

PREPARED FOR:



APPENDIX C:

Lawrence RSAs



CORRADINO LLC

ABBREVIATED ENGINEERING REVIEW FOR TRAFFIC SAFETY

				Date: 6/25/2026	
				Des. No.: n/a	
Reviewer Information:			Agency/Firm Name: Corradino LLC		
Primary Author: James Mark Rinehart			Agency: Indianapolis Metropolitan Planning Organization		
Phone Numbers: (317) 488-2363			Email Address: jrinehart@corradino.com		
Purpose of Review:					
Corradino LLC was hired by the Indianapolis MPO (IMPO) to conduct a series of roadway safety audits at preselected intersections within its urbanized area. The goal was to identify existing safety issues and recommend near-term and long-term improvements to address them. Improvements may range from lower-cost maintenance items, such as signage and pavement markings, to higher-cost capital improvements, including intersection upgrades, multimodal infrastructure, and upgraded traffic signals, as needed. This form is suitable for Level 1 review. Of the three available levels of engineering review, this represents the least refined, lowest-intensity degree of analysis, development of essential project intent (outline of the certified course of action), scoring, and process documentation.					
Project Location:					
Route: 56 th St & Franklin Rd		District: Greenfield		City: Lawrence	
				County: Marion	
Lat & Long (BOP)	39.854968	-86.027102	Lat & Long (EOP):	39.854968	-86.027102
			Inside Urban Area Boundary ☒ Yes or No (circle)		
IMPO: Indianapolis Metropolitan Planning Organization			Project Type: Roadway Safety Audit		
Location: The intersection of 56 th Street & Franklin Road					
Existing Conditions:					
The 56th Street & Franklin Road intersection is a signalized T-intersection. Franklin Road "T's" into 56th St from the south. The NB approach has two dedicated left-turn lanes and one right-turn lane with protected left-turn signal phasing. 56th St has two travel lanes on the EB and WB approaches. There is an EB-to-SB right-turn lane on the EB approach, and a WB-to-SB left-turn lane on the WB approach. The signal phasing for the WB-to-SB left turn is protected/permissive. 56th St has a raised median dividing opposing traffic on both approaches, with the WB median tapering off to accommodate the left-turn lane. The posted speed limit for 56th St at the intersection is 40mph. The posted speed limit for Franklin Road at the intersection is 35mph. There are sidewalks with grass buffers running along the north and south sides of 56th St and ADA pedestrian ramps on all four corners of the intersection. Pedestrian signals and pushbuttons are located at all four points for pedestrians to cross the intersection. Currently, there is no pedestrian crosswalk painted at the intersection. Lawrence staff noted plans to extend the sidewalk south along the east side of Franklin Road and to update the north-side ADA pedestrian ramps. There are faded/no crosswalk markings. Located in each quadrant of the intersection are: - N of intersection: Lawrence Creek Nature Preserve. - SW Quadrant: Grove of trees and a single-family residential neighborhood. - SE Quadrant: Grove of trees and Fort Harrison Assisted Living. Corradino staff held a virtual meeting with IMPO staff, Lawrence staff and the Lawrence Police Department on April 9, 2026, to review the Preliminary Findings Report, discuss any past or upcoming projects at or near the intersection, and identify potential near-term and long-term solutions for Corradino to test before the field check. Meeting minutes from the virtual meeting are available in Attachment D. Corradino held a field check with representatives from the IMPO, Indianapolis DPW, and City of Lawrence on May 6, 2026, to provide a recap of the discussion held during the virtual meeting, share test results for the near-term and long-term solutions, and build consensus around a series of countermeasures for Corradino to cost as part of the final recommendations. The field check meeting minutes are available in Attachment D.					

Traffic Operations:

- a) **Mobility/Congestion Performance:** According to 24-hour traffic count data collected on December 5, 2023, EB traffic entering the intersection was **12,758**. The WB traffic entering the intersection was **11,310**. The NB traffic entering the intersection was **3,434**. Turning movement counts are available for review in **Attachment B**. A **1.8%** forecasted annual growth rate, derived from the IMPO's TDM, was used to develop a future no-build traffic scenario and to test long-term build alternatives at the intersection. The design year for the long-term build alternatives was **2050**. Results from the traffic analysis are available in **Attachment C**.

	Eastbound		Westbound		Northbound		Southbound	
Alternative	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay
AM Peak – 2026	B	15.8	B	10.8	C	29.1	-	-
PM Peak - 2026	B	17.3	B	11.1	C	27.5	-	-
AM Peak - 2050	C	22.9	B	16.7	C	26.4	-	-
PM Peak - 2050	D	37.1	C	22.1	C	22.9	-	-

- b) **Safety Performance / Crash Analysis:** According to available crash data from January 1, 2022, to December 31, 2024, there were **30** crashes associated with the study area. Of those crashes, **0** resulted in fatality, **4** resulted in incapacitating injuries, and **4** resulted in non-incapacitating injuries. See attached Crash Summary and output from RoadHAT 4.1 in **Attachment A**.

It is worth noting that six (20%) of the reported crashes at the intersection were WB-to-SB left-turning vehicles. Additionally, five of the eight injury-related crashes reported at the 56th Street & Franklin Road intersection were WB-to-SB left-turning vehicles. Since WB-to-SB left-turning movement accounted for only 7% of traffic in a 24hr period, there is evidence of an overrepresentation of both left-turn crash frequency and severity at the intersection.

RoadHAT 4.1 was used to develop crash cost (ICC) and crash frequency (ICF) scores for the 56th Street & Franklin Road Intersection. Results from the RoadHAT 4.1 analysis were as follows: $ICC = 1.54$, $ICF = 1.37$. The RoadHAT 4.1 analysis results are available in **Attachment A**.

Alternatives & Recommendations

During the field check with representatives from Indianapolis DPW and the IMPO, crash data and traffic data were discussed while observing traffic patterns. Multiple maintenance-type improvements were identified in the field to address near-term safety needs at the intersection (striping, traffic signal backplates, etc.) as well as some longer-term infrastructure improvements. Below are the discussed Near- and Long-Term recommended improvements for the 56th Street and Franklin Road intersection. Notes from the field check summarizing conversations are available for review in **Attachment D**.

Near-Term

Near-term solutions will include:

- Update striping, arrows, and stop bars on the EB and WB intersection approaches.
- Update pedestrian crossings at all three intersection approaches.
- Add retroreflective tape to the existing “double arrow” sign’s signposts, located on the north side of the intersection.
- Add lane assignment signage to the mast arm adjacent to signal heads for the NB intersection approach.
- Modify signal phasing to make the WB-to-SB left turn “protected only.” (See Miscellaneous Notes on the next page for more information.)
- Add back plates to all existing traffic signals. (Indianapolis DPW confirmed the signal poles are steel and can carry the additional wind load caused by installing back plates.)

Long-Term

- Implement the near-term improvements that involve striping, new signage, and retroreflective tape for signposts
- Extend the WB left-turn lane 400’.
- Replace the WB 5-section “dog house” traffic signal for the left turn lane and the 3-section head centered over the two through lanes with a 3-section (arrows) head over the left turn lane and two 3-section heads, one each centered above a through lane.
- Replace the existing mast arm for WB traffic with a new 35’ mast arm to accommodate new signal heads over each travel lane (see image in **Attachment E**).
- Replace the NB signal heads from a 3-section (ball) head and two 5-section “dog house” heads with two 3-section (arrow) heads,

one for each left turn lane, and a 3-section (arrow) head for the right turn lane • Reconstruct the two ADA ramps on the north side of the intersection. • Replace the six storm drain castings located at the intersection. • Resurface 56th Street at the intersection as far as the turn lanes on the west and east legs of the intersection. <u>Future Consideration</u> • It was discussed in detail about the concerns related to traffic congestion and capacity along 56th Street. A future consideration would be for the City of Lawrence to partner with the Indianapolis DPW to evaluate signal timing along 56th Street from the I-465 interchange to Lee Road to determine whether any modifications can improve efficiency.
Near-Term & Long-Term Cost Estimates for the Proposed Safety Improvements
Cost estimates for the near- and long-term improvements are available in Attachment E. <u>Near-Term Recommendation</u> PE - \$10,000 ROW - \$0 Utility CN - \$500 Railroad CN - \$0 Construction Inspection/Testing (10% Rounded up to nearest \$1k) - \$0 CN (including 10% contingency) - \$74,000 Near-Term Total - \$84,500 <u>Long-Term Recommendation</u> PE - \$80,160 ROW - \$0 Utility CN - \$30,000 Railroad CN - \$0 Construction Inspection/Testing (10% Rounded up to nearest \$1k) - \$66,800 CN (including 10% contingency) - \$668,000 Long-Term Total - \$844,960
Project Score: (for INDOT use)
Safety Program Score =
Miscellaneous Notes:
With the primary focus of this project being safety, it was decided that, despite the existing and forecasted traffic capacity indicating a decrease in level of service for the WB-to-SB left turn at the 56th Street & Franklin Road intersection, recommending the protected left-turn signal phase would still be a safety benefit. The protected left turn would help address the left-turn conflict point at the intersection, which accounted for 20% of all crashes and 62% of injury-related crashes.
Attachments:
Attachment A: Preliminary Findings Report Attachment B: Traffic Counts Attachment C: Traffic Analysis Attachment D: Virtual Meeting Minutes & Field Check Minutes Attachment E: Cost Estimates & Schematics

Attachment A

Preliminary Findings

PRELIMINARY FINDINGS

Safety Analysis at 56th Street & Franklin Road

Report Prepared for: IMPO & City of Lawrence

1. **Safety Analysis**

A crash data analysis was completed for the intersection of 56th Street & Frankline Road (Study Area) in Lawrence, IN. Before beginning the crash analysis, the project team followed these steps to clean the data:

- Received 2022-2024 crash data from the IMPO. Serious Injury and Fatal crashes had been cleaned by IMPO staff.
- Placed a 250' buffer around the Study Area to identify reported crashes near the intersection.
- Reviewed the police reports for each crash record identified within the 250' buffer.
- Identified and removed any crash records from the analysis that involved a collision with an animal in the roadway or occurred in a parking lot near the intersection.
- Reviewed the description in the reports to confirm the selected Manner of Collision & Crash Severity accurately reflected how the police officer described the crash.
- Exported the results from ArcGIS Pro into MS Excel.
- Created a collision diagram of the Study Area as well as summary tables of the crash records.
- Developed a crash cost (Icc) and crash frequency (Icf) for the Study Area using RoadHat 4.1.

30 crashes were identified within the Study Area. Eight of the 30 reported crashes were injury-related crashes. Four of the injury-related crashes reported in the Study Area were Incapacitating injury crashes, and four were Non-Incapacitating injury crashes. Six of the eight injury-related crashes were either Left Turn or Right Angle crashes. There were no reported Fatal crashes in the Study Area.

Other notable results near the Study Area include:

- 47% of the reported crashes within the Study Area were Rear End crashes.
- 30% of crashes were either Left Turn or Right Angle crashes.
 - 66% of the combined Left Turn and Right Angle crashes resulted in injury.
- Seven percent of reported crashes were Ran off Road. All of the Ran Off Road crashes occurred north of the Study Area and landed in a ditch. One of the Ran Off Road crashes resulted in injury.
- 57% of reported crashes occurred during Off-Peak travel times. 27% of reported crashes occurred during the evening peak hours (4 pm-7 pm), and 17% during the morning peak hours (6 am-9 am).
- 80% of reported crashes occurred in daylight hours and 17% in dark (lighted) conditions. The remaining 3% of crashes listed lighting conditions as "Dawn/Dusk" in the police report.
- 20% of reported crashes occurred in wet roadway surface conditions. The remaining 80% of reported crashes occurred on dry roadways.
- 70% of reported crashes occurred when the weather conditions were clear. The remaining 30% of reported crashes occurred in either Cloudy, Rainy, or Snowy weather conditions.

Attached are the crash summary tables, a collision diagram, images of the intersection, and the results of the RoadHAT 4.1 analysis.

2022-2024 Crash Summary	
TOTAL CRASHES	30
TOTAL INJURIES	13
PROPERTY DAMAGE ONLY	22
NON-INCAPACITATING	4
INCAPACITATING	4
FATAL	0

Summary of Primary Factors per Manner of Collision		
Primary Factors per Manner of Collision	Crashes	Percent
REAR END	14	47%
FOLLOWING TOO CLOSELY	8	
DRIVER DISTRACTED - EXPLAIN IN NARRATIVE	3	
BRAKE FAILURE OR DEFECTIVE	2	
OTHER (DRIVER) - EXPLAIN IN NARRATIVE	1	
LEFT TURN	6	20%
FAILURE TO YIELD RIGHT OF WAY	3	
IMPROPER TURNING	2	
IMPROPER LANE USAGE	1	
RIGHT ANGLE	3	10%
FAILURE TO YIELD RIGHT OF WAY	2	
DISREGARD SIGNAL/REG SIGN	1	
SAME DIRECTION SIDESWIPE	3	10%
IMPROPER LANE USAGE	1	
FAILURE TO MAINTAIN LANE	1	
FOLLOWING TOO CLOSELY	1	
RAN OFF ROAD	2	7%
DISREGARD SIGNAL/REG SIGN	1	
UNSAFE LANE MOVEMENT	1	
RIGHT TURN	1	3%
UNSAFE SPEED	1	
LEFT/RIGHT TURN	1	3%
FAILURE TO YIELD RIGHT OF WAY	1	
Total Crashes	30	100%

Summary of Crashes per Time of Day		
Time of Day	Crashes	Percent
Peak AM (6:00-9:00 AM)	8	27%
Peak PM (4:00-7:00 PM)	5	17%
Off Peak	17	57%
Total Crashes	30	100%

Summary of Crashes per Light Conditions		
Light Conditions	Crashes	Percent
DAWN/DUSK	1	3%
DARK (LIGHTED)	5	17%
DAYLIGHT	24	80%
Total Crashes	30	100%

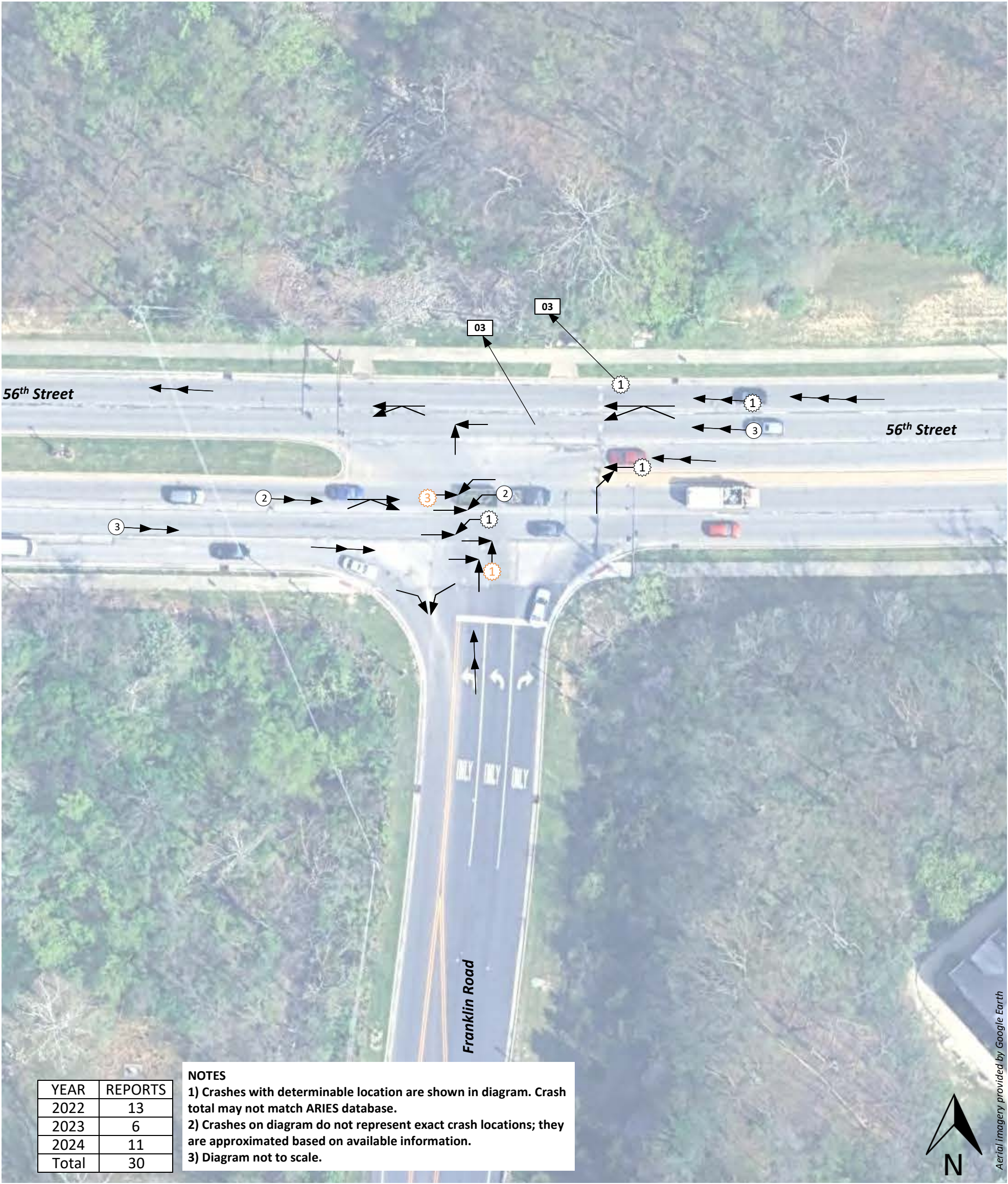
Summary of Roadway Surface Conditions			
Manner of Collision	DRY	WET	Total Crashes
REAR END	9	5	14
LEFT TURN	6		6
SAME DIRECTION SIDESWIPE	3		3
RIGHT ANGLE	2	1	3
RAN OFF ROAD	2		2
LEFT/RIGHT TURN	1		1
RIGHT TURN	1		1
Total Crashes	24	6	30

Summary of Weather Conditions					
Manner of Collision	CLEAR	RAIN	CLOUDY	SNOW	Total Crashes
REAR END	8	3	3		14
LEFT TURN	6				6
SAME DIRECTION SIDESWIPE	3				3
RIGHT ANGLE	1			2	3
RAN OFF ROAD	1		1		2
LEFT/RIGHT TURN	1				1
RIGHT TURN	1				1
Total Crashes	21	3	4	2	30

DIAGRAM OF
COLLISION
REPORTS

56th Street & Franklin Road

Study Period: 1/1/2022 to 12/31/2024 Location: Lawrence
INDOT District: Greenfield County: Marion City/Town: Lawrence
Analyst: JMR QC: DC Date: 3/26/2026



Intersection Images	56 th Street & Franklin Road	
	Study Period: <u>1/1/2022 to 12/31/2024</u> INDOT District: <u>Greenfield</u> County: <u>Marion</u>	Location: <u>Lawrence</u> City/Town: <u>Lawrence</u>



West Leg – Looking West



West Leg – Looking East



East Leg – Looking West



East Leg – Looking East



South Leg – Looking South



South Leg – Looking North

No North Leg at this Intersection

North Leg – Looking South

No North Leg at this Intersection

North Leg – Looking North

RoadHAT 4D	Index of Crash Frequency and Cost - Form F1		Page 1/2
Settings: Indiana local settings		Version: Version 4.1	
Location	56th Street & Franklin Road		
GIS			
Post			
Analyst	JMR		
Date	4/21/2026		
INPUT			
Road Facility Type	City Arterial Intersection		
Busiest Road AADT (veh/day)	24068		
Crossing Road AADT (veh/day)	3434		
First Year with Crash Data (yyyy)	2022		
Last Year with Crash Data (yyyy)	2024		
Number of Crashes (crash/period)			
Fatal and Incapacitating Injury Crashes	4		
Non-Incapacitating and Possible Injury Crashes	4		
Property Damage Only Crashes	22		
Route or Road Type	City Arterial Intersection		
Average Crash Costs (\$)			
Fatal and Incapacitating Injury Crashes	1840100		
Non-Incapacitating and Possible Injury Crashes	393200		
Property Damage Only Crashes	40200		
Crash Cost Year (yyyy)	2017		
OUTPUT			
Expected Crash Frequency (crash/year)			
Fatal and Incapacitating Injury Crashes	0.274		
Non-Incapacitating and Possible Injury Crashes	0.66		
Property Damage Only Crashes	3.46		
All Crashes	4.40		
Index of Crash Frequency	1.37		
Index of Crash Cost	1.54		

RoadHAT 4D	Index of Crash Frequency and Cost - Form F1		Page 2/2
Settings: Indiana local settings		Version: Version 4.1	
Location	56th Street & Franklin Road		
GIS			
Post			
Analyst	JMR		
Date	4/21/2026		
Comments: Traffic Counts: MioVision Counts provided by Indy DPW (dated: 12/5/2023) Crash Data: ARIES provided by IMPO			

Attachment B Traffic Counts

56th St & Franklin Rd - TMC

Tue Dec 5, 2023

Full Length (12 AM-12 AM (+1))

All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)

All Movements

ID: 1141047, Location: 39.854965, -86.027104, Site Code: 2363-2099-70 phase 1000



Provided by: DLZ

8430 W Bryn Mawr Ave., 100,
Chicago, IL, 60631, US

Leg Direction	West Eastbound				East Westbound				South Northbound				
Time	T	R	U	App	L	T	U	App	L	R	U	App	Int
2023-12-05 12:00AM	15	5	0	20	8	8	0	16	5	3	0	8	44
12:15AM	16	1	0	17	3	9	0	12	3	1	0	4	33
12:30AM	13	2	0	15	1	8	0	9	2	0	0	2	26
12:45AM	10	1	0	11	1	9	0	10	0	2	0	2	23
Hourly Total	54	9	0	63	13	34	0	47	10	6	0	16	126
1:00AM	8	2	0	10	2	5	0	7	0	1	0	1	18
1:15AM	7	2	0	9	1	8	0	9	1	1	0	2	20
1:30AM	6	1	0	7	0	6	0	6	1	0	0	1	14
1:45AM	11	3	0	14	2	1	0	3	1	3	0	4	21
Hourly Total	32	8	0	40	5	20	0	25	3	5	0	8	73
2:00AM	6	0	0	6	1	3	0	4	0	0	0	0	10
2:15AM	2	0	0	2	2	2	0	4	1	1	0	2	8
2:30AM	11	0	0	11	1	3	0	4	3	1	0	4	19
2:45AM	8	0	0	8	2	3	0	5	0	3	0	3	16
Hourly Total	27	0	0	27	6	11	0	17	4	5	0	9	53
3:00AM	8	1	0	9	2	6	0	8	0	0	0	0	17
3:15AM	3	0	0	3	3	9	0	12	2	1	0	3	18
3:30AM	14	0	0	14	0	12	0	12	1	1	0	2	28
3:45AM	15	1	0	16	0	7	0	7	2	1	0	3	26
Hourly Total	40	2	0	42	5	34	0	39	5	3	0	8	89
4:00AM	8	0	0	8	1	18	0	19	1	1	0	2	29
4:15AM	20	0	0	20	0	11	0	11	3	2	0	5	36
4:30AM	17	1	0	18	0	10	0	10	1	2	0	3	31
4:45AM	29	3	0	32	3	23	0	26	3	2	0	5	63
Hourly Total	74	4	0	78	4	62	0	66	8	7	0	15	159
5:00AM	33	4	0	37	4	22	0	26	6	6	0	12	75
5:15AM	37	3	0	40	4	29	0	33	7	7	0	14	87
5:30AM	61	5	0	66	8	44	0	52	6	9	0	15	133
5:45AM	72	3	0	75	6	43	0	49	10	16	0	26	150
Hourly Total	203	15	0	218	22	138	0	160	29	38	0	67	445
6:00AM	61	6	0	67	9	54	0	63	8	11	0	19	149
6:15AM	104	4	0	108	14	81	0	95	6	16	0	22	225
6:30AM	87	15	0	102	14	100	0	114	13	28	0	41	257
6:45AM	122	16	0	138	10	115	0	125	16	29	0	45	308
Hourly Total	374	41	0	415	47	350	0	397	43	84	0	127	939
7:00AM	126	17	0	143	17	133	0	150	30	24	0	54	347
7:15AM	180	17	0	197	32	166	0	198	29	39	0	68	463
7:30AM	184	23	0	207	34	213	0	247	44	42	0	86	540
7:45AM	211	27	0	238	34	242	0	276	45	49	0	94	608
Hourly Total	701	84	0	785	117	754	0	871	148	154	0	302	1958
8:00AM	214	17	0	231	45	262	0	307	29	46	0	75	613
8:15AM	218	24	0	242	47	249	0	296	50	50	0	100	638
8:30AM	228	61	0	289	43	230	0	273	60	45	0	105	667
8:45AM	241	38	0	279	25	174	0	199	43	48	0	91	569
Hourly Total	901	140	0	1041	160	915	0	1075	182	189	0	371	2487
9:00AM	169	19	0	188	36	115	0	151	39	42	0	81	420
9:15AM	193	27	0	220	43	129	0	172	19	34	0	53	445
9:30AM	157	15	0	172	32	133	0	165	15	21	0	36	373
9:45AM	126	15	0	141	25	108	0	133	14	23	0	37	311
Hourly Total	645	76	0	721	136	485	0	621	87	120	0	207	1549
10:00AM	124	18	0	142	24	113	0	137	25	25	0	50	329
10:15AM	87	16	0	103	25	102	0	127	23	21	0	44	274
10:30AM	129	20	0	149	11	107	0	118	22	19	0	41	308

Leg Direction	West Eastbound				East Westbound				South Northbound				
Time	T	R	U	App	L	T	U	App	L	R	U	App	Int
10:45AM	138	26	0	164	28	92	0	120	15	28	0	43	327
Hourly Total	478	80	0	558	88	414	0	502	85	93	0	178	1238
11:00AM	123	15	0	138	29	101	0	130	14	32	0	46	314
11:15AM	110	20	0	130	17	116	0	133	16	32	0	48	311
11:30AM	127	22	0	149	25	125	0	150	18	26	0	44	343
11:45AM	152	20	0	172	32	123	0	155	23	22	0	45	372
Hourly Total	512	77	0	589	103	465	0	568	71	112	0	183	1340
12:00PM	145	27	0	172	38	140	1	179	18	30	0	48	399
12:15PM	147	26	0	173	31	139	0	170	22	27	0	49	392
12:30PM	138	24	0	162	28	138	0	166	21	29	0	50	378
12:45PM	162	9	0	171	34	134	0	168	26	23	0	49	388
Hourly Total	592	86	0	678	131	551	1	683	87	109	0	196	1557
1:00PM	139	15	0	154	23	117	0	140	21	31	0	52	346
1:15PM	160	22	0	182	24	128	0	152	16	29	0	45	379
1:30PM	183	22	0	205	36	137	0	173	19	25	0	44	422
1:45PM	167	34	0	201	36	130	0	166	15	21	0	36	403
Hourly Total	649	93	0	742	119	512	0	631	71	106	0	177	1550
2:00PM	185	20	0	205	46	146	0	192	19	19	0	38	435
2:15PM	163	33	1	197	30	146	0	176	25	32	0	57	430
2:30PM	202	26	0	228	45	166	0	211	28	33	0	61	500
2:45PM	182	29	0	211	44	165	0	209	31	37	0	68	488
Hourly Total	732	108	1	841	165	623	0	788	103	121	0	224	1853
3:00PM	196	38	0	234	45	172	0	217	30	32	0	62	513
3:15PM	177	40	0	217	45	211	0	256	33	37	0	70	543
3:30PM	183	41	0	224	57	195	0	252	37	27	0	64	540
3:45PM	246	78	0	324	48	179	0	227	34	35	0	69	620
Hourly Total	802	197	0	999	195	757	0	952	134	131	0	265	2216
4:00PM	285	56	0	341	50	185	0	235	39	32	0	71	647
4:15PM	208	42	0	250	67	199	0	266	23	29	0	52	568
4:30PM	266	36	0	302	60	251	0	311	22	54	0	76	689
4:45PM	234	57	0	291	53	239	0	292	38	46	0	84	667
Hourly Total	993	191	0	1184	230	874	0	1104	122	161	0	283	2571
5:00PM	249	55	0	304	57	255	0	312	24	33	0	57	673
5:15PM	236	60	0	296	37	204	0	241	26	34	0	60	597
5:30PM	240	34	0	274	38	178	0	216	31	40	0	71	561
5:45PM	208	43	0	251	35	188	0	223	22	29	0	51	525
Hourly Total	933	192	0	1125	167	825	0	992	103	136	0	239	2356
6:00PM	203	29	0	232	29	180	0	209	29	35	0	64	505
6:15PM	168	31	0	199	32	128	0	160	23	20	0	43	402
6:30PM	174	31	0	205	23	111	0	134	21	23	0	44	383
6:45PM	130	32	0	162	26	105	0	131	24	23	0	47	340
Hourly Total	675	123	0	798	110	524	0	634	97	101	0	198	1630
7:00PM	140	26	0	166	22	90	0	112	21	27	0	48	326
7:15PM	130	26	0	156	21	92	0	113	26	14	0	40	309
7:30PM	144	26	0	170	19	58	0	77	11	14	0	25	272
7:45PM	128	25	0	153	11	70	0	81	20	16	0	36	270
Hourly Total	542	103	0	645	73	310	0	383	78	71	0	149	1177
8:00PM	127	19	0	146	12	78	0	90	14	11	0	25	261
8:15PM	143	27	0	170	12	78	0	90	14	11	0	25	285
8:30PM	66	13	0	79	16	81	0	97	11	8	0	19	195
8:45PM	66	16	0	82	10	57	0	67	13	11	0	24	173
Hourly Total	402	75	0	477	50	294	0	344	52	41	0	93	914
9:00PM	81	20	0	101	16	38	0	54	6	9	0	15	170
9:15PM	84	8	0	92	8	49	0	57	8	8	0	16	165
9:30PM	71	12	0	83	7	42	0	49	7	12	0	19	151
9:45PM	61	11	0	72	10	41	0	51	2	5	0	7	130
Hourly Total	297	51	0	348	41	170	0	211	23	34	0	57	616
10:00PM	43	6	0	49	8	32	0	40	6	3	0	9	98
10:15PM	43	10	0	53	4	27	0	31	2	5	0	7	91
10:30PM	49	6	0	55	6	35	1	42	2	12	0	14	111

Leg Direction	West Eastbound				East Westbound				South Northbound				
Time	T	R	U	App	L	T	U	App	L	R	U	App	Int
10:45PM	48	6	0	54	1	18	0	19	2	5	0	7	80
Hourly Total	183	28	0	211	19	112	1	132	12	25	0	37	380
11:00PM	32	10	0	42	3	25	0	28	3	3	0	6	76
11:15PM	21	5	0	26	2	13	0	15	5	4	0	9	50
11:30PM	28	13	0	41	2	7	0	9	4	2	0	6	56
11:45PM	21	3	0	24	5	11	0	16	4	0	0	4	44
Hourly Total	102	31	0	133	12	56	0	68	16	9	0	25	226
Total	10943	1814	1	12758	2018	9290	2	11310	1573	1861	0	3434	27502
% Approach	85.8%	14.2%	0%	-	17.8%	82.1%	0%	-	45.8%	54.2%	0%	-	-
% Total	39.8%	6.6%	0%	46.4%	7.3%	33.8%	0%	41.1%	5.7%	6.8%	0%	12.5%	-
Lights	10595	1777	1	12373	1976	9021	2	10999	1527	1836	0	3363	26735
% Lights	96.8%	98.0%	100%	97.0%	97.9%	97.1%	100%	97.3%	97.1%	98.7%	0%	97.9%	97.2%
Articulated Trucks	27	3	0	30	4	23	0	27	3	0	0	3	60
% Articulated Trucks	0.2%	0.2%	0%	0.2%	0.2%	0.2%	0%	0.2%	0.2%	0%	0%	0.1%	0.2%
Buses and Single-Unit Trucks	321	34	0	355	38	246	0	284	43	25	0	68	707
% Buses and Single-Unit Trucks	2.9%	1.9%	0%	2.8%	1.9%	2.6%	0%	2.5%	2.7%	1.3%	0%	2.0%	2.6%

* L: Left, R: Right, T: Thru, U: U-Turn

56th St & Franklin Rd - TMC

Tue Dec 5, 2023

Full Length (12 AM-12 AM (+1))

All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)

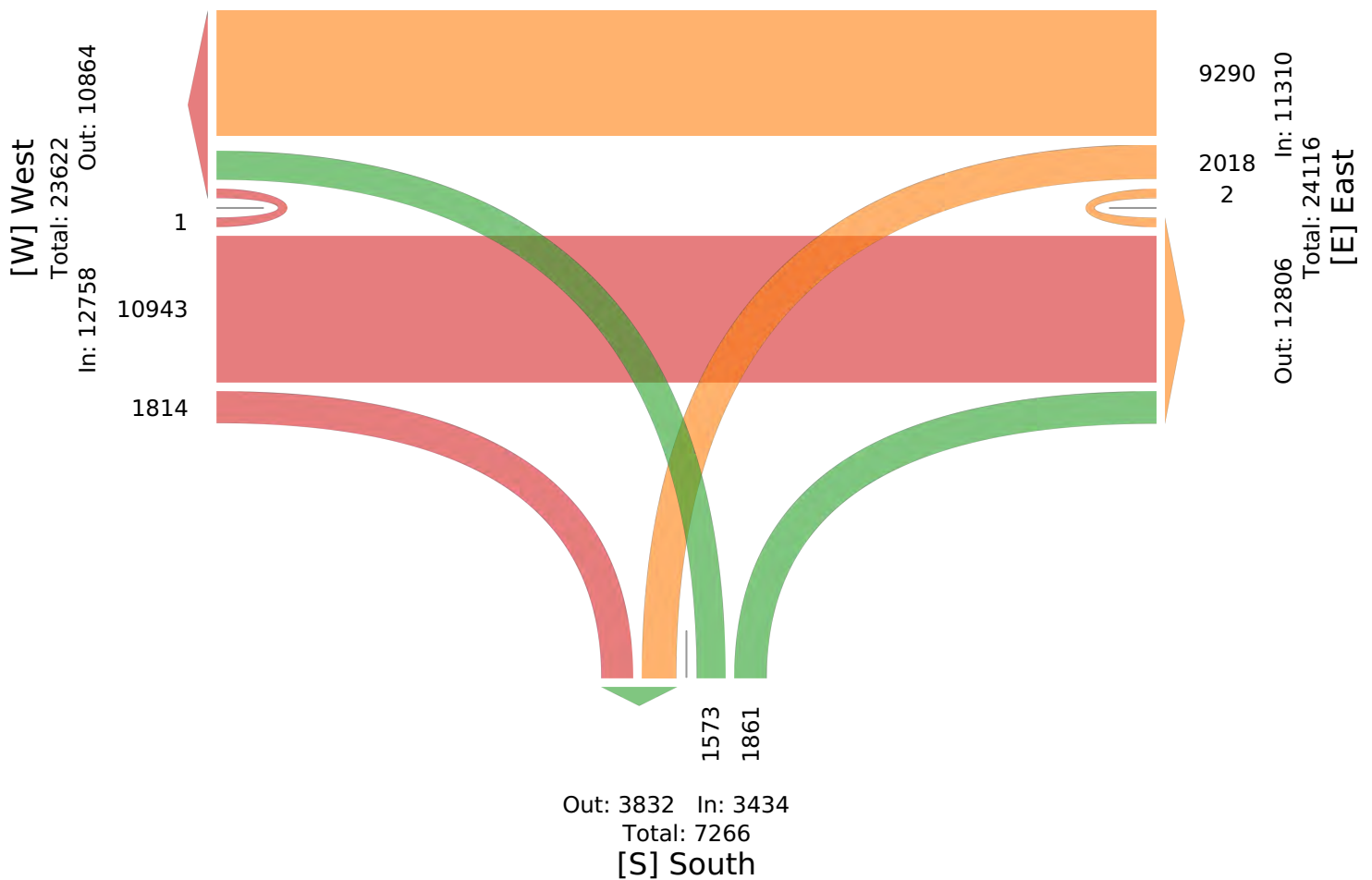
All Movements

ID: 1141047, Location: 39.854965, -86.027104, Site Code: 2363-2099-70 phase 1000



Provided by: DLZ

8430 W Bryn Mawr Ave., 100,
Chicago, IL, 60631, US



56th St & Franklin Rd - TMC

Tue Dec 5, 2023

AM Peak (7:45 AM - 8:45 AM)

All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)

