ramp from Barker Avenue, with free flow access to SR 62. South Lemcke Avenue connects to Pennsylvania Street just west of its entrance to SR 62, and is stop-controlled. South Lemcke Avenue serves as the main route for trucks exiting the Mead Johnson Nutrition facility in the southwest quadrant of the SR 62 and St. Joseph Avenue intersection. While the minimal distance between South Lemcke Avenue and the Pennsylvania Street entrance ramp to SR 62 is undesirable, removing the access point would leave the Mead Johnson Nutrition facility without truck egress to SR 62. In addition, INDOT plans to rebuild the existing pedestrian overpass located adjacent to the intersection, which further limits opportunities to reconfigure the existing access. For these reasons, it is recommended to do nothing, and leave the Pennsylvania Street and South Lemcke Avenue/SR 62 eastbound entrance ramp as it is configured today.

Currently, North Lemcke Avenue forms a right-in-right-out access point with SR 62, just west of the intersection of SR 62 and St. Joseph Avenue. North Lemcke Avenue provides access for residents to the north, and serves only minor traffic volumes. This access will be converted into the west quadrant road sub-intersection along SR 62 as part of the St. Joseph Avenue improvements. Since there will be no local road access to or from the proposed quadrant road, displaced existing traffic is assumed to reroute to the St. Joseph Avenue signalized intersection. It should be noted, rerouting all traffic to the St. Joseph

Avenue intersection is a conservative estimate, as some traffic is expected to utilize the Barker Avenue interchange.

It is recommended to close the 10th Avenue and 12th Avenue right-in, right-out access points, and all private business access drives onto SR 62 between St. Joseph Avenue and Wabash Avenue in an effort to implement good access management practices along the corridor. These businesses have access to 10th, 11th, or 12th Avenues, which can be accessed via West Indiana and Ohio Streets, and do not need direct access to SR 62. The close proximity of both St. Joseph and Wabash Avenues will allow existing traffic to reroute to SR 62 easily via Ohio Street, Illinois Street, or Indiana Street.

2040 Full Build Traffic Analysis

Traffic operations were evaluated with respect to the aforementioned preferred alternative improvements throughout the study area. The 2040 no-build traffic volumes were applied to the reconfigured roadway network. Traffic which previously utilized roadways with a proposed change in access were reassigned to the roadway network in the following manner:

- Previous northbound right traffic at South Ingle Avenue would now travel north on Barker Avenue, turn right on Pennsylvania Street, and enter SR 62 going eastbound.
- Previous southbound right traffic at North Ingle Avenue would now utilize the Igleheart Avenue westbound entrance ramp.
- Previous westbound right traffic at North Ingle Avenue would now utilize the new Corbierre westbound exit ramp.
- Previous eastbound right traffic at South Ingle Avenue would exit at the Barker Avenue eastbound exit ramp, and travel south.
- Previous westbound right traffic at North Lemcke Avenue would now turn at SR 62 and St. Joseph Avenue.
- Previous southbound right traffic at North Lemcke Avenue would now turn at SR 62 and St. Joseph Avenue.
- Previous eastbound left traffic at St. Joseph Avenue would now turn at the western signalized quadrant road sub-intersection along SR 62.
- Previous southbound right traffic at St. Joseph Avenue would now turn at the northern signalized quadrant road sub-intersection along St. Joseph Avenue.
- Previous westbound traffic at W Indiana Street and St. Joseph Avenue would now access St. Joseph Avenue via W Illinois Street or Mt. Vernon Avenue to the north.
- Previous eastbound traffic at W Indiana Street and St. Joseph Avenue from N Marine, N Lemcke, and N Bell Avenues would now access St. Joseph Avenue via W Illinois Street or Mt. Vernon Avenue to the north.

A summary of the 2040 Full Build traffic volumes and operating conditions throughout the corridor can be found in the Appendix. Several signal coordination and timing plans were considered for both morning and afternoon peak hours. Each timing plan varied in terms of cycle lengths to best fit the corridor's travel characteristics and patterns. As expected, shorter cycle lengths led to better side street operations, while longer cycle lengths benefitted SR 62. It was determined that a 120 and 130 second cycle length best fit the morning and afternoon peak hours, respectively.

Corridor Operating Performance

The travel times for eastbound and westbound traffic along the corridor under the proposed signal timing plans are summarized in **Table 16**. The proposed 2040 full-build signal timing plans, coupled with the preferred alternative improvements, result in travel time reductions of approximately 38% for eastbound traffic and 24% for westbound traffic during the morning peak hour, and 17% for eastbound traffic and 64% for westbound traffic during the afternoon peak hour, as compared to the 2040 No-Build scenario.

The overall intersection operating conditions as compared to the 2040 No-Build scenario are shown in **Table 17**. The analysis results pertaining to specific locations of interest are discussed in the following sections. All operating conditions tables convey VISSIM simulation modeling results. While most of the study area intersections show a substantial reduction in delay as compared to 2040 No-Build conditions, the stop-controlled intersections at Barker Avenue and Igleheart Avenue and Barker Avenue and the SR 62 eastbound off-ramp/Pennsylvania Street show an increase in delay ranging from 5% to 93% during the AM and PM peak hours. This increased delay is due to increased traffic volume at the intersections from vehicle re-routings. However, the magnitude of the delay increases when calculated as a percentage is misleading. The overall intersection delays at the Barker Avenue interchange ramp terminals increase from less than 2.0 seconds in the 2040 No-Build scenario to less than 3.0 seconds in the 2040 Full-Build scenario. 3.0 seconds of overall delay represents an intersection that functions efficiently; therefore, the increase in delay from the 2040 No-Build to 2040 Full-Build scenario is not a concern.

Table 16. 2040 Full-Build Travel Times (VISSIM)

Routes	2040 Full-Build Travel Time (sec)		Reduction Compared to 2040 No-Build	
	AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour
EB SR 62 (Rosenberger Avenue to Wabash Avenue)	152	170	-38%	-17%
WB SR 62 (Wabash Avenue to Rosenberger Avenue)	166	158	-24%	-64%

Table 17. 2040 Full-Build Intersection Operating Conditions (VISSIM)

Routes	Overall Intersection Vehicle Delay (seconds)		Reduction Compared to 2040 No-Build	
	AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour
SR 62 and Rosenberger Ave (signalized)	25.2	34.3	-11%	-32%
Barker and Igleheart Ave / SR 62 WB Off-Ramp (stop-controlled)	2.0	2.4	11%*	26%*
Barker and SR 62 EB Off-Ramp/Pennsylvania St (stop-controlled)	2.9	2.0	93%*	5%*
SR 62 and St. Joseph Ave (signalized)	31.5**	26.9**	-46%	-41%
SR 62 and Wabash Ave (signalized)	15.2	18.1	-50%	-38%

*Increased delay due to increased traffic volume from vehicle re-routings. Percent increases appear substantial due to incredibly low overall 2040 No-Build delay values (less than 2.0 seconds of overall intersection delay) increasing to 3.0 seconds of overall intersection delay.

**Denotes volume weighted delay to account for cumulative delay from the west sub-intersection, north sub-intersection, and main intersection for quadrant road.

SR 62 at Rosenberger Avenue

The overall intersection performance is within an acceptable range of delay based on standard driver expectations for both morning and afternoon peak hours, as shown in **Table 18**. The side street approaches also operate within an acceptable range of delay based on standard driver expectations during the morning peak hour, but have increased delays during the afternoon peak hour. The poor side street delays are mainly due to longer cycle lengths and the need to prioritize mainline traffic. The southbound left and through turning movements operate with high delay during the afternoon peak hour, with queues extending back into University Drive much like existing conditions. Similarly, the mainline eastbound and westbound left turns operate with high delay during the afternoon peak hour. This is expected as the proposed alternative did not change the protected only phasing to prioritize safety, while sacrificing some capacity. The westbound left turn lane will be able to extend past the SR 62 bridge east of Rosenberger Avenue as part of the previously planned, and separately funded SR 62 pavement reconstruction project, which will help to alleviate queue spillover onto the mainline.

The mainline through movements operate exceptionally better due to coordinating Rosenberger Avenue with St. Joseph Avenue and Wabash Avenue, as can be seen by the minimal delay during both peak hours for westbound traffic. The performance of the eastbound through movement can likely be increased beyond the current delay if Rosenberger Avenue is also coordinated with the intersections further to the west. The capabilities for this coordination exist; however, intersections to the west of Rosenberger Avenue are outside the scope of this study and so the benefits of coordination to the west were not captured here.

Table 18. 2040 Full-Build Operating Conditions at SR 62 & Rosenberger Avenue (VISSIM)

Intersection / Approach	Weekday AM Peak Hour			Weekday PM Peak Hour		
	Vehicle Delay (sec)	Average Queue (ft)	Maximum Queue (ft)	Vehicle Delay (sec)	Average Queue (ft)	Maximum Queue (ft)
SR 62 and Rosenberger Avenue (signalized)						
Overall Intersection	**25.2**			**34.3**		
Eastbound Left	84.0	136	717	105.6	488	1244
Eastbound Thru	21.2	136	717	29.0	488	1244
Eastbound Right	8.7	130	717	10.0	488	1244
Eastbound Approach	24.3	136	717	34.2	488	1244
Westbound Left	73.9	84	664	87.8	179	696
Westbound Thru	12.9	85	664	9.0	179	696
Westbound Right	7.5	83	664	6.8	178	696
Westbound Approach	15.6	85	664	16.8	179	696
Northbound Left	37.5	53	207	104.9	112	275
Northbound Thru	72.9	56	207	70.2	113	275
Northbound Right	44.6	55	207	35.6	111	274
Northbound Approach	54.5	56	207	69.3	113	275
Southbound Left	48.8	82	327	97.3	198	350
Southbound Thru	46.6	82	327	86.2	198	350
Southbound Right	33.2	74	327	58.3	197	350
Southbound Approach	43.7	82	327	82.3	198	350