All Movements

ID: 1141047, Location: 39.854965, -86.027104, Site Code: 2363-2099-70 phase 1000



Provided by: DLZ

8430 W Bryn Mawr Ave., 100,
Chicago, IL, 60631, US

Leg Direction	West Eastbound				East Westbound				South Northbound				
Time	T	R	U	App	L	T	U	App	L	R	U	App	Int
2023-12-05 7:45AM	211	27	0	238	34	242	0	276	45	49	0	94	608
8:00AM	214	17	0	231	45	262	0	307	29	46	0	75	613
8:15AM	218	24	0	242	47	249	0	296	50	50	0	100	638
8:30AM	228	61	0	289	43	230	0	273	60	45	0	105	667
Total	871	129	0	1000	169	983	0	1152	184	190	0	374	2526
% Approach	87.1%	12.9%	0%	-	14.7%	85.3%	0%	-	49.2%	50.8%	0%	-	-
% Total	34.5%	5.1%	0%	39.6%	6.7%	38.9%	0%	45.6%	7.3%	7.5%	0%	14.8%	-
PHF	0.955	0.529	-	0.865	0.899	0.938	-	0.938	0.767	0.950	-	0.890	0.947
Lights	830	124	0	954	163	946	0	1109	174	187	0	361	2424
% Lights	95.3%	96.1%	0%	95.4%	96.4%	96.2%	0%	96.3%	94.6%	98.4%	0%	96.5%	96.0%
Articulated Trucks	2	1	0	3	0	2	0	2	0	0	0	0	5
% Articulated Trucks	0.2%	0.8%	0%	0.3%	0%	0.2%	0%	0.2%	0%	0%	0%	0%	0.2%
Buses and Single-Unit Trucks	39	4	0	43	6	35	0	41	10	3	0	13	97
% Buses and Single-Unit Trucks	4.5%	3.1%	0%	4.3%	3.6%	3.6%	0%	3.6%	5.4%	1.6%	0%	3.5%	3.8%

*L: Left, R: Right, T: Thru, U: U-Turn

56th St & Franklin Rd - TMC

Tue Dec 5, 2023

AM Peak (7:45 AM - 8:45 AM)

All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)

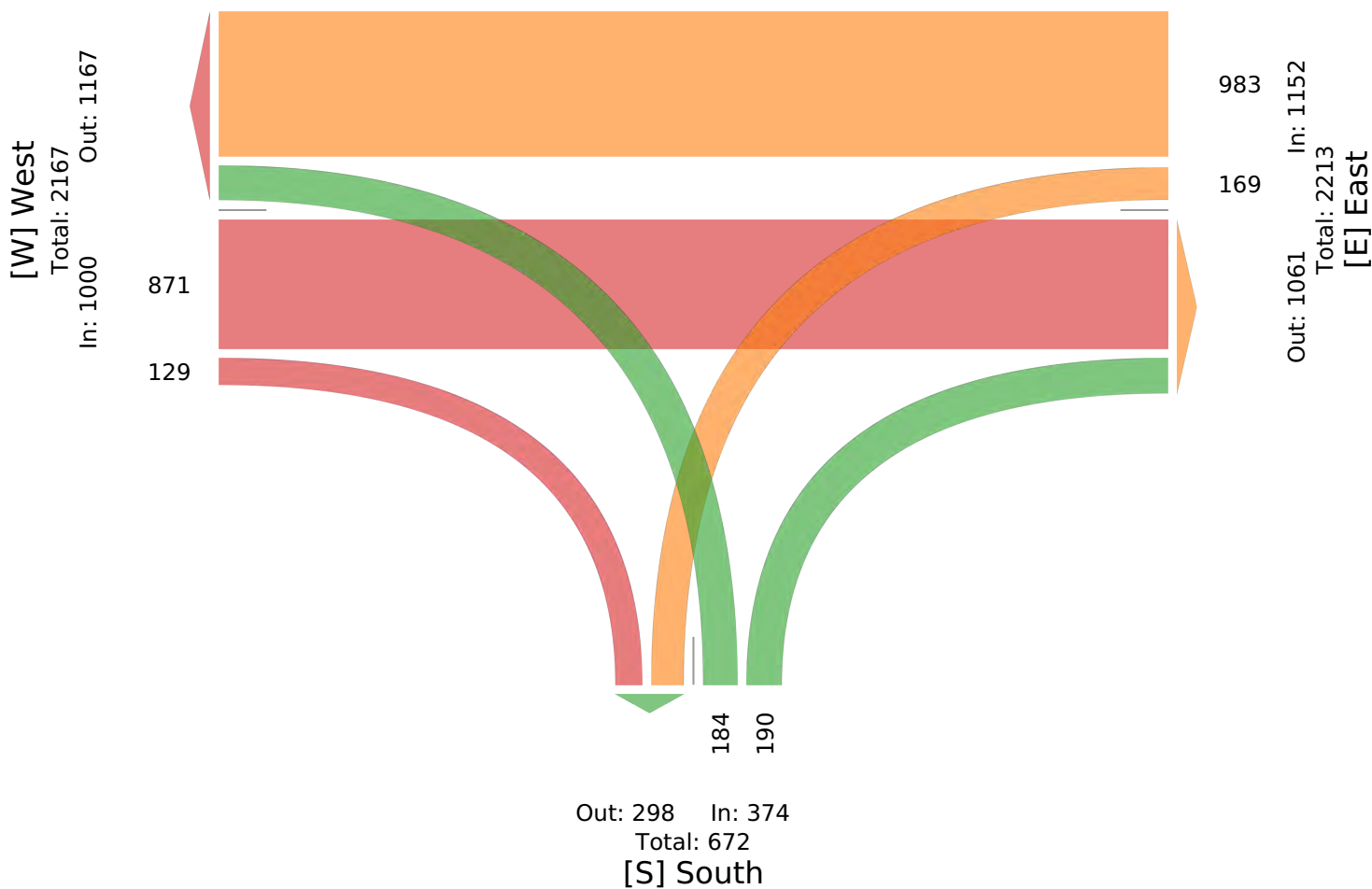
All Movements

ID: 1141047, Location: 39.854965, -86.027104, Site Code: 2363-2099-70 phase 1000



Provided by: DLZ

8430 W Bryn Mawr Ave., 100,
Chicago, IL, 60631, US



56th St & Franklin Rd - TMC

Tue Dec 5, 2023

Midday Peak (12 PM - 1 PM)

All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)

All Movements

ID: 1141047, Location: 39.854965, -86.027104, Site Code: 2363-2099-70 phase

1000



Provided by: DLZ

8430 W Bryn Mawr Ave., 100,
Chicago, IL, 60631, US

Leg Direction	West Eastbound				East Westbound				South Northbound				
Time	T	R	U	App	L	T	U	App	L	R	U	App	Int
2023-12-05 12:00PM	145	27	0	172	38	140	1	179	18	30	0	48	399
12:15PM	147	26	0	173	31	139	0	170	22	27	0	49	392
12:30PM	138	24	0	162	28	138	0	166	21	29	0	50	378
12:45PM	162	9	0	171	34	134	0	168	26	23	0	49	388
Total	592	86	0	678	131	551	1	683	87	109	0	196	1557
% Approach	87.3%	12.7%	0%	-	19.2%	80.7%	0.1%	-	44.4%	55.6%	0%	-	-
% Total	38.0%	5.5%	0%	43.5%	8.4%	35.4%	0.1%	43.9%	5.6%	7.0%	0%	12.6%	-
PHF	0.914	0.796	-	0.980	0.862	0.984	0.250	0.954	0.837	0.908	-	0.980	0.976
Lights	578	81	0	659	128	537	1	666	85	106	0	191	1516
% Lights	97.6%	94.2%	0%	97.2%	97.7%	97.5%	100%	97.5%	97.7%	97.2%	0%	97.4%	97.4%
Articulated Trucks	3	0	0	3	1	0	0	1	0	0	0	0	4
% Articulated Trucks	0.5%	0%	0%	0.4%	0.8%	0%	0%	0.1%	0%	0%	0%	0%	0.3%
Buses and Single-Unit Trucks	11	5	0	16	2	14	0	16	2	3	0	5	37
% Buses and Single-Unit Trucks	1.9%	5.8%	0%	2.4%	1.5%	2.5%	0%	2.3%	2.3%	2.8%	0%	2.6%	2.4%

*L: Left, R: Right, T: Thru, U: U-Turn

56th St & Franklin Rd - TMC

Tue Dec 5, 2023

Midday Peak (12 PM - 1 PM)

All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)

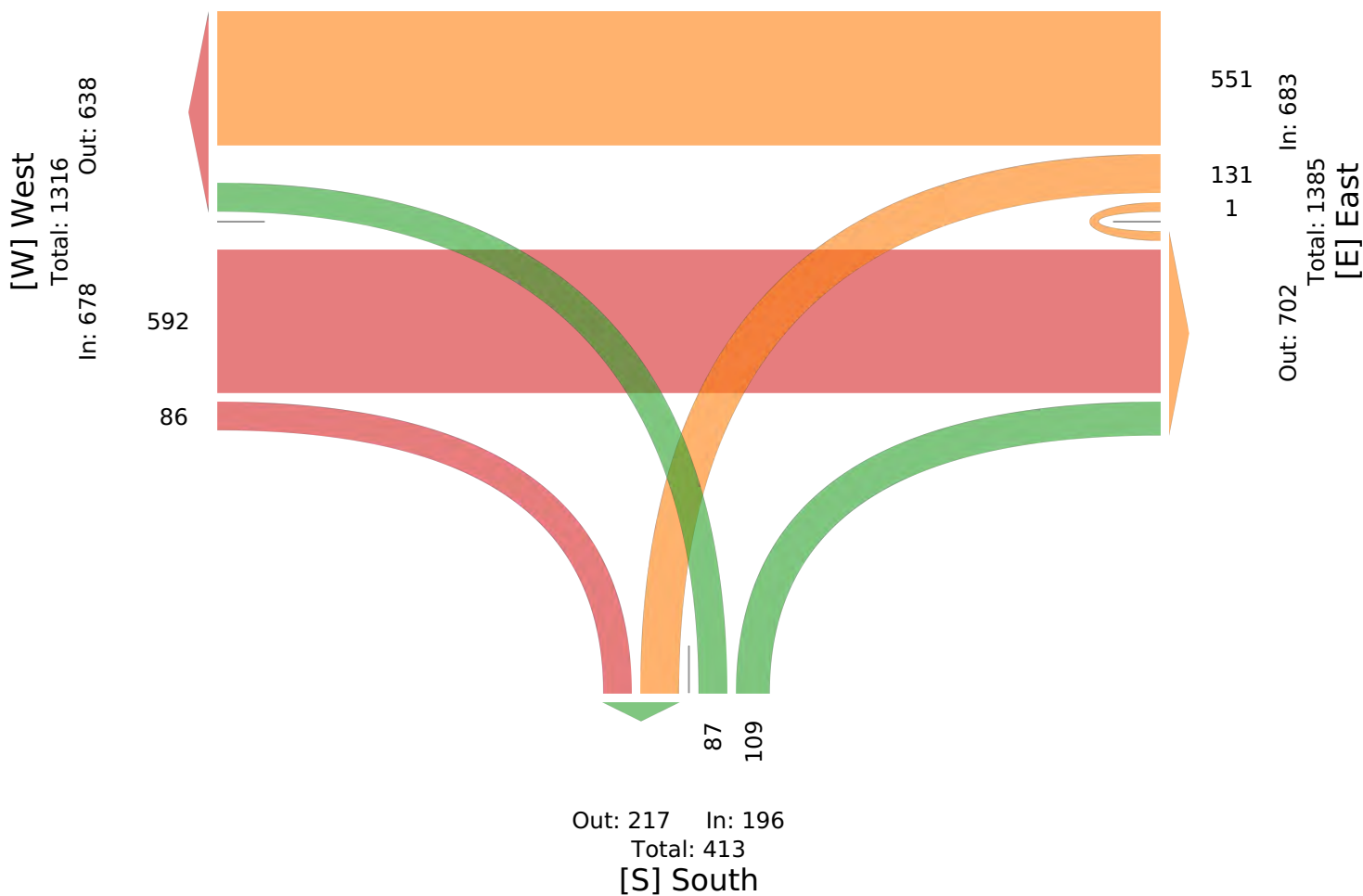
All Movements

ID: 1141047, Location: 39.854965, -86.027104, Site Code: 2363-2099-70 phase 1000



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8430 W Bryn Mawr Ave., 100,
Chicago, IL, 60631, US



56th St & Franklin Rd - TMC

Tue Dec 5, 2023

PM Peak (4:30 PM - 5:30 PM) - Overall Peak Hour

All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)

All Movements

ID: 1141047, Location: 39.854965, -86.027104, Site Code: 2363-2099-70 phase

1000



Provided by: DLZ

8430 W Bryn Mawr Ave., 100,
Chicago, IL, 60631, US

Leg Direction	West Eastbound				East Westbound				South Northbound				
Time	T	R	U	App	L	T	U	App	L	R	U	App	Int
2023-12-05 4:30PM	266	36	0	302	60	251	0	311	22	54	0	76	689
4:45PM	234	57	0	291	53	239	0	292	38	46	0	84	667
5:00PM	249	55	0	304	57	255	0	312	24	33	0	57	673
5:15PM	236	60	0	296	37	204	0	241	26	34	0	60	597
Total	985	208	0	1193	207	949	0	1156	110	167	0	277	2626
% Approach	82.6%	17.4%	0%	-	17.9%	82.1%	0%	-	39.7%	60.3%	0%	-	-
% Total	37.5%	7.9%	0%	45.4%	7.9%	36.1%	0%	44.0%	4.2%	6.4%	0%	10.5%	-
PHF	0.926	0.867	-	0.981	0.863	0.930	-	0.926	0.724	0.773	-	0.824	0.953
Lights	954	207	0	1161	205	937	0	1142	110	165	0	275	2578
% Lights	96.9%	99.5%	0%	97.3%	99.0%	98.7%	0%	98.8%	100%	98.8%	0%	99.3%	98.2%
Articulated Trucks	2	0	0	2	0	1	0	1	0	0	0	0	3
% Articulated Trucks	0.2%	0%	0%	0.2%	0%	0.1%	0%	0.1%	0%	0%	0%	0%	0.1%
Buses and Single-Unit Trucks	29	1	0	30	2	11	0	13	0	2	0	2	45
% Buses and Single-Unit Trucks	2.9%	0.5%	0%	2.5%	1.0%	1.2%	0%	1.1%	0%	1.2%	0%	0.7%	1.7%

*L: Left, R: Right, T: Thru, U: U-Turn

56th St & Franklin Rd - TMC

Tue Dec 5, 2023

PM Peak (4:30 PM - 5:30 PM) - Overall Peak Hour

All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)

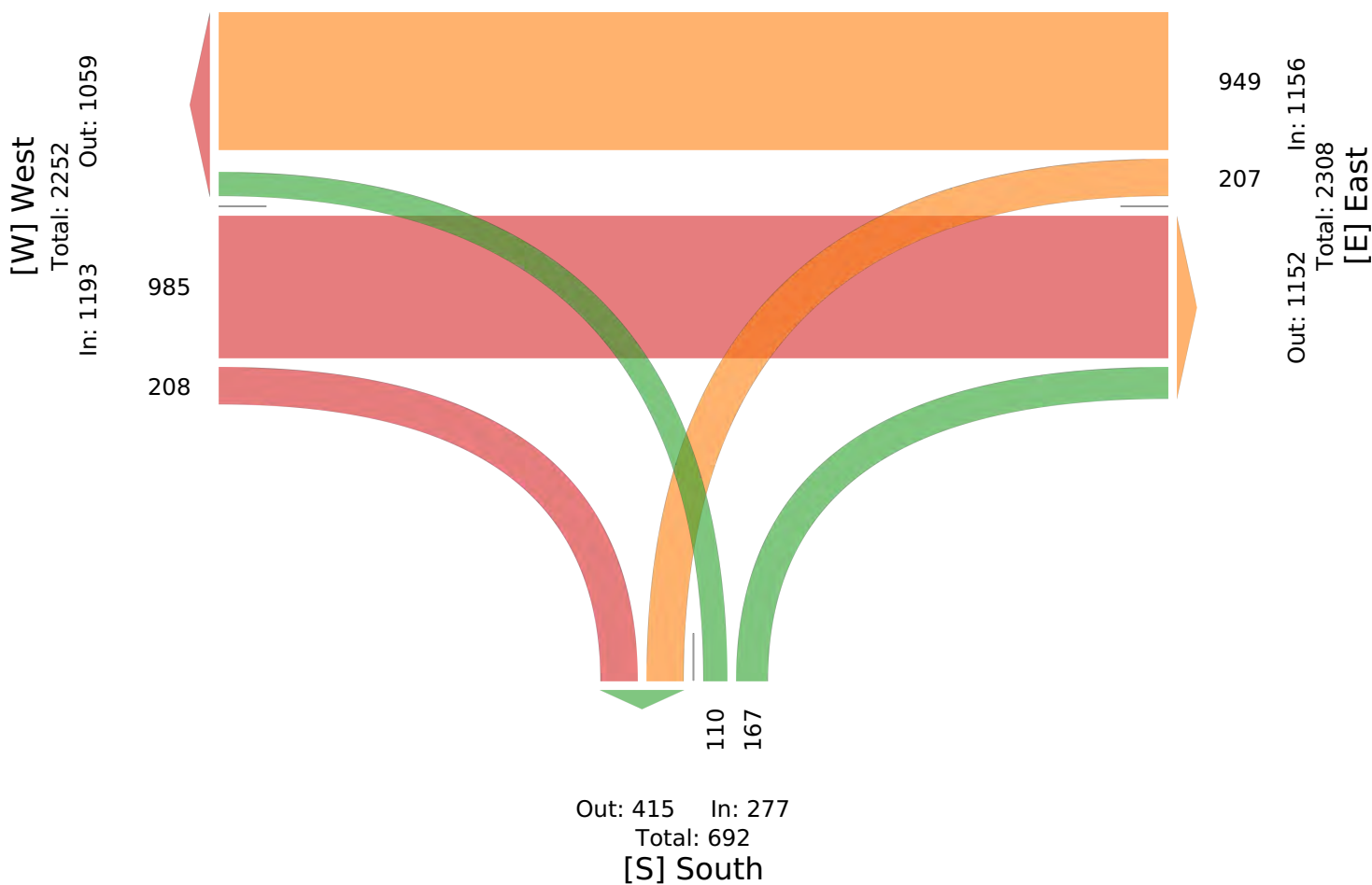
All Movements

ID: 1141047, Location: 39.854965, -86.027104, Site Code: 2363-2099-70 phase 1000



Provided by: DLZ

8430 W Bryn Mawr Ave., 100,
Chicago, IL, 60631, US



Attachment C

Traffic Analysis

			Existing 2026									
Intersection	Type	MOE	2026 AM Peak Hour					2026 PM Peak Hour				
			EB	WB	NB	SB	INT	EB	WB	NB	SB	INT
Franklin Rd & 56th Street	Signal	LOS	B	B	C	---	B	B	B	C	---	B
		Delay (sec/veh)	15.8	10.8	29.1	---	15.5	17.3	11.1	27.5	---	15.6
		Queue Length 95th (ft)	306	252	85	---		324	203	89	---	
		v/c Ratio	0.50	0.47	0.39	---		0.57	0.63	0.33	---	
		LOS-F Movements	---	---	---	---		---	---	---	---	

			No-Build 2050									
Intersection	Type	MOE	2050 AM Peak Hour					2050 PM Peak Hour				
			EB	WB	NB	SB	INT	EB	WB	NB	SB	INT
Franklin Rd & 56th Street	Signal	LOS	C	B	C	---	C	D	C	C	---	C
		Delay (sec/veh)	22.9	16.7	26.4	---	20.6	37.1	22.1	22.9	---	29.0
		Queue Length 95th (ft)	458	364	157	---		594	326	137	---	
		v/c Ratio	0.79	0.85	0.50	---		0.96	0.95	0.39	---	
		LOS-F Movements	---	---	---	---		---	---	---	---	

			Build 2026									
Intersection	Type	MOE	2026 AM Peak Hour					2026 PM Peak Hour				
			EB	WB	NB	SB	INT	EB	WB	NB	SB	INT
Franklin Rd & 56th Street	Signal	LOS	B	B	C	---	B	C	B	C	---	C
		Delay (sec/veh)	19.8	15.7	27.5	---	19.1	21.8	17.1	25.8	---	20.2
		Queue Length 95th (ft)	352	289	140	---		377	249	95	---	
		v/c Ratio	0.56	0.85	0.34	---		0.64	0.87	0.29	---	
		LOS-F Movements	---	---	---	---		---	---	---	---	

			Build 2050									
Intersection	Type	MOE	2050 AM Peak Hour					2050 PM Peak Hour				
			EB	WB	NB	SB	INT	EB	WB	NB	SB	INT
Franklin Rd & 56th Street	Signal	LOS	D	C	C	---	C	D	C	C	---	C
		Delay (sec/veh)	37.6	22.3	23.6	---	28.6	43.9	25.1	25.4	---	33.7
		Queue Length 95th (ft)	516	540	182	---		750	916	136	---	
		v/c Ratio	0.94	0.92	0.42	---		0.98	0.98	0.37	---	
		LOS-F Movements	---	---	---	---		---	WBL	---	---	

HCM 7th Signalized Intersection Summary
21: Franklin Rd & 56th St

2026 AM
Existing

						
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↑	↑	↑↑	↑↑	↑
Traffic Volume (veh/h)	868	129	168	980	183	189
Future Volume (veh/h)	868	129	168	980	183	189
Initial Q (Qb), veh	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1826	1841	1841	1841	1826	1870
Adj Flow Rate, veh/h	914	136	177	1032	193	199
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	5	4	4	4	5	2
Cap, veh/h	1825	821	373	2186	870	510
Arrive On Green	0.53	0.53	0.06	0.63	0.26	0.26
Sat Flow, veh/h	3561	1560	1753	3589	3374	1585
Grp Volume(v), veh/h	914	136	177	1032	193	199
Grp Sat Flow(s),veh/h/ln	1735	1560	1753	1749	1687	1585
Q Serve(g_s), s	17.0	4.5	4.4	15.7	4.5	9.7
Cycle Q Clear(g_c), s	17.0	4.5	4.4	15.7	4.5	9.7
Prop In Lane		1.00	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	1825	821	373	2186	870	510
V/C Ratio(X)	0.50	0.17	0.47	0.47	0.22	0.39
Avail Cap(c_a), veh/h	1825	821	462	2186	870	510
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	15.3	12.3	11.2	10.0	29.2	26.3
Incr Delay (d2), s/veh	1.0	0.4	0.3	0.7	0.6	2.2
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	6.3	1.6	1.5	5.4	1.9	9.6
Unsig. Movement Delay, s/veh						
LnGrp Delay(d), s/veh	16.2	12.7	11.5	10.7	29.8	28.5
LnGrp LOS	B	B	B	B	C	C
Approach Vol, veh/h	1050			1209	392	
Approach Delay, s/veh	15.8			10.8	29.1	
Approach LOS	B			B	C	
Timer - Assigned Phs	1	2		4		6
Phs Duration (G+Y+Rc), s	9.9	58.1		32.0		68.0
Change Period (Y+Rc), s	3.5	5.5		6.2		5.5
Max Green Setting (Gmax), s	11.5	47.5		25.8		47.5
Max Q Clear Time (g_c+I1), s	6.4	19.0		11.7		17.7
Green Ext Time (p_c), s	0.1	8.2		1.0		10.2
Intersection Summary						
HCM 7th Control Delay, s/veh			15.5			
HCM 7th LOS			B			

						
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Group Flow (vph)	914	136	177	1032	193	199
v/c Ratio	0.74	0.21	0.68	0.61	0.15	0.22
Control Delay (s/veh)	31.3	4.0	26.3	20.1	21.6	8.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	31.3	4.0	26.3	20.1	21.6	8.2
Queue Length 50th (ft)	276	0	62	253	41	34
Queue Length 95th (ft)	306	35	86	252	77	85
Internal Link Dist (ft)	1395			737	732	
Turn Bay Length (ft)		180	200		100	
Base Capacity (vph)	1633	809	301	2169	1330	946
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.56	0.17	0.59	0.48	0.15	0.21
Intersection Summary						

						
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	982	207	206	946	110	166
Future Volume (veh/h)	982	207	206	946	110	166
Initial Q (Qb), veh	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1856	1900	1885	1885	1900	1885
Adj Flow Rate, veh/h	1034	218	217	996	116	175
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	3	0	1	1	0	1
Cap, veh/h	1819	831	346	2239	906	531
Arrive On Green	0.52	0.52	0.07	0.63	0.26	0.26
Sat Flow, veh/h	3618	1610	1795	3676	3510	1598
Grp Volume(v), veh/h	1034	218	217	996	116	175
Grp Sat Flow(s),veh/h/ln	1763	1610	1795	1791	1755	1598
Q Serve(g_s), s	20.1	7.6	5.4	14.4	2.5	8.2
Cycle Q Clear(g_c), s	20.1	7.6	5.4	14.4	2.5	8.2
Prop In Lane		1.00	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	1819	831	346	2239	906	531
V/C Ratio(X)	0.57	0.26	0.63	0.44	0.13	0.33
Avail Cap(c_a), veh/h	1819	831	419	2239	906	531
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	16.6	13.6	13.4	9.7	28.5	25.0
Incr Delay (d2), s/veh	1.3	0.8	1.0	0.6	0.3	1.7
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	7.7	2.7	1.9	5.1	1.1	8.3
Unsig. Movement Delay, s/veh						
LnGrp Delay(d), s/veh	17.9	14.3	14.4	10.4	28.8	26.7
LnGrp LOS	B	B	B	B	C	C
Approach Vol, veh/h	1252			1213	291	
Approach Delay, s/veh	17.3			11.1	27.5	
Approach LOS	B			B	C	
Timer - Assigned Phs	1	2		4		6
Phs Duration (G+Y+Rc), s	10.9	57.1		32.0		68.0
Change Period (Y+Rc), s	3.5	5.5		6.2		5.5
Max Green Setting (Gmax), s	11.5	47.5		25.8		47.5
Max Q Clear Time (g_c+I1), s	7.4	22.1		10.2		16.4
Green Ext Time (p_c), s	0.1	9.1		0.7		9.8
Intersection Summary						
HCM 7th Control Delay, s/veh			15.6			
HCM 7th LOS			B			

						
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Group Flow (vph)	1034	218	217	996	116	175
v/c Ratio	0.74	0.28	0.79	0.53	0.09	0.21
Control Delay (s/veh)	28.7	3.2	35.6	16.0	24.4	10.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	28.7	3.2	35.6	16.0	24.4	10.7
Queue Length 50th (ft)	296	0	67	208	25	38
Queue Length 95th (ft)	324	38	125	203	51	89
Internal Link Dist (ft)	1395			737	732	
Turn Bay Length (ft)		180	200		100	
Base Capacity (vph)	1664	881	306	2233	1242	877
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.62	0.25	0.71	0.45	0.09	0.20
Intersection Summary						

						
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↑	↓	↑↑	↓	↑
Traffic Volume (veh/h)	1233	183	239	1392	260	268
Future Volume (veh/h)	1233	183	239	1392	260	268
Initial Q (Qb), veh	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1826	1841	1841	1841	1826	1870
Adj Flow Rate, veh/h	1298	193	252	1465	274	282
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	5	4	4	4	5	2
Cap, veh/h	1638	736	296	2110	900	569
Arrive On Green	0.47	0.47	0.09	0.60	0.27	0.27
Sat Flow, veh/h	3561	1560	1753	3589	3374	1585
Grp Volume(v), veh/h	1298	193	252	1465	274	282
Grp Sat Flow(s),veh/h/ln	1735	1560	1753	1749	1687	1585
Q Serve(g_s), s	28.4	6.7	6.2	25.7	5.8	12.5
Cycle Q Clear(g_c), s	28.4	6.7	6.2	25.7	5.8	12.5
Prop In Lane		1.00	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	1638	736	296	2110	900	569
V/C Ratio(X)	0.79	0.26	0.85	0.69	0.30	0.50
Avail Cap(c_a), veh/h	1638	736	358	2110	900	569
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	20.0	14.3	18.5	12.2	26.3	22.5
Incr Delay (d2), s/veh	4.0	0.9	13.1	1.9	0.9	3.1
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	11.1	2.3	3.3	8.9	2.4	12.0
Unsig. Movement Delay, s/veh						
LnGrp Delay(d), s/veh	24.1	15.2	31.6	14.1	27.2	25.6
LnGrp LOS	C	B	C	B	C	C
Approach Vol, veh/h	1491			1717	556	
Approach Delay, s/veh	22.9			16.7	26.4	
Approach LOS	C			B	C	
Timer - Assigned Phs	1	2		4		6
Phs Duration (G+Y+Rc), s	11.8	48.0		30.2		59.8
Change Period (Y+Rc), s	3.5	5.5		6.2		5.5
Max Green Setting (Gmax), s	11.5	39.3		24.0		54.3
Max Q Clear Time (g_c+I1), s	8.2	30.4		14.5		27.7
Green Ext Time (p_c), s	0.1	6.1		1.3		15.0
Intersection Summary						
HCM 7th Control Delay, s/veh			20.6			
HCM 7th LOS			C			

						
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Group Flow (vph)	1298	193	252	1465	274	282
v/c Ratio	0.87	0.25	0.88	0.72	0.29	0.38
Control Delay (s/veh)	31.3	4.7	49.7	15.5	26.9	16.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	31.3	4.7	49.7	15.5	26.9	16.4
Queue Length 50th (ft)	354	9	89	284	67	95
Queue Length 95th (ft)	#458	49	#220	364	102	157
Internal Link Dist (ft)	1395			737	732	
Turn Bay Length (ft)		180	200		100	
Base Capacity (vph)	1511	775	304	2094	940	767
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.86	0.25	0.83	0.70	0.29	0.37

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

						
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↑	↓	↑↑	↓	↑
Traffic Volume (veh/h)	1395	294	293	1344	156	236
Future Volume (veh/h)	1395	294	293	1344	156	236
Initial Q (Qb), veh	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1856	1900	1885	1885	1900	1885
Adj Flow Rate, veh/h	1468	309	308	1415	164	248
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	3	0	1	1	0	1
Cap, veh/h	1524	696	325	2161	936	637
Arrive On Green	0.43	0.43	0.13	0.60	0.27	0.27
Sat Flow, veh/h	3618	1610	1795	3676	3510	1598
Grp Volume(v), veh/h	1468	309	308	1415	164	248
Grp Sat Flow(s),veh/h/ln	1763	1610	1795	1791	1755	1598
Q Serve(g_s), s	36.5	12.1	10.9	23.3	3.2	9.9
Cycle Q Clear(g_c), s	36.5	12.1	10.9	23.3	3.2	9.9
Prop In Lane		1.00	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	1524	696	325	2161	936	637
V/C Ratio(X)	0.96	0.44	0.95	0.65	0.18	0.39
Avail Cap(c_a), veh/h	1524	696	325	2161	936	637
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	24.9	18.0	26.5	11.7	25.4	19.2
Incr Delay (d2), s/veh	15.8	2.0	36.1	1.6	0.4	1.8
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	17.0	4.5	5.8	8.1	1.4	10.2
Unsig. Movement Delay, s/veh						
LnGrp Delay(d), s/veh	40.7	20.0	62.6	13.3	25.8	21.0
LnGrp LOS	D	C	E	B	C	C
Approach Vol, veh/h	1777			1723	412	
Approach Delay, s/veh	37.1			22.1	22.9	
Approach LOS	D			C	C	
Timer - Assigned Phs	1	2		4		6
Phs Duration (G+Y+Rc), s	15.4	44.4		30.2		59.8
Change Period (Y+Rc), s	3.5	5.5		6.2		5.5
Max Green Setting (Gmax), s	11.9	38.9		24.0		54.3
Max Q Clear Time (g_c+I1), s	12.9	38.5		11.9		25.3
Green Ext Time (p_c), s	0.0	0.4		1.0		15.1
Intersection Summary						
HCM 7th Control Delay, s/veh			29.0			
HCM 7th LOS			C			

						
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Group Flow (vph)	1468	309	308	1415	164	248
v/c Ratio	0.97	0.37	0.96	0.66	0.18	0.33
Control Delay (s/veh)	42.6	6.1	64.1	13.6	26.0	16.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	42.6	6.1	64.1	13.6	26.0	16.0
Queue Length 50th (ft)	426	26	121	256	37	82
Queue Length 95th (ft)	#594	78	#286	326	61	137
Internal Link Dist (ft)	1395			737	732	
Turn Bay Length (ft)		180	200		100	
Base Capacity (vph)	1517	830	323	2156	933	753
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.97	0.37	0.95	0.66	0.18	0.33

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

						
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↑	↓	↑↑	↓	↑
Traffic Volume (veh/h)	868	129	168	980	183	189
Future Volume (veh/h)	868	129	168	980	183	189
Initial Q (Qb), veh	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1826	1841	1841	1841	1826	1870
Adj Flow Rate, veh/h	914	136	177	1032	193	199
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	5	4	4	4	5	2
Cap, veh/h	1634	735	208	2221	837	582
Arrive On Green	0.47	0.47	0.12	0.63	0.25	0.25
Sat Flow, veh/h	3561	1560	1753	3589	3374	1585
Grp Volume(v), veh/h	914	136	177	1032	193	199
Grp Sat Flow(s),veh/h/ln	1735	1560	1753	1749	1687	1585
Q Serve(g_s), s	18.9	5.1	9.9	15.3	4.6	9.1
Cycle Q Clear(g_c), s	18.9	5.1	9.9	15.3	4.6	9.1
Prop In Lane		1.00	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	1634	735	208	2221	837	582
V/C Ratio(X)	0.56	0.19	0.85	0.46	0.23	0.34
Avail Cap(c_a), veh/h	1634	735	342	2221	837	582
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	19.0	15.3	43.2	9.4	30.0	22.9
Incr Delay (d2), s/veh	1.4	0.6	5.1	0.7	0.6	1.6
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	7.3	1.8	4.5	5.2	1.9	9.3
Unsig. Movement Delay, s/veh						
LnGrp Delay(d), s/veh	20.4	15.9	48.3	10.2	30.6	24.5
LnGrp LOS	C	B	D	B	C	C
Approach Vol, veh/h	1050			1209	392	
Approach Delay, s/veh	19.8			15.7	27.5	
Approach LOS	B			B	C	
Timer - Assigned Phs	1	2		4		6
Phs Duration (G+Y+Rc), s	16.4	52.6		31.0		69.0
Change Period (Y+Rc), s	4.5	5.5		6.2		5.5
Max Green Setting (Gmax), s	19.5	39.5		24.8		63.5
Max Q Clear Time (g_c+I1), s	11.9	20.9		11.1		17.3
Green Ext Time (p_c), s	0.1	7.0		1.0		11.5
Intersection Summary						
HCM 7th Control Delay, s/veh			19.1			
HCM 7th LOS			B			

						
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↑	↓	↑↑	↓	↑
Traffic Volume (veh/h)	982	207	206	946	110	166
Future Volume (veh/h)	982	207	206	946	110	166
Initial Q (Qb), veh	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1856	1900	1885	1885	1900	1885
Adj Flow Rate, veh/h	1034	218	217	996	116	175
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	3	0	1	1	0	1
Cap, veh/h	1618	739	250	2303	843	606
Arrive On Green	0.46	0.46	0.14	0.64	0.24	0.24
Sat Flow, veh/h	3618	1610	1795	3676	3510	1598
Grp Volume(v), veh/h	1034	218	217	996	116	175
Grp Sat Flow(s),veh/h/ln	1763	1610	1795	1791	1755	1598
Q Serve(g_s), s	22.5	8.5	11.8	13.8	2.6	7.6
Cycle Q Clear(g_c), s	22.5	8.5	11.8	13.8	2.6	7.6
Prop In Lane		1.00	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	1618	739	250	2303	843	606
V/C Ratio(X)	0.64	0.30	0.87	0.43	0.14	0.29
Avail Cap(c_a), veh/h	1618	739	368	2303	843	606
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	20.7	16.9	42.2	8.8	29.9	21.7
Incr Delay (d2), s/veh	1.9	1.0	10.0	0.6	0.3	1.2
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	9.0	3.2	5.8	4.7	1.1	8.1
Unsig. Movement Delay, s/veh						
LnGrp Delay(d), s/veh	22.7	17.9	52.2	9.4	30.2	22.9
LnGrp LOS	C	B	D	A	C	C
Approach Vol, veh/h	1252			1213	291	
Approach Delay, s/veh	21.8			17.1	25.8	
Approach LOS	C			B	C	
Timer - Assigned Phs	1	2		4		6
Phs Duration (G+Y+Rc), s	18.4	51.4		30.2		69.8
Change Period (Y+Rc), s	4.5	5.5		6.2		5.5
Max Green Setting (Gmax), s	20.5	39.3		24.0		64.3
Max Q Clear Time (g_c+I1), s	13.8	24.5		9.6		15.8
Green Ext Time (p_c), s	0.1	7.0		0.7		10.9
Intersection Summary						
HCM 7th Control Delay, s/veh			20.2			
HCM 7th LOS			C			

						
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↑	↓	↑↑	↓	↑
Traffic Volume (veh/h)	1233	183	239	1392	260	268
Future Volume (veh/h)	1233	183	239	1392	260	268
Initial Q (Qb), veh	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1826	1841	1841	1841	1826	1870
Adj Flow Rate, veh/h	1298	193	252	1465	274	282
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	5	4	4	4	5	2
Cap, veh/h	1376	619	275	2110	900	671
Arrive On Green	0.40	0.40	0.16	0.60	0.27	0.27
Sat Flow, veh/h	3561	1560	1753	3589	3374	1585
Grp Volume(v), veh/h	1298	193	252	1465	274	282
Grp Sat Flow(s),veh/h/ln	1735	1560	1753	1749	1687	1585
Q Serve(g_s), s	32.5	7.7	12.7	25.7	5.8	11.2
Cycle Q Clear(g_c), s	32.5	7.7	12.7	25.7	5.8	11.2
Prop In Lane		1.00	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	1376	619	275	2110	900	671
V/C Ratio(X)	0.94	0.31	0.92	0.69	0.30	0.42
Avail Cap(c_a), veh/h	1376	619	275	2110	900	671
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	26.2	18.7	37.4	12.2	26.3	18.2
Incr Delay (d2), s/veh	14.0	1.3	32.8	1.9	0.9	1.9
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	14.9	2.8	7.7	8.9	2.4	11.5
Unsig. Movement Delay, s/veh						
LnGrp Delay(d), s/veh	40.2	20.0	70.2	14.1	27.2	20.1
LnGrp LOS	D	C	E	B	C	C
Approach Vol, veh/h	1491			1717	556	
Approach Delay, s/veh	37.6			22.3	23.6	
Approach LOS	D			C	C	
Timer - Assigned Phs	1	2		4		6
Phs Duration (G+Y+Rc), s	18.6	41.2		30.2		59.8
Change Period (Y+Rc), s	4.5	5.5		6.2		5.5
Max Green Setting (Gmax), s	14.1	35.7		24.0		54.3
Max Q Clear Time (g_c+I1), s	14.7	34.5		13.2		27.7
Green Ext Time (p_c), s	0.0	1.0		1.3		15.0
Intersection Summary						
HCM 7th Control Delay, s/veh			28.6			
HCM 7th LOS			C			

						
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↑	↑	↑↑	↑↑	↑
Traffic Volume (veh/h)	1395	294	293	1344	156	236
Future Volume (veh/h)	1395	294	293	1344	156	236
Initial Q (Qb), veh	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1856	1900	1885	1885	1900	1885
Adj Flow Rate, veh/h	1468	309	308	1415	164	248
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	3	0	1	1	0	1
Cap, veh/h	1491	681	314	2303	843	663
Arrive On Green	0.42	0.42	0.17	0.64	0.24	0.24
Sat Flow, veh/h	3618	1610	1795	3676	3510	1598
Grp Volume(v), veh/h	1468	309	308	1415	164	248
Grp Sat Flow(s),veh/h/ln	1763	1610	1795	1791	1755	1598
Q Serve(g_s), s	41.2	13.7	17.1	23.3	3.7	10.7
Cycle Q Clear(g_c), s	41.2	13.7	17.1	23.3	3.7	10.7
Prop In Lane		1.00	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	1491	681	314	2303	843	663
V/C Ratio(X)	0.98	0.45	0.98	0.61	0.19	0.37
Avail Cap(c_a), veh/h	1491	681	314	2303	843	663
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	28.5	20.6	41.1	10.5	30.3	20.3
Incr Delay (d2), s/veh	19.9	2.2	45.1	1.2	0.5	1.6
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	20.1	5.3	11.2	8.1	1.6	11.2
Unsig. Movement Delay, s/veh						
LnGrp Delay(d), s/veh	48.4	22.8	86.2	11.8	30.8	21.9
LnGrp LOS	D	C	F	B	C	C
Approach Vol, veh/h	1777			1723	412	
Approach Delay, s/veh	43.9			25.1	25.4	
Approach LOS	D			C	C	
Timer - Assigned Phs	1	2		4		6
Phs Duration (G+Y+Rc), s	22.0	47.8		30.2		69.8
Change Period (Y+Rc), s	4.5	5.5		6.2		5.5
Max Green Setting (Gmax), s	17.5	42.3		24.0		64.3
Max Q Clear Time (g_c+I1), s	19.1	43.2		12.7		25.3
Green Ext Time (p_c), s	0.0	0.0		1.0		17.4
Intersection Summary						
HCM 7th Control Delay, s/veh			33.7			
HCM 7th LOS			C			

Intersection: 21: Franklin Rd & 56th St

Movement	EB	EB	EB	WB	WB	WB	NB	NB	NB
Directions Served	T	T	R	L	T	T	L	L	R
Maximum Queue (ft)	402	366	243	269	325	280	123	169	123
Average Queue (ft)	250	206	49	127	193	146	14	75	41
95th Queue (ft)	352	309	127	216	289	244	64	140	92
Link Distance (ft)	1421	1421			769	769			741
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (ft)			180	200			100	100	
Storage Blk Time (%)		9		1	6		0	4	1
Queuing Penalty (veh)		11		7	10		0	8	1

Network Summary

Network wide Queuing Penalty: 37

Intersection: 21: Franklin Rd & 56th St

Movement	EB	EB	EB	WB	WB	WB	NB	NB	NB
Directions Served	T	T	R	L	T	T	L	L	R
Maximum Queue (ft)	417	356	279	247	272	240	81	120	106
Average Queue (ft)	276	230	74	136	164	127	7	46	40
95th Queue (ft)	377	327	193	217	249	214	38	95	84
Link Distance (ft)	1421	1421			769	769			741
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (ft)			180	200			100	100	
Storage Blk Time (%)		13	0	2	3		0	1	1
Queuing Penalty (veh)		27	0	9	6		0	1	1

Network Summary

Network wide Queuing Penalty: 43

Intersection: 21: Franklin Rd & 56th St

Movement	EB	EB	EB	WB	WB	WB	NB	NB	NB
Directions Served	T	T	R	L	T	T	L	L	R
Maximum Queue (ft)	557	487	280	297	590	541	168	208	192
Average Queue (ft)	360	297	103	203	270	208	39	106	83
95th Queue (ft)	516	453	270	327	540	453	125	182	160
Link Distance (ft)	1421	1421			769	769			741
Upstream Blk Time (%)					1	0			
Queuing Penalty (veh)					0	0			
Storage Bay Dist (ft)			180	200			100	100	
Storage Blk Time (%)		23	0	25	5		0	11	4
Queuing Penalty (veh)		42	0	175	13		1	31	11

Network Summary

Network wide Queuing Penalty: 273

Intersection: 21: Franklin Rd & 56th St

Movement	EB	EB	EB	WB	WB	WB	NB	NB	NB
Directions Served	T	T	R	L	T	T	L	L	R
Maximum Queue (ft)	750	691	280	300	725	680	98	145	156
Average Queue (ft)	467	399	193	261	453	373	15	75	75
95th Queue (ft)	750	679	363	352	916	813	61	132	136
Link Distance (ft)	1421	1421			769	769			741
Upstream Blk Time (%)					16	0			
Queuing Penalty (veh)					0	0			
Storage Bay Dist (ft)			180	200			100	100	
Storage Blk Time (%)		34	0	55	1		0	4	4
Queuing Penalty (veh)		101	0	368	4		0	11	6

Network Summary

Network wide Queuing Penalty: 490

Attachment D

Virtual Meeting Minutes & Field Check Minutes

IMPO Safety Study: City of Lawrence RSA Locations

Date: April 9, 2026

Time: 10:30 – 11:00 AM

Location: MS Teams

Attendees:

Renea Rafala, City of Lawrence

James Perron, City of Lawrence

Deputy Chief Cline, Lawrence PD

Captain Cantrell, Lawrence PD

Jennifer Dunn, IMPO

James Mark Rinehart, Corradino LLC

David Cleveland, Corradino LLC

Agenda

1. Introductions

- a. Corradino staff kicked off the meeting with a round of introductions for all the participants on the Teams call.
- b. Corradino staff then shared that the purpose of the kick-off meeting was to spend some time talking with City of Lawrence staff and local law enforcement about the two RSA locations they selected to study as part of the Indianapolis MPO's (IMPO) Safety Study. The information from the kick-off meeting will be considered as Corradino completes the safety and traffic analysis and begins identifying potential countermeasures for the two RSA locations. Corradino then asked the Lawrence staff to provide an overview of why they selected their two RSA locations, such as observed safety concerns, changes in traffic related to new development, or existing plans or studies that have identified long-term improvements at the RSA sites.

2. Overview of RSA locations

a. 71st Street & Lee Road

- i. Lawrence staff shared that the intersection at 71st Street & Lee Road is a ~90-degree curve that has dark, not lighted roadway conditions. Additionally, there is a steep hill on Lee Road that can cause vehicles to enter the turn at high speed, leading to frequent run off road and opposite-direction sideswipe crashes.
 1. Lawrence staff noted they used to have a guardrail in the corner of the intersection, but it was frequently struck by vehicles and needed to be repaired.

2. Lawrence staff transitioned from the guardrail and formed a berm on the north side of 71st Street, plus a temporary curb and retroreflective delineators on the edge of the curve.
 3. Lawrence staff did note these improvements have not necessarily decreased the crash frequency, but it is easier to maintain the berm and delineators than it was to fix the guardrail.
- ii. Lawrence staff shared that Lee Road is a heavily used roadway with a lot of traffic accessing Forest Glen Elementary School and Fall Creek Valley Middle School, both located near the Lee Road and 63rd Street intersection. Lawrence staff noted Lee Road may need to be modified in the future to widen the roadway to accommodate the increased traffic.
 - iii. Corradino staff shared results from the draft Preliminary Findings Report for the 71st Street Lee Road intersection. Corradino noted that the crash patterns at the intersection aligned closely with those the Lawrence PD observes. Additionally, Corradino noted ~66% of crashes occurred in wet roadway conditions.
 1. Lawrence staff noted that they were not surprised that a lot of crashes occurred in wet roadway conditions for two reasons:
 - a. Because they have observed vehicles frequently driving too fast at the intersection, and the slippery roadway conditions result in more crashes.
 - b. The dense tree canopy around the intersection prevents the intersection from drying out after rainfall or snowfall as quickly as other locations.
 - iv. Lawrence staff and Corradino staff brainstormed ideas to improve the 71st Street & Lee Road intersection. A few concepts discussed included increased lighting, some tree clearing in the southwest corner of the intersection, rumble strips, wider centerline striping, and additional signage notifying of the speed limit through the curve.
 1. Corradino noted these improvements will be considered as they move into the next phases of the RSA.

b. 56th Street & Franklin Road Intersection

- i. Lawrence staff noted that the 56th Street & Franklin Road intersection was identified on their High Injury Network, which is why they selected the intersection to be studied.
- ii. Both 56th Street & Franklin Road are thoroughfares owned and maintained by the Indianapolis DPW. But, the City of Lawrence has an MOU to partner on any recommended improvements identified on Indianapolis DPW roadways within the City of Lawrence.

1. Lawrence staff noted they are currently partnering with Indianapolis DPW to construct a sidewalk from the southwest corner of the 56th Street & Franklin Road intersection south to the Lawrence Park entrance.
2. Lawrence staff also noted they have conceptualized adding bicycle lanes on 56th Street and reducing from a divided four-lane roadway to a three-lane roadway near the 56th Street & Franklin Road intersection. This roadway project had not yet been studied.
- iii. When asked about safety concerns, Lawrence PD shared that they felt the layout of the 56th Street & Franklin Road intersection was good, and that higher traffic volumes and distracted driving may be the primary factors for crashes occurring at the intersection
- iv. Corradino shared results from the draft Preliminary Findings Report, which showed rear-end crashes were the highest crash type with 47%, and left-turn crashes were the second highest at 20%. However, 56th Street & Franklin Road is a “T” intersection with only one potential conflict point for left-turning vehicles. This means that 20% of all crashes involved a single left-turn movement: the westbound 56th Street-to-southbound Franklin Road left turn.
 1. Corradino suggested a way to help improve safety for westbound to southbound left-turning vehicles is to update the traffic signal from a protected/permissive to a protected-only signal phase.
 2. Lawrence staff agreed that the protected-only signal phase could be a good countermeasure. If needed, they could remove some of the existing median to extend the westbound to southbound left-turn lane further east.
- v. Corradino said they would look further into the signal phasing, plus other safety countermeasures, before meeting with Lawrence staff again at the field check.

3. Preliminary Findings Reports

- a. Corradino staff walked through the preliminary findings reports, summarizing the crash history and patterns about both RSA locations. The draft report was shared with IMPO staff for review and will then be updated and shared with Lawrence staff before the field check.

4. Traffic Counts

- a. Corradino staff asked Lawrence staff if they had recent traffic counts available for either RSA location.
- b. Lawrence staff said they did not have any recent traffic counts at either location, but could reach out to Indianapolis DPW about accessing counts at 56th Street & Franklin Road.

- c. Indianapolis MPO noted that they have a license with the SaaS, Replica, which will be able to provide traffic counts, in case traffic capacity analysis is needed for either RSA site.

5. Next Steps

- a. Finalize Preliminary Findings Reports.
- b. Schedule Field Checks.
 - i. Corradino sent a follow-up email to Lawrence staff on 4/9/2026 to schedule a field check with them between 5/1/2026 and 5/8/2026.

Field Check Notes for RSA at 56th Street & Franklin Road

				Date: 5/21/2026	
				Des. No.: n/a	
Reviewer Information:			Agency/Firm Name: Corradino LLC		
Primary Author: James Mark Rinehart			Agency: Indianapolis Metropolitan Planning Organization		
Phone Numbers: (317) 488-2363			Email Address: jrinehart@corradino.com		
Attendees:					
- Renea Rafala, City of Lawrence - James Perron, City of Lawrence - Jill Palmer, Indianapolis DPW - Jennifer Dunn, IMPO - James Mark Rinehart, Corradino - David Cleveland, Corradino					
Purpose of Field Check:					
The purpose of this field check was to review the crash history at the 56th Street & Franklin Road intersection, evaluate the current roadway conditions, observe traffic patterns, and collaborate with representatives from Local Public Agencies (LPA) and Law Enforcement to identify safety countermeasures. Participants at the field check were provided a packet of information containing preliminary findings from the crash data analysis, a diagram illustrating 24hr vehicle turning movements at the intersection, results from an existing conditions capacity analysis, and a future no-build scenario. The goal of the field check was to identify near-term and long-term improvements and build consensus with the LPAs and Local Law Enforcement on the recommendations. Recommendations from the field check will serve as the final recommendations for the RSA and will be included in IMPO's Safety Study.					
Project Location:					
Location: Intersection of 56 th Street & Franklin Road					
INDOT District: Greenfield			City: Lawrence	County: Marion	
Lat & Long (BOP)	39.854968	-86.027102	Urban/Rural - URBAN	Functional Class of Major Roadway: Other Principal Arterial	
Traffic Control Type: Signalized "T" intersection			Posted Speed Limit: 56 th St. – 40mph; Franklin Rd. – 35mph		
Site Observations					
- Corradino kicked off the field check by sharing results from the crash analysis and how they compare to the 24hr vehicle turning movements at the intersection. Results showed that 20% of crashes at the intersection were left-turn crashes, and 100% of those involved a WB-to-SB left-turn vehicle crashing into an EB-through vehicle. According to turning movement counts collected at the intersection in 2023, approximately 2,000 vehicles complete a WB-to-SB left-turn at the intersection within 24 hours. - Lawrence staff emphasized that the WB-to-SB left-turn at the intersection is problematic. Lawrence staff said that vehicles trying to turn left queue into the left WB through lane. Lawrence staff noted that WB-to-SB left turns have been higher recently due to I-465 construction, which has closed the 56th Street interchange. Franklin Road at 56th Street is part of a detour route for that INDOT project. - Note: The detour for the 56th Street interchange should be lifted before the end of 2026. Also, the turning movement counts used in the traffic capacity analysis were collected in 2023, prior to the detour's implementation. This will help accurately determine traffic demand at the intersection. - Note: Lawrence staff noted that Lawrence Public Schools (Lawrence Central HS, Belzer MS, and Harrison Hill ES) and the Federal Defense Building, all located along 56th Street, cause a lot of traffic congestion at the 56th Street & Franklin Road intersection from about 2:30 – 5:00 pm. - It was discussed at the field check about modifying the signal phasing plan at the intersection to make the WB-to-SB left-turn a protected-only phase. A protected-only phase could help address safety concerns at					

the intersection but may negatively affect overall traffic capacity. Corradino said they would evaluate the signal timings with this new phasing plan to determine if it is acceptable. Green time may need to be reallocated from the NB approach at the intersection to the WB approach to accommodate a protected-only WB-to-SB left-turn phase.

- o Additionally, extending the WB-to-SB left-turn was identified as a long-term improvement for the intersection.
- In addition to upgrading the signal phasing at the intersection, it was discussed to modernize the signals at the intersection and add backplates to the signal heads. It was not known during the field check whether the poles and mast arms were aluminum or steel. If they are aluminum, Indianapolis DPW asked that Corradino check (if possible) to make sure they can handle the additional wind load caused by backing plates and/or signs, prior to recommending.
 - o The WB signal heads were suggested to be replaced from the 5-section “dog house” for the left turn lane and the 3-section head centered over the two through lanes to a 3-section (arrows) head over the left turn lane and two 3-section heads, one each centered above a through lane.
 - Additionally, adding a sign to the mast arm adjacent to the new 3-section (arrow) head stating “left on green arrow only” for WB-to-SB left turns would be a systemic safety improvement that also notifies of the change in signal phasing.
 - o It was also suggested that the NB signal heads be replaced from a 3-section (ball) head and two 5-section “dog house” heads with two 3-section (arrow) heads, one for each left turn lane, and a 3-section (arrow) head for the right turn lane. The rationale for updating these is that there is no NB through movement at the intersection, and although there is no crash history indicating motorists inadvertently assumed there was a NB through movement, updating the signals to provide clearer guidance could be a preventive safety measure.
 - Additionally, adding lane assignment signage to the mast arm adjacent to the new signal heads NB traffic is an additional low-cost systemic safety improvement.
- Lawrence staff mentioned they are partnering with the City of Indianapolis to install a sidewalk on the east side of Franklin Road, from Community Park to the southeast corner of the 56th Street & Franklin Road intersection. Part of that project will be tying into the existing ADA ramp at the intersection.
 - o Lawrence staff also noted that the ADA ramps in the SW and SE corners of the intersection were recently reconstructed as part of a pavement resurfacing project along Franklin Road. Still, the ADA ramps on the north side of 56th Street at the intersection were not updated. Lawrence Staff noted they would update those ADA ramps as part of a long-term intersection improvement project.
- It was also observed during the field check that the storm grates at the intersection had been damaged. Lawrence staff agreed and suggested including storm grate replacement as part of the long-term improvements at the intersection.
- It is important to note that the 56th Street & Franklin Road intersection falls under Indianapolis DPW’s jurisdiction, though it is within the Lawrence city limits, per a Memorandum of Understanding. Traffic signal and infrastructure improvements identified and recommended as part of this RSA must be agreed upon by both Lawrence and the Indianapolis DPW.

Potential Alternatives Discussed

Near-Term

- Update striping, arrows, and stop bars on the WB and WB intersection approaches.
- Update pedestrian crossings at all three intersection approaches.
- Add retroreflective tape to the existing “double arrow” sign’s signposts, located on the north side of the intersection.
- Add lane assignment signage to the mast arm adjacent to signal heads for the NB intersection approach.
- Modify signal phasing to make the WB left-turn “protected only.”
- Add back plates to all existing traffic signals. **(After the field check, Indianapolis DPW confirmed the signal poles are steel and can carry the wind load caused by installing back plates.)**

Long-Term

- Extend the WB-to-SB left-turn lane (using traffic capacity analysis to determine how far to extend the left-turn lane,
- WB signal heads are to be replaced from the 5-section “dog house” for the left turn lane and the 3-section head centered over the two through lanes to a 3-section (arrows) head over the left turn lane and two 3-section heads, one each centered above a through lane
- NB signal heads are to be replaced from a 3-section (ball) head and two 5-section “dog house” heads with two 3-section (arrow) heads, one for each left turn lane, and a 3-section (arrow) head for the right turn lane.
 - Reconstruct the two ADA ramps on the north side of the intersection.
- Replace the six storm drain inlets located at the intersection.
- Resurface 56th Street at the intersection (preferably as far as the turn lanes on the west and east legs of the intersection.
- Implement the near-term improvements that involve striping, new signage, and retroreflective tape for signposts.

Future Consideration

- It was discussed in detail about the concerns related to traffic congestion and capacity along 56th Street. A future consideration would be for the City of Lawrence to partner with the Indianapolis DPW to evaluate signal timing along 56th Street from the I-465 interchange to Lee Road, to see if any modifications can be made to improve efficiency.

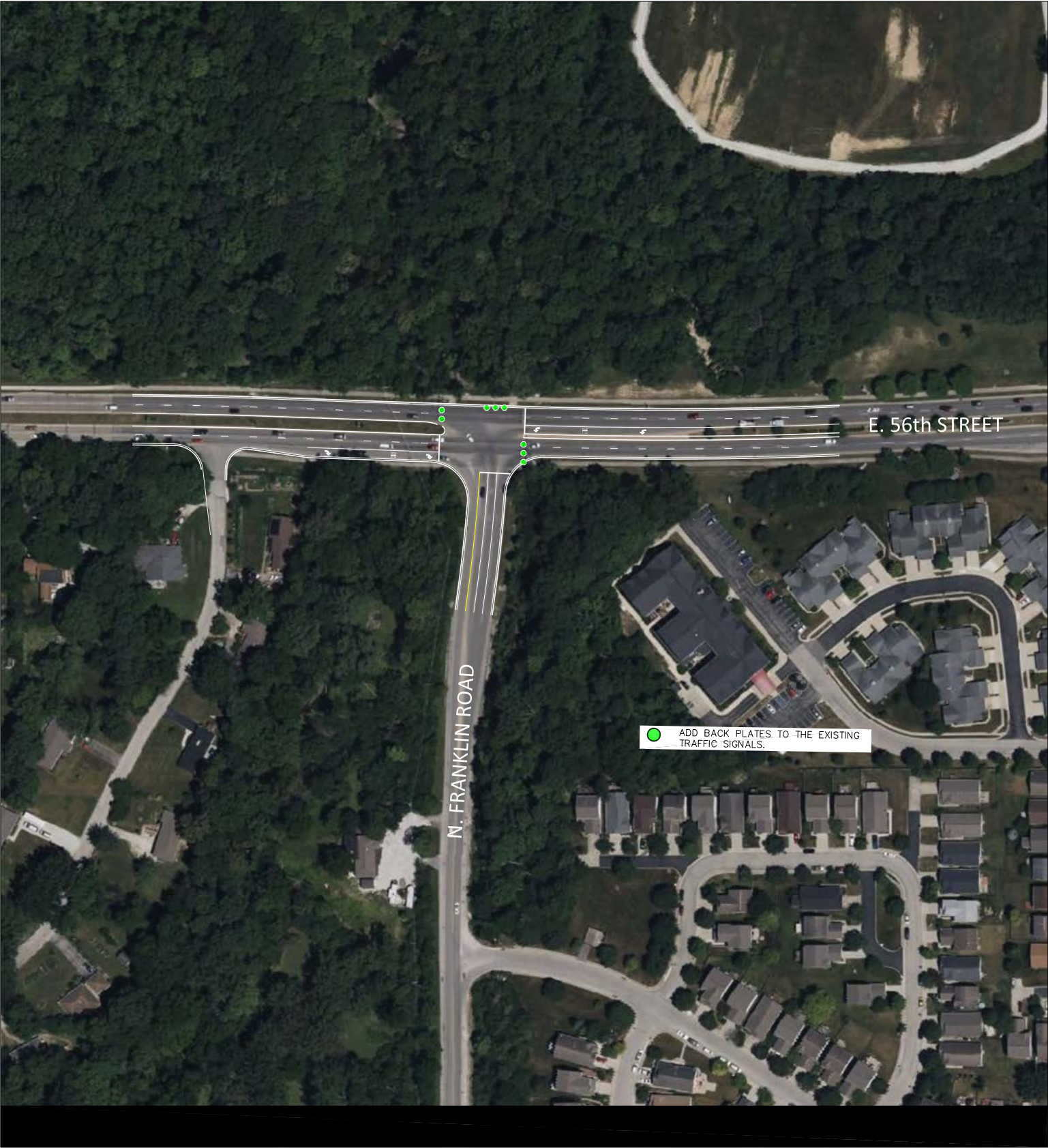
Consensus on Key Items for Alternatives

- Consensus was to make the potential Near- and Long-Term alternatives the recommended improvements for this RSA. Lawrence staff also agreed that evaluating signal timing along 56th Street could be a good project to partner with Indianapolis DPW on in the future.

Attachment E

Cost Estimates & Schematics

Near-Term Improvements 56th Street & Franklin Road



PRELIMINARY COST ESTIMATE - NEAR TERM
56th Street & Franklin Road

LINE ITEM	ITEM NO.	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	AMOUNT
1	110-01001	MOBILIZATION AND DEMOBILIZATION	1	LS	\$ 5,000.00	\$ 5,000.00
2	801-06775	MAINTAINING TRAFFIC	1	LS	\$ 10,000.00	\$ 10,000.00
3	802-05704	SIGN POST, SQUARE, TYPE 1, UNREINFORCED ANCHOR BASE	13	LFT	\$ 31.00	\$ 403.00
4	802-09838	SIGN, SHEET, WITH LEGEND, 0.080 IN. THICKNESS	30	SFT	\$ 45.00	\$ 1,350.00
5	802-09840	SIGN, SHEET, WITH LEGEND, 0.100 IN. THICKNESS	14	SFT	\$ 50.00	\$ 700.00
6	802-11648	SIGN POST, TYPE	2	EACH	\$ 125.00	\$ 250.00
7	805-01300	TRAFFIC SIGNAL EQUIPMENT, REMOVE	1	EACH	\$ 3,000.00	\$ 3,000.00
8	805-01579	MISCELLANEOUS EQUIPMENT FOR TRAFFIC SIGNALS	1	LS	\$ 1,500.00	\$ 1,500.00
9	805-02087	TRANSPORTATION OF SALVAGEABLE SIGNAL EQUIPMENT	1	LS	\$ 1,000.00	\$ 1,000.00
10	805-02645	SIGNAL POLE FOUNDATION, 24 IN. X 24 IN. X 36 IN.	3	EACH	\$ 2,000.00	\$ 6,000.00
11	805-08126	TRAFFIC SIGNAL HEAD, (NO.) SECTION, RETROFIT, (LOUVERS REQUIRED)	7	EACH	\$ 1,750.00	\$ 12,250.00
12	805-12650	SIGNAL POLE, PEDESTAL, 5 FT	3	EACH	\$ 1,100.00	\$ 3,300.00
13	805-78205	TRAFFIC SIGNAL HEAD, NO. 3 SECTION, 12 IN.	2	EACH	\$ 1,200.00	\$ 2,400.00
14	805-78370	PEDESTRIAN PUSH BUTTON, NON-APS	5	EACH	\$ 1,600.00	\$ 8,000.00
15	805-78485	SIGNAL CABLE, CONTROL, COPPER, 5C/14 GAUGE	450	LFT	\$ 4.30	\$ 1,935.00
16	805-99999	SIGNAL MAST ARM, 35 FT	1	EACH	\$ 1,800.00	\$ 1,800.00
17	808-06701	LINE, THERMOPLASTIC, BROKEN, WHITE, 4 IN.	220	LFT	\$ 2.50	\$ 550.00
18	808-06703	LINE, THERMOPLASTIC, SOLID, WHITE, 4 IN.	330	LFT	\$ 1.25	\$ 412.50
19	808-11482	LINE, THERMOPLASTIC, DOTTED, WHITE, 4 IN.	34	LFT	\$ 3.00	\$ 102.00
20	808-11493	LINE, THERMOPLASTIC, DOTTED, YELLOW, 4 IN.	34	LFT	\$ 3.00	\$ 102.00
21	808-75245	LINE, THERMOPLASTIC, SOLID, YELLOW, 4 IN.	1,760	LFT	\$ 1.25	\$ 2,200.00
22	808-75297	TRANSVERSE MARKING, THERMOPLASTIC, STOP LINE, WHITE, 24 IN.	74	LFT	\$ 14.00	\$ 1,036.00
23	808-75300	TRANSVERSE MARKING, THERMOPLASTIC, CROSSWALK LINE, WHITE, 6 IN.	512	LFT	\$ 4.00	\$ 2,048.00
24	808-75320	PAVEMENT MESSAGE MARKING, THERMOPLASTIC, LANE INDICATION ARROW	4	EACH	\$ 250.00	\$ 1,000.00
25	808-75325	PAVEMENT MESSAGE MARKING, THERMOPLASTIC, ONLY	2	EACH	\$ 240.00	\$ 480.00
						\$ -
TOTAL						\$ 66,818.50

CONSTRUCTION TOTAL	\$67,000.00
CONTINGENCY (10%)	\$7,000.00
OVERALL PROJECT TOTAL	\$74,000.00

This cost estimate makes the following assumptions:
1.) Unit price estimates based on stand-alone project

Project Phases		
Task No.	Task	Cost
1	Preliminary Engineering	\$ 10,000
2	Right of Way	\$ -
3	Utility CN	\$ 500
4	Railroad CN	\$ -
5	Construction Inspection/Testing	\$ -
TOTAL		\$ 10,500

Todd Johnson
Estimate Completed By
6/5/2026
Date

The Preliminary Cost Estimate portion of this document was prepared by me or under my supervision and represents a planning level cost estimate of the project's scope.

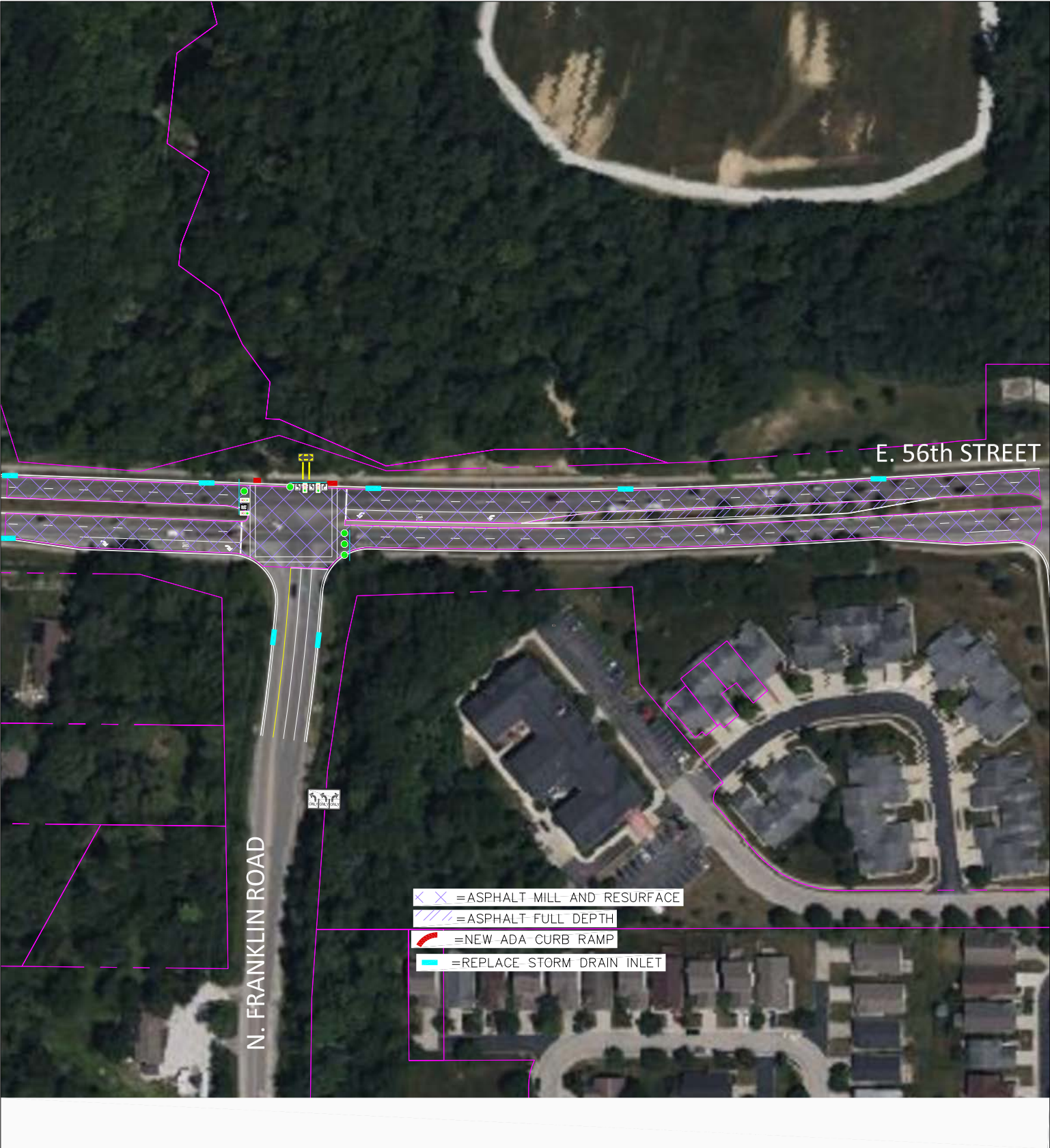
Gary L. Yellig
Signature



ABBREVIATED ENGINEERING NOTES FOR PRELIMINARY COST ESTIMATE - LONG TERM
56th Street & Franklin Road

LINE ITEM	ITEM NO.	DESCRIPTION	NOTES
1	110-01001	MOBILIZATION AND DEMOBILIZATION	
2	801-06775	MAINTAINING TRAFFIC	
3	802-05704	SIGN POST, SQUARE, TYPE 1, UNREINFORCED ANCHOR BASE	use for the lane control sign say 13 LFT
4	802-09838	SIGN, SHEET, WITH LEGEND, 0.080 IN. THICKNESS	needed if we have a "Left On Green Arrow Only" sign R10-5 (30"x36") and Lane Arrows R3-5 3 each at 30"x36" for a total of 30 SFT
5	802-09840	SIGN, SHEET, WITH LEGEND, 0.100 IN. THICKNESS	for lane control sign - use 30" by 48" or 10 SFT (R3-8x) and street sign on W Leg mast arm 3.33 SFT assume 14 SFT total
6	802-11648	SIGN POST, TYPE	use this item for reflective strips on Double Arrow sign use 2 each (assume 7 ft per each post or 14 LFT)
7	805-01300	TRAFFIC SIGNAL EQUIPMENT, REMOVE	removes W Leg mast arm and signal faces on all Legs
8	805-01579	MISCELLANEOUS EQUIPMENT FOR TRAFFIC SIGNALS	
9	805-02087	TRANSPORTATION OF SALVAGEABLE SIGNAL EQUIPMENT	assume old signal faces and mast arm will be salvaged
10	805-02645	SIGNAL POLE FOUNDATION, 24 IN. X 24 IN. X 36 IN.	1 in the NE; 1 in the SE; and 1 in the SW for 3 each
11	805-08126	TRAFFIC SIGNAL HEAD, (NO.) SECTION, RETROFIT, (LOUVERS REQUIRED)	supplies new signal face with backplate on existing faces that will remain - 7 each (3 on E Leg mast arm, 3 on N Leg mast arm, 1 on W Leg mast arm for a total of 7 each)
12	805-12650	SIGNAL POLE, PEDESTAL, 5 FT	1 in the NE; 1 in the SE; and 1 in the SW for 3 each
13	805-78205	TRAFFIC SIGNAL HEAD, NO. 3 SECTION, 12 IN.	Add two 3-Section signal faces on the W Leg - 2 Each
14	805-78370	PEDESTRIAN PUSH BUTTON, NON-APS	1 in the NE; 2 in the SE; and 2 in the SW for 5 each
15	805-78485	SIGNAL CABLE, CONTROL, COPPER, 5C/14 GAUGE	for new Ped Buttons (say 250') and new signal heads on W Leg (say 200') total say 450 LFT
16	805-99999	SIGNAL MAST ARM, 35 FT	1 each for the W Leg
17	808-06701	LINE, THERMOPLASTIC, BROKEN, WHITE, 4 IN.	restripe 440' past stop line or say 440'/4 * 2 sides = 220 LFT
18	808-06703	LINE, THERMOPLASTIC, SOLID, WHITE, 4 IN.	restripe existing turn lane - lane lines (no edge lines) use 330 LFT
19	808-11482	LINE, THERMOPLASTIC, DOTTED, WHITE, 4 IN.	Assume a 2' line and a spacing of 6'. Length of arc is about 130' or 130'/8 * 2' each = say 34 LFT
20	808-11493	LINE, THERMOPLASTIC, DOTTED, YELLOW, 4 IN.	assume restripe for 440' past stop line on 56th Street or say 1,760 LFT
21	808-75245	LINE, THERMOPLASTIC, SOLID, YELLOW, 4 IN.	E Leg = 36'; W Leg = 38' for a total of 74 LFT
22	808-75297	TRANSVERSE MARKING, THERMOPLASTIC, STOP LINE, WHITE, 24 IN.	E Leg = 168' W Leg = 168' S Leg = 176' for a total of 512 LFT
23	808-75300	TRANSVERSE MARKING, THERMOPLASTIC, CROSSWALK LINE, WHITE, 6 IN.	replace existing - say 2 each on EB to SB RTL and 2 each on WB to SB LTL
24	808-75320	PAVEMENT MESSAGE MARKING, THERMOPLASTIC, LANE INDICATION ARROW	replace existing - say 1 each on EB to SB RTL and 1 each on WB to SB LTL
25	808-75325	PAVEMENT MESSAGE MARKING, THERMOPLASTIC, ONLY	