Delay reported in seconds per vehicle

SR 62 Ramps at Corbierre/Igleheart/Barker Avenues

Despite the increased traffic volumes due to traffic diverted by the closures of Ingle Avenue at SR 62 and the Igleheart Avenue westbound loop ramp, both ramp terminal intersections along Barker Avenue operate with favorable delay based on standard driver expectations during the peak hours, as shown in **Table 19**. Similarly, **Table 20** shows that all merges, diverges, and weaving segments operate with LOS B or better during all peak periods, with the exception of the westbound Barker exit ramp which operates with LOS C during the afternoon peak period.

Table 19. 2040 Full Build Operating Conditions at SR 62 & Barker Avenue Ramp Terminals (VISSIM)

Intersection / Approach	Weekday AM Peak Hour			Weekday PM Peak Hour		
	Vehicle Delay (sec)	Average Queue (ft)	Maximum Queue (ft)	Vehicle Delay (sec)	Average Queue (ft)	Maximum Queue (ft)
Barker Avenue and Igleheart Avenue / SR 62 WB Off-Ramp (stop-controlled)						
Overall Intersection	2.0			2.4		
Eastbound Approach	7.0	2	52	6.5	1	36
Westbound Approach	8.7	3	65	9.0	5	95
Northbound Left	2.2	0	31	1.8	0	24
Barker Avenue and SR 62 EB Off-Ramp/Pennsylvania St (stop-controlled)						
Overall Intersection	2.9			2.0		
Eastbound Approach	8.0	4	87	8.2	4	92
Southbound Left	8.6	10	118	3.7	2	86

Delay reported in seconds per vehicle

Table 20. 2040 Full Build Merge, Diverge, and Weaving Segment Operating Conditions (HCS)

Merge, Diverge, or Weaving Segment	LOS (Density in Ramp Influence Area in pc/mi/ln)	
	Weekday AM Peak Hour	Weekday PM Peak Hour
1. Igleheart Ave to WB SR 62 Entrance MERGE	A (9.9)	B (17.3)
2. Pennsylvania Street to EB SR 62 MERGE	B (15.8)	B (15.4)
3. WB SR 62 to Barker Exit Ramp DIVERGE	B (17.2)	C (24.7)
5. WB SR 62 to Corbierre Exit Ramp DIVERGE	A (4.9)	A (5.1)
6. EB SR 62 to Barker Exit Ramp DIVERGE	B (16.6)	B (19.7)
7. Igleheart WB entrance and Corbierre WB exit WEAVE	B (11.4)	B (17.3)

SR 62 at St. Joseph Avenue

The intersection of SR 62 and St. Joseph Avenue operates within an acceptable range of delay based on standard driver expectations during both morning and afternoon peak hours, as shown in **Table 21**. As referenced in Table 17, the volume weighted delay to account for the cumulative effect of the west sub-intersection, north sub-intersection, and main intersection combined totals 31.5 and 26.9 seconds of overall intersection delay during the morning and afternoon peak hours, respectively.

The eastbound and westbound through movements operate with favorable delays and queues during all peak hours, which is a direct result of the signal timing improvements which coordinate the arrival of platoons from adjacent intersections, as well as the proposed northwest quadrant road intersection improvements.

At times, the northbound approach queues back to the Ohio Street intersection, which is located approximately 250 feet south of the intersection of SR 62 and St. Joseph Avenue. However, the cross-coordination effort between SR 62 and St. Joseph Avenue and Ohio Street drastically reduces these occurrences.

While the southbound left turn at the main intersection operates with delay near the acceptable limit based on standard driver expectations due to the significant traffic volume during the morning peak hour, modifying the southbound lane configuration to better inform efficient lane utilization reduces average and maximum queue lengths. Due to the spacing of approximately 300 feet between the northern quadrant road sub-intersection and SR 62 along St. Joseph Avenue, it is recommended to install “DO NOT BLOCK INTERSECTION” signs, so southbound vehicles do not queue in the middle of the intersection.

Southbound right turn motorists now bypass the main SR 62 and St. Joseph Avenue intersection and utilize the quadrant road. The southbound right turn at the north quadrant road sub-intersection is free-flow, and is signalized at the west quadrant road sub-intersection. During the afternoon peak hour motorists experience slight delays and queueing at the west sub-intersection before entering SR 62. However, the delays are still within an acceptable range based on standard driver expectations, with an average queue of approximately 150 feet.

Similarly, eastbound left turning motorists also bypass the main intersection utilizing the quadrant road. Eastbound left turning motorists experience modest delays and queues during the morning peak period at the west sub-intersection as they wait to turn onto the quadrant road from SR 62. However, the signal timings are coordinated such that almost all eastbound left turning motorists from the west sub-intersection will also make it through the north sub-intersection, and should not be stopped at both sub-intersections.

As stated previously, the SR 62 and St. Joseph Avenue intersection is a heavily congested intersection. Previously, the eastbound left and southbound right turning movements experience heavy volumes during all peak hours, and complete with the mainline for green time. With the quadrant road in place, these heavier intersection movements are now shifted to the west sub-intersection, and are able to run in parallel while the side-street volumes are served at the intersection of SR 62 and St. Joseph Avenue. Overall, the quadrant road provides more green time for the eastbound left and southbound right turn movements without impacting mainline progression, as compared to the existing intersection phasing.

Westbound delays and queues remain minimal at the west sub-intersection during all peak hours. The only traffic to be stopped at this signal is northbound left traffic from St. Joseph Avenue, and the occasional vehicles at the end of the westbound platoon or cycle along the mainline.

Table 21. 2040 Full Build Operating Conditions at SR 62 & St. Joseph Avenue (VISSIM)

Intersection / Approach	Weekday AM Peak Hour			Weekday PM Peak Hour		
	Vehicle Delay (sec)	Average Queue (ft)	Maximum Queue (ft)	Vehicle Delay (sec)	Average Queue (ft)	Maximum Queue (ft)
SR 62 and St. Joseph Avenue (signalized)						
Overall Intersection	24.5			22.5		
Eastbound Thru	18.6	90	556	26.8	157	644
Eastbound Right	35.3	90	556	13.7	157	644
Eastbound Approach	19.3	90	556	26.6	157	644
Westbound Left	60.5	67	231	67.2	58	258
Westbound Thru	13.4	68	231	7.4	59	258
Westbound Right	3.4	65	231	6.0	56	258
Westbound Approach	15.1	68	231	9.1	59	258
Northbound Left	59.3	82	331	56.0	71	280
Northbound Thru	56.6	85	331	55.4	74	280
Northbound Right	47.6	84	330	44.0	73	280
Northbound Approach	53.4	85	331	53.3	74	280
Southbound Left	42.8	123	340	48.3	68	257
Southbound Thru	34.5	123	340	44.3	68	257
Southbound Approach	39.7	123	340	46.8	68	257
St. Joseph Ave and North Quad Rd Sub-Intersection (signalized)						
Overall Intersection	16.9			6.5		
Eastbound Left	34.5	55	209	14.5	24	229
Northbound Thru	12.3	19	126	1.8	4	89
Southbound Thru	17.5	51	437	10.3	20	223
SR 62 and West Quad Rd Sub-Intersection (signalized)						
Overall Intersection	6.6			8.0		
Eastbound Left	61.7	90	421	32.2	50	346
Westbound Thru	1.1	2	78	2.4	10	184
Southbound Right	15.9	20	176	44.8	155	667

Delay reported in seconds per vehicle

SR 62 at Wabash Avenue

The overall intersection operates with favorable delay based on standard driver expectations during both morning and afternoon peak hours, as shown in **Table 22**. The eastbound through movement operates with favorable delay during the morning and afternoon peak hour, with queues contained to less than 300 feet. This is accomplished as part of the signal coordination system and optimizing the eastbound traffic platoon arrival from the St. Joseph Avenue intersection. The westbound through movement has a significantly larger maximum queue, particularly during the afternoon peak period, due to the random arrival of vehicles from the freeway segment of SR 62 to the east.

As a condition of restricting the eastbound and westbound left turns to protected only signal phasing, westbound left turn queues were scrutinized to verify they do not exceed the provided storage bay length of 200 feet. As shown in Table 22, the eastbound and westbound left turn lanes are frequently blocked by adjacent through queues, and do not appear to experience any spillover from the turn bay into the through lanes. Still, westbound left turn split times were adjusted in the signal timing plan to ensure the 95th percentile queues, as reported by Synchro, were less than 200 feet. An additional few seconds of the cycle time was given to the westbound left turn phase in case the turning movement experiences an influx in traffic. If the extra time is in fact not needed, the signal phase will gap out, and the additional time will be given to the eastbound through movement.