Long-Term Improvements 56th Street & Franklin Road



PRELIMINARY COST ESTIMATE - LONG TERM
56th Street & Franklin Road

LINE ITEM	ITEM NO.	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	AMOUNT
1	105-06845	CONSTRUCTION ENGINEERING	1	LS	\$ 15,000.00	\$ 15,000.00
2	110-01001	MOBILIZATION AND DEMOBILIZATION	1	LS	\$ 28,000.00	\$ 28,000.00
3	201-52370	CLEARING RIGHT-OF-WAY	1	LS	\$ 25,000.00	\$ 25,000.00
4	202-02240	PAVEMENT REMOVAL	70	SYS	\$ 70.00	\$ 4,900.00
5	202-02273	CENTER CURB, CONCRETE, REMOVE	40	SYS	\$ 100.00	\$ 4,000.00
6	202-02278	CURB, CONCRETE, REMOVE	490	LFT	\$ 20.00	\$ 9,800.00
7	202-02279	CURB AND GUTTER, REMOVE	48	LFT	\$ 60.00	\$ 2,880.00
8	202-02772	CASTING, REMOVE	8	EACH	\$ 800.00	\$ 6,400.00
9	202-52710	SIDEWALK CONCRETE, REMOVE	30	SYS	\$ 125.00	\$ 3,750.00
10	202-93763	LIGHT STANDARD AND FOUNDATION, REMOVE	3	EACH	\$ 2,000.00	\$ 6,000.00
11	203-02000	EXCAVATION, COMMON	600	CYS	\$ 80.00	\$ 48,000.00
12	207-09935	SUBGRADE TREATMENT, TYPE IC	820	SYS	\$ 45.00	\$ 36,900.00
13	306-08034	MILLING, ASPHALT, 1 1/2 IN.	8,335	SYS	\$ 5.00	\$ 41,675.00
14	401-000005	QC/QA-HMA, 3, 58H, SURFACE, 9.5 mm	690	TON	\$ 100.00	\$ 69,000.00
15	401-000032	QC/QA-HMA, 3, 58H, INTERMEDIATE, 12.5 mm	90	TON	\$ 110.00	\$ 9,900.00
16	401-000046	QC/QA-HMA, 2, 58S, BASE, 25.0 mm	210	TON	\$ 110.00	\$ 23,100.00
17	401-000062	QC/QA-HMA, 3, 58E, INTERMEDIATE, OG, 19.0 mm	105	TON	\$ 150.00	\$ 15,750.00
18	401-11526	JOINT ADHESIVE	3,210	LFT	\$ 1.00	\$ 3,210.00
19	401-12439	VOID REDUCING ASPHALT MEMBRANE FOR HMA	3,210	LFT	\$ 7.00	\$ 22,470.00
20	406-05520	ASPHALT FOR TACK COAT	4	TON	\$ 750.00	\$ 3,000.00
21	506-06000	PAVEMENT RECONSTRUCTION ADJACENT TO CURB RAMPS	15	SYS	\$ 35.00	\$ 525.00
22	506-06001	PAVEMENT RECONSTRUCTION ADJACENT TO CURB	30	SYS	\$ 35.00	\$ 1,050.00
23	604-06070	SIDEWALK, CONCRETE	10	SYS	\$ 240.00	\$ 2,400.00
24	604-08086	CURB RAMP, CONCRETE	20	SYS	\$ 280.00	\$ 5,600.00
25	604-12083	DETECTABLE WARNING SURFACES	3	SYS	\$ 325.00	\$ 975.00
26	605-06120	CURB, CONCRETE	540	LFT	\$ 100.00	\$ 54,000.00
27	605-06140	CURB AND GUTTER, CONCRETE	48	LFT	\$ 90.00	\$ 4,320.00
28	605-06255	CENTER CURB, CONCRETE, TYPE D	195	SYS	\$ 200.00	\$ 39,000.00
29	621-06560	MULCHED SEEDING, TYPE U	340	SYS	\$ 5.00	\$ 1,700.00
30	621-06575	SODDING, NURSERY	60	SYS	\$ 65.00	\$ 3,900.00
31	720-44055	CASTING, TYPE 10, FURNISH AND ADJUST TO GRADE	8	EACH	\$ 2,100.00	\$ 16,800.00
32	801-06775	MAINTAINING TRAFFIC	1	LS	\$ 45,000.00	\$ 45,000.00
33	802-05704	SIGN POST, SQUARE, TYPE 1, UNREINFORCED ANCHOR BASE	13	LFT	\$ 31.00	\$ 403.00
34	802-09838	SIGN, SHEET, WITH LEGEND, 0.080 IN. THICKNESS	30	SFT	\$ 45.00	\$ 1,350.00
35	802-09840	SIGN, SHEET, WITH LEGEND, 0.100 IN. THICKNESS	14	SFT	\$ 50.00	\$ 700.00
36	802-11648	SIGN POST, TYPE	2	EACH	\$ 125.00	\$ 250.00
37	805-01300	TRAFFIC SIGNAL EQUIPMENT, REMOVE	1	EACH	\$ 3,000.00	\$ 3,000.00
38	805-01579	MISCELLANEOUS EQUIPMENT FOR TRAFFIC SIGNALS	1	LS	\$ 1,500.00	\$ 1,500.00
39	805-02087	TRANSPORTATION OF SALVAGEABLE SIGNAL EQUIPMENT	1	LS	\$ 1,000.00	\$ 1,000.00
40	805-02645	SIGNAL POLE FOUNDATION, 24 IN. X 24 IN. X 36 IN.	3	EACH	\$ 2,000.00	\$ 6,000.00
41	805-08126	TRAFFIC SIGNAL HEAD, (NO.) SECTION, RETROFIT	7	EACH	\$ 1,750.00	\$ 12,250.00
42	805-12650	SIGNAL POLE, PEDESTAL, 5 FT	3	EACH	\$ 1,100.00	\$ 3,300.00
43	805-78205	TRAFFIC SIGNAL HEAD, NO. 3 SECTION, 12 IN.	2	EACH	\$ 1,200.00	\$ 2,400.00
44	805-78370	PEDESTRIAN PUSH BUTTON, NON-APS	5	EACH	\$ 1,600.00	\$ 8,000.00
45	805-78485	SIGNAL CABLE, CONTROL, COPPER, 5C/14 GAUGE	450	LFT	\$ 4.30	\$ 1,935.00
46	805-99999	SIGNAL MAST ARM, 35 FT	1	EACH	\$ 1,800.00	\$ 1,800.00
47	808-06701	LINE, THERMOPLASTIC, BROKEN, WHITE, 4 IN.	520	LFT	\$ 2.50	\$ 1,300.00
48	808-06703	LINE, THERMOPLASTIC, SOLID, WHITE, 4 IN.	725	LFT	\$ 1.25	\$ 906.25
49	808-11482	LINE, THERMOPLASTIC, DOTTED, WHITE, 4 IN.	34	LFT	\$ 3.00	\$ 102.00
50	808-75245	LINE, THERMOPLASTIC, SOLID, YELLOW, 4 IN.	2,140	LFT	\$ 1.25	\$ 2,675.00
51	808-75297	TRANSVERSE MARKING, THERMOPLASTIC, STOP LINE, WHITE, 24 IN.	74	LFT	\$ 14.00	\$ 1,036.00
52	808-75300	TRANSVERSE MARKING, THERMOPLASTIC, CROSSWALK LINE, WHITE, 6 IN.	512	LFT	\$ 4.00	\$ 2,048.00
53	808-75320	PAVEMENT MESSAGE MARKING, THERMOPLASTIC, LANE INDICATION ARROW	4	EACH	\$ 250.00	\$ 1,000.00
54	808-75325	PAVEMENT MESSAGE MARKING, THERMOPLASTIC, ONLY	2	EACH	\$ 240.00	\$ 480.00
TOTAL						\$ 607,440.25

CONSTRUCTION TOTAL	\$607,000.00
CONTINGENCY (10%)	\$61,000.00
OVERALL PROJECT TOTAL	\$668,000.00

This cost estimate makes the following assumptions:
1.) Unit price estimates based on stand-alone project

Project Phases		
Task No.	Task	Cost
1	Preliminary Engineering	\$ 80,160
2	Right of Way	\$ -
3	Utility CN	\$ 30,000
4	Railroad CN	\$ -
5	Construction Inspection/Testing	\$ 66,800
TOTAL		\$ 176,960

Todd Johnson

Estimate Completed By

6/5/2026

Date

The Preliminary Cost Estimate portion of this document was prepared by me or under my supervision and represents a planning level cost estimate of the project's scope.

Gary L. Yellig
Signature



ABBREVIATED ENGINEERING NOTES FOR PRELIMINARY COST ESTIMATE - LONG TERM
56th Street & Franklin Road

LINE ITEM	ITEM NO.	DESCRIPTION	NOTES
1	105-06845	CONSTRUCTION ENGINEERING	
2	110-01001	MOBILIZATION AND DEMOBILIZATION	
3	201-52370	CLEARING RIGHT-OF-WAY	includes removing small trees and shrubs in existing median
4	202-02240	PAVEMENT REMOVAL	removes existing pavement in the taper to get squared-up for new pavement. 1/2 * 12' * 100' * 1/9 = say 70 SYS
5	202-02273	CENTER CURB, CONCRETE, REMOVE	removes existing center curb in taper area. By cad use 40 SYS
6	202-02278	CURB, CONCRETE, REMOVE	removes inside curb on WB lanes. Say 490 LFT
7	202-02279	CURB AND GUTTER, REMOVE	used at casting removals. Say 3' of each side of casting to be removed or 6' * 8 each = 48 LFT
8	202-02772	CASTING, REMOVE	removes broken inlet castings - 8 each within project area
9	202-52710	SIDEWALK CONCRETE, REMOVE	removes existing sidewalk/curb ramp on north side. 2 ramps each and assume 15 SYS per ramp or 30 SYS
10	202-93763	LIGHT STANDARD AND FOUNDATION, REMOVE	there are three of these within the existing median
11	203-02000	EXCAVATION, COMMON	used to get existing grass median excavated down to subgrade level. Area is 6,350 sft per CAD and say average depth is 30" or say 600 CYS
12	207-09935	SUBGRADE TREATMENT, TYPE IC	use the same 6,350 sft above and add in pavement removal area (70 SYS) and center curb removal area (40 SYS) and get say 820 SYS
13	306-08034	MILLING, ASPHALT, 1 1/2 IN.	total area of existing pavement by cad is 69,351 sft or say 7,710 SYS then add the 625 SYS of turn lane extension and get 8,335 SYS
14	401-000005	QC/QA-HMA, 3, 58H, SURFACE, 9.5 mm	use the same 8,335 SYS and 1.5" depth and get 8,335 * 1.5 * 110/2000 = say 690 Tons
15	401-000032	QC/QA-HMA, 3, 58H, INTERMEDIATE, 12.5 mm	area is subgrade treatment area of 820 SYS minus center curb area of 195 SYS or 625 SYS. 625 * 2.5" * 110/2000 = say 90 Tons
16	401-000046	QC/QA-HMA, 2, 58S, BASE, 25.0 mm	use same 625 SYS and 6" thick or 625 * 6 * 110/2000 = say 210 Tons
17	401-000062	QC/QA-HMA, 3, 58E, INTERMEDIATE, OG, 19.0 mm	use same 625 SYS and 3" thick or 625 * 3 * 110/2000 = say 105 Tons
18	401-11526	JOINT ADHESIVE	length of joints in Surface is about 3,210 LFT
19	401-12439	VOID REDUCING ASPHALT MEMBRANE FOR HMA	length of joints in Surface is about 3,210 LFT
20	406-05520	ASPHALT FOR TACK COAT	area of Surface * 1 = 8,335 SYS + area of Inter./Base * 3 = 1,875 SYS or 10,210 SYS total. Use 0.00034 T/SYS and get say 4 Tons
21	506-06000	PAVEMENT RECONSTRUCTION ADJACENT TO CURB RAMPS	used at two curb ramp reconstructions use 16' by 4' by 2 each = say 15 SYS
22	506-06001	PAVEMENT RECONSTRUCTION ADJACENT TO CURB	used at inlet casting work area. 8 inlets and use 8' by 4' for each inlet or say 30 SYS
23	604-06070	SIDEWALK, CONCRETE	patches sidewalk back in around new ramps, assume 10 SYS
24	604-08086	CURB RAMP, CONCRETE	two ramps being replaced, assume 10 SYS each or 20 SYS
25	604-12083	DETECTABLE WARNING SURFACES	use 1.5 SYS per each or two ramps or 3 SYS
26	605-06120	CURB, CONCRETE	this is for new curb along the inside of the WB lanes. Use 540 LFT
27	605-06140	CURB AND GUTTER, CONCRETE	replaces existing curb and gutter removed for inlet work use the same 48 LFT
28	605-06255	CENTER CURB, CONCRETE, TYPE D	area is 5' by 345' or say 195 SYS
29	621-06560	MULCHED SEEDING, TYPE U	reseeds grass median area. By cad area is 3,047 sft or say 340 SYS
30	621-06575	SODDING, NURSERY	for patching grass utility strip at inlet and curb ramp work. Say say 6 SYS per each for 10 total or 60 SYS
31	720-44055	CASTING, TYPE 10, FURNISH AND ADJUST TO GRADE	furnishes and installs new castings for the 8 inlets - use 8 Each
32	801-06775	MAINTAINING TRAFFIC	
33	802-05704	SIGN POST, SQUARE, TYPE 1, UNREINFORCED ANCHOR BASE	use for the lane control sign say 13 LFT
34	802-09838	SIGN, SHEET, WITH LEGEND, 0.080 IN. THICKNESS	needed if we have a "Left On Green Arrow Only" sign R10-5 (30"x36") and Lane Arrows R3-5 3 each at 30"x36" for a total of 30 SFT
35	802-09840	SIGN, SHEET, WITH LEGEND, 0.100 IN. THICKNESS	for lane control sign - use 30" by 48" or 10 SFT (R3-8x) and street sign on W Leg mast arm 3.33 SFT assume 14 SFT total
36	802-11648	SIGN POST, TYPE	use this item for reflective strips on Double Arrow sign use 2 each (assume 7 ft per each post or 14 LFT)
37	805-01300	TRAFFIC SIGNAL EQUIPMENT, REMOVE	removes W Leg mast arm and signal faces on all Legs
38	805-01579	MISCELLANEOUS EQUIPMENT FOR TRAFFIC SIGNALS	
39	805-02087	TRANSPORTATION OF SALVAGEABLE SIGNAL EQUIPMENT	assume old signal faces and mast arm will be salvaged
40	805-02645	SIGNAL POLE FOUNDATION, 24 IN. X 24 IN. X 36 IN.	1 in the NE; 1 in the SE; and 1 in the SW for 3 each
41	805-08126	TRAFFIC SIGNAL HEAD, (NO.) SECTION, RETROFIT	supplies new signal face with backplate on existing faces that will remain - 7 each (3 on E Leg mast arm, 3 on N Leg mast arm, 1 on W Leg mast arm for a total of 7 each)
42	805-12650	SIGNAL POLE, PEDESTAL, 5 FT	1 in the NE; 1 in the SE; and 1 in the SW for 3 each
43	805-78205	TRAFFIC SIGNAL HEAD, NO. 3 SECTION, 12 IN.	Add two 3-Section signal faces on the W Leg - 2 Each
44	805-78370	PEDESTRIAN PUSH BUTTON, NON-APS	1 in the NE; 2 in the SE; and 2 in the SW for 5 each
45	805-78485	SIGNAL CABLE, CONTROL, COPPER, 5C/14 GAUGE	for new Ped Buttons (say 250') and new signal heads on W Leg (say 200') total say 450 LFT
46	805-99999	SIGNAL MAST ARM, 35 FT	1 each for the W Leg
47	808-06701	LINE, THERMOPLASTIC, BROKEN, WHITE, 4 IN.	52 each at 10 LFT/Ea = 520 LFT
48	808-06703	LINE, THERMOPLASTIC, SOLID, WHITE, 4 IN.	used only for the lane lines between turn lanes (no edge lines). Use 725 LFT
49	808-11482	LINE, THERMOPLASTIC, DOTTED, WHITE, 4 IN.	Assume a 2' line and a spacing of 6'. Length of arc is about 130' or 130'/8 * 2' each = say 34 LFT
50	808-75245	LINE, THERMOPLASTIC, SOLID, YELLOW, 4 IN.	used for the length of the milling/overlay - use 2,140 LFT
51	808-75297	TRANSVERSE MARKING, THERMOPLASTIC, STOP LINE, WHITE, 24 IN.	E Leg = 36'; W Leg = 38' for a total of 74 LFT
52	808-75300	TRANSVERSE MARKING, THERMOPLASTIC, CROSSWALK LINE, WHITE, 6 IN.	E Leg = 168' W Leg = 168' S Leg = 176' for a total of 512 LFT
53	808-75320	PAVEMENT MESSAGE MARKING, THERMOPLASTIC, LANE INDICATION ARROW	replace existing - say 2 each on EB to SB RTL and 2 each on WB to SB LTL
54	808-75325	PAVEMENT MESSAGE MARKING, THERMOPLASTIC, ONLY	replace existing - say 1 each on EB to SB RTL and 1 each on WB to SB LTL

Attachment E - 7

OUTPUT	
Total Crashes Saved	6.208
FI Crashes Saved	0.557
NI Crashes Saved	0.804
PDO Crashes Saved	4.846
Equivalent Annual Benefit (\$)	2,044,373
Equivalent Annual Cost (\$)	53,146
Present Worth Benefit (\$)	51,109,326
Present Worth Cost (\$)	1,328,657
Net Annual Benefit (\$)	1,991,227
Present Worth Net Benefit (\$)	49,780,669
Benefit-Cost Ratio	38.47

Post

Analyst

Date

Comments

JMR

4/21/2026

Traffic Counts: MioVision
Counts provided by Indy
DPW (dated: 12/5/2023)
Crash Data: ARIES provided

Settings: Indiana local settings

Version 4.1 56th & Franklin

ABBREVIATED ENGINEERING REVIEW FOR TRAFFIC SAFETY

		Date:	6/25/2026
		Des. No.:	n/a

Reviewer Information:	Agency/Firm Name: Corradino LLC
Primary Author: James Mark Rinehart	Agency: Indianapolis Metropolitan Planning Organization
Phone Numbers: (317) 488-2363	Email Address: jrinehart@corradino.com

Purpose of Review:

Corradino LLC was hired by the Indianapolis MPO (IMPO) to conduct a series of roadway safety audits at preselected intersections within its urbanized area. The goal was to identify existing safety issues and recommend near-term and long-term improvements to address them. Improvements may range from lower-cost maintenance items, such as signage and pavement markings, to higher-cost capital improvements, including intersection upgrades, multimodal infrastructure, and upgraded traffic signals, as needed. This form is suitable for Level 1 review. Of the three available levels of engineering review, this represents the least refined, lowest-intensity degree of analysis, development of essential project intent (outline of the certified course of action), scoring, and process documentation.

Project Location:

Route: 71 st St & Lee Rd	District: Greenfield	City: Lawrence	County: Marion
Lat & Long (BOP): 39.883582 -86.000049	Lat & Long (EOP): 39.883582 -86.000049	Inside Urban Area Boundary: <u>Yes</u> or No (circle)	
IMPO: Indianapolis Metropolitan Planning Organization		Project Type: Roadway Safety Audit	
Location: The intersection of 71 st Street & Lee Road			

Existing Conditions:

The 71st St & Lee Rd intersection is an unsignalized 90-degree curve with NB and EB approaches. Both approaches have one travel lane and approximately 2' shoulders. There are flexible retroreflective delineators and a berm along the northern and eastern edge of the curve. The EB approach has right-turn arrow signs on both sides of the road before the intersection, and another at the intersection. The NB approach has left-turn arrow signs on both sides of the road. The posted speed limit is 40mph for both approaches. The dense trees in the SW quadrant of the intersection partially obstruct the view of the road's curvature.

Additionally, the 71st Street & Lee Road intersection is located at the bottom of a steep hill. According to Google Earth's elevation tool, Lee Road descends ~83' over the span of a half-mile with an average slope of 4%. It was observed that when Corradino's team drove Lee Road NB to the intersection, they could exceed the posted speed limit while coasting downhill on Lee Road.

There are no pedestrian facilities present at any of the approaches to the intersection.

The entire intersection is surrounded by dense forest. To the NE is a gravel path for utility access leading off the intersection, with one streetlight.

Corradino staff held a virtual meeting with IMPO staff, Lawrence staff, and the Lawrence Police Department on April 9, 2026, to review the Preliminary Findings Report, discuss any past or upcoming projects at or near the intersection, and identify potential near-term and long-term solutions for Corradino to test before the field check. Meeting minutes from the virtual meeting are available in **Attachment B**.

Corradino held a field check with representatives from the IMPO and City of Lawrence on May 6, 2026, to provide a recap of the discussion held during the virtual meeting, share test results for the near-term and long-term solutions, and build consensus around a series of countermeasures for Corradino to cost as part of the final recommendations. The field check meeting minutes are available in **Attachment B**.

Traffic Operations:

- a) **Mobility/Congestion Performance:** Traffic counts for the intersection were collected from INDOT's Traffic Count Database System (TCDS) to generate results for the RoadHat Analysis. Because this intersection is a 90-degree curve versus a traditional stop-controlled or signalized intersection, no traffic capacity analysis was needed to test long-term recommendations.
- b) **Safety Performance / Crash Analysis:** According to available crash data from January 1, 2022, to December 31, 2024, there were **12** crashes associated with the study area. Of those crashes, **0** resulted in fatality, **0** resulted in incapacitating injuries, and **2** resulted in non-incapacitating injuries. See attached Crash Summary in **Attachment A**.

According to the collision diagram developed for this project, six (50%) of the reported crashes were Opposite Direction Sideswipe crashes that occurred in the 90-degree curve. Additionally, the two reported injury-related crashes were Head-On collisions in the 90-degree curve. The five (33%) remaining crashes were reported as Ran Off Road crashes that, according to the police reports, speeding or steering failure were the primary factors. Lawrence staff noted that it is common for NB vehicles to enter the 90-degree curve at a high rate of speed due to the hill on Lee Road, which correlates with the police narratives.

It is also important to note that 75% of reported crashes at the 71st & Lee Road intersection occurred on wet road surfaces. When Corradino shared this information with the Lawrence staff, they confirmed that due to the dense tree canopy surrounding the roadway, the pavement stays wet much longer. Safety countermeasures were discussed with Lawrence staff to help address speeding, wet roadway surface conditions, and general visibility due to the dense tree canopy at the 90-degree curve.

RoadHAT 4.1 was used to develop crash cost (ICC) and crash frequency (ICF) scores for the 71st Street & Lee Road Intersection. Results from the RoadHAT 4.1 analysis were: $I_{CC} = 0.39$, $I_{CF} = 1.43$. The RoadHAT 4.1 analysis results are available in **Attachment A**.

Alternatives & Recommendations

During the field check with representatives from the City of Lawrence and the IMPO, crash data and traffic data were discussed while observing traffic patterns. Multiple maintenance-type improvements were identified in the field to address near-term safety needs at the intersection (striping, signage, tree pruning, etc.), as well as some longer-term infrastructure improvements. Below are the Near- and Long-Term improvements discussed for the 71st Street & Lee Road intersection. Notes from the field check summarizing conversations are available for review in **Attachment B**.

Near-Term

- Prune trees along Lee Road & 71st Street.
- Add new edge line striping and new double yellow centerline striping, and consider having the separation between double yellow lines be wider than the standard 6" as noted in the IDM Chapter 502-2.02.
- Remove temporary curb and delineators and install chevron signs on the outside of the curve.
- Cut rumble strips on the edge lines approaching and exiting the curve.
- Cut a rumble stripe on the centerline approaching and exiting the curve.
- Replace the four signs at the approaches to the curve with updated signs indicating the speed limit in the curve is 20mph.
- Add retroreflective tape to the signposts of the four 20 mph signs and the recommended chevron signs.

Long-Term

- Include all recommendations outlined in the Near-Term.
- Mill and resurface the roadway with a high-friction pavement at the approaches and within the curve.
- Widen the shoulder on the northeast side of the curve.

Future Consideration

- N/A

Near-Term & Long-Term Cost Estimates for the Proposed Safety Improvements	
Cost estimates for the near- and long-term improvements are available in Attachment C .	
<u>Near-Term Recommendation</u>	
PE - \$10,000	
ROW - \$0	
Utility CN - \$1,000	
Railroad CN - \$0	
Construction Inspection/Testing (10% Rounded up to nearest \$1k) - \$0	
CN (including 10% contingency) - \$34,000	
Near-Term Total - \$45,000	
<u>Long-Term Recommendation</u>	
PE - \$25,000	
ROW - \$0	
Utility CN - \$1,000	
Railroad CN - \$0	
Construction Inspection/Testing (10% Rounded up to nearest \$1k) - \$0	
CN (including 10% contingency) - \$202,000	
Long-Term Total – \$228,000	
Project Score: (for INDOT use)	
Safety Program Score =	
Miscellaneous Notes:	
Attachments:	
Attachment A: Preliminary Findings Report	
Attachment B: Virtual Meeting Minutes & Field Check Minutes	
Attachment C: Cost Estimates & Schematics	

Attachment A

Preliminary Findings

PRELIMINARY FINDINGS

Safety Analysis at 71st Street & Lee Road

Report Prepared for: IMPO & City of Lawrence

1. **Safety Analysis**

A crash data analysis was completed for the intersection of 71st Street & Lee Road (Study Area) in Lawrence, IN. Before beginning the crash analysis, the project team followed these steps to clean the data:

- Received 2022-2024 crash data from the IMPO. Serious Injury and Fatal crashes had been cleaned by IMPO staff.
- Placed a 250' buffer around the Study Area to identify reported crashes near the intersection.
- Reviewed the police reports for each crash record identified within the 250' buffer.
- Identified and removed any crash records from the analysis that involved a collision with an animal in the roadway or occurred in a parking lot near the intersection.
- Reviewed the description in the reports to confirm the selected Manner of Collision & Crash Severity accurately reflected how the police officer described the crash.
- Exported the results from ArcGIS Pro into MS Excel.
- Created a collision diagram of the Study Area as well as summary tables of the crash records.
- Developed a crash cost (Icc) and crash frequency (Icf) for the Study Area using RoadHat 4.1.

12 crashes were identified within the Study Area. Two of the reported crashes were Non-Incapacitating injury crashes. There were no reported Fatal crashes or Incapacitating injury crashes between 2022 and 2024. However, there was one reported fatal crash and two reported incapacitating injury crashes in the Study Area between 2020 and 2021. These were recognized but not analyzed further in this Preliminary Findings Report.

Both reported injury-related crashes that occurred during the study period were Head On Between Two Motor Vehicle crashes that occurred where Lee Road & 71st Street meet at a 90-degree curve. Both police narratives noted that the road surface was wet at the time of the crash.

Other notable results near the Study Area include:

- 50% of the reported crashes were Opposite Direction Sideswipe crashes.
- 33% of the reported crashes were Ran Off Road crashes that indicated speed or steering failure as a primary factor for the crashes.
- 17% of reported crashes were Head On Between Two Motor Vehicle crashes.
- 75% of reported crashes occurred in wet or icy roadway surface conditions. The remaining 25% of reported crashes occurred on dry roadways.
- 33% of reported crashes occurred when the weather conditions were clear. The remaining 67% of reported crashes occurred in Rainy weather conditions.
- 92% of reported crashes occurred during Off-Peak travel times. 8% of reported crashes occurred during the evening peak hours (4 pm-7 pm). There were no reported crashes during the morning peak hours (6 am-9 am).
- 92% of reported crashes occurred in daylight hours and 8% in dark (lighted) conditions.

Attached are the crash summary tables, a collision diagram, images of the intersection, and the results of the RoadHAT 4.1 analysis.

2022-2024 Crash Summary	
TOTAL CRASHES	12
TOTAL INJURIES	8
PROPERTY DAMAGE ONLY	9
POSSIBLE INJURY	1
NON-INCAPACITATING	2
INCAPACITATING	0
FATAL	0

Summary of Primary Factors per Manner of Collision		
Primary Factors per Manner of Collision	Crashes	Percent
OPPOSITE DIRECTION SIDESWIPE	6	50%
FAILURE TO MAINTAIN LANE	2	
UNSAFE SPEED	1	
IMPROPER LANE USAGE	1	
SPEED TOO FAST FOR WEATHER CONDITIONS	1	
LEFT OF CENTER	1	
RAN OFF ROAD	4	33%
STEERING FAILURE	1	
OTHER (DRIVER) - EXPLAIN IN NARRATIVE	1	
SPEED TOO FAST FOR WEATHER CONDITIONS	1	
OVERCORRECTING/OVERSTEERING	1	
HEAD ON BETWEEN TWO VEHICLES	2	17%
SPEED TOO FAST FOR WEATHER CONDITIONS	1	
UNSAFE SPEED	1	
Total Crashes	12	100%

Summary of Crashes per Time of Day		
Time of Day	Crashes	Percent
Peak AM (6:00-9:00 AM)	0	0%
Peak PM (4:00-7:00 PM)	1	8%
Off Peak	11	92%
Total Crashes	12	100%

Summary of Crashes per Light Conditions		
Light Conditions	Crashes	Percent
DAWN/DUSK	0	0%
DARK (LIGHTED)	1	8%
DAYLIGHT	11	92%
Total Crashes	12	100%

Summary of Roadway Surface Conditions			
Manner of Collision	DRY	WET	Total Crashes
OPPOSITE DIRECTION SIDESWIPE	2	4	6
RAN OFF ROAD	1	3	4
HEAD ON BETWEEN TWO VEHICLES		2	2
Total Crashes	3	9	12

Summary of Weather Conditions			
Manner of Collision	CLEAR	RAIN	Total Crashes
OPPOSITE DIRECTION SIDESWIPE	2	4	6
RAN OFF ROAD	2	2	4
HEAD ON BETWEEN TWO VEHICLES		2	2
Total Crashes	4	8	12

DIAGRAM OF
COLLISION
REPORTS

71st Street & Lee Road

Study Period: 1/1/2022 to 12/31/2024 Location: Lawrence
INDOT District: Greenfield County: Marion City/Town: Lawrence
Analyst: JMR QC: DC Date: 3/26/2026



YEAR	REPORTS
2022	5
2023	5
2024	2
Total	12

NOTES
1) Crashes with determinable location are shown in diagram. Crash total may not match ARIES database.
2) Crashes on diagram do not represent exact crash locations; they are approximated based on available information.
3) Diagram not to scale.