Table 22. 2040 Full Build Operating Conditions at SR 62 & Wabash Avenue (VISSIM)

Intersection / Approach	Weekday AM Peak Hour			Weekday PM Peak Hour		
	Vehicle Delay (sec)	Average Queue (ft)	Maximum Queue (ft)	Vehicle Delay (sec)	Average Queue (ft)	Maximum Queue (ft)
SR 62 and Wabash Avenue (signalized)						
Overall Intersection	15.2			18.1		
Eastbound Left	47.1	49	290	58.4	17	182
Eastbound Thru	9.0	51	290	2.9	23	183
Eastbound Right	7.6	48	284	6.7	20	183
Eastbound Approach	9.5	51	290	3.8	23	183
Westbound Left	58.6	73	357	90.8	199	894
Westbound Thru	11.4	73	357	21.4	199	894
Westbound Right	3.4	53	357	8.5	190	893
Westbound Approach	14.8	73	357	23.9	199	894
Northbound Left	41.6	32	237	40.7	49	256
Northbound Thru	55.6	45	239	55.4	62	260
Northbound Right	35.4	45	239	43.3	61	260
Northbound Approach	38.5	45	239	44.3	62	260
Southbound Left	70.4	58	252	59.2	67	292
Southbound Thru	45.4	60	253	0.1	26	228
Southbound Right	19.6	40	250	27.1	45	277
Southbound Approach	58.2	60	253	45.1	67	292

Delay reported in seconds per vehicle

2040 Full Build Safety Analysis

RoadHAT is unable to quantify the safety impacts of the preferred alternatives throughout the corridor. In order to quantify safety improvements for the 2040 full build conditions, Crash Modification Factors (CMFs) associated with the preferred alternatives along the corridor were applied to the 2040 no-build forecasted number of crashes to calculate potential reductions. The applied CMFs are summarized in **Table 23**, while the potential crash reductions are summarized in **Table 24**.

The method of dominant effect was used when applying multiple CMFs to the same intersection or segment, meaning the smallest CMF with the largest potential crash reduction was chosen between all treatments, and the impact of combined treatments was not considered. This is a conservative approach, as additional treatments are likely to realize further crash reduction benefits. All CMFs are applicable to all crash severities and types, with the exception of the CMF associated with flattening the vertical curve along SR 62 east of Rosenberger Avenue. This CMF is applicable to all crash types, but only fatal and injury crash severities, thus it was applied to only the fatal, incapacitating, and non-incapacitating injury crashes at SR 62 and Rosenberger Avenue. In keeping with the dominant effect methodology, the CMF associated with implementing a signal coordination system was applied to the PDO crashes at Rosenberger Avenue, as it was the smallest applicable CMF with the largest potential crash reduction for that particular crash severity.

There is very little published research regarding the safety impact of implementing a quadrant roadway intersection. A comparison of total intersection conflict points of the proposed three quadrant road intersections (main intersection and two sub-quadrant road intersections) as compared to the existing conflict points of a traditional intersection yields similar results. Therefore, the CMF assigned for implementing a quadrant road intersection is estimated as 1.00, to represent an assumed minimal impact to the safety performance of the overall intersection.

As shown, the preferred alternatives could reduce total crashes along the corridor by up to 34%.

Table 23. Preferred Alternative Crash Modification Factors (CMFs)

Intersection / Segment	Roadway Treatment	CMF for Roadway Treatment	Total Reduction in Crashes
SR 62 and Rosenberger Ave	Flatten Vertical Curvature East of Intersection	0.49	*51%
	Signal Coordination System	0.79	**21%
Interchange Segment	Increase Spacing Between Corbierre Ave and Igleheart Ave WB Ramps	0.32	68%
	Continuous Third Auxiliary Weaving Lane	0.79	
SR 62 & St. Joseph Ave	Implement NW Quadrant Road	1.00	21%
	Signal Coordination System	0.79	
SR 62 and Wabash Ave	Protected Only Mainline Left Turns	0.58	42%
	Signal Coordination System	0.79	

* Applied to fatal, incapacitating, and non-incapacitating crashes

** Applied to property damage only crashes

Table 24. Potential Crash Reduction Comparison

Scenario / Impact	Intersection / Segment	Crashes				
		Fatal	In-Capacitating	Non-Incapacitating	PDO	Total
2040 No-Build	SR 62 and Rosenberger Ave	1	7	38	198	244
	Interchange Segment	1	3	13	74	91
	SR 62 & St. Joseph Ave	0	2	19	144	165
	SR 62 and Wabash Ave	0	3	20	105	128
	Total	2	15	90	521	628
2040 Full Build	SR 62 and Rosenberger Ave	0.5	3.2	18.4	156.3	178.4
	Interchange Segment	0.4	1.1	4.2	23.7	29.4
	SR 62 & St. Joseph Ave	0.0	1.7	14.8	113.5	130.0
	SR 62 and Wabash Ave	0.0	1.9	11.5	60.9	74.3
	Total	0.9	7.9	48.9	354.4	412.1
Relative Decrease		**-55%**	**-47%**	**-46%**	**-32%**	**-34%**

Maintenance of Traffic (MOT) Conditions

The corridor was analyzed for various construction scenarios to determine how many eastbound or westbound thru lanes along SR 62 could be closed to assist in the creation of maintenance of traffic plans. Maintenance of traffic (MOT) plans should be developed with the goals of minimizing impacts on the traveling public, area businesses, and/or residents within the area. Traffic impacts were assessed with respect to providing both one and two thru lanes along SR 62 during future construction phasing.