- Object Symbols**
- MOVING VEHICLE
 - TURNING VEHICLE
 - BACKING VEHICLE
 - OUT OF CONTROL
 - PARKED VEHICLE
 - PEDESTRIAN
 - BICYCLE
 - ANIMAL
 - DEBRIS IN ROADWAY
 - DRIVEWAY CRASH

- FATAL CRASH
- INJURY CRASH – INCAPACITATING
- INJURY CRASH – NONINCAPACITATING
- PDO CRASHES (IF > 1)

- SIGNALIZED INTERSECTION
- FIXED OBJECT (See table for # codes)

- Collision Symbols**
- REAR END
 - HEAD ON
 - OTHER
 - SIDESWIPE – SAME
 - SIDESWIPE – OPPOSITE
 - RIGHT ANGLE
 - LEFT/RIGHT TURN
 - RAN OFF ROAD

- Fixed Object Codes**
- 01 – BRIDGE or OVERPASS
 - 02 – BUILDING
 - 03 – CULVERT or DITCH
 - 04 – CURB
 - 05 – GUARDRAIL or BARRIER
 - 06 – EMBANKMENT
 - 07 – FENCE
 - 08 – TRAFFIC POLE
 - 09 – UTILITY POLE
 - 10 – SIGN
 - 11 – TREE / SHRUB
 - 12 – CONSTRUCTION BARRIER
 - 13 – CRASH ATTENUATOR
 - 88 – OTHER
 - 99 - UNKNOWN

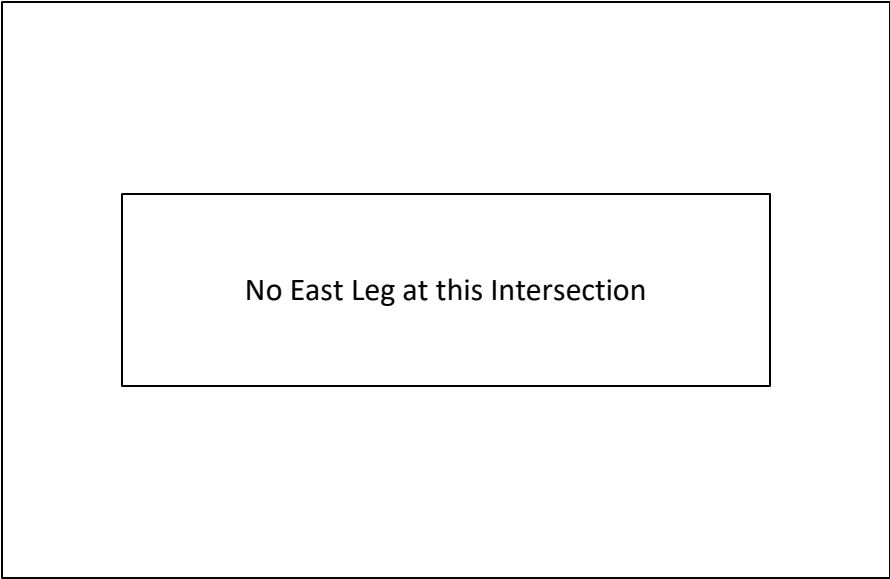
Intersection Images	71 st Street & Lee Road	
	Study Period: <u>1/1/2022 to 12/31/2024</u>	Location: <u>Lawrence</u>
	INDOT District: <u>Greenfield</u> County: <u>Marion</u>	City/Town: <u>Lawrence</u>



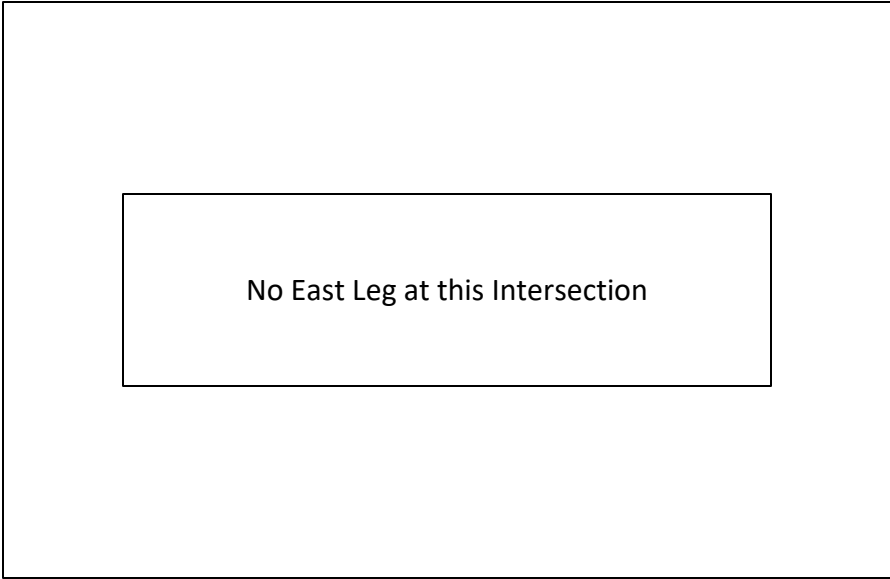
West Leg – Looking West



West Leg – Looking East



East Leg – Looking West



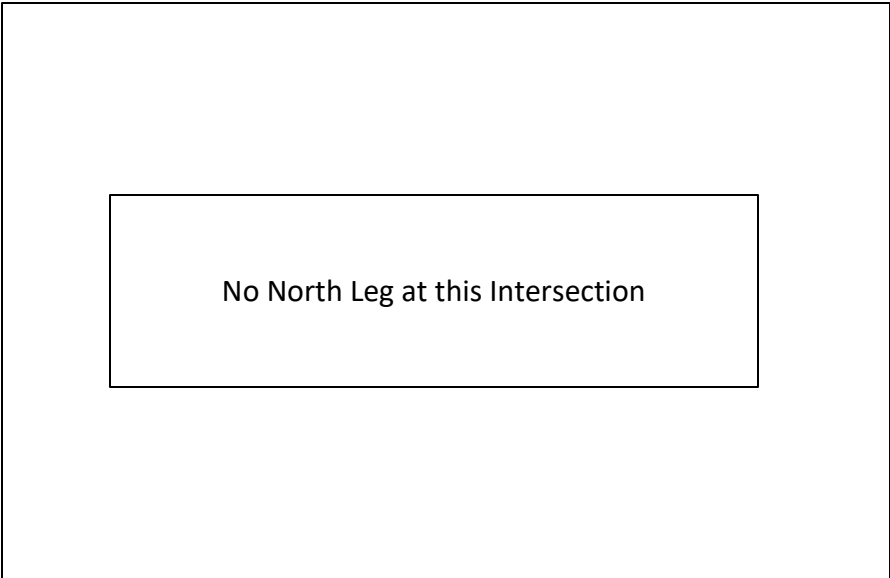
East Leg – Looking East



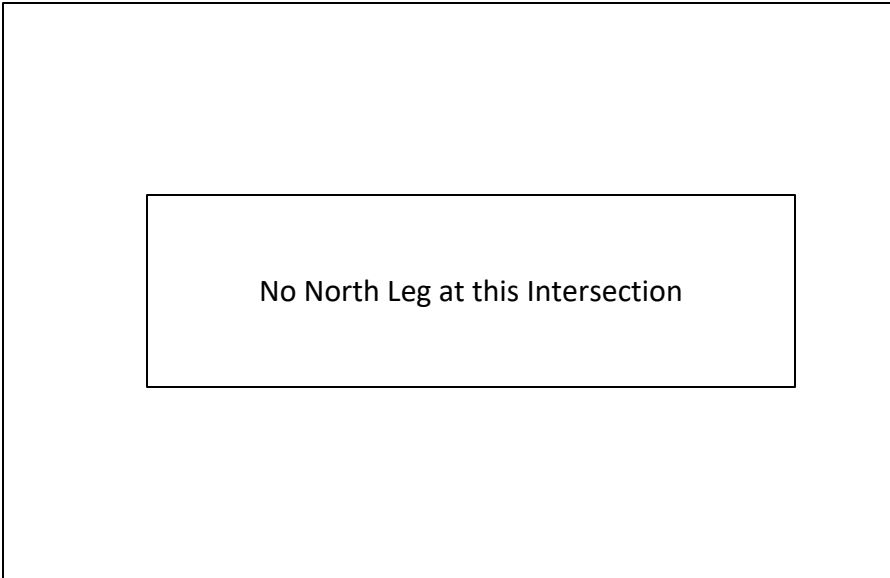
South Leg – Looking South



South Leg – Looking North



North Leg – Looking South



North Leg – Looking North

RoadHAT 4D		Index of Crash Frequency and Cost - Form F1		Page 1/2
Settings: Indiana local settings		Version: Version 4.1		
Location		71st Street & Lee Road		
GIS				
Post				
Analyst		JMR		
Date		3/27/2026		
INPUT				
Road Facility Type		City Non- Arterial Intersection		
Busiest Road AADT (veh/day)		5670		
Crossing Road AADT (veh/day)		5670		
First Year with Crash Data (yyyy)		2022		
Last Year with Crash Data (yyyy)		2024		
Number of Crashes (crash/period)				
Fatal and Incapacitating Injury Crashes		0		
Non-Incapacitating and Possible Injury Crashes		3		
Property Damage Only Crashes		9		
Route or Road Type		City Non- Arterial Intersection		
Average Crash Costs (\$)				
Fatal and Incapacitating Injury Crashes		1699800		
Non-Incapacitating and Possible Injury Crashes		363300		
Property Damage Only Crashes		37300		
Crash Cost Year (yyyy)		2017		
OUTPUT				
Expected Crash Frequency (crash/year)				
Fatal and Incapacitating Injury Crashes		0.105		
Non-Incapacitating and Possible Injury Crashes		0.19		
Property Damage Only Crashes		1.10		
All Crashes		1.40		
Index of Crash Frequency		1.43		
Index of Crash Cost		0.39		

RoadHAT 4D		Index of Crash Frequency and Cost - Form F1		Page 2/2
Settings: Indiana local settings		Version: Version 4.1		
Location		71st Street & Lee Road		
GIS				
Post				
Analyst		JMR		
Date		3/27/2026		
Comments: Traffic Counts: INDOT TCDS (cut in have to factor two way traffic, begin an "L" intersection). Crash Data: ARIES provided by IMPO.				

Attachment B

Virtual Meeting Minutes & Field Check Minutes

IMPO Safety Study: City of Lawrence RSA Locations

Date: April 9, 2026

Time: 10:30 – 11:00 AM

Location: MS Teams

Attendees:

Renea Rafala, City of Lawrence

James Perron, City of Lawrence

Deputy Chief Cline, Lawrence PD

Captain Cantrell, Lawrence PD

Jennifer Dunn, IMPO

James Mark Rinehart, Corradino LLC

David Cleveland, Corradino LLC

Agenda

1. Introductions

- a. Corradino staff kicked off the meeting with a round of introductions for all the participants on the Teams call.
- b. Corradino staff then shared that the purpose of the kick-off meeting was to spend some time talking with City of Lawrence staff and local law enforcement about the two RSA locations they selected to study as part of the Indianapolis MPO's (IMPO) Safety Study. The information from the kick-off meeting will be considered as Corradino completes the safety and traffic analysis and begins identifying potential countermeasures for the two RSA locations. Corradino then asked the Lawrence staff to provide an overview of why they selected their two RSA locations, such as observed safety concerns, changes in traffic related to new development, or existing plans or studies that have identified long-term improvements at the RSA sites.

2. Overview of RSA locations

a. 71st Street & Lee Road

- i. Lawrence staff shared that the intersection at 71st Street & Lee Road is a ~90-degree curve that has dark, not lighted roadway conditions. Additionally, there is a steep hill on Lee Road that can cause vehicles to enter the turn at high speed, leading to frequent run off road and opposite-direction sideswipe crashes.
 1. Lawrence staff noted they used to have a guardrail in the corner of the intersection, but it was frequently struck by vehicles and needed to be repaired.

2. Lawrence staff transitioned from the guardrail and formed a berm on the north side of 71st Street, plus a temporary curb and retroreflective delineators on the edge of the curve.
 3. Lawrence staff did note these improvements have not necessarily decreased the crash frequency, but it is easier to maintain the berm and delineators than it was to fix the guardrail.
- ii. Lawrence staff shared that Lee Road is a heavily used roadway with a lot of traffic accessing Forest Glen Elementary School and Fall Creek Valley Middle School, both located near the Lee Road and 63rd Street intersection. Lawrence staff noted Lee Road may need to be modified in the future to widen the roadway to accommodate the increased traffic.
 - iii. Corradino staff shared results from the draft Preliminary Findings Report for the 71st Street Lee Road intersection. Corradino noted that the crash patterns at the intersection aligned closely with those the Lawrence PD observes. Additionally, Corradino noted ~66% of crashes occurred in wet roadway conditions.
 1. Lawrence staff noted that they were not surprised that a lot of crashes occurred in wet roadway conditions for two reasons:
 - a. Because they have observed vehicles frequently driving too fast at the intersection, and the slippery roadway conditions result in more crashes.
 - b. The dense tree canopy around the intersection prevents the intersection from drying out after rainfall or snowfall as quickly as other locations.
 - iv. Lawrence staff and Corradino staff brainstormed ideas to improve the 71st Street & Lee Road intersection. A few concepts discussed included increased lighting, some tree clearing in the southwest corner of the intersection, rumble strips, wider centerline striping, and additional signage notifying of the speed limit through the curve.
 1. Corradino noted these improvements will be considered as they move into the next phases of the RSA.

b. 56th Street & Franklin Road Intersection

- i. Lawrence staff noted that the 56th Street & Franklin Road intersection was identified on their High Injury Network, which is why they selected the intersection to be studied.
- ii. Both 56th Street & Franklin Road are thoroughfares owned and maintained by the Indianapolis DPW. But, the City of Lawrence has an MOU to partner on any recommended improvements identified on Indianapolis DPW roadways within the City of Lawrence.

1. Lawrence staff noted they are currently partnering with Indianapolis DPW to construct a sidewalk from the southwest corner of the 56th Street & Franklin Road intersection south to the Lawrence Park entrance.
2. Lawrence staff also noted they have conceptualized adding bicycle lanes on 56th Street and reducing from a divided four-lane roadway to a three-lane roadway near the 56th Street & Franklin Road intersection. This roadway project had not yet been studied.
- iii. When asked about safety concerns, Lawrence PD shared that they felt the layout of the 56th Street & Franklin Road intersection was good, and that higher traffic volumes and distracted driving may be the primary factors for crashes occurring at the intersection
- iv. Corradino shared results from the draft Preliminary Findings Report, which showed rear-end crashes were the highest crash type with 47%, and left-turn crashes were the second highest at 20%. However, 56th Street & Franklin Road is a “T” intersection with only one potential conflict point for left-turning vehicles. This means that 20% of all crashes involved a single left-turn movement: the westbound 56th Street-to-southbound Franklin Road left turn.
 1. Corradino suggested a way to help improve safety for westbound to southbound left-turning vehicles is to update the traffic signal from a protected/permissive to a protected-only signal phase.
 2. Lawrence staff agreed that the protected-only signal phase could be a good countermeasure. If needed, they could remove some of the existing median to extend the westbound to southbound left-turn lane further east.
- v. Corradino said they would look further into the signal phasing, plus other safety countermeasures, before meeting with Lawrence staff again at the field check.

3. Preliminary Findings Reports

- a. Corradino staff walked through the preliminary findings reports, summarizing the crash history and patterns about both RSA locations. The draft report was shared with IMPO staff for review and will then be updated and shared with Lawrence staff before the field check.

4. Traffic Counts

- a. Corradino staff asked Lawrence staff if they had recent traffic counts available for either RSA location.
- b. Lawrence staff said they did not have any recent traffic counts at either location, but could reach out to Indianapolis DPW about accessing counts at 56th Street & Franklin Road.

- c. Indianapolis MPO noted that they have a license with the SaaS, Replica, which will be able to provide traffic counts, in case traffic capacity analysis is needed for either RSA site.

5. Next Steps

- a. Finalize Preliminary Findings Reports.
- b. Schedule Field Checks.
 - i. Corradino sent a follow-up email to Lawrence staff on 4/9/2026 to schedule a field check with them between 5/1/2026 and 5/8/2026.

Field Check Notes for RSA at 71st Street & Lee Road

				Date: 5/6/2026	
				Des. No.: n/a	
Reviewer Information:			Agency/Firm Name: Corradino LLC		
Primary Author: James Mark Rinehart			Agency: Indianapolis Metropolitan Planning Organization		
Phone Numbers: (317) 488-2363			Email Address: jrinehart@corradino.com		
Attendees:					
- Renea Rafala, City of Lawrence - James Perron, City of Lawrence - Jennifer Dunn, IMPO - James Mark Rinehart, Corradino - David Cleveland, Corradino					
Purpose of Field Check:					
The purpose of this field check was to review the crash history at the 71st Street & Lee Road intersection, evaluate the current roadway conditions, observe traffic patterns, and collaborate with representatives from Local Public Agencies (LPA) and Law Enforcement to identify safety countermeasures. Participants in the field check were provided a packet of information outlining the crash history at the intersection. The goal of the field check was to identify near-term and long-term improvements and build consensus with the LPAs and Local Law Enforcement on the recommendations. Recommendations from the field check will be used as the final recommendations for the RSA and included in the IMPO's Safety Study.					
Project Location:					
Location: Intersection of 71 st Street & Lee Road					
INDOT District: Greenfield			City: Lawrence	County: Marion	
Lat & Long (BOP)	39.883582	-86.000049	Urban/Rural – URBAN	Functional Class of Major Roadway: Other Principal Arterial	
Traffic Control Type: Unsignalized – 90-degree curve			Posted Speed Limit: 71 st St. – 40mph; Lee Rd. – 40mph		
Site Observations					
- To begin the field check, it was agreed that, because the intersection is not a traditional intersection, but rather a 90-degree turn that changes roadway names, this intersection did not need a traffic capacity analysis completed. No stop-controlled or signalized intersection would be a part of the recommended alternatives. - Corradino shared the crash history with Lawrence staff, which indicated that the crashes at the intersection correlated with taking the 90-degree turn at 71st Street & Lee Road too quickly, crossing over the centerlines, and running off the road or striking and approaching vehicle, either head-on or with an opposite direction sideswipe. ○ While in the field, it was observed that the centerlines and the inside edge line were worn off the roadway. - Vehicles going EB on 71st Street to SB on Lee Road were observed driving on the edge line or even on the shoulder of the roadway to avoid getting too close to the centerlines. - Vehicles going NB on Lee Road to WB on 71st Street were observed driving on the centerlines when making the turn. ○ Lawrence staff noted that in 2025, they installed a berm on the outside edge of the curve to prevent vehicles from running off the roadway and into the trees, and then also added temporary curbs with delineators to notify drivers of the outside edge of the roadway. Lawrence staff noted that the berm has helped reduce run-off-road crashes, but the delineators are continually struck by vehicles. - To assist vehicles in knowing where the edge and centerlines are, it was discussed adding rumble strips through the turn of the intersection and replacing the delineators with chevron signs in the					

curve.

- In addition to the rumble strips, widening the “double yellow” centerline may help channel traffic to avoid head-on collisions.
 - As part of a future pavement project, it was discussed that replacing the existing pavement with a high-friction pavement in the curve may help, especially when the roadways are wet. Lawrence staff noted that the pavement at this location stays wet longer because of the dense tree canopy located on both sides of the roadway.
 - As part of a future pavement project, Lawrence mentioned adding pavement to the existing shoulder in the outside edge of the turn would be preferred as well.
- o It was observed that signage notifying of the tight turn is located along both sides of the roadway, and as EB/SB and NB/WB vehicles enter the turn. However, trees have started to grow over the signs, and the signs do not indicate a recommended speed for the turn.
- Lawrence staff said they could trim trees at the intersection. Additionally, it was discussed adding signage to show the recommended speed for navigating the turn.

Potential Alternatives Discussed

Near-Term

- Prune trees along Lee Road & 71st Street.
- Add new edge line striping and new centerline striping. Make the new centerline striping wider than the current 2’ width in the turn
- Remove temporary curb and delineators and install chevron signs on the outside of the turn.
- Cut rumble strips on the edge lines approaching and exiting the turn.
- Cut a rumble stripe on the centerline approaching and exiting the turn.
- Replace the four “turn” signs at the approaches to the turn with updated signs indicating the speed limit in the turn is 20mph.
- Add retroreflective tape to the signposts of the four 20 mph signs and the recommended chevron signs.

Long-Term

- Include all recommendations outlined in the Near-Term; and
- Mill and resurface roadway with a high-friction pavement at the approaches and within the turn.

Future Consideration

- N/A

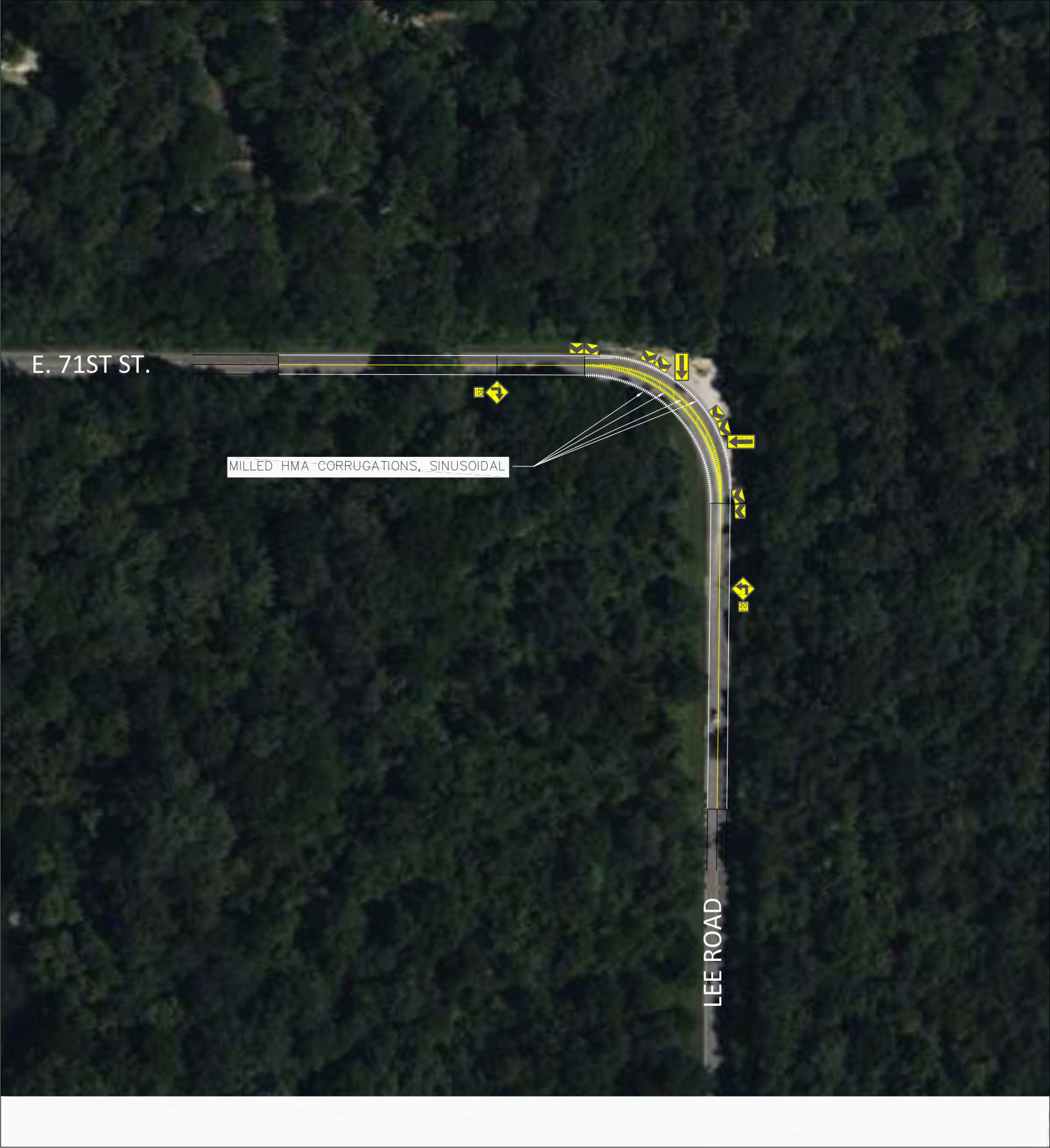
Consensus on Key Items for Alternatives

- A consensus was met with Lawrence staff on the near- and Long-term alternatives to be the recommendations for the RSA.

Attachment C

Cost Estimates & Schematics

Near-Term Improvements 71st Street & Lee Road



PRELIMINARY COST ESTIMATE - NEAR TERM
71st Street & Lee Road

LINE ITEM	ITEM NO.	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	AMOUNT
1	110-01001	MOBILIZATION AND DEMOBILIZATION	1	LS	\$ 5,000.00	\$ 5,000.00
2	202-04435	DELINEATOR POST, REMOVE	21	EACH	\$ 40.00	\$ 840.00
3	202-74045	SIGN AND SUPPORTS, CHANNEL POSTS, REMOVE	5	EACH	\$ 140.00	\$ 700.00
4	606-12400	MILLED HMA CORRUGATIONS, SINUSOIDAL	970	LFT	\$ 10.00	\$ 9,700.00
5	622-03680	TREE PRUNING	1	LS	\$ 1,200.00	\$ 1,200.00
6	801-06775	MAINTAINING TRAFFIC	1	LS	\$ 1,500.00	\$ 1,500.00
7	802-05704	SIGN POST, SQUARE, TYPE 1, UNREINFORCED ANCHOR BASE	120	LFT	\$ 31.00	\$ 3,720.00
8	802-09838	SIGN, SHEET, WITH LEGEND, 0.080 IN. THICKNESS	47	SFT	\$ 45.00	\$ 2,115.00
9	802-09840	SIGN, SHEET, WITH LEGEND, 0.100 IN. THICKNESS	16	SFT	\$ 50.00	\$ 800.00
10	802-11648	SIGN POST, TYPE	14	EACH	\$ 125.00	\$ 1,750.00
11	808-06703	LINE, THERMOPLASTIC, SOLID, WHITE, 4 IN.	1,200	LFT	\$ 1.25	\$ 1,500.00
12	808-75245	LINE, THERMOPLASTIC, SOLID, YELLOW, 4 IN.	1,170	LFT	\$ 1.25	\$ 1,462.50
13	808-75274	TRANSVERSE MARKING, THERMOPLASTIC, CROSSHATCH LINE, YELLOW, 8 IN.	75	LFT	\$ 5.00	\$ 375.00
TOTAL						\$ 30,662.50

CONSTRUCTION TOTAL	\$31,000.00
CONTINGENCY (10%)	\$3,000.00
OVERALL PROJECT TOTAL	\$34,000.00

This cost estimate makes the following assumptions:
1.) Unit price estimates based on stand-alone project

Project Phases		
Task No.	Task	Cost
1	Preliminary Engineering	\$ 10,000
2	Right of Way	\$ -
3	Utility CN	\$ 1,000
4	Railroad CN	\$ -
5	Construction Inspection/Testing	\$ -
TOTAL		\$ 11,000

The Preliminary Cost Estimate portion of this document was prepared by me or under my supervision and represents a planning level cost estimate of the project's scope.

Signature Gary L. Yellig

Todd Johnson
Estimate Completed By
6/5/2026
Date

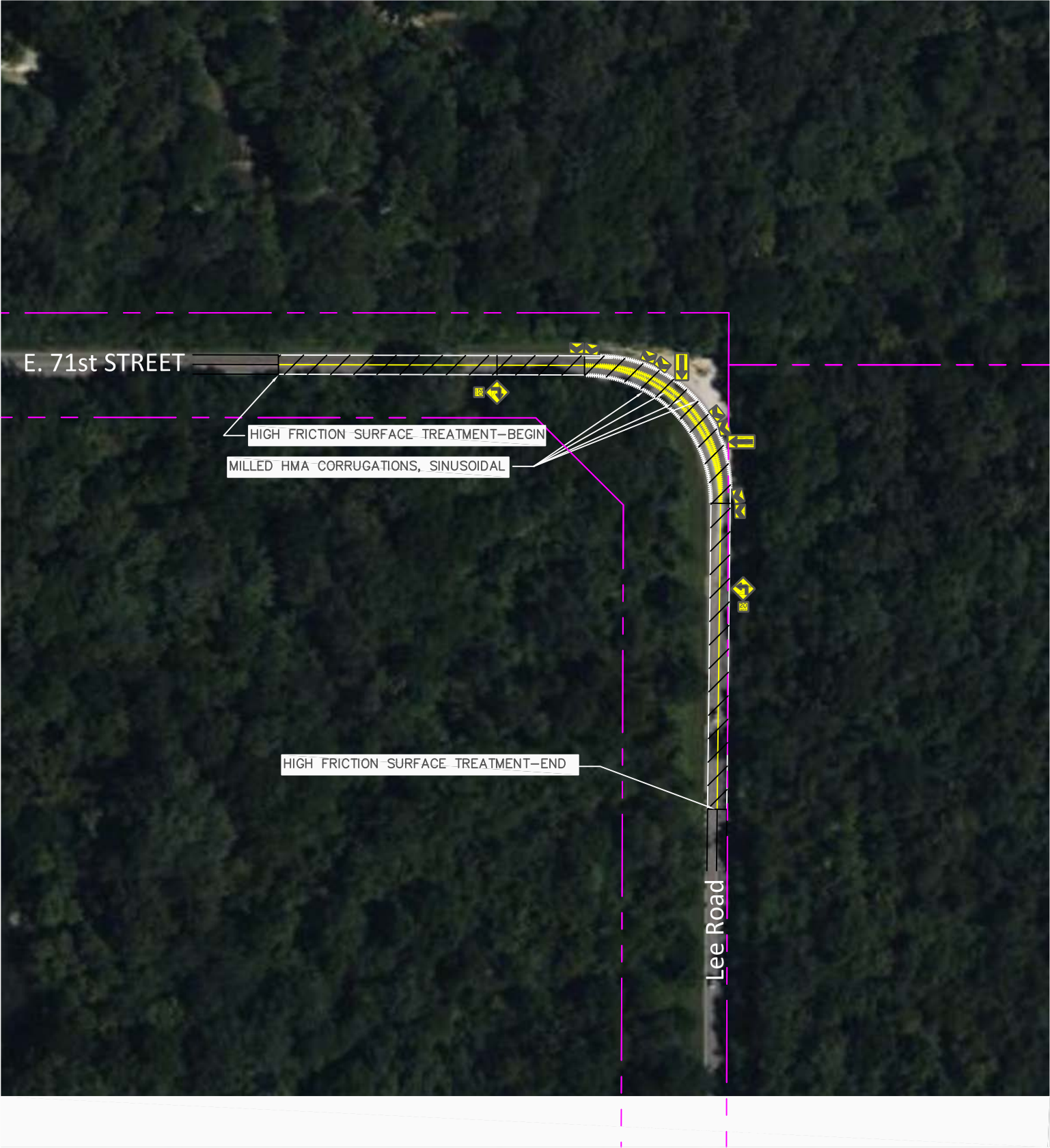


ABBREVIATED ENGINEERING NOTES FOR PRELIMINARY COST ESTIMATE - LONG TERM
71st Street & Lee Road

LINE ITEM	ITEM NO.	DESCRIPTION	NOTES
1	110-01001	MOBILIZATION AND DEMOBILIZATION	
2	202-04435	DELINEATOR POST, REMOVE	to remove existing curbing/delineators. Count 21 each
3	202-74045	SIGN AND SUPPORTS, CHANNEL POSTS, REMOVE	removes existing Warning signs - 4 each of Curve (W1-1) and one each of Large Arrow (W1-6)
4	606-12400	MILLED HMA CORRUGATIONS, SINUSOIDAL	White Inside = 230'; White Outside = 270'; Yellow Inside = 248'; Yellow Outside = 222'. = 970 LFT
5	622-03680	TREE PRUNING	
6	801-06775	MAINTAINING TRAFFIC	
7	802-05704	SIGN POST, SQUARE, TYPE 1, UNREINFORCED ANCHOR BASE	Use 14' for each W1-1 (4); use 10' for each W1-8 (4); use 12' for each W1-6 (2). Total = 120 LFT
8	802-09838	SIGN, SHEET, WITH LEGEND, 0.080 IN. THICKNESS	use 5 SFT by 4 for W1-1; use 2.25 SFT by 8 for W1-6; use 2.25 SFT by 4 for W13-1P or 47 SFT
9	802-09840	SIGN, SHEET, WITH LEGEND, 0.100 IN. THICKNESS	for two Large Arrow signs at 48" by 24" each or 16 SFT total
10	802-11648	SIGN POST, TYPE	use this for the reflective strip on sign posts. Count each Chevron as 2 posts or 14 Each
11	808-06703	LINE, THERMOPLASTIC, SOLID, WHITE, 4 IN.	stripe through curve and 350' past in each direction = 230' + 270' + 350' + 350' = 1,200 LFT
12	808-75245	LINE, THERMOPLASTIC, SOLID, YELLOW, 4 IN.	stripe through curve and 350' past in each direction = 248' + 222' + 350' + 350' = 1,170
13	808-75274	TRANSVERSE MARKING, THERMOPLASTIC, CROSSHATCH LINE, YELLOW, 8 IN.	total length of all transverse hatch lines per CAD is about 75'

Long-Term Improvements

71st Street & Lee Road



PRELIMINARY COST ESTIMATE - LONG TERM
71st Street & Lee Road

LINE ITEM	ITEM NO.	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	AMOUNT
1	110-01001	MOBILIZATION AND DEMOBILIZATION	1	LS	\$ 8,800.00	\$ 8,800.00
2	202-04435	DELINEATOR POST, REMOVE	21	EACH	\$ 40.00	\$ 840.00
3	202-74045	SIGN AND SUPPORTS, CHANNEL POSTS, REMOVE	5	EACH	\$ 140.00	\$ 700.00
4	606-12400	MILLED HMA CORRUGATIONS, SINUSOIDAL	970	LFT	\$ 10.00	\$ 9,700.00
5	306-08034	MILLING, ASPHALT, 1 1/2 IN.	2,440	SYS	\$ 6.00	\$ 14,640.00
6	401-000008	QC/QA-HMA, 3, 58E, SURFACE, 9.5 mm	205	TON	\$ 100.00	\$ 20,500.00
7	617-12128	HIGH FRICTION SURFACE TREATMENT	2,440	SYS	\$ 45.00	\$ 109,800.00
8	622-03680	TREE PRUNING	1	LS	\$ 1,200.00	\$ 1,200.00
9	801-06775	MAINTAINING TRAFFIC	1	LS	\$ 6,000.00	\$ 6,000.00
10	802-05704	SIGN POST, SQUARE, TYPE 1, UNREINFORCED ANCHOR BASE	120	LFT	\$ 31.00	\$ 3,720.00
11	802-09838	SIGN, SHEET, WITH LEGEND, 0.080 IN. THICKNESS	47	SFT	\$ 45.00	\$ 2,115.00
12	802-09840	SIGN, SHEET, WITH LEGEND, 0.100 IN. THICKNESS	16	SFT	\$ 50.00	\$ 800.00
13	802-11648	SIGN POST, TYPE	14	EACH	\$ 125.00	\$ 1,750.00
14	808-06703	LINE, THERMOPLASTIC, SOLID, WHITE, 4 IN.	1,200	LFT	\$ 1.25	\$ 1,500.00
15	808-75245	LINE, THERMOPLASTIC, SOLID, YELLOW, 4 IN.	1,170	LFT	\$ 1.25	\$ 1,462.50
16	808-75256	TRANSVERSE MARKING, THERMOPLASTIC, CROSSHATCH LINE, WHITE, 8 IN.	75	LFT	\$ 5.00	\$ 375.00
TOTAL						\$ 183,902.50

CONSTRUCTION TOTAL	\$184,000.00
CONTINGENCY (10%)	\$18,000.00
OVERALL PROJECT TOTAL	\$202,000.00

This cost estimate makes the following assumptions:
1.) Unit price estimates based on stand-alone project

Project Phases		
Task No.	Task	Cost
1	Preliminary Engineering	\$ 25,000
2	Right of Way	\$ -
3	Utility CN	\$ 1,000
4	Railroad CN	\$ -
5	Construction Inspection/Testing	\$ -
TOTAL		\$ 26,000

The Preliminary Cost Estimate portion of this document was prepared by me or under my supervision and represents a planning level cost estimate of the project's scope.

Signature Gary L. Yellig

Todd Johnson
Estimate Completed By
6/5/2026
Date



ABBREVIATED ENGINEERING NOTES FOR PRELIMINARY COST ESTIMATE - LONG TERM
71st Street & Lee Road

LINE ITEM	ITEM NO.	DESCRIPTION	NOTES
1	110-01001	MOBILIZATION AND DEMOBILIZATION	
2	202-04435	DELINEATOR POST, REMOVE	to remove existing curbing/delineators. Count 21 each
3	202-74045	SIGN AND SUPPORTS, CHANNEL POSTS, REMOVE	removes existing Warning signs - 4 each of Curve (W1-1) and one each of Large Arrow (W1-6)
4	606-12400	MILLED HMA CORRUGATIONS, SINUSOIDAL	White Inside = 230'; White Outside = 270'; Yellow Inside = 248'; Yellow Outside = 222'. = 970 LFT
5	306-08034	MILLING, ASPHALT, 1 1/2 IN.	area in CAD = 21,935 sft or say 2,440 SYS
6	401-000008	QC/QA-HMA, 3, 58E, SURFACE, 9.5 mm	area in CAD = 21,935 sft or say 2,440 SYS * 1.5" * 110/2000 = say 205 Tons
7	617-12128	HIGH FRICTION SURFACE TREATMENT	area in CAD = 21,935 sft or say 2,440 SYS
8	622-03680	TREE PRUNING	
9	801-06775	MAINTAINING TRAFFIC	
10	802-05704	SIGN POST, SQUARE, TYPE 1, UNREINFORCED ANCHOR BASE	Use 14' for each W1-1 (4); use 10' for each W1-8 (4); use 12' for each W1-6 (2). Total = 120 LFT
11	802-09838	SIGN, SHEET, WITH LEGEND, 0.080 IN. THICKNESS	use 5 SFT by 4 for W1-1; use 2.25 SFT by 8 for W1-6; use 2.25 SFT by 4 for W13-1P or 47 SFT
12	802-09840	SIGN, SHEET, WITH LEGEND, 0.100 IN. THICKNESS	for two Large Arrow signs at 48" by 24" each or 16 SFT total
13	802-11648	SIGN POST, TYPE	use this for the reflective strip on sign posts. Count each Chevron as 2 posts or 14 Each
14	808-06703	LINE, THERMOPLASTIC, SOLID, WHITE, 4 IN.	stripe through curve and 350' past in each direction = 230' + 270' + 350' + 350' = 1,200 LFT
15	808-75245	LINE, THERMOPLASTIC, SOLID, YELLOW, 4 IN.	stripe through curve and 350' past in each direction = 248" + 222' + 350' + 350' = 1,170
16	808-75256	TRANSVERSE MARKING, THERMOPLASTIC, CROSSHATCH LINE, WHITE, 8 IN.	total length of all transverse hatch lines per CAD is about 75'

Economic Evaluation - Form F5		Form <u>1</u> <u>2</u> <u>3</u> <u>4</u> <u>5</u> <u>6</u> <u>7</u> CDB Tool	
Alternative	71st Street & Lee Road - Long-Term Recommendation		
INPUT Collapse			
Number of Crashes (crash/period)			
Fatal and Incapacitating Injury Crashes		0	
Non-Incapacitating and Possible Injury Crashes		3	
Property Damage Only Crashes		9	
Road Type	City Non-Arterial Intersectic ▾		
Average Crash Costs (\$)			
Fatal and Incapacitating Injury Crashes		1699800	
Non-Incapacitating and Possible Injury Crashes		363300	
Property Damage Only Crashes		37300	
Crash Cost Year (yyyy)		2017	
First Year with Crash Data (yyyy)		2022	
Last Year with Crash Data (yyyy)		2024	
Present Year (yyyy)		2026	
Implementation Year (yyyy)		2030	
Inflation Rate (%)		2	
Interest Rate (%)		4	
Annual Traffic Growth Rate (%)		2	
Total Traffic Growth Factor		1.73	
Future Traffic Growth Period (years)		24	
COUNTERMEASURES Collapse All			
Countermeasure 1 Collapse	[C] Copy		
Description	New Chevron Signs, Warning Signs with Flashing Beacons, Rumble Strips, Traffic Signals ▾		
Crash Reduction Factors (%)			
Fatal and Incapacitating Injury Crashes		79	
Non-Incapacitating and Possible Injury Crashes		79	
Property Damage Only Crashes		79	
Number of Target Crashes (crash/period)			
Fatal and Incapacitating Injury Crashes		0	
Non-Incapacitating and Possible Injury Crashes		3	
Property Damage Only Crashes		9	
Countermeasure Service Life (years)		20	
Countermeasure Capital Cost (\$)		45000	
Countermeasure Annual Maintenance Cost (\$)		0	
Countermeasure Salvage Value (\$)		0	
	[+] Add		
Calculate Load Crashes New Open Save Save As Reports Exit Guidelines Help Equations General Improvements Table Service Life Table Crash Reduction Factors Table - Indiana Crash Modification Factors Clearinghouse			
Alternatives Save Current Alternative Read Alternative 71st Street & Lee Road - Long-Term Recomm ▾			
Notes:			
The number of target crashes are those that can be specifically reduced by the countermeasure selected. The number of target crashes for each countermeasure should not exceed the number of crashes ▾			
Location 71st Street & Lee Road			
GIS			
Post			
Analyst JMR			
Date 3/27/2026 15			
Comments The CRF was calculated by multiplying the CMF for improvements, then subtracting from 1. ▾			

OUTPUT	
Total Crashes Saved	3.143
FI Crashes Saved	0.000
NI Crashes Saved	0.613
PDO Crashes Saved	2.529
Equivalent Annual Benefit (\$)	494,004
Equivalent Annual Cost (\$)	2,830
Present Worth Benefit (\$)	12,350,105
Present Worth Cost (\$)	70,760
Net Annual Benefit (\$)	491,174
Present Worth Net Benefit (\$)	12,279,345
Benefit-Cost Ratio	174.53

Post
Analyst
Date
Comments

JMR

3/27/2026

15

The CRF was calculated by multiplying the CMF for improvements, then subtracting from 1.