Preliminary synchro traffic modeling determined that constraining the mainline to one through lane in each direction during any construction phase would not satisfactorily adhere to the desire to minimize impacts on the traveling public. With only one lane open in each direction on SR 62, severe congestion and excessive queueing would persist throughout the length of the project study area. Therefore, it was determined that two through lanes in each direction are required on SR 62 for all construction phases, in addition to auxiliary turn lanes at each intersection along the corridor.

Traffic performance with two through lanes open in each direction along SR 62 was first evaluated with the existing signal timings along the corridor. Two separate modified preliminary timing plans (150 and 170 second cycle length) were also developed for the corridor to serve anticipated MOT conditions in the morning and afternoon peak periods. Other timing pans would likely be necessary during midday, off peak, or weekend conditions to acceptably accommodate fluctuations in traffic throughout various construction phases.

Table 25 summarizes the mainline travel times along SR 62 with two thru lanes open in each direction, simulating construction conditions under both existing and modified signal timings. Similarly, **Table 26** summarizes the mainline traffic performance operations at the signalized intersections along the SR 62 corridor with existing signal timings, while **Table 27** shows the same metrics with modified signal timings. The comparison of the existing and modified signal timing plans is meant to serve as an indicator of how beneficial continued signal timing plan maintenance is for the corridor as part of any MOT plan.

In order to accommodate mainline traffic with two eastbound and westbound through lanes along SR 62, longer cycle lengths are required. Consequentially, side-street operations may suffer as progression along SR 62 is prioritized during construction conditions. As shown, travel times are greatly reduced with the modified signal timings as compared to existing timing plans. In fact, it is likely the existing signal timings perform even worse than the conditions shown in Table 26, as much of the corridor would experience extended rolling queues, which are difficult to quantify within VISSIM.

Furthermore, the conditions presented below are likely a worst-case depiction of construction conditions, as no traffic was re-routed from SR 62 as part of the MOT analysis. It is typical for a percentage of traffic to reroute themselves in order to avoid delays during construction. However, it is difficult to estimate the number of vehicles which do so, as the decision is based on each driver's trip characteristics and willingness to accept additional delays.

It is recommended that construction signal timing plans be developed and maintained by a third-party for the impacted traffic signals along the corridor during each stage of construction. Similar attention should be given to any routes or roadways which may be impacted by traffic detouring or otherwise re-routing during each stage of construction along SR 62.

Table 25. MOT Travel Times During Construction: Two-Lanes Each Direction on SR 62 (VISSIM)

Routes	Existing Signal Timings Travel Time (sec)		Modified Signal Timings Travel Time (sec)	
	AM Peak Hour	PM Peak Hour	AM Peak Hour *	PM Peak Hour **
EB SR 62 (Rosenberger Avenue to Wabash Avenue)	537	504	171	209
WB SR 62 (Wabash Avenue to Rosenberger Avenue)	219	309	170	156

*150 second cycle length
**170 second cycle length

Table 26. MOT Operating Conditions: Existing Signal Timings (VISSIM)

Intersection / Approach	Weekday AM Peak Hour		Weekday PM Peak Hour	
	Average Queue (ft)	Maximum Queue (ft)	Average Queue (ft)	Maximum Queue (ft)
SR 62 and Wabash Ave (signalized)				
Eastbound Approach	1327	1682	1310	1675
Westbound Approach	104	674	1351	1687
SR 62 and St. Joseph Ave (signalized)				
Eastbound Approach	1300	1670	1249	1665
Westbound Approach	322	1250	1180	1678
SR 62 and Rosenberger Ave (signalized)				
Eastbound Approach	108	542	268	1008
Westbound Approach	144	868	214	865

Table 27. MOT Operating Conditions: Modified Signal Timings (VISSIM)

Intersection / Approach	Weekday AM Peak Hour		Weekday PM Peak Hour	
	Average Queue (ft)	Maximum Queue (ft)	Average Queue (ft)	Maximum Queue (ft)
SR 62 and Wabash Ave (signalized)				
Eastbound Approach	72	580	62	602
Westbound Approach	138	658	529	1560
SR 62 and St. Joseph Ave (signalized)				
Eastbound Approach	529	1250	285	762
Westbound Approach	109	435	381	1402
SR 62 and Rosenberger Ave (signalized)				
Eastbound Approach	109	566	236	1008
Westbound Approach	62	593	165	947

Conclusions

The Lloyd Expressway (SR 62) corridor traffic analysis from Rosenberger Avenue to Wabash Avenue concludes the following:

Existing Traffic Analysis

- The overall intersection operating conditions along the SR 62 corridor under existing traffic conditions perform within an acceptable range of delay based on standard driver expectations for both morning and afternoon peak hours. However, many turning movements throughout the corridor operate with higher, unacceptable delays during both peak hours, and the accompanying queue lengths contribute to congestion and safety issues along the corridor.