Settings: Indiana local settings
Version 4.1 71st & Lee

PREPARED FOR:



APPENDIX D:

Hamilton County RSAs



CORRADINO LLC

ABBREVIATED ENGINEERING REVIEW FOR TRAFFIC SAFETY

				Date: 6/25/2026	
				Des. No.: n/a	
Reviewer Information:			Agency/Firm Name: Corradino LLC		
Primary Author: James Mark Rinehart			Agency: Indianapolis Metropolitan Planning Organization		
Phone Numbers: (317) 488-2363			Email Address: jrinehart@corradino.com		
Purpose of Review:					
Corradino LLC was hired by the Indianapolis MPO (IMPO) to conduct a series of roadway safety audits at preselected intersections within its urbanized area. The goal was to identify existing safety issues and recommend near-term and long-term improvements to address them. Improvements may range from lower-cost maintenance items, such as signage and pavement markings, to higher-cost capital improvements, including intersection upgrades, multimodal infrastructure, and upgraded traffic signals, as needed. This form is suitable for Level 1 review. Of the three available levels of engineering review, this represents the least refined, lowest-intensity degree of analysis, development of essential project intent (outline of the certified course of action), scoring, and process documentation.					
Project Location:					
Route: Campus Pkwy & Brooks School Rd		District: Greenfield		City: Noblesville	
				County: Hamilton	
Lat & Long (BOP)	39.996594	-85.937859	Lat & Long (EOP):	39.996594	-85.937859
			Inside Urban Area Boundary: <u>Yes</u> or No (circle)		
IMPO: Indianapolis Metropolitan Planning Organization			Project Type: Roadway Safety Audit		
Location: The intersection of Campus Parkway & Brooks School Road					
Existing Conditions:					
The Campus Pkwy & Brooks School Rd intersection is a signalized four-leg intersection. The EB approach has one dedicated left-turn lane, three through lanes, and a raised grass median separating opposing traffic. The WB approach has one dedicated slotted left-turn lane, two through lanes, one dedicated right-turn lane, and a 12' hatched median separating opposing traffic. The left-turn lane is formed by a lane drop from the upstream inside lane of a three-through-lane section. The NB approach has one dedicated left-turn lane, a through lane, and a shared through/right-turn lane. There is also a hashed median separating opposing traffic. The SB approach has two dedicated left-turn lanes, one through lane, and one dedicated right-turn lane. There is a 2' median separating opposing traffic. The NB and SB approaches appear to have protected only left-turn signal phasing, while the EB and WB approaches have protected/permissive left-turn signal phasing. Signal ahead signs are posted for EB/WB traffic approximately 420' from the intersection. The traffic signals are mounted on signal poles with ~80' long cantilever arms. There are shared-use paths along all quadrants, and each corner has push buttons and ADA pedestrian ramps with parallel striped pedestrian crosswalk markings across all approaches. Located in each quadrant of the intersection are: - NW Quadrant: Vacant land with plans for recreational development; - SW Quadrant: Open field with multifamily apartment buildings in development; - SE Quadrant: Commercial business plaza; - NE Quadrant: Vacant land with a stub street connector for future development. Corradino staff held a virtual meeting with IMPO and Hamilton County staff on April 8, 2026, to review the Preliminary Findings Report, discuss past or upcoming projects at or near the intersection, and identify potential near- and long-term solutions for Corradino to test before the field check. Meeting minutes from the virtual meeting are available in Attachment D. Corradino held a field check with representatives from the IMPO, Hamilton County, on May 8, 2026, to provide a recap of the discussion held during the virtual meeting, share test results for the near-term and long-term solutions, and build consensus around a series of countermeasures for Corradino to cost as part of the final recommendations. The field check meeting minutes are available in Attachment D.					

Traffic Operations:

- a) **Mobility/Congestion Performance:** According to 24-hour traffic count data collected on March 13, 2026, EB traffic entering the intersection was **12,455**. The WB traffic entering the intersection was **14,653**. The NB traffic entering the intersection was **6,702**. The SB traffic entering the intersection was **9,088**. Turning movement counts are available for review in **Attachment B**. A **2.4%** forecasted annual growth rate, derived from the IMPO's TDM, was used to develop a future no-build traffic scenario. The design year for the long-term build alternatives was **2050**. Results from the traffic analysis are available in **Attachment C**.

	Eastbound		Westbound		Northbound		Southbound	
Alternative	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay
AM Peak – 2026	C	25.2	C	25.0	D	39.2	D	40.2
PM Peak - 2026	C	30.3	C	26.1	D	42.4	D	43.8
AM Peak - 2050	D	42.4	D	51.3	E	63.0	E	65.1
PM Peak - 2050	E	71.7	D	49.7	E	77.8	E	75.9

- b) **Safety Performance / Crash Analysis:** According to available crash data from January 1, 2022, to December 31, 2024, there were **44** crashes associated with the study area. Of those crashes, **0** resulted in fatality, **7** resulted in incapacitating injuries, and **3** resulted in non-incapacitating injuries. See attached Crash Summary and output from RoadHAT 4.1 in **Attachment A**.

It is important to note that 19 of the 44 crashes reported at the intersection (43%) were Rear End crashes. These crashes were dispersed, almost equally, on the EB (4), WB (6), and NB (5) intersection approaches. The remaining four Rear End crashes occurred on the NB approach (2) or on Campus Parkway after the vehicles passed through the intersection. There were also seven Left Turn crashes reported at the intersection. Four of the seven crashes occurred during EB-to-NB or WB-to-SB left turns. The remaining three left-turn crashes occurred during the SB-to-EB left-turn movement, which has a protected left-turn only signal phase. The collision diagram for the Campus Parkway & Brooks School Road intersection is available in **Attachment A**.

During the field check, potential speeding concerns were discussed with Hamilton County staff. They indicated they had not observed speeding concerns at the intersection. The IMPO mentioned that their software license with Replica had speed data available for review. After the field check, Corradino's team reviewed the Replica Speed data and did not find any significant evidence of excessive speeding along Campus Parkway or Brooks School Road.

RoadHAT 4.1 was used to develop crash cost (ICC) and crash frequency (ICF) scores for the Campus Parkway & Brooks School Road Intersection. Results from the RoadHAT 4.1 analysis were as follows: $I_{CC} = 1.85$, $I_{CF} = 1.16$. The RoadHAT 4.1 analysis results are available in **Attachment A**.

Alternatives & Recommendations

During the field check with representatives from Hamilton County and the IMPO, crash data and traffic data were discussed while observing traffic patterns. Multiple maintenance-type improvements were identified in the field to address near-term safety needs at the intersection (striping, signage, tree pruning, etc.). Below are the Near- and Long-Term improvements discussed for the Campus Parkway & Brooks School Road intersection. Notes from the field check summarizing conversations are available for review in **Attachment D**.

Near-Term

The list of near-term solutions discussed during the field check includes:

- Install backplates (IDM item specified in cost estimate) to existing traffic signals.
- Update pedestrian crosswalk striping from parallel lines to piano-key crosswalks.
- Replace pedestrian push buttons in the NW and SE corners that are not operating.
- Consider adding a flashing speed sign on the EB approach to the intersection, because it is the most vulnerable intersection approach to experience speeding.

Long-Term

- It was decided during the field check not to pursue a long-term alternative for the intersection at this time.

Future Consideration

- Future considerations for an innovative intersection were discussed, but it was agreed that it is not needed anytime soon at the Campus Parkway & Brooks School Road intersection.

Near-Term & Long-Term Cost Estimates for the Proposed Safety Improvements
Cost estimates for the near- and long-term improvements are available in Attachment E . <u>Near-Term Recommendation</u> PE - \$10,000 ROW - \$0 Utility CN - \$500 Railroad CN - \$0 Construction Inspection/Testing (10% Rounded up to nearest \$1k) - \$0 CN (including 10% Contingency) - \$74,000 Near-Term Total - \$84,500
Project Score: (for INDOT use)
Safety Program Score =
Miscellaneous Notes:
Attachments:
Attachment A: Preliminary Findings Report Attachment B: Traffic Counts Attachment C: Traffic Analysis Attachment D: Virtual Meeting Minutes & Field Check Minutes Attachment E: Cost Estimates & Schematics

Attachment A

Preliminary Findings

PRELIMINARY FINDINGS

Safety Analysis at Campus Pkwy & Brooks School Rd.

Report Prepared for: IMPO & Hamilton County Highway Department

1. **Safety Analysis**

A crash data analysis was completed for the intersection of Campus Parkway & Brooks School Road (Study Area) in Noblesville, IN. The intersection is maintained by the Hamilton County Highway Department, but will benefit from coordination with them and representatives from the City of Noblesville. Before beginning the crash analysis, the project team followed these steps to clean the data:

- Received 2022-2024 crash data from the IMPO. Serious Injury and Fatal crashes had been cleaned by IMPO staff.
- Placed a 500' buffer around the Study Area to identify reported crashes near the intersection.
 - Typically, a 250' buffer is used for a crash data analysis, but based on the size of the intersection, the project team decided to expand the search radius to identify intersection-related crashes.
- Reviewed the police reports for each crash record identified within the 500' buffer.
- Identified and removed any crash records from the analysis that involved a collision with an animal in the roadway or occurred in a parking lot near the intersection.
- Reviewed the description in the reports to confirm the selected Manner of Collision & Crash Severity accurately reflected how the police officer described the crash.
- Exported the results from ArcGIS Pro into MS Excel.
- Created a collision diagram of the Study Area as well as summary tables of the crash records.
- Developed a crash cost (lcc) and crash frequency (lcf) for the Study Area using RoadHat 4.1.

44 crashes were identified within the Study Area. Seven of the reported crashes resulted in Incapacitating injuries, and three resulted in Non-Incapacitating injuries. There were no reported fatal crashes. Other notable results near the Study Area include:

- 43% of the reported crashes within the Study Area were Rear End crashes.
- Left Turn and Right Angle Crashes combined made up 27% of the reported crashes in the Study Area, and 60% of the injury-related crashes in the Study Area.
- 54% of reported crashes occurred during Off-Peak travel times. 14% of reported crashes occurred during the morning peak hours (6 am-9 am), and 32% during the evening peak hours (4 pm-7 pm).
- 54% of reported crashes occurred in daylight hours and 30% in dark (lighted) conditions. The remaining 16% of crashes listed lighting conditions as "Dawn/Dusk" in the police report.
- 20% of reported crashes occurred in wet, icy, or snowy roadway surface conditions. The remaining 80% of reported crashes occurred on dry roadways.
- 73% of reported crashes occurred when the weather conditions were clear. The remaining 27% of reported crashes occurred in either Cloudy, Rainy, or Snowy weather conditions.

Attached are the crash summary tables, a collision diagram, images of the intersection, and the results of the RoadHAT 4.1 analysis.

2022-2024 Crash Summary	
TOTAL CRASHES	44
TOTAL INJURIES	15
PROPERTY DAMAGE ONLY	33
REFUSED TREATMENT	1
NON-INCAPACITATING	3
INCAPACITATING	7
FATAL	0

Summary of Primary Factors per Manner of Collision		
Primary Factors per Manner of Collision	Crashes	Percent
REAR END	19	43%
FOLLOWING TOO CLOSELY	10	
BRAKE FAILURE OR DEFECTIVE	2	
OTHER (DRIVER) - EXPLAIN IN NARRATIVE	2	
DISREGARD SIGNAL/REG SIGN	1	
UNSAFE SPEED	1	
OTHER (VEHICLE) - EXPLAIN IN NARRATIVE	1	
ROADWAY SURFACE CONDITION	1	
DRIVER DISTRACTED - EXPLAIN IN NARRATIVE	1	
LEFT TURN	7	16%
FAILURE TO YIELD RIGHT OF WAY	5	
DISREGARD SIGNAL/REG SIGN	2	
SAME DIRECTION SIDESWIPE	7	16%
FAILURE TO YIELD RIGHT OF WAY	3	
UNSAFE LANE MOVEMENT	1	
IMPROPER LANE USAGE	1	
OTHER (DRIVER) - EXPLAIN IN NARRATIVE	1	
IMPROPER TURNING	1	
RIGHT ANGLE	5	11%
DISREGARD SIGNAL/REG SIGN	3	
FAILURE TO YIELD RIGHT OF WAY	2	
RAN OFF ROAD	5	11%
IMPROPER TURNING	2	
IMPROPER LANE USAGE	1	
RAN OFF ROAD RIGHT	1	
OTHER (DRIVER) - EXPLAIN IN NARRATIVE	1	
BACKING CRASH	1	3%
UNSAFE BACKING	1	
Total Crashes	44	100%

Summary of Crashes per Time of Day		
Time of Day	Crashes	Percent
Peak AM (6:00-9:00 AM)	6	14%
Peak PM (4:00-7:00 PM)	14	32%
Off Peak	24	54%
Total Crashes	44	100%

Summary of Crashes per Light Conditions		
Light Conditions	Crashes	Percent
DAWN/DUSK	7	16%
DARK (LIGHTED)	13	30%
DAYLIGHT	24	54%
Total Crashes	44	100%

Summary of Roadway Surface Conditions					
Manner of Collision	DRY	ICE	SNOW/SLUSH	WET	Total Crashes
REAR END	16		2	1	19
SAME DIRECTION SIDESWIPE	6			1	7
LEFT TURN	5			2	7
RIGHT ANGLE	5				5
RAN OFF ROAD	2	1		2	5
BACKING CRASH	1				1
Total Crashes	35	1	2	6	44

Summary of Weather Conditions					
Manner of Collision	CLEAR	CLOUDY	SNOW	RAIN	Total Crashes
REAR END	15	2	2		19
SAME DIRECTION SIDESWIPE	5	1		1	7
LEFT TURN	6			1	7
RIGHT ANGLE	3	2			5
RAN OFF ROAD	2	1	1	1	5
BACKING CRASH	1				1
Total Crashes	32	6	3	3	44

DIAGRAM OF
COLLISION
REPORTS

Campus Parkway & Brooks School Road

Study Period: 1/1/2022 to 12/31/2024

Location: Hamilton County Hwy Dept.

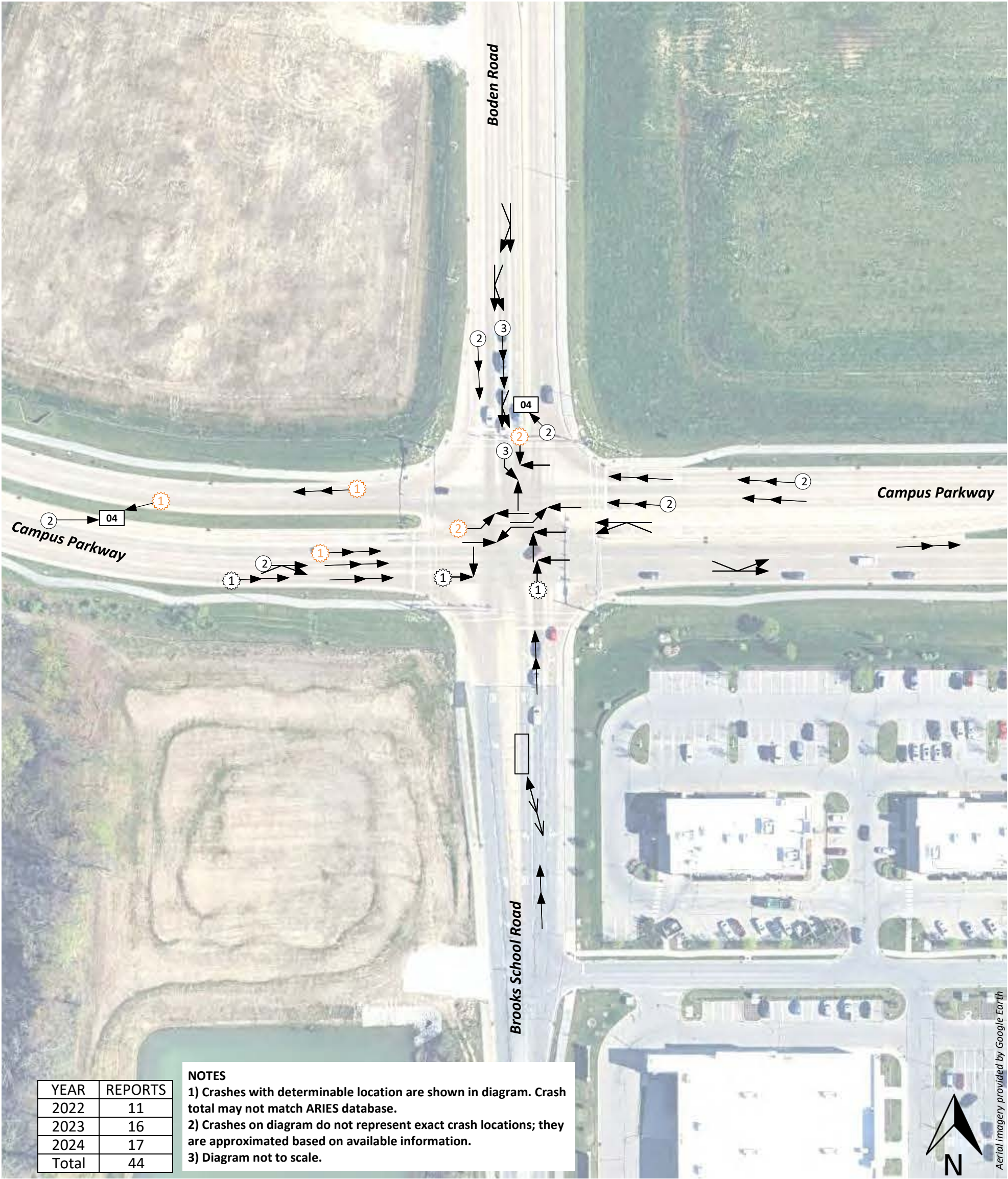
INDOT District: Greenfield County: Hamilton

City/Town: Hamilton County

Analyst: JMR

QC: DC

Date: 3/18/2026



YEAR	REPORTS
2022	11
2023	16
2024	17
Total	44

NOTES

1) Crashes with determinable location are shown in diagram. Crash total may not match ARIES database.

2) Crashes on diagram do not represent exact crash locations; they are approximated based on available information.

3) Diagram not to scale.

- Object Symbols**
- MOVING VEHICLE
 - TURNING VEHICLE
 - BACKING VEHICLE
 - OUT OF CONTROL
 - PARKED VEHICLE
 - PEDESTRIAN
 - BICYCLE
 - ANIMAL
 - DEBRIS IN ROADWAY
 - DRIVEWAY CRASH

- FATAL CRASH
- INJURY CRASH – INCAPACITATING
- INJURY CRASH – NONINCAPACITATING
- PDO CRASHES (IF > 1)

- SIGNALIZED INTERSECTION
- FIXED OBJECT (See table for # codes)

- Collision Symbols**
- REAR END
 - HEAD ON
 - OTHER
 - SIDESWIPE – SAME
 - SIDESWIPE – OPPOSITE
 - RIGHT ANGLE
 - LEFT/RIGHT TURN
 - RAN OFF ROAD

- Fixed Object Codes**
- 01 – BRIDGE or OVERPASS
 - 02 – BUILDING
 - 03 – CULVERT or DITCH
 - 04 – CURB
 - 05 – GUARDRAIL or BARRIER
 - 06 – EMBANKMENT
 - 07 – FENCE
 - 08 – TRAFFIC POLE
 - 09 – UTILITY POLE
 - 10 – SIGN
 - 11 – TREE / SHRUB
 - 12 – CONSTRUCTION BARRIER
 - 13 – CRASH ATTENUATOR
 - 88 – OTHER
 - 99 - UNKNOWN

Intersection Images	Campus Parkway & Brooks School Road		
	Study Period: <u>1/1/2022 to 12/31/2024</u>	Location: <u>Hamilton County Hwy Dept.</u>	
	INDOT District: <u>Greenfield</u>	County: <u>Hamilton</u>	City/Town: <u>Hamilton County</u>



West Leg – Looking West



West Leg – Looking East



East Leg – Looking West



East Leg – Looking East



South Leg – Looking South



South Leg – Looking North



North Leg – Looking South



North Leg – Looking North

RoadHAT 4D	Index of Crash Frequency and Cost - Form F1		Page 1/2
Settings: Indiana local settings		Version: Version 4.1	
Location	Campus Pkwy & Brooks School Rd.		
GIS			
Post			
Analyst	JMR		
Date	3/19/2026		
INPUT			
Road Facility Type	City Arterial Intersection		
Busiest Road AADT (veh/day)	25386		
Crossing Road AADT (veh/day)	8421		
First Year with Crash Data (yyyy)	2022		
Last Year with Crash Data (yyyy)	2024		
Number of Crashes (crash/period)			
Fatal and Incapacitating Injury Crashes	7		
Non-Incapacitating and Possible Injury Crashes	3		
Property Damage Only Crashes	34		
Route or Road Type	City Arterial Intersection		
Average Crash Costs (\$)			
Fatal and Incapacitating Injury Crashes	1840100		
Non-Incapacitating and Possible Injury Crashes	393200		
Property Damage Only Crashes	40200		
Crash Cost Year (yyyy)	2017		
OUTPUT			
Expected Crash Frequency (crash/year)			
Fatal and Incapacitating Injury Crashes	0.396		
Non-Incapacitating and Possible Injury Crashes	1.11		
Property Damage Only Crashes	5.71		
All Crashes	7.22		
Index of Crash Frequency	1.16		
Index of Crash Cost	1.85		

RoadHAT 4D	Index of Crash Frequency and Cost - Form F1		Page 2/2
Settings: Indiana local settings		Version: Version 4.1	
Location	Campus Pkwy & Brooks School Rd.		
GIS			
Post			
Analyst	JMR		
Date	3/19/2026		
Comments: Traffic Counts: INDOT TCDS Crash Data: ARIES provided by the IMPO.			

Attachment B Traffic Counts

Tuesday

Time	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	Total
12 AM	3	46	3	5	46	22	5	15	5	16	8	6	180
1 AM	1	19	2	4	23	18	1	7	1	5	2	3	86
2 AM	0	14	1	2	15	8	1	3	0	21	2	0	67
3 AM	1	28	1	3	30	10	1	2	3	19	3	2	103
4 AM	3	42	6	2	66	6	4	0	0	55	13	5	202
5 AM	18	165	9	13	222	25	28	30	6	151	34	20	721
6 AM	32	302	37	42	519	56	71	40	15	258	98	70	1540
7 AM	61	609	61	75	715	149	112	162	61	373	257	125	2760
8 AM	58	556	84	76	604	134	123	199	84	344	264	97	2623
9 AM	53	540	77	74	479	156	88	170	57	280	184	61	2219
10 AM	46	501	104	56	498	149	80	130	66	272	194	54	2150
11 AM	37	617	139	83	526	218	103	185	92	300	226	51	2577
12 PM	46	582	140	103	568	231	136	185	101	267	206	45	2610
1 PM	50	591	117	81	572	237	123	232	114	253	236	34	2640
2 PM	54	605	130	78	578	247	143	222	116	267	221	72	2733
3 PM	63	756	161	99	620	296	138	267	96	258	268	69	3091
4 PM	89	879	128	111	787	375	179	298	137	284	278	67	3612
5 PM	84	841	175	131	728	382	160	271	143	264	292	72	3543
6 PM	57	716	155	102	574	305	128	225	122	271	273	56	2984
7 PM	31	499	124	84	463	213	116	211	97	262	170	44	2314
8 PM	27	392	100	68	391	225	110	201	83	179	133	25	1934
9 PM	12	257	52	43	277	113	73	129	49	83	77	15	1180
10 PM	15	131	15	26	191	85	29	57	16	61	40	8	674
11 PM	9	85	11	7	87	46	16	24	5	37	24	4	355
Total	850	9773	1832	1368	9579	3706	1968	3265	1469	4580	3503	1005	42898

Time	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	Total
0:00	3	20	2	1	14	4	0	5	3	3	2	3	60
0:15	0	13	0	1	14	4	0	8	0	8	2	1	51
0:30	0	9	0	1	14	11	1	1	1	5	2	2	47
0:45	0	4	1	2	4	3	4	1	1	0	2	0	22
1:00	0	9	1	0	8	5	1	2	0	2	0	1	29
1:15	0	3	0	1	5	8	0	0	0	1	1	0	19
1:30	1	6	1	2	7	2	0	1	0	1	1	1	23
1:45	0	1	0	1	3	3	0	4	1	1	0	1	15
2:00	0	4	0	0	4	1	1	2	0	5	0	0	17
2:15	0	5	0	1	5	2	0	0	0	1	0	0	14
2:30	0	3	0	1	4	2	0	0	0	9	1	0	20
2:45	0	2	1	0	2	3	0	1	0	6	1	0	16
3:00	0	9	0	0	9	2	0	0	2	0	0	2	24
3:15	0	6	0	0	5	3	1	0	0	2	0	0	17
3:30	1	5	0	0	6	1	0	0	1	8	1	0	23
3:45	0	8	1	3	10	4	0	2	0	9	2	0	39
4:00	0	8	0	0	9	1	1	0	0	7	1	1	28
4:15	1	7	1	0	12	1	1	0	0	17	4	0	44
4:30	1	12	1	0	18	3	0	0	0	12	4	2	53
4:45	1	15	4	2	27	1	2	0	0	19	4	2	77
5:00	0	21	2	0	27	3	1	6	0	34	4	4	102
5:15	2	40	0	1	38	6	9	2	1	36	3	4	142
5:30	6	54	2	5	76	5	10	5	5	38	11	5	222
5:45	10	50	5	7	81	11	8	17	0	43	16	7	255
6:00	10	51	7	3	104	8	5	11	1	48	14	12	274
6:15	5	60	4	4	115	17	14	7	3	58	18	10	315
6:30	8	86	8	16	159	9	27	6	5	78	20	21	443
6:45	9	105	18	19	141	22	25	16	6	74	46	27	508
7:00	16	146	10	23	156	36	16	31	10	82	44	23	593
7:15	15	134	22	18	176	27	30	32	13	98	58	43	666
7:30	9	153	9	13	188	35	31	52	15	118	85	27	735
7:45	21	176	20	21	195	51	35	47	23	75	70	32	766
8:00	13	135	21	22	143	21	30	41	17	98	68	25	634
8:15	16	149	25	25	156	39	29	45	24	86	67	28	689
8:30	14	137	16	18	163	34	34	57	23	67	57	22	642
8:45	15	135	22	11	142	40	30	56	20	93	72	22	658
9:00	12	135	19	21	91	40	26	44	14	89	51	17	559
9:15	16	140	22	20	133	32	19	36	18	60	49	15	560
9:30	16	136	16	14	128	51	22	45	9	60	27	13	537
9:45	9	129	20	19	127	33	21	45	16	71	57	16	563
10:00	13	127	30	14	112	34	19	32	25	53	53	12	524
10:15	13	103	23	13	133	33	21	33	11	91	42	16	532
10:30	11	139	19	12	120	45	17	31	10	76	48	11	539
10:45	9	132	32	17	133	37	23	34	20	52	51	15	555
11:00	6	154	35	13	128	45	22	37	29	65	45	5	584
11:15	13	137	26	22	151	55	23	43	19	69	55	20	633
11:30	5	153	48	25	123	59	29	57	26	85	53	12	675
11:45	13	173	30	23	124	59	29	48	18	81	73	14	685
12:00	16	143	33	17	140	59	34	52	25	66	64	23	672
12:15	9	143	47	28	128	61	32	42	24	53	46	6	619
12:30	14	146	27	29	152	62	40	56	32	77	44	9	688
12:45	7	150	33	29	148	49	30	35	20	71	52	7	631
13:00	8	151	41	23	137	63	27	49	27	60	62	7	655
13:15	18	161	30	23	159	62	27	49	28	55	51	14	677
13:30	7	139	23	12	168	69	33	67	30	78	66	9	701
13:45	17	140	23	23	108	43	36	67	29	60	57	4	607
14:00	9	143	35	20	145	50	35	62	38	68	70	13	688
14:15	10	152	25	19	155	63	37	47	22	49	49	22	650
14:30	18	163	37	19	145	67	33	57	31	67	54	17	708
14:45	17	147	33	20	133	67	38	56	25	83	48	20	687
15:00	13	165	39	22	131	46	31	59	24	76	68	13	687
15:15	8	193	33	29	172	73	36	89	18	58	61	13	783
15:30	20	198	48	31	166	90	29	51	28	72	72	22	827
15:45	22	200	41	17	151	87	42	68	26	52	67	21	794
16:00	16	208	40	24	174	85	34	72	34	57	59	14	817
16:15	28	206	40	32	197	100	50	68	34	83	66	14	918
16:30	25	230	31	26	230	97	45	75	29	63	73	22	946
16:45	20	235	17	29	186	93	50	83	40	81	80	17	931
17:00	16	220	43	28	182	98	37	83	38	63	71	24	903
17:15	24	217	48	36	176	92	31	66	34	79	77	9	889
17:30	23	203	41	34	182	96	44	46	32	54	70	16	841
17:45	21	201	43	33	188	96	48	76	39	68	74	23	910
18:00	19	220	42	24	149	56	32	68	37	82	70	16	815
18:15	10	195	36	33	147	87	29	52	29	59	88	8	773
18:30	14	138	39	25	145	88	32	40	30	69	64	19	703

18:45	14	163	38	20	133	74	35	65	26	61	51	13	693
19:00	12	166	31	16	129	59	34	52	22	78	44	17	660
19:15	7	117	42	28	120	48	32	59	30	63	50	10	606
19:30	6	119	32	26	114	62	27	46	24	67	39	6	568
19:45	6	97	19	14	100	44	23	54	21	54	37	11	480
20:00	8	112	33	17	113	60	28	58	23	48	38	8	546
20:15	7	124	22	20	112	59	36	50	26	57	36	6	555
20:30	7	85	24	18	79	60	19	49	19	34	37	4	435
20:45	5	71	21	13	87	46	27	44	15	40	22	7	398
21:00	3	85	17	18	99	39	22	46	15	30	21	3	398
21:15	6	59	15	14	75	25	19	26	11	17	23	5	295
21:30	3	57	8	7	65	26	15	38	17	17	22	2	277
21:45	0	56	12	4	38	23	17	19	6	19	11	5	210
22:00	4	39	4	6	56	26	6	15	6	13	12	5	192
22:15	2	29	5	5	55	20	6	16	5	12	7	1	163
22:30	4	37	4	8	44	18	11	15	3	17	8	1	170
22:45	5	26	2	7	36	21	6	11	2	19	13	1	149
23:00	3	32	5	3	29	14	4	6	1	12	3	3	115
23:15	2	19	1	2	26	13	3	4	2	7	9	1	89
23:30	1	22	3	1	13	7	4	9	1	9	5	0	75
23:45	3	12	2	1	19	12	5	5	1	9	7	0	76

Attachment C

Traffic Analysis

			Existing 2026									
Intersection	Type	MOE	2026 AM Peak Hour					2026 PM Peak Hour				
			EB	WB	NB	SB	INT	EB	WB	NB	SB	INT
Campus Pkwy & Brooks School Rd / Boden Rd	Signal	LOS	C	C	D	D	C	C	C	D	D	C
		Delay (sec/veh)	25.2	25.0	39.2	40.2	31.0	30.3	26.1	42.4	43.8	33.4
		Queue Length 95th (ft)	150	263	148	261		216	252	156	266	
		v/c Ratio	0.47	0.66	0.80	0.84		0.70	0.70	0.81	0.85	
		LOS-F Movements	---	---	---	---		---	---	---	---	

			No-Build 2050									
Intersection	Type	MOE	2050 AM Peak Hour					2050 PM Peak Hour				
			EB	WB	NB	SB	INT	EB	WB	NB	SB	INT
Campus Pkwy & Brooks School Rd / Boden Rd	Signal	LOS	D	D	E	E	D	E	D	E	E	E
		Delay (sec/veh)	42.4	51.3	63.0	65.1	54.1	71.7	49.7	77.8	75.9	66.0
		Queue Length 95th (ft)	316	562	313	549		575	605	347	582	
		v/c Ratio	0.75	0.98	0.97	1.00		1.00	0.95	0.98	1.01	
		LOS-F Movements	---	---	NBL	SBT		---	---	NBL	SBT	

HCM 7th Signalized Intersection Summary
4: Brooks School Rd/Boden Rd & Campus Pkwy

Existing
2026 AM

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		  			 			 		 	 	
Traffic Volume (veh/h)	53	564	75	92	639	118	130	160	67	305	264	99
Future Volume (veh/h)	53	564	75	92	639	118	130	160	67	305	264	99
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1841	1870	1870	1826	1870	1870	1870	1870	1811	1811	1811
Adj Flow Rate, veh/h	56	600	80	98	680	126	138	170	71	324	281	105
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %	2	4	2	2	5	2	2	2	2	6	6	6
Cap, veh/h	256	1289	170	324	1037	672	172	388	156	418	335	284
Arrive On Green	0.04	0.29	0.29	0.06	0.30	0.30	0.10	0.16	0.16	0.13	0.18	0.18
Sat Flow, veh/h	1781	4493	592	1781	3469	1585	1781	2475	993	3346	1811	1535
Grp Volume(v), veh/h	56	446	234	98	680	126	138	120	121	324	281	105
Grp Sat Flow(s),veh/h/ln	1781	1675	1734	1781	1735	1585	1781	1777	1692	1673	1811	1535
Q Serve(g_s), s	1.7	8.8	8.9	3.1	13.7	4.0	6.1	4.9	5.2	7.5	12.0	4.8
Cycle Q Clear(g_c), s	1.7	8.8	8.9	3.1	13.7	4.0	6.1	4.9	5.2	7.5	12.0	4.8
Prop In Lane	1.00		0.34	1.00		1.00	1.00		0.59	1.00		1.00
Lane Grp Cap(c), veh/h	256	961	498	324	1037	672	172	278	265	418	335	284
V/C Ratio(X)	0.22	0.46	0.47	0.30	0.66	0.19	0.80	0.43	0.46	0.77	0.84	0.37
Avail Cap(c_a), veh/h	288	961	498	368	1037	672	207	278	265	560	371	315
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	19.1	23.5	23.5	18.8	24.5	14.4	35.4	30.5	30.6	33.9	31.5	28.5
Incr Delay (d2), s/veh	0.4	1.6	3.2	0.5	3.2	0.6	16.9	1.1	1.2	4.8	14.4	0.8
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.7	3.4	3.8	1.2	5.5	1.4	3.3	2.1	2.1	3.1	6.2	1.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	19.5	25.1	26.7	19.3	27.7	15.0	52.2	31.6	31.9	38.7	45.9	29.3
LnGrp LOS	B	C	C	B	C	B	D	C	C	D	D	C
Approach Vol, veh/h		736			904			379			710	
Approach Delay, s/veh		25.2			25.0			39.2			40.2	
Approach LOS		C			C			D			D	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	11.8	30.3	15.4	22.5	10.9	31.2	17.7	20.2				
Change Period (Y+Rc), s	7.3	7.3	7.7	7.7	7.3	7.3	7.7	7.7				
Max Green Setting (Gmax), s	6.5	17.8	9.3	16.4	5.0	19.3	13.4	12.3				
Max Q Clear Time (g_c+l1), s	5.1	10.9	8.1	14.0	3.7	15.7	9.5	7.2				
Green Ext Time (p_c), s	0.0	5.1	0.0	0.8	0.0	3.0	0.5	0.4				
Intersection Summary												
HCM 7th Control Delay, s/veh			31.0									
HCM 7th LOS			C									