Existing Safety Analysis

- Potential improvements for the corridor were considered with the primary objective of improving safety for motorists traveling along the Lloyd Expressway. An existing safety analysis revealed the following:
    - The intersection of SR 62 and Rosenberger Avenue has an Index of Crash Frequency (ICF) and Index of Crash Cost (ICC) of 5.72 and 4.47, respectively. These values are extremely high considering the RoadHAT threshold for when an intersection may be considered a high or severe crash location is any value over 2. Contributing circumstances may include the vertical curvature of SR 62 east of Rosenberger Avenue, which limits visibility of stopped traffic ahead for westbound traffic on SR 62, as well as reduced visibility for turning vehicles due to steep intersection approach grades.
    - The Corbierre, Igleheart, and Barker Avenues ramps segment has an ICF and ICC value of 1.95 and 2.2, respectively. Contributing circumstances may include the tight weaving conditions between the westbound Igleheart Avenue entrance ramp and the westbound Corbierre Avenue exit ramp, as well as the tight curvature on the westbound Igleheart Avenue exit loop ramp, particularly since no deceleration lane is provided on westbound SR 62.
    - SR 62 and St. Joseph Avenue has an ICF and ICC of 1.70 and 1.29, respectively. The ICF is approaching 2, which indicates this location is near the threshold for being considered a high or severe crash location, but the ICC indicates that the cost of crashes at this intersection may not be much higher than would otherwise be expected.
    - SR 62 and Wabash Avenue has an ICF of 1.82 and an ICC of 1.82. Both indices are approaching 2, which indicates this location is near the threshold for being considered a high or severe crash location. Contributing circumstances may include the westbound approach vertical curvature, which is descending from an elevated bridge section, making the intersection appear very quickly for arriving motorists traveling at high speeds, as well as the protected + permissive left turn signal phasing in place for the eastbound and westbound left turn movements, which may contribute to right-angle crashes.

2040 No-Build Conditions

- 2040 No-Build conditions are drastically under-represented in the intersection operating conditions due to the nature in which VISSIM calculates node results. During the afternoon peak hour, the westbound queue at SR 62 and Rosenberger Avenue extends back past the Barker Avenue interchange. Performance of the side-streets along the corridor continues to worsen, specifically at Rosenberger Avenue and at St. Joseph Avenue.

- As expected, even with conservative crash estimates, the Indices of Crash Frequency (ICF) and Indices of Crash Cost (ICC) do not improve, or continue to worsen over time and as traffic continues to grow along the corridor.

2040 Full Build Alternatives Analysis

- Cost considerations for the preferred alternatives were based on those from the previous corridor study, which budgeted approximately $2.185 million dollars towards professional engineering, right-of-way acquisition, utility relocation, and construction costs for improvements throughout the entire study area. This study optimized the allocation of those funds to maximize impact on safety.
    - In May 2021, INDOT requested additional analysis of a northwest quadrant road alternative at the intersection of SR 62 and St. Joseph Avenue.

<u>Recommendations by location along the corridor are as follows:</u>

SR 62 and Rosenberger Avenue

- Leave the mainline left turns as a protected ONLY phase, and prohibit right-turns-on-red from all approaches. Install right turn overlaps on all approaches to offset capacity reductions due to the right-turn-on-red restrictions.
- Extend the westbound left turn lane through the SR 62 bridge east of Rosenberger Avenue. This will allow for additional queue storage and vehicles to decelerate from free flow traffic speeds within the turn bay as opposed to decelerating in the through travel lanes.
- Extend the southbound right turn bay as far as possible to accommodate the slightly increased queue lengths.

Ingle Avenue/Corbierre Avenue

- Close the existing Corbierre Avenue westbound exit ramp along SR 62, and construct a new ramp to the west of Ingle Avenue.
- Change Corbierre Avenue from a one-way street to a two-way street east of Ingle Avenue.
- Close the Ingle Avenue right-in-right-out access points on the north and south side of SR 62.
- Create a continuous third auxiliary lane between the Corbierre Avenue westbound exit ramp and the Igleheart Avenue westbound entrance ramp.

Barker Avenue Interchange

- Close the Igleheart Avenue westbound exit loop ramp.
- Drop the third westbound through lane along SR 62 as an exit-only lane at the eastern Barker Avenue exit ramp.
- Reconfigured the east approach of the Barker Avenue and Igleheart Avenue/WB SR 62 exit ramp to allow for a single dedicated left turn lane, and a shared thru/right turn lane opposite Igleheart Avenue.