										
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	56	680	98	680	126	138	241	324	281	105
v/c Ratio	0.21	0.50	0.32	0.62	0.13	0.69	0.42	0.65	0.82	0.21
Control Delay (s/veh)	17.6	26.7	18.9	28.6	1.3	53.3	24.3	38.1	51.0	0.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	17.6	26.7	18.9	28.6	1.3	53.3	24.3	38.1	51.0	0.9
Queue Length 50th (ft)	17	111	31	176	0	68	41	82	140	0
Queue Length 95th (ft)	40	150	62	#263	15	#148	76	124	#261	0
Internal Link Dist (ft)		759		1070			787		772	
Turn Bay Length (ft)	500				800	300		375		
Base Capacity (vph)	264	1358	307	1094	982	209	595	553	367	521
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.21	0.50	0.32	0.62	0.13	0.66	0.41	0.59	0.77	0.20

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

HCM 7th Signalized Intersection Summary
4: Brooks School Rd/Boden Rd & Campus Pkwy

Existing
2026 PM

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		  			 			 		 		
Traffic Volume (veh/h)	85	846	152	111	716	351	143	292	131	289	280	79
Future Volume (veh/h)	85	846	152	111	716	351	143	292	131	289	280	79
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1856	1856	1856
Adj Flow Rate, veh/h	86	855	154	112	723	355	144	295	132	292	283	80
Peak Hour Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	3	3	3
Cap, veh/h	243	1230	220	262	1039	637	179	409	179	375	332	281
Arrive On Green	0.05	0.28	0.28	0.06	0.29	0.29	0.10	0.17	0.17	0.11	0.18	0.18
Sat Flow, veh/h	1781	4354	780	1781	3554	1585	1781	2406	1051	3428	1856	1572
Grp Volume(v), veh/h	86	667	342	112	723	355	144	216	211	292	283	80
Grp Sat Flow(s),veh/h/ln	1781	1702	1730	1781	1777	1585	1781	1777	1681	1714	1856	1572
Q Serve(g_s), s	2.7	14.0	14.1	3.5	14.5	13.8	6.3	9.2	9.5	6.6	11.8	3.5
Cycle Q Clear(g_c), s	2.7	14.0	14.1	3.5	14.5	13.8	6.3	9.2	9.5	6.6	11.8	3.5
Prop In Lane	1.00		0.45	1.00		1.00	1.00		0.63	1.00		1.00
Lane Grp Cap(c), veh/h	243	961	489	262	1039	637	179	302	286	375	332	281
V/C Ratio(X)	0.35	0.69	0.70	0.43	0.70	0.56	0.81	0.72	0.74	0.78	0.85	0.28
Avail Cap(c_a), veh/h	260	961	489	263	1039	637	207	331	313	416	355	301
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	19.6	25.6	25.7	19.8	25.1	18.4	35.2	31.4	31.5	34.7	31.8	28.4
Incr Delay (d2), s/veh	0.9	4.1	8.1	1.1	3.9	3.5	18.1	6.5	8.2	8.3	17.0	0.5
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.1	5.7	6.4	1.4	6.1	5.2	3.5	4.3	4.3	3.0	6.5	1.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	20.4	29.7	33.7	20.9	29.0	21.9	53.3	37.9	39.7	43.0	48.8	29.0
LnGrp LOS	C	C	C	C	C	C	D	D	D	D	D	C
Approach Vol, veh/h		1095			1190			571			655	
Approach Delay, s/veh		30.3			26.1			42.4			43.8	
Approach LOS		C			C			D			D	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	12.4	29.9	15.7	22.0	11.6	30.7	16.5	21.3				
Change Period (Y+Rc), s	7.3	7.3	7.7	7.7	7.3	7.3	7.7	7.7				
Max Green Setting (Gmax), s	5.1	20.3	9.3	15.3	5.0	20.4	9.7	14.9				
Max Q Clear Time (g_c+I1), s	5.5	16.1	8.3	13.8	4.7	16.5	8.6	11.5				
Green Ext Time (p_c), s	0.0	3.8	0.0	0.5	0.0	3.5	0.1	0.6				
Intersection Summary												
HCM 7th Control Delay, s/veh			33.4									
HCM 7th LOS			C									

4: Brooks School Rd/Boden Rd & Campus Pkwy

2026 PM

										
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	86	1009	112	723	355	144	427	292	283	80
v/c Ratio	0.36	0.68	0.53	0.70	0.39	0.71	0.65	0.70	0.83	0.16
Control Delay (s/veh)	19.8	27.8	26.1	30.9	6.8	54.7	29.7	44.0	53.8	0.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	19.8	27.8	26.1	30.9	6.8	54.7	29.7	44.0	53.8	0.7
Queue Length 50th (ft)	26	167	35	181	40	72	85	75	140	0
Queue Length 95th (ft)	54	216	#72	#252	98	#156	134	#126	#266	0
Internal Link Dist (ft)		759		1070			787		772	
Turn Bay Length (ft)	500				800	300		375		
Base Capacity (vph)	236	1503	211	1052	911	210	694	422	353	513
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.36	0.67	0.53	0.69	0.39	0.69	0.62	0.69	0.80	0.16

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

HCM 7th Signalized Intersection Summary
4: Brooks School Rd/Boden Rd & Campus Pkwy

No-Build
2050 AM

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	83	885	118	144	1003	185	204	251	105	479	414	155
Future Volume (veh/h)	83	885	118	144	1003	185	204	251	105	479	414	155
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1870	1841	1870	1870	1826	1870	1870	1870	1870	1811	1811	1811
Adj Flow Rate, veh/h	88	941	126	153	1067	197	217	267	112	510	440	165
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %	2	4	2	2	5	2	2	2	2	6	6	6
Cap, veh/h	150	1260	168	252	1088	771	223	481	197	578	440	373
Arrive On Green	0.05	0.28	0.28	0.08	0.31	0.31	0.13	0.20	0.20	0.17	0.24	0.24
Sat Flow, veh/h	1781	4485	599	1781	3469	1585	1781	2461	1005	3346	1811	1535
Grp Volume(v), veh/h	88	702	365	153	1067	197	217	191	188	510	440	165
Grp Sat Flow(s),veh/h/ln	1781	1675	1733	1781	1735	1585	1781	1777	1689	1673	1811	1535
Q Serve(g_s), s	3.7	21.0	21.1	6.6	33.5	8.0	13.3	10.6	11.1	16.4	26.7	10.0
Cycle Q Clear(g_c), s	3.7	21.0	21.1	6.6	33.5	8.0	13.3	10.6	11.1	16.4	26.7	10.0
Prop In Lane	1.00		0.35	1.00		1.00	1.00		0.60	1.00		1.00
Lane Grp Cap(c), veh/h	150	941	487	252	1088	771	223	347	330	578	440	373
V/C Ratio(X)	0.59	0.75	0.75	0.61	0.98	0.26	0.97	0.55	0.57	0.88	1.00	0.44
Avail Cap(c_a), veh/h	150	941	487	270	1088	771	223	347	330	636	440	373
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	29.2	36.0	36.0	27.6	37.4	16.6	47.9	39.9	40.1	44.4	41.6	35.3
Incr Delay (d2), s/veh	5.8	5.4	10.1	3.5	23.0	0.8	51.8	1.8	2.3	13.0	43.2	0.8
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.7	8.9	9.9	2.9	16.9	3.0	9.0	4.7	4.7	7.6	16.6	3.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	34.9	41.3	46.1	31.0	60.4	17.4	99.7	41.7	42.4	57.4	84.8	36.2
LnGrp LOS	C	D	D	C	E	B	F	D	D	E	F	D
Approach Vol, veh/h	1155			1417			596			1115		
Approach Delay, s/veh	42.4			51.3			63.0			65.1		
Approach LOS	D			D			E			E		
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	15.9	38.2	21.5	34.4	12.3	41.8	26.7	29.2				
Change Period (Y+Rc), s	7.3	7.3	7.7	7.7	7.3	7.3	7.7	7.7				
Max Green Setting (Gmax), s	9.7	29.8	13.8	26.7	5.0	34.5	20.9	19.6				
Max Q Clear Time (g_c+11), s	8.6	23.1	15.3	28.7	5.7	35.5	18.4	13.1				
Green Ext Time (p_c), s	0.0	6.1	0.0	0.0	0.0	0.0	0.6	0.8				
Intersection Summary												
HCM 7th Control Delay, s/veh	54.1											
HCM 7th LOS	D											

										
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	88	1067	153	1067	197	217	379	510	440	165
v/c Ratio	0.59	0.79	0.70	0.92	0.20	0.98	0.56	0.85	1.01	0.32
Control Delay (s/veh)	37.7	41.2	40.0	50.1	2.7	103.9	39.0	57.8	88.9	4.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	37.7	41.2	40.0	50.1	2.7	103.9	39.0	57.8	88.9	4.9
Queue Length 50th (ft)	37	260	68	408	6	157	114	188	~333	0
Queue Length 95th (ft)	#76	316	#142	#562	38	#313	166	#268	#549	39
Internal Link Dist (ft)		759		1070			787		772	
Turn Bay Length (ft)	500				800	300		375		
Base Capacity (vph)	149	1359	224	1155	1009	222	671	627	434	514
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.59	0.79	0.68	0.92	0.20	0.98	0.56	0.81	1.01	0.32

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

HCM 7th Signalized Intersection Summary
4: Brooks School Rd/Boden Rd & Campus Pkwy

No-Build
2050 PM

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	133	1328	239	174	1124	551	224	458	206	454	439	124
Future Volume (veh/h)	133	1328	239	174	1124	551	224	458	206	454	439	124
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1856	1856	1856
Adj Flow Rate, veh/h	134	1341	241	176	1135	557	226	463	208	459	443	125
Peak Hour Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	3	3	3
Cap, veh/h	156	1345	242	196	1190	765	230	520	232	506	438	371
Arrive On Green	0.05	0.31	0.31	0.08	0.34	0.34	0.13	0.22	0.22	0.15	0.24	0.24
Sat Flow, veh/h	1781	4352	782	1781	3554	1585	1781	2390	1066	3428	1856	1572
Grp Volume(v), veh/h	134	1049	533	176	1135	557	226	343	328	459	443	125
Grp Sat Flow(s),veh/h/ln	1781	1702	1730	1781	1777	1585	1781	1777	1679	1714	1856	1572
Q Serve(g_s), s	6.0	36.9	36.9	8.1	37.4	33.6	15.2	22.5	22.8	15.8	28.3	7.9
Cycle Q Clear(g_c), s	6.0	36.9	36.9	8.1	37.4	33.6	15.2	22.5	22.8	15.8	28.3	7.9
Prop In Lane	1.00		0.45	1.00		1.00	1.00		0.63	1.00		1.00
Lane Grp Cap(c), veh/h	156	1052	535	196	1190	765	230	386	365	506	438	371
V/C Ratio(X)	0.86	1.00	1.00	0.90	0.95	0.73	0.98	0.89	0.90	0.91	1.01	0.34
Avail Cap(c_a), veh/h	156	1052	535	196	1190	765	230	386	365	506	438	371
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	31.2	41.4	41.4	30.9	39.0	24.8	52.1	45.5	45.6	50.3	45.8	38.1
Incr Delay (d2), s/veh	35.5	26.9	38.2	38.0	17.1	6.0	54.1	21.5	23.9	20.2	46.2	0.5
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.0	18.7	20.7	5.4	18.3	13.2	10.1	12.0	11.7	8.0	18.2	3.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	66.8	68.3	79.6	68.9	56.0	30.8	106.2	67.0	69.5	70.5	92.0	38.6
LnGrp LOS	E	E	E	E	E	C	F	E	E	E	F	D
Approach Vol, veh/h	1716			1868			897			1027		
Approach Delay, s/veh	71.7			49.7			77.8			75.9		
Approach LOS	E			D			E			E		
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	16.4	44.4	23.2	36.0	13.3	47.5	25.4	33.8				
Change Period (Y+Rc), s	7.3	7.3	7.7	7.7	7.3	7.3	7.7	7.7				
Max Green Setting (Gmax), s	9.1	37.1	15.5	28.3	6.0	40.2	17.7	26.1				
Max Q Clear Time (g_c+I1), s	10.1	38.9	17.2	30.3	8.0	39.4	17.8	24.8				
Green Ext Time (p_c), s	0.0	0.0	0.0	0.0	0.0	0.7	0.0	0.4				
Intersection Summary												
HCM 7th Control Delay, s/veh	66.0											
HCM 7th LOS	E											

4: Brooks School Rd/Boden Rd & Campus Pkwy

2050 PM

										
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	134	1582	176	1135	557	226	671	459	443	125
v/c Ratio	0.89	1.02	0.90	0.96	0.61	0.99	0.86	0.92	1.02	0.25
Control Delay (s/veh)	75.3	67.3	70.1	57.2	18.1	110.0	54.1	74.7	93.5	2.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	75.3	67.3	70.1	57.2	18.1	110.0	54.1	74.7	93.5	2.8
Queue Length 50th (ft)	62	~463	86	457	231	180	249	187	~372	0
Queue Length 95th (ft)	#176	#575	#224	#605	350	#345	#347	#286	#582	17
Internal Link Dist (ft)		759		1070			787		772	
Turn Bay Length (ft)	500				800	300		375		
Base Capacity (vph)	150	1557	196	1185	909	228	777	501	435	503
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.89	1.02	0.90	0.96	0.61	0.99	0.86	0.92	1.02	0.25

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Attachment D

Virtual Meeting Minutes & Field Check Minutes

IMPO Safety Study: Hamilton County RSA Locations

Date: April 8, 2026

Time: 10:00 – 10:30 PM

Location: MS Teams

Attendees:

Chris Burt, Hamilton County

Joel Thurman, Hamilton County

Bradley Davix, Hamilton County

Dan DeYoung, Hamilton County Sheriff's Department

Jennifer Dunn, IMPO

James Mark Rinehart, Corradino LLC

David Cleveland, Corradino LLC

Jeremy VanVleet, BN

Agenda

1. Introductions

- a. Corradino staff kicked off the meeting with a round of introductions for all the participants on the Teams call.
- b. Corradino staff then shared that the purpose of the kick-off meeting was to spend some time talking with Hamilton County about the three RSA locations they selected to study as part of the Indianapolis MPO's (IMPO) Safety Study. The information from the kick-off meeting will be considered as Corradino completes the safety and traffic analysis and begins identifying potential countermeasures for the three RSA locations. Corradino then asked Hamilton staff to provide an overview of why they selected their three RSA locations, such as observed safety concerns, changes in traffic related to new development, or existing plans or studies that have identified long-term improvements at the RSA sites.
- c. Corradino will be responsible for the RSA at the Campus Parkway & Brooks School Road intersection. BN will be responsible for the RSAs at the 146th Street & Lowes Way and 146th Street & Carey Road intersections. Meeting minutes for BN's assigned RSAs will be separate from these.

2. Overview of RSA locations

- a. **Campus Parkway & Brooks School Road**
 - i. Hamilton County Staff noted there is a lot of new residential development and mixed-use development underway southwest of the Campus Parkway & Brookes School Road. Additionally, new single-family residential developments are underway north of the intersection,

between 156th Street and 166th Street along Boden Road. (Brookes School Road changes to Boden Road once north of Campus Parkway). Hamilton County staff anticipate approximately 10,000 more residents between the two developments over the next 5-7 years.

- ii. Other impacts to the traffic at the Campus Parkway & Brookes School Road intersection are the commercial development at Hamilton Town Center, located east of the intersection, as well as event traffic coming from the Ruoff Music Center.
 - 1. A Hamilton County Sheriff's Department representative in the meeting noted they do prohibit southbound left turns at the Campus Parkway & Brookes School Road intersection during events at the Ruoff Music Center, and intentionally direct traffic south and west to avoid congestion at the intersection.
- iii. Hamilton County staff noted roadway projects, led by the City of Noblesville, are planned for Boden Road and Olio Road. They believed both projects were to increase capacity along the roadways and to improve intersections at Boden Road & 166th Street, Olio Road & 156th Street, and Olio Road & 166th Street.
- iv. Hamilton County Staff noted they selected the Campus Parkway & Brookes School Road intersection to be studied because they saw it was on the High-Injury Network. However, they were not aware of crash patterns or trends that made them concerned about how it was designed.
 - 1. The representative from the Hamilton County Sheriff's Department noted that the City of Noblesville PD responds to more crashes at this location than the Sheriff's Department. Still, they believe the intersection operates safely because there is clear sight distance for turning vehicles. Most crashes were believed to be related more to the volume of traffic through the intersection than to its design or operations.

3. Preliminary Findings Reports

- a. Corradino staff noted they are wrapping up a draft of the Preliminary Findings Report and will share it with Hamilton County staff before the field check.

4. Traffic Counts

- a. Hamilton County staff said they would be able to share traffic counts, as well as an impact study for the Hyde Park Development located southwest of the Campus Parkway & Brooks School Road intersection.

- b. Indianapolis MPO also noted that they have a license with the SaaS, Replica, which will be able to provide traffic counts to compare to the counts provided by Hamilton County.

5. Next Steps

- a. Finalize Preliminary Findings Reports.
- b. Schedule Field Checks.
 - i. Corradino sent a follow-up email to Greenwood staff on 4/8/2026 to schedule a field check with them between 5/1/2026 and 5/8/2026.

Field Check Notes for RSA at Campus Parkway & Brooks School Road

				Date: 5/21/2026	
				Des. No.: n/a	
Reviewer Information:			Agency/Firm Name: Corradino LLC		
Primary Author: James Mark Rinehart			Agency: Indianapolis Metropolitan Planning Organization		
Phone Numbers: (317) 488-2363			Email Address: jrinehart@corradino.com		
Attendees:					
- Chris Burt, Hamilton County - Brad Davis, Hamilton County - Jennifer Dunn, IMPO - James Mark Rinehart, Corradino - David Cleveland, Corradino - Jeremy VanVleet, Burgess & Niple					
Purpose of Field Check:					
The purpose of this field check was to review the crash history at the Campus Parkway & Brooks School Road intersection, evaluate the current roadway conditions, observe traffic patterns, and collaborate with representatives from Local Public Agencies (LPA) and Law Enforcement to identify safety countermeasures. Participants at the field check were provided with a preliminary findings report summarizing the reported crash history at the intersection. The goal of the field check was to identify near-term and long-term improvements and build consensus with the LPAs and Local Law Enforcement on the recommendations. Recommendations from the field check will serve as the final recommendations for the RSA and will be included in IMPO's Safety Study.					
Project Location:					
Location: Intersection of Campus Parkway & Brooks School Road					
INDOT District: Greenfield			City: Indianapolis	County: Marion	
Lat & Long (BOP)	39.996594	-85.937859	Urban/Rural - URBAN	Functional Class of Major Roadway: Other Principal Arterial	
Traffic Control Type: Signalized			Posted Speed Limit: Campus Pkwy – 45mph; Brooks School Rd. – 40mph		
Site Observations					
- Corradino kicked off the field check, providing an overview of the crash patterns reported in the preliminary findings report. The results indicated that there were 44 reported crashes at the intersection, with 19 (43%) being Rear-end crashes. Left-turn crashes and same-direction sideswipes were the next-highest crash types, each with 7 crashes. - Corradino noted that 43% of crashes are rear-end crashes at a large intersection like the Campus Pkwy and Brooks School Road, which is common and more likely due to the high traffic volumes at the intersection than failures in the traffic signal timing or signal phasing. - Hamilton County's traffic engineer agreed and noted that the intersection is routinely monitored and calibrated at an 80-second cycle to operate in sync with the signalized intersections to the east. Additionally, Hamilton County noted that they must monitor the signals closely to ensure efficiency as vehicles enter and exit the DDI interchange at Campus Parkway and I-69. - Hamilton County also noted that they monitor Ruoff Music Center's event calendars to calibrate the traffic signals when there is an anticipated spike in traffic due to major music events and festivals. - The question of speeding at the intersection was discussed during the field check. Hamilton County believed that all traffic north, south, and east of the intersection does not experience excessive speeding due to the proximity to other signalized intersections. The EB approach to the intersection was thought to					

experience some speeding, but it was not noticeable during the field check.

- Corradino went back after the field check and reviewed the traffic data. Only one reported crash referenced speeding as a primary factor. It was a reported “hit and run” crash SB on Boden Road at the intersection.
- Corradino also reviewed the speed data in the Replica Software provided by the IMPO. It did not appear that there was excessive speeding identified at the intersection.
- Hamilton County staff noted the Hyde Park residential development has multiple multifamily apartment buildings being constructed SW of the intersection. There are also plans to develop the NW corner of the intersection into recreational space in the future.
 - Corradino asked if the new development is anticipated to impact the Campus Parkway and Brooks School Road intersection. Hamilton County believes it would impact the traffic capacity, but not significantly. Hamilton County staff believe, based on the impact study generated for the development, that traffic will be distributed between the Campus Parkway & Brooks School Road and the 146th Street & Marilyn Road intersections.
- It was agreed that, at this time, there is no need for a long-term improvement at the intersection, but rather systemic safety improvements for the near term, such as adding back plates to the traffic signals (if the signal poles can handle the wind load, updating striping at the intersection, and maintenance to the pedestrian push buttons that are currently not operational).
 - It was discussed during the field check that a pedestrian refuge might be a good idea to add for crossing Campus Parkway. However, when Corradino walked through the intersection after the field check, it was observed that a pedestrian refuge might only be constructed on the EB approach. The slotted left-turn lane on the WB approach makes it more difficult to construct a pedestrian refuge. Additionally, there were no reported pedestrian crashes at the intersection, indicating that the cost of constructing the pedestrian refuge would exceed the benefit it provides. Therefore, Corradino recommends not moving forward with a pedestrian refuge at this time.

Potential Alternatives Discussed

Near-Term

- Evaluate the wind load capabilities of the existing signal poles. (Hamilton County will provide specs for the signal poles).
 - If possible, add back plates to the existing traffic signals at the intersection.
- Update pedestrian crosswalk striping from parallel lines to piano-key crosswalks.
- Replace pedestrian push buttons in the NW and SE corners that are not operating.
- Consider adding a flashing speed sign on the EB approach to the intersection, because it is the most vulnerable intersection approach to experience speeding.

Long-Term

- It was decided during the field check not to pursue a long-term alternative for the intersection at this time.

Future Consideration

- Future considerations for an innovative intersection were discussed, but it was agreed that it is not needed anytime soon at the Campus Parkway & Brooks School Road intersection.

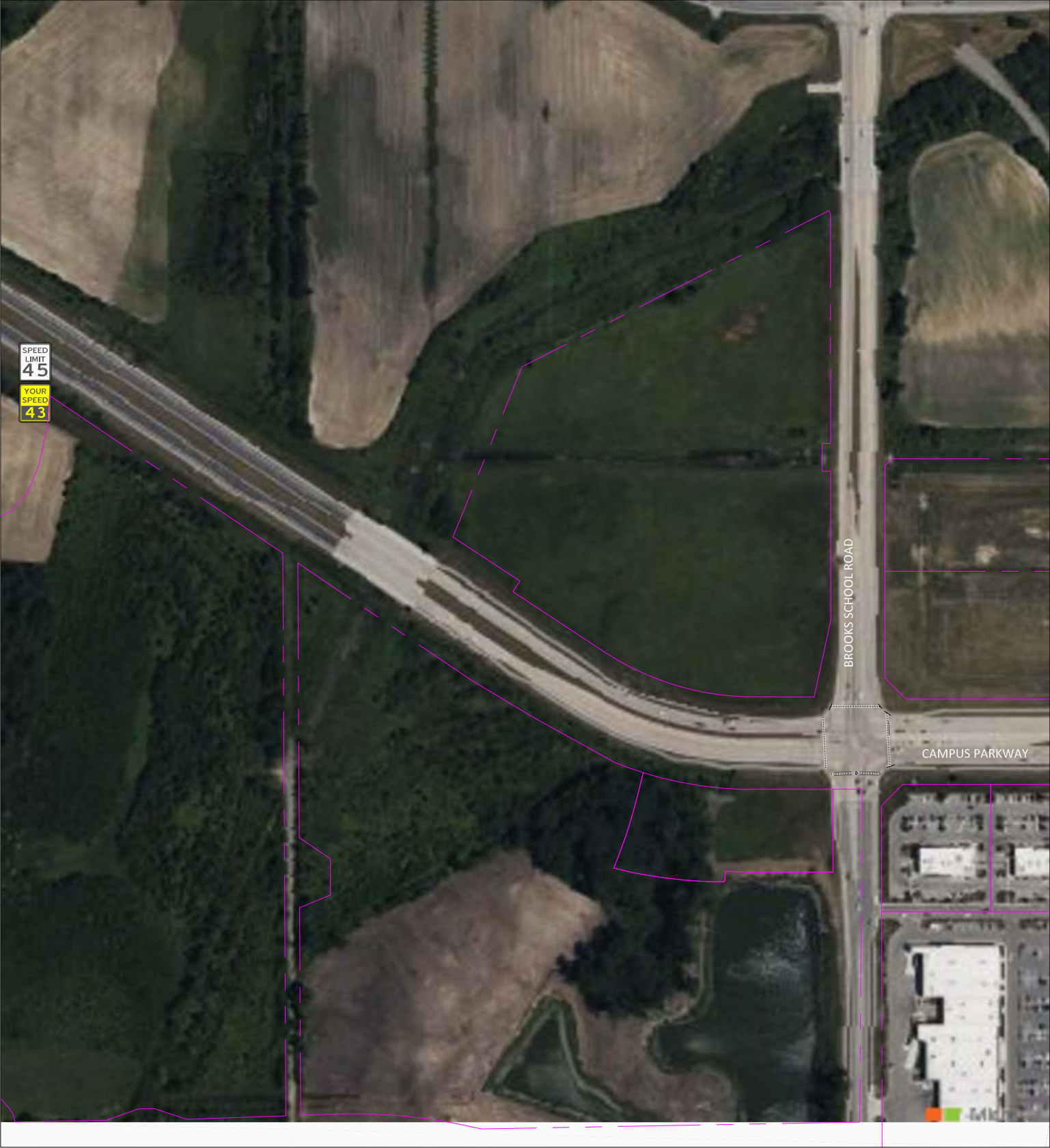
Consensus on Key Items for Alternatives

- Consensus was met on the Near-Term recommended improvements as listed in the field notes.

Attachment E

Cost Estimates & Schematics

Near-Term Improvements Campus Parkway & Brooks School Road



PRELIMINARY COST ESTIMATE - NEAR TERM
Campus Parkway & Brooks School Road

LINE ITEM	ITEM NO.	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	AMOUNT
1	110-01001	MOBILIZATION AND DEMOBILIZATION	1	LS	\$ 5,000.00	\$ 5,000.00
2	801-06775	MAINTAINING TRAFFIC	1	LS	\$ 3,000.00	\$ 3,000.00
3	802-11843	RADAR SPEED DISPLAY SIGN ASSEMBLY	1	EACH	\$ 15,000.00	\$ 15,000.00
4	805-01300	TRAFFIC SIGNAL EQUIPMENT, REMOVE	1	EACH	\$ 500.00	\$ 500.00
5	805-02087	TRANSPORTATION OF SALVAGEABLE SIGNAL EQUIPMENT	1	LS	\$ 500.00	\$ 500.00
6	805-08126	TRAFFIC SIGNAL HEAD, (NO.) SECTION, RETROFIT (LOUVERS REQUIRED)	15	EACH	\$ 1,750.00	\$ 26,250.00
7	805-11817	PEDESTRIAN PUSH BUTTON, APS	4	EACH	\$ 250.00	\$ 1,000.00
8	805-78485	SIGNAL CABLE, CONTROL, COPPER, 5C/14 GAUGE	400	LFT	\$ 4.30	\$ 1,720.00
9	808-06368	TRANSVERSE MARKING, REMOVE	950	LFT	\$ 5.00	\$ 4,750.00
10	808-10099	TRANSVERSE MARKING, MULTI-COMPONENT, CROSSWALK LINE, WHITE, 24 IN.	540	LFT	\$ 17.00	\$ 9,180.00
TOTAL						\$ 66,900.00

CONSTRUCTION TOTAL **\$67,000.00**

CONTINGENCY (10%) **\$7,000.00**

OVERALL PROJECT TOTAL **\$74,000.00**

This cost estimate makes the following assumptions:
1.) Unit price estimates based on stand-alone project

Project Phases		
Task No.	Task	Cost
1	Preliminary Engineering	\$ 10,000
2	Right of Way	\$ -
3	Utility CN	\$ 500
4	Railroad CN	\$ -
5	Construction Inspection/Testing	\$ -
TOTAL		\$ 10,500

The Preliminary Cost Estimate portion of this document was prepared by me or under my supervision and represents a planning level cost estimate of the project's scope.

Gary L. Yellig
Signature

Todd Johnson
Estimate Completed By
6/5/2026
Date



ABBREVIATED ENGINEERING NOTES FOR PRELIMINARY COST ESTIMATE - NEAR TERM
Campus Parkway & Brooks School Road

LINE ITEM	ITEM NO.	DESCRIPTION	NOTES
1	110-01001	MOBILIZATION AND DEMOBILIZATION	
2	801-06775	MAINTAINING TRAFFIC	
3	802-11843	RADAR SPEED DISPLAY SIGN ASSEMBLY	
4	805-01300	TRAFFIC SIGNAL EQUIPMENT, REMOVE	
5	805-02087	TRANSPORTATION OF SALVAGEABLE SIGNAL EQUIPMENT	
6	805-08126	TRAFFIC SIGNAL HEAD, (NO.) SECTION, RETROFIT (LOUVERS REQUIRED)	
7	805-11817	PEDESTRIAN PUSH BUTTON, APS	assume buttons in the NW and SE quads are not working - use 4 each
8	805-78485	SIGNAL CABLE, CONTROL, COPPER, 5C/14 GAUGE	Assume issue may involve wiring and replace existing. Assume 400 LFT
9	808-06368	TRANSVERSE MARKING, REMOVE	removes existing parallel lines crosswalks. In CAD length measures about 950'
10	808-10099	TRANSVERSE MARKING, MULTI-COMPONENT, CROSSWALK LINE, WHITE, 24 IN.	by CAD, meaasures about 540' (assumes 6' long and 2' on - 2' off pattern)

ABBREVIATED ENGINEERING REVIEW FOR TRAFFIC SAFETY

				Date: 6/19/2026	
				Des. No.: N/A	
Reviewer Information:				Agency/Firm Name: Burgess & Niple	
Primary Author: Micah Reynolds, RSP ₂₁				Agency: Indianapolis Metropolitan Planning Organization	
Phone Numbers: (260) 452-7171				Email Address: micah.reynolds@burgessniple.com	
Purpose of Review:					
Burgess & Niple was hired by the Indianapolis MPO (IMPO) to conduct a series of roadway safety audits at preselected intersections within its urbanized area. The goal was to identify existing safety issues and recommend near-term and long-term improvements to address them. Improvements may range from lower-cost maintenance items, such as signage and pavement markings, to higher-cost capital improvements, including intersection upgrades, multimodal infrastructure, and upgraded traffic signals, as needed. This form is suitable for Level 1 review. Of the three available levels of engineering review, this represents the least refined, lowest-intensity degree of analysis, development of essential project intent (outline of the certified course of action), scoring, and process documentation.					
Project Location:					
Route: Lowe's Way		District: Greenfield		City: Carmel	
County: Hamilton					
Lat & Long (BOP):	39.810757	-86.121594	Lat & Long (EOP):	39.810757	-86.121594
IMPO: Indianapolis Metropolitan Planning Organization			Project Type: Roadway Safety Audit		
Location: The intersection of Lowe's Way & 146 th Street					
Existing Conditions:					
The Lowe's Way & 146th Street intersection is a signalized four-leg intersection. 146th Street is a four-lane roadway at the intersection, with left and right turn lanes in each direction. Lowe's Way is a 4-lane roadway at the intersection with left turn lanes in each direction. There are two southbound and two northbound through lanes along Lowe's Way. The posted speed limit on Lowe's Way and 146th Street at the intersection is 45 MPH. There doesn't appear to be significant geometric deficiencies that are contributing to the crashes that are occurring. Grades in the NW and SW quadrants of the intersection limit widening to provide a dedicated right turn lane for EB 146th Street at the intersection. Proximity to the US 31 interchange also impacts traffic operations at this intersection. There is significant pedestrian and bicycle traffic that traverses this intersection, due to the trail that runs along 146th Street on both the north and south sides of the road. Additionally, the trail on the south side of 146th Street connects to a trailhead for the Hagan-Burke Trail just east of the intersection. There is an existing turning roadway for westbound right turns, but the free-flow nature of the turning roadway allowing vehicles to complete a high-speed right turn might conflict with pedestrian traffic. The skewed angle of the crosswalk contributes to less-than-desirable visibility for vehicles as they approach. Located in each quadrant of the intersection are: - NW Quadrant: Commercial property - SW Quadrant: Commercial property - SE Quadrant: Commercial property - NE Quadrant: Commercial property Burgess & Niple held a field check with the representatives from the IMPO and City of Indianapolis DPW on April 27, 2026, to discuss some near-term and long-term solutions and build consensus around a series of countermeasures for Burgess & Niple to cost as part of the final recommendations. The field check meeting minutes are available in Attachment C. Prior to the field check, B&N set up Miovision cameras to record driver, pedestrian, and bicyclist behaviors. The surveillance video was studied for a 24-hour period. There were few pedestrians that used the intersection and all obeyed traffic laws. There was a group of children cyclists that crossed illegally and were nearly hit. Right-turning vehicles consistently stopped on the crosswalk and while this was not observed to impede pedestrians this would cause them to cross either in front of or behind the vehicle. There was consistent eastbound right turn and through movement red light running. The northbound right turn movement also consistently ran the red light. Northbound left turns were also running the red light however; the vehicles were typically across the stop bar when the light turned red. The yellow and all red clearance time may need to be evaluated to determine if enough clearance time is provided. During the PM peak, the northbound left turn movement blocks the intersection due to congestion west of the intersection stemming from the US 31 interchange. The still photo observations are available in Attachment E.					

Traffic Operations:										
Mobility/Congestion Performance: Traffic analysis was not completed at this location because the crash data indicated congestion as a major issue at this location. There is an existing study underway for the 146th Street corridor at the time of this study. The holistic corridor view with the adjacent interchange should be considered for operational improvements. Safety Performance / Crash Analysis: According to available crash data, there were 59 crashes associated with the study area from January 1, 2022, to December 31, 2024. Of those crashes, two resulted in incapacitating injuries, and three resulted in non-incapacitating injuries. The majority of the crashes were rear ends or same direction sideswipes which often correlate with congestion which results in more property damage crashes due to the lower operating speed at the time of collision. See attached Crash Summary, crash diagram, and RoadHAT 4.1 report in Attachment A. 2022-2024 Crash Data - analyzed as City Arterial Intersection One AADT $I_{CC} = 0.47$, $I_{CF} = 1.81$										
Alternatives & Recommendations										
<u>Near-Term</u> <u>Long-Term</u> Add raised crosswalk for pedestrians crossing the right turn lane from westbound 146th Street to Greyhound Pass. <u>Future Consideration</u> The current 146th Street corridor study (performed by others) should consider how to improve operations while providing safe mobility for all users of this intersection. Things such as pedestrian refuge, leading pedestrian intervals should be considered as the corridor is being analyzed.										
Long-Term Cost Estimates for the Proposed Safety Improvements										
Detailed cost estimates for the near- and long-term improvements are available in Attachment D. <u>Long-Term Recommendation</u> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 60%;">Construction</td> <td style="text-align: right;">\$114,770</td> </tr> <tr> <td>Preliminary Engineering (15%)</td> <td style="text-align: right;">\$17,300</td> </tr> <tr> <td>Utility Allowance (5%)</td> <td style="text-align: right;">\$5,800</td> </tr> <tr> <td>Right of Way</td> <td style="text-align: right;">\$0</td> </tr> <tr> <td>Grand Total</td> <td style="text-align: right;">\$137,870</td> </tr> </table>	Construction	\$114,770	Preliminary Engineering (15%)	\$17,300	Utility Allowance (5%)	\$5,800	Right of Way	\$0	Grand Total	\$137,870
Construction	\$114,770									
Preliminary Engineering (15%)	\$17,300									
Utility Allowance (5%)	\$5,800									
Right of Way	\$0									
Grand Total	\$137,870									
Project Score: (for INDOT use)										
Safety Program Score =										
Miscellaneous Notes:										
Attachments:										
Attachment A: Preliminary Findings Report Attachment B: Traffic Counts Attachment C: Virtual Meeting Minutes & Field Check Minutes Attachment D: Cost Estimates & Schematics Attachment E: Near Miss Analysis										

ATTACHMENT A

Preliminary Findings Report

PRELIMINARY FINDINGS

Safety Analysis at 146th Street & Lowe's Way

Report Prepared for: IMPO & Hamilton County

1. **Safety Analysis**

A crash data analysis was completed for the intersection of 146th Street & Lowe's Way (Study Area) in Indianapolis, IN. Before beginning the crash analysis, the project team followed these steps to clean the data:

- Received 2022-2024 crash data from the IMPO. Serious Injury and Fatal crashes had been cleaned by IMPO staff.
- Placed a 250' buffer around the Study Area to identify reported crashes near the intersection.
- Reviewed the police reports for each crash record identified within the 250' buffer.
- Identified and removed any crash records from the analysis that involved a collision with an animal in the roadway or occurred in a parking lot near the intersection or occurred at a different intersection entirely.
- Reviewed the description in the reports to confirm the selected Manner of Collision & Crash Severity accurately reflected how the police officer described the crash.
- Exported the results from ArcGIS Pro into MS Excel.
- Created a collision diagram of the Study Area as well as summary tables of the crash records.
- Developed a crash cost (I_{CC}) and crash frequency (I_{CF}) for the Study Area using RoadHat 4.1.