SR 62 and St. Joseph Avenue

- Install a northwest quadrant road by converting N Lemcke Avenue and W Indiana Street bordering the INDOT owned parking lot in the northwest quadrant of the intersection into an intersection quadrant roadway. The newly created quadrant road intersections on St. Joseph Avenue and SR 62 would be signalized.
- Access to St. Joseph Avenue from West Indiana Street, east of St. Joseph Avenue, would now be restricted to allow the quadrant road intersection with St. Joseph Avenue to function as a more efficient three-legged intersection.
- Access to the quadrant road from N Lemcke Avenue or N Bell Avenue to the north would not be allowed. The only access points onto the quadrant road would serve the INDOT parking lot which it encloses.
- The new signalized quadrant road sub-intersection to the north of SR 62 along St. Joseph Avenue would have a dedicated southbound right turn lane, a shared left/right eastbound turn lane, and two northbound and southbound thru lanes. Northbound left turns would not be allowed. With the northbound left turn restricted, the southbound right turn movement can be free-flow from the southbound right turn lane.
- In order to optimize lane storage, it is recommended the easternmost southbound through lane feed directly into the easternmost dual left turn lane at the intersection of SR 62 and St. Joseph Avenue. This would leave the western most southbound lane at the north quadrant road sub-intersection to feed the westernmost dual left turn lane and through movements at the intersection with SR 62 to the south. Sufficient signage would be required to direct motorists to the correct lane.
- The new signalized quadrant road sub-intersection to the west of St. Joseph Avenue along SR 62 would have a single dedicated eastbound left turn lane with only southbound right turns allowed from the quadrant roadway. Westbound right turns from SR 62 onto the quadrant road would also be allowed to provide access to the INDOT parking lot. The eastbound left turn movement would operate under protected phasing only, and run concurrently with a southbound right-turn overlap to maximize intersection efficiency. The eastbound through movement at the new quadrant road sub-intersection to the west of St. Joseph Avenue along SR 62 would operate under free-flow conditions at all times.
- The western sub-intersection along SR 62 should be located upstream of the Pennsylvania Street on-ramp so as to minimize conflicts with eastbound vehicles entering SR 62.
- Care should be taken to ensure that westbound traffic signal heads at the western sub-intersection are visible to motorists under the re-constructed pedestrian bridge connecting the INDOT parking lot to the south side of SR 62.

SR 62 and Wabash Avenue

- Restrict mainline left turns to protected only left turn signal phasing. All signal timing plans must allow sufficient green time for the westbound left turn phase such that the maximum queue does not extend further than 200 feet.

- Clearly stripe the northbound and southbound approaches to clearly indicate one left turn lane, one through lane, and one right turn lane. Install northbound and southbound protected plus permissive left turn phases along with right turn signal overlap phases.
- Close the Pennsylvania Street access within the southeast quadrant of the intersection.

Other Improvements

- Implement a signal coordination plan along the SR 62 corridor which includes the intersections of SR 62 and Rosenberger Avenue, St. Joseph Avenue, and Wabash Avenue.
- Cross-coordinate the intersection of St. Joseph Avenue/Ray Becker Parkway and Ohio Street with St. Joseph and SR 62.
- Install a protected + permissive southbound left turn at the intersection of St. Joseph Avenue/Ray Becker Parkway and Ohio Street.
- Do nothing to the Pennsylvania Street and South Lemcke Avenue/SR 62 eastbound entrance ramp, and leave as it is configured today.
- North Lemcke Avenue will be converted into the signalized west quadrant road sub-intersection along SR 62 as part of the St. Joseph Avenue improvements.
- Close the 10th Avenue and 12th Avenue right-in, right-out access points, and all private business access drives onto SR 62 between St. Joseph Avenue and Wabash Avenue.

2040 Full Build Traffic Analysis

- The proposed 2040 full-build signal timing plans, coupled with the preferred alternative improvements, result in travel time reductions of approximately 38% for eastbound traffic and 24% for westbound traffic during the morning peak hour, and 17% for eastbound traffic and 64% for westbound traffic during the afternoon peak hour, as compared to the 2040 No-Build scenario.

2040 Full Build Safety Analysis

- The preferred alternatives could reduce total crashes along the corridor by up to 34%.

Maintenance of Traffic (MOT) Conditions

- Two through lanes in each direction are required on SR 62 for all construction phases, in addition to auxiliary turn lanes at each intersection along the corridor.
- Travel times are greatly reduced throughout the corridor with modified construction phase signal timings as compared to existing timing plans.
- It is recommended that construction timing plans be developed and maintained by a third-party for the impacted traffic signals along the corridor during each stage of construction. Similar attention should be given to any routes or roadways which may be impacted by traffic detouring or otherwise re-routing during each stage of construction along SR 62.