59 crashes were identified within the Study Area. Two (2) of those reported crashes resulted in incapacitating injuries. Most of the incapacitating injury crashes were reported as Rear End crashes. Other notable results near the Study Area include:

- 75.4% of crashes that occurred were rear end crashes, 16% were same direction sideswipe crashes, and 7% were right angle crashes.
- 58% of reported crashes occurred during Off-Peak travel times. 7% of reported crashes occurred during the morning peak hours (6am-9am), and 35% during the evening peak hours (4pm-7pm).
- 76% of reported crashes occurred in daylight hours and 44% in dark conditions. There appears to be a significant split in the crash data whether the crashes were lighted or not, with 17% of the crashes occurring during this time. The remaining 6% of crashes listed lighting conditions as "Dawn/Dusk" in the police report.
- 11% of reported crashes occurred in wet roadway surface conditions. 87% of reported crashes occurred in dry surface conditions. The remaining 1% of reported crashes occurred on icy or snowy roadway surface.
- 65% of reported crashes occurred when the weather conditions were clear. The remaining 35% of reported crashes occurred on cloudy (25%), rainy (8%), or snow (1%) days.

Attached are the crash summary tables, a collision diagram, images of the intersection, and the results of the RoadHAT 4.1 analysis.

Crash Data Summary 146th Street & Lowe's Way

2022-2024 Crash Summary	
TOTAL CRASHES	59
TOTAL DEAD	0
TOTAL INJURED	5
PROPERTY DAMAGE ONLY	54
NON-INCAPACITATING	3
INCAPACITATING	2
FATAL	0

Summary of Primary Factors per Manner of Collision		
Primary Factors per Manner of Collision	Crashes	Percent
LEFT TURN	1	1.75%
DISREGARD SIGNAL/REG SIGN	1	
REAR END	43	75.44%
DRIVER ILLNESS	1	
FOLLOWING TOO CLOSELY	41	
IMPROPER TURNING	1	
RIGHT ANGLE	4	7.02%
DISREGARD SIGNAL/REG SIGN	3	
FAILURE TO YIELD RIGHT OF WAY	1	
SAME DIRECTION SIDESWIPE	9	15.79%
FAILURE TO MAINTAIN LANE	1	
FOLLOWING TOO CLOSELY	2	
IMPROPER LANE USAGE	3	
UNSAFE LANE MOVEMENT	3	
Total Crashes	57	100.00%

Summary of Crashes per Time of Day		
Time of Day	Crashes	Percent
Peak AM (6:00-9:00 AM)	8	7.3%
Peak PM (4:00-7:00 PM)	16	32.8%
Off Peak	35	59.8%
Total Crashes	57	100%

Summary of Crashes per Light Conditions		
Light Conditions	Crashes	Percent
DAYLIGHT	46	78%
DARK (LIGHTED)	7	12%
DAWN/DUSK	4	7%
DARK (NOT LIGHTED)	2	3%
Total Crashes	48	100%

Summary of Roadway Surface Conditions				
Manner of Collision	DRY	SNOW/SLUSH	WET	Total Crashes
REAR END	36	1	6	43
SAME DIRECTION SIDESWIPE	9			9
RIGHT ANGLE	4			4
PEDALCYCLE	2			2
LEFT TURN	1			1
Total Crashes	52	1	6	59

Summary of Weather Conditions					
Manner of Collision	CLEAR	CLOUDY	RAIN	SNOW	Total Crashes
REAR END	28	10	4	1	43
SAME DIRECTION SIDESWIPE	7	2			9
RIGHT ANGLE	2	2			4
PEDALCYCLE	1	1			2
LEFT TURN	1				1
Total Crashes	39	15	4	1	59

Intersection Images	146 th Street at Lowe's Way	
	Study Period: 1/1/2022 to 12/31/2024	Location: Noblesville
	INDOT District: Greenfield	County: Hamilton City/Town: Carmel/Westfield



West Leg – Looking West



West Leg – Looking East



East Leg – Looking West



East Leg – Looking East



South Leg – Looking South



South Leg – Looking North



North Leg – Looking South



North Leg – Looking North

RoadHAT 4D	Index of Crash Frequency and Cost - Form F1		Page 1/2
Settings: Indiana local settings		Version: Version 4.1	
Location	146th Street at Lowe's Way		
GIS			
Post			
Analyst	Micah Reynolds, PE, RSP2I		
Date	5/7/2026		
INPUT			
Road Facility Type	City Arterial Intersection One AADT		
Busiest Road AADT (veh/day)	38005		
Crossing Road Principal Arterial Indicator (1 if present, 0 otherwise)	0		
Crossing Road Minor Arterial Indicator (1 if present, 0 otherwise)	0		
Crossing Road Major Collector Indicator (1 if present, 0 otherwise)	1		
Crossing Road Minor Collector Indicator (1 if present, 0 otherwise)	0		
First Year with Crash Data (yyyy)	2022		
Last Year with Crash Data (yyyy)	2024		
Number of Crashes (crash/period)			
Fatal and Incapacitating Injury Crashes	2		
Non-Incapacitating and Possible Injury Crashes	3		
Property Damage Only Crashes	54		
Route or Road Type	City Arterial Intersection One AADT		
Average Crash Costs (\$)			
Fatal and Incapacitating Injury Crashes	1840100		
Non-Incapacitating and Possible Injury Crashes	393200		
Property Damage Only Crashes	40200		
Crash Cost Year (yyyy)	2017		
OUTPUT			
Expected Crash Frequency (crash/year)			
Fatal and Incapacitating Injury Crashes	0.474		
Non-Incapacitating and Possible Injury Crashes	1.17		
Property Damage Only Crashes	5.17		
All Crashes	6.81		
Index of Crash Frequency	1.81		
Index of Crash Cost	0.47		

RoadHAT 4D	Index of Crash Frequency and Cost - Form F1		Page 2/2
Settings: Indiana local settings		Version: Version 4.1	
Location	146th Street at Lowe's Way		
GIS			
Post			
Analyst	Micah Reynolds, PE, RSP2I		
Date	5/7/2026		
Comments: AADT from INDOT TCDS 			

ATTACHMENT B

Traffic Counts

Week Average

Time	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	Total
0:00	4	57	4	10	51	3	18	88	17	5	6	2	264
0:15	3	50	4	9	42	4	13	89	11	5	5	2	236
0:30	3	42	3	7	35	3	13	83	11	6	4	2	211
0:45	3	37	2	6	32	3	11	76	11	6	4	2	191
1:00	2	31	2	5	29	3	10	73	9	4	3	3	174
1:15	2	26	2	4	27	2	9	72	10	3	3	2	163
1:30	2	24	2	4	25	2	8	81	9	2	3	2	163
1:45	1	22	2	3	22	2	6	84	7	2	3	2	156
2:00	1	22	4	3	22	2	6	87	7	2	2	1	159
2:15	1	22	4	4	25	2	7	92	7	1	2	1	168
2:30	1	23	4	4	30	2	6	83	5	1	2	1	160
2:45	1	26	4	6	34	2	7	79	6	1	1	1	168
3:00	2	29	3	5	40	1	13	78	10	1	2	1	185
3:15	2	29	4	6	48	1	13	71	12	1	3	2	191
3:30	3	34	5	7	64	1	15	75	14	1	3	2	224
3:45	7	44	8	10	81	4	16	82	16	2	3	2	276
4:00	8	67	11	18	106	6	14	93	22	2	4	3	354
4:15	8	95	13	20	133	8	17	98	27	4	4	3	430
4:30	9	130	17	25	166	8	20	99	31	5	5	4	517
4:45	13	172	21	30	230	8	27	107	41	5	8	5	666
5:00	15	211	31	37	302	10	42	109	51	6	10	5	830
5:15	17	255	40	50	381	15	63	136	69	7	13	9	1057
5:30	19	295	49	66	492	23	109	167	84	11	21	16	1350
5:45	16	358	61	81	620	29	139	192	105	15	27	25	1668
6:00	21	431	66	101	778	37	182	230	131	20	36	37	2070
6:15	28	516	81	123	939	45	209	249	157	27	51	45	2470
6:30	36	625	104	150	1119	49	233	272	184	33	65	55	2927
6:45	50	717	132	183	1292	56	286	300	210	37	77	63	3403
7:00	60	777	166	214	1407	65	324	316	237	43	92	75	3776
7:15	71	824	191	229	1461	70	370	335	252	47	104	87	4040
7:30	77	843	212	243	1441	79	403	365	282	56	114	99	4212
7:45	78	848	246	263	1408	88	415	373	294	62	123	110	4306
8:00	88	878	261	279	1363	91	428	398	317	65	132	118	4416
8:15	99	867	263	281	1286	105	445	429	344	72	136	127	4453
8:30	114	848	263	272	1204	114	450	441	362	73	140	136	4419
8:45	131	824	238	243	1070	120	454	460	387	82	148	140	4296
9:00	141	796	232	212	955	125	459	470	390	90	152	143	4164
9:15	149	787	238	204	882	123	457	463	392	95	158	149	4097
9:30	161	782	244	201	840	127	456	459	391	105	167	152	4086
9:45	169	787	249	206	833	137	463	466	391	106	174	165	4145
10:00	179	787	246	210	823	149	463	475	394	115	186	178	4204
10:15	188	804	249	212	826	163	477	500	406	124	194	194	4337
10:30	199	822	250	216	816	170	481	519	426	130	204	210	4442
10:45	214	838	255	214	806	172	492	536	444	139	213	225	4549
11:00	230	851	263	214	813	176	499	548	462	143	219	243	4661
11:15	247	866	265	223	833	181	489	556	474	145	228	254	4761
11:30	259	879	264	226	845	188	499	563	481	150	233	269	4855
11:45	260	883	261	229	854	190	503	567	488	159	248	288	4928
12:00	257	876	257	232	861	187	510	565	491	165	253	294	4948
12:15	253	859	253	231	859	182	522	559	492	169	260	300	4940
12:30	250	845	254	224	864	177	533	557	485	168	263	295	4914
12:45	249	846	256	225	870	174	530	550	474	161	255	279	4867
13:00	245	853	258	226	865	173	524	546	465	154	250	267	4825
13:15	234	882	254	227	856	167	519	536	468	155	241	254	4794
13:30	218	909	250	226	857	163	499	534	470	153	242	251	4770
13:45	213	912	243	223	850	157	518	534	473	152	234	244	4752
14:00	212	929	237	216	855	155	522	528	477	152	228	236	4745
14:15	212	976	239	205	865	150	522	525	462	152	219	226	4752
14:30	210	1011	242	200	861	145	527	528	462	151	206	213	4755
14:45	202	1063	243	194	855	143	505	512	456	148	204	207	4732
15:00	199	1126	240	190	858	136	500	512	461	149	204	200	4775
15:15	192	1169	238	195	873	141	495	517	476	141	203	198	4839
15:30	190	1237	232	195	896	146	503	519	493	140	198	193	4941
15:45	184	1290	233	192	920	152	508	535	520	144	191	186	5056
16:00	170	1318	235	191	920	160	513	544	528	143	188	189	5098
16:15	171	1336	230	188	927	162	519	542	532	149	193	189	5138
16:30	166	1333	229	196	938	166	522	544	533	154	194	194	5170
16:45	176	1326	224	207	946	175	520	542	525	157	201	196	5194
17:00	180	1297	224	209	936	174	513	529	508	157	207	197	5132
17:15	178	1236	226	211	913	172	506	526	498	154	206	199	5024
17:30	183	1171	222	207	882	168	498	513	474	150	210	199	4878
17:45	177	1085	224	198	847	159	488	495	446	145	208	206	4680
18:00	169	1017	209	198	836	155	475	491	428	144	203	205	4530
18:15	160	944	203	194	802	148	460	480	405	142	193	203	4336
18:30	152	861	193	196	772	141	432	468	390	142	188	198	4133
18:45	141	800	175	195	724	130	414	457	379	143	180	191	3929
19:00	139	739	168	188	670	117	399	437	364	138	175	181	3715
19:15	132	693	154	183	642	109	387	425	345	131	171	167	3540
19:30	119	655	147	168	615	96	368	405	327	121	156	157	3334
19:45	106	607	134	158	592	90	358	401	307	109	143	141	3147
20:00	88	563	118	149	565	84	335	393	290	101	126	126	2937
20:15	75	510	97	137	526	75	318	378	279	93	110	114	2711
20:30	64	468	75	126	475	68	294	370	256	85	103	99	2484
20:45	55	417	59	117	433	55	255	353	228	72	93	86	2224
21:00	43	362	47	102	391	47	221	340	203	62	79	73	1969
21:15	35	319	39	90	355	39	190	311	173	49	71	60	1731
21:30	26	276	34	74	307	31	171	286	156	38	60	49	1508
21:45	20	239	28	57	260	26	152	252	148	37	50	38	1307
22:00	19	212	22	49	211	21	140	214	125	34	46	30	1122
22:15	14	178	17	39	174	16	109	175	101	33	35	22	914
22:30	13	143	13	36	146	14	80	135	76	29	26	17	728
22:45	11	127	11	31	120	12	59	111	53	21	19	12	587
23:00	9	109	9	28	101	9	39	89	42	17	15	10	477

ATTACHMENT C

Virtual Meeting Minutes & Field Check Minutes

251 North Illinois Street | Capital Center Suite 920 | Indianapolis, IN 46204 | 317.237.2760

Project: IMPO Safety On-Call
Location: Lowe's Way at 146th Street
Hamilton County

Date: June 18, 2026

Attendees

Chris Burt	Hamilton County	Jennifer Dunn	Indy MPO
Bradley Davis	Hamilton County	Mark Rinehart	Corradino LLC
Dan DeYoung	Hamilton County	Dave Cleveland	Corradino LLC
Joel Thurman	Hamilton County	Jeremy VanVleet	Burgess & Niple

Kickoff Meeting Discussion

The purpose of this meeting was to review the selected intersection and gather local insights on existing conditions, safety concerns, planned developments, and previous studies.

The following intersections were confirmed for inclusion in the 2025-2026 Safety Study:

1. 146th Street & Carey Road

- No planned additional development
- Notable severe pedestrian crash reported in 2025 where left turning vehicle ended in northwest corner where pedestrians were residing
- Observations of frequent pedestrian activity on the south side of the intersection
- High pedestrian presence due to nearby residential area and Hagen-Burke trail connection to the west
- Traffic volumes may be an issue at this intersection

2. 146th Street & Lowes Way

- Nearby commercial development includes BJ's
- There are two trail systems nearby, the Hagen-Burke trail and Monon trail
- Recent intersection modifications were completed in late 2024 and include:
 - Added northbound through lane
 - Reconfiguration of right-turn/free-flow lane to yield condition
 - Widened crosswalks
- Crosswalk across free-flow right turn identified as a potential risk area
- Long crossings may require additional safety improvements such as refuge islands
- Significant congestion during weekends and evening rush hour especially eastbound traffic

The next steps include finalization and distribution of the preliminary findings reports, conducting field checks with a target of early to mid-May 2026, and continued coordination with stakeholders on observed issues and potential improvements.

251 North Illinois Street | Capital Center Suite 920 | Indianapolis, IN 46204 | 317.237.2760

Project: IMPO Safety On-Call
Location: Lowe's Way at 146th Street
Hamilton County

Date: June 9, 2026**Attendees**

Chris Burt	Hamilton County	Jeremy VanVleet	Burgess & Niple
Bradley Davis	Hamilton County		
Jennifer Dunn	Indy MPO		

Field Check Observations

The field check attendees met at the intersection of Lowe's Way on Friday, May 8th, 2026, at approximately 11:30AM. The existing intersection is a four-leg, signalized intersection.

It was noted that the 146th Street corridor in this area is currently being studied by HNTB. Any major improvements to the intersection will likely come out of that study.

Jeremy then discussed with the group the existing safety performance at the intersection. The crash history indicated that there is a significant crash pattern of right angle and left turn crashes at the intersection. The RoadHAT analysis results showed an I_{CF} of 1.81 and an I_{CC} of 0.47 which indicate the intersection is performing worse than expected.

After reviewing the traffic and safety analysis and while watching traffic at the site, the group decided on options that should be analyzed further.

- In the short term, converting the pedestrian crossing across the westbound to northbound right turn lane to a raised crosswalk will help assist turning vehicles to stay within acceptable speeds.

These alternatives will be analyzed, and results will be shared and discussed further.

ATTACHMENT D

Cost Estimates & Schematics

IMPO RSAs - Lowe's Way at 146th Street

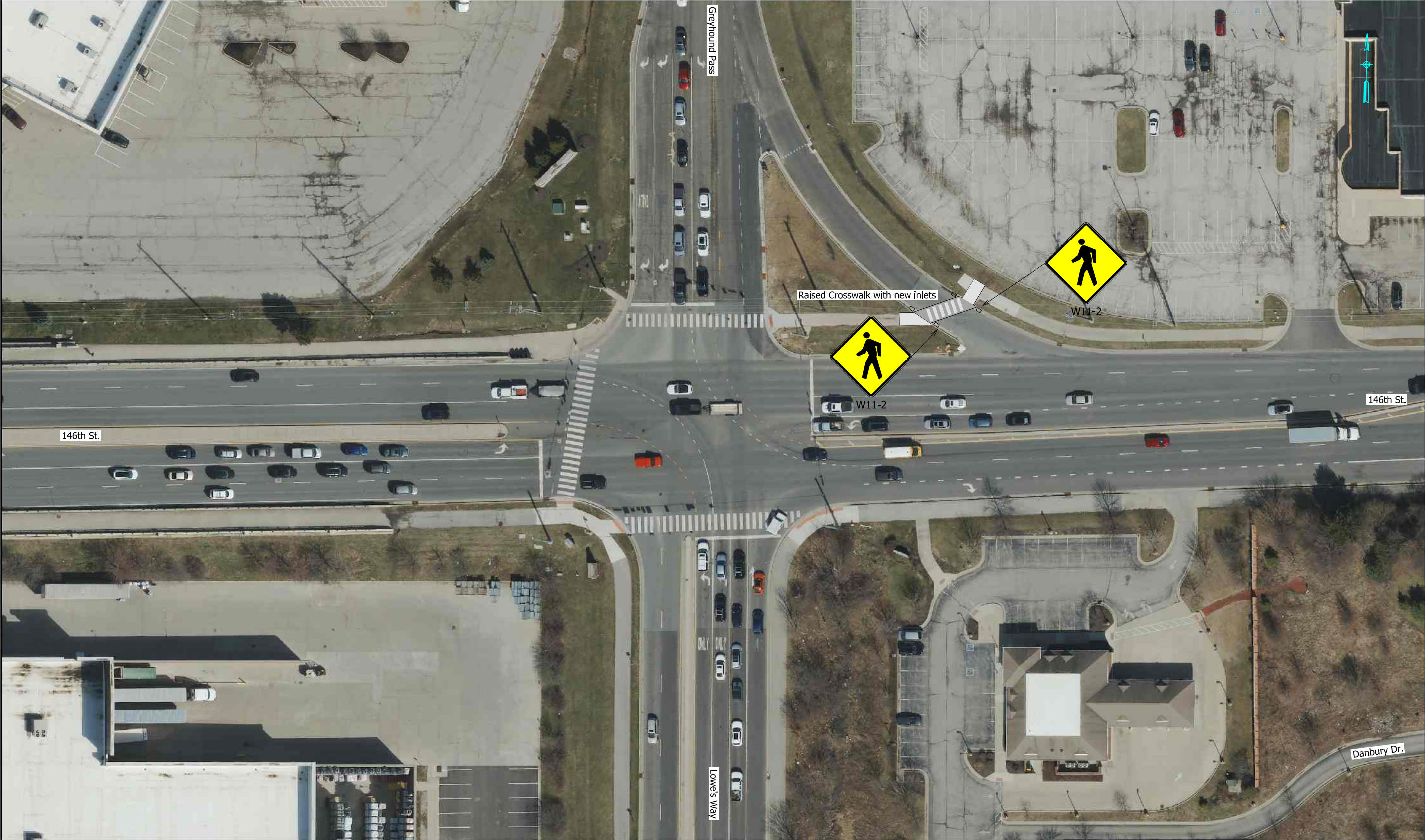
Des N/A

ESTIMATED TOTAL: \$114,770.00

Appendix D - 52

Prepared By: _____ Date: _____ Checked By: _____ Date: _____

Cost Estimate | Page 1 of 1



B&N burgessniple.com		RECOMMENDED FOR APPROVAL _____ DESIGN ENGINEER _____ DATE _____		INDIANAPOLIS METROPOLITAN PLANNING ORGANIZATION	HORIZONTAL SCALE	BRIDGE FILE
		1" = 30'			N/A	
		VERTICAL SCALE			DESIGN VEHICLE	
		N/A			WB-50	
DESIGNED: <u>MDR</u>		DRAWN: <u>EMW</u>		146TH AVENUE AT LOWE'S WAY/GREYHOUND PASS CONCEPT DRAWING	SURVEY BOOK	SHEETS
					of	
CHECKED: _____		CHECKED: _____			CONTRACT R-XXXXX	PROJECT XXXXXXXX

RoadHAT 4D	Economic Evaluation - Form F5	Page 1/2
Settings: Indiana local settings Version: Version 4.1		
Location	146th Street & Lowes Way	
Hamilton County		
GIS		
Post		
Analyst	Elaina Wahlman	
Date	6/18/2026	
INPUT		
Alternative	Long-term recommendation	
Number of Crashes (crash/period)		
Fatal and Incapacitating Injury Crashes	2	
Non-Incapacitating and Possible Injury Crashes	3	
Property Damage Only Crashes	54	
Route Type	City Arterial Intersection One AADT	
Average Crash Costs (\$)		
Fatal and Incapacitating Injury Crashes	1840100	
Non-Incapacitating and Possible Injury Crashes	393200	
Property Damage Only Crashes	40200	
Crash Cost Year (yyyy)	2017	
First Year with Crash Data (yyyy)	2022	
Last Year with Crash Data (yyyy)	2024	
Present Year (yyyy)	2026	
Implementation Year (yyyy)	2050	
Inflation Rate (%)	2	
Interest Rate (%)	4	
Annual Traffic Growth Rate (%)	2	
Total Traffic Growth Factor (%)	1.127	
Future Traffic Growth Period (years)	24	
Countermeasure 1		
Countermeasure Description	Add raised crosswalk.	
Crash Reduction Factors (%)		
Fatal and Incapacitating Injury Crashes	36	
Non-Incapacitating and Possible Injury Crashes	36	
Property Damage Only Crashes	0	

RoadHAT 4D

Economic Evaluation - Form F5

Page 2/2

Settings: Indiana local settings

Version: Version 4.1

Location

146th Street & Lowes Way

Hamilton County

GIS

Post

Analyst

Elaina Wahlman

Date

6/18/2026

Number of Target Crashes (crash/period)

Fatal and Incapacitating Injury Crashes

2

Non-Incapacitating and Possible Injury Crashes

3

Property Damage Only Crashes

54

Countermeasure Service Life (years)

25

Countermeasure Capital Cost (\$)

137870

Countermeasure Annual Maintenance Cost (\$)

0

Countermeasure Salvage Value (\$)

0

OUTPUT

Total Crashes Saved

0.000

FI Crashes Saved

0.000

NI Crashes Saved

0.000

PDO Crashes Saved

0.000

Equivalent Annual Benefit (\$)

0

Equivalent Annual Cost (\$)

3,443

Present Worth Benefit (\$)

0

Present Worth Cost (\$)

86,074

Net Annual Benefit (\$)

-3,443

Present Worth Net Benefit (\$)

-86,074

Benefit-Cost Ratio

1.00

Comments: Long term solution: Add raised crosswalks for pedestrians crossing the right turn lane from westbound 146th Street to Greyhound Pass.

ATTACHMENT E

Near Miss Analysis

Consistent EB right turn red light running before the WB left turning traffic crosses the intersection. Consistent EB through red light running. Consistent NB left turn red light running however, the vehicles are typically across the stop bar when the light turns red. Yellow clearance time needs to be extended. Consistent NB right turn red light running.

12 AM – No Instances

1 AM – No Instances

2 AM – No Instances

3 AM – No Instances

4 AM – No Instances

5 AM

05:48:39 Ran red light.



6 AM

06:02:10 Right turning vehicle stops abruptly for left turning vehicles.



06:29:28 Ran red light.



06:44:12 Ran red light.



7 AM

07:06:08 Ran red light.



07:11:38 Ran red light.



07:52:48 Ran red light.

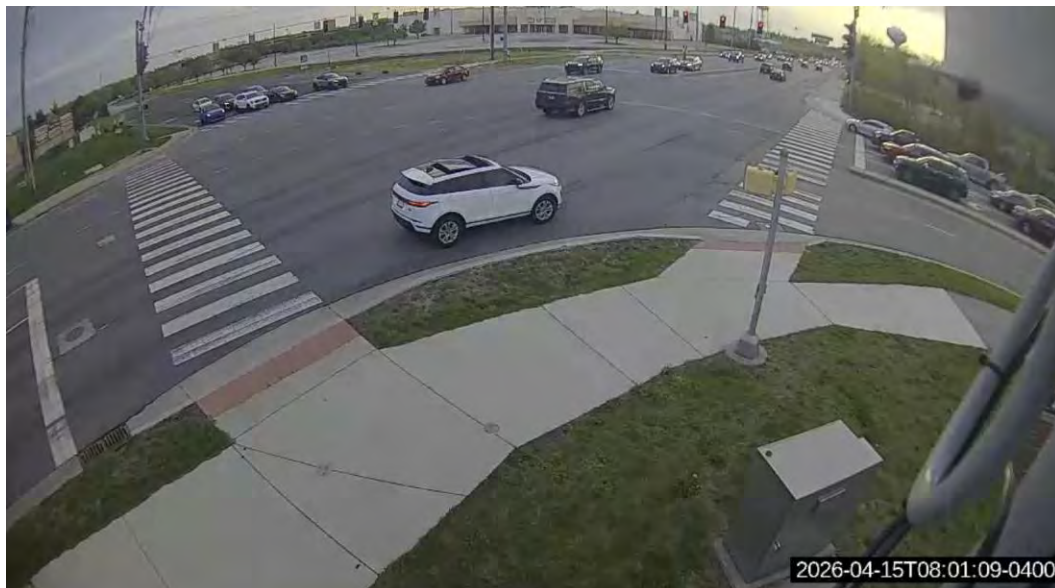


07:55:38 Ran red light.



8 AM

08:01:09 Ran red light.



08:04:48 Ran red light.



08:24:58 Ran red light.



08:26:47 Ran red light.



08:29:35 Ran red light.



08:35:05 Ran red light.



08:40:35 Ran red light.



08:46:58 Ran red light.



08:49:46 Ran red light.



08:55:15 Ran red light.



08:56:21 Ran red light.



9 AM

09:23:50 Ran red light.



09:24:41 Ran red light.



09:35:12 Ran red light.



09:51:58 Ran red light.



10 AM

10:05:50 Ran red light.



10:10:03 Ran red light.



10:26:50 Ran red light.



10:27:41 Ran red light.



10:59:11 Ran red light.



11 AM

11:04:38 Ran red light.



11:15:58 Ran red light.



11:24:22 Ran red light.



11:42:26 Ran red light.



12 PM

12:02:11 Ran red light.



12:13:56 Ran red light.



12:24:27 Ran red light.



12:33:41 Ran red light.



12:45:26 Ran red light.



1 PM

13:24:05 Ran red light.



13:56:50 Ran red light.



2 PM

14:07:21 Ran red light.



14:18:41 Ran red light.



14:30:26 Ran red light.



14:36:07 Pedestrian runs out of vehicles path.



3 PM

15:07:03 Left turning vehicles stopped in intersection.



15:26:36 Left turning vehicles stopped in intersection.



15:33:12 Left turning vehicles blocking intersection.



15:50:27 Left turning vehicles blocking intersection.



15:52:41 Left turning vehicles blocking intersection.



15:54:47 Left turning vehicles blocking intersection.



15:56:58 Left turning vehicles blocking intersection.



4 PM

16:05:29 Left turning vehicles blocking intersection.



16:07:41 Left turning vehicles blocking intersection.



16:09:22 Vehicles running red light.



16:09:50 Left turning vehicles blocking intersection.



16:12:01 Left turning vehicles blocking intersection.



16:15:54 Ran red light.



16:16:24 Left turning vehicles blocking intersection.



16:20:40 Left turning vehicles blocking intersection.



16:22:55 Left turning vehicles blocking intersection.



16:27:13 Left turning vehicles blocking intersection.



16:29:23 Left turning vehicles blocking intersection.



16:33:54 Left turning vehicles blocking intersection.



16:35:54 Left turning vehicles blocking intersection.



16:42:21 Left turning vehicles blocking intersection.



16:44:29 Left turning vehicles blocking intersection.



16:51:05 Left turning vehicles blocking intersection.



16:57:32 Left turning vehicles blocking intersection.



5 PM

NB left turning vehicles keep blocking the intersection and the WB through lanes are backing up as well.

6 PM

18:31:30 Vehicle on cross walk.



18:54:26 Pedestrian running to make it across.



7 PM

19:29:29 Ran red light.



19:29:50 Cyclist crosses in front of vehicle.



19:57:22 Vehicles not yielding to pedestrians.



8 PM – No Instances

9 PM – No Instances

10 PM – No Instances

11 PM – No Instances

ABBREVIATED ENGINEERING REVIEW FOR TRAFFIC SAFETY

				Date: 6/19/2026	
				Des. No.: N/A	
Reviewer Information:				Agency/Firm Name: Burgess & Niple	
Primary Author: Micah Reynolds, PE, RSP ₂₁				Agency: Indianapolis Metropolitan Planning Organization	
Phone Numbers: (260) 452-7171				Email Address: micah.reynolds@burgessniple.com	
Purpose of Review:					
Burgess & Niple was hired by the Indianapolis MPO (IMPO) to conduct a series of roadway safety audits at preselected intersections within its urbanized area. The goal was to identify existing safety issues and recommend near-term and long-term improvements to address them. Improvements may range from lower-cost maintenance items, such as signage and pavement markings, to higher-cost capital improvements, including intersection upgrades, multimodal infrastructure, and upgraded traffic signals, as needed. This form is suitable for Level 1 review. Of the three available levels of engineering review, this represents the least refined, lowest-intensity degree of analysis, development of essential project intent (outline of the certified course of action), scoring, and process documentation.					
Project Location:					
Route: Carey Road		District: Greenfield		City: Noblesville	
				County: Hamilton	
Lat & Long (BOP):	39.810757	-86.121594	Lat & Long (EOP):	39.810757	-86.121594
			Inside Urban Area Boundary: Yes		
IMPO: Indianapolis Metropolitan Planning Organization			Project Type: Roadway Safety Audit		
Location: The intersection of Carey Road & 146 th Street					
Existing Conditions:					
The Carey Road & 146th Street intersection is a signalized four-leg intersection. 146th Street is a two-lane roadway at the intersection, with left and right turn lanes in each direction. Carey Road is a 4-lane roadway at the intersection with left turn lanes in each direction. There are two southbound and two northbound through lanes along Carey Road. The posted speed limit on Carey Road and 146th Street at the intersection is 45 MPH. The neutral offset for the 146th Street left turns creates a safety concern for the left turning vehicles when attempting to complete their movement under the permitted phase since they cannot see around opposing left turn vehicles and pull in front of opposing through traffic. This is apparent with the left turn crashes in the crash data and crash diagram. There is significant pedestrian traffic that attempts to cross Carey Road at this location, due to the trail that runs along Carey Road in the northwest and southeast quadrants. Located in each quadrant of the intersection are: - NW Quadrant: Private Residence - SW Quadrant: Private Residence - SE Quadrant: Church - NE Quadrant: Commercial property Burgess & Niple held a field check with the representatives from the IMPO and City of Indianapolis DPW on April 27, 2026, to discuss some near-term and long-term solutions and build consensus around a series of countermeasures for Burgess & Niple to cost as part of the final recommendations. The field check meeting minutes are available in Attachment B. Prior to the field check, B&N set up Miovision cameras to record driver, pedestrian, and bicyclist behaviors. The surveillance video was studied for a 24-hour period. There were few pedestrians that used the intersection and all observed pedestrians obeyed traffic laws. One cyclist was nearly hit by a right-turning vehicle. Right-turning vehicles consistently stopped on the crosswalk and while this was not observed to impede pedestrians this would cause them to cross either in front of or behind the vehicle. Left-turning vehicles on 146th Street frequently pull into the middle of the intersection and turn in front of opposing traffic. The still photo observations are available in Attachment D.					

Traffic Operations:																					
Mobility/Congestion Performance: Traffic analysis was not completed at this location because the crash data indicated congestion as a major issue at this location. There is an existing study underway for the 146th Street corridor at the time of this study. The holistic corridor view with the adjacent interchange should be considered for operational improvements. Safety Performance / Crash Analysis: According to available crash data, there were 39 crashes associated with the study area from January 1, 2022, to December 31, 2024. Of those crashes, two resulted in incapacitating injuries, and four resulted in non-incapacitating injuries. See attached Crash Summary, crash diagram and RoadHAT 4.1 report in Attachment A. 2022-2024 Crash Data - analyzed as City Arterial Intersection One AADT $I_{CC} = 0.59$, $I_{CF} = 1.24$																					
Alternatives & Recommendations																					
<u>Near-Term</u> Protected only phasing. <u>Long-Term</u> Provide additional offset for left turn lanes. <u>Future Consideration</u> The current 146th Street corridor study (performed by others) should consider how to improve operations while providing safe mobility for all users of this intersection. Things such as pedestrian refuge, leading pedestrian intervals should be considered as the corridor is being analyzed.																					
Near-Term & Long-Term Cost Estimates for the Proposed Safety Improvements																					
Detailed cost estimates for the near- and long-term improvements are available in Attachment C. <u>Near-Term Recommendation</u> <table> <tr><td>Construction</td><td>\$</td></tr> <tr><td>Preliminary Engineering (15%)</td><td>\$</td></tr> <tr><td>Utility Allowance (5%)</td><td>\$</td></tr> <tr><td>Right of Way</td><td>\$</td></tr> <tr><td>Grand Total</td><td>\$</td></tr> </table> <u>Long-Term Recommendation</u> <table> <tr><td>Construction</td><td>\$216,000</td></tr> <tr><td>Preliminary Engineering (15%)</td><td>\$32,400</td></tr> <tr><td>Utility Allowance (5%)</td><td>\$10,800</td></tr> <tr><td>Right of Way</td><td>\$0</td></tr> <tr><td>Grand Total</td><td>\$259,200</td></tr> </table>		Construction	\$	Preliminary Engineering (15%)	\$	Utility Allowance (5%)	\$	Right of Way	\$	Grand Total	\$	Construction	\$216,000	Preliminary Engineering (15%)	\$32,400	Utility Allowance (5%)	\$10,800	Right of Way	\$0	Grand Total	\$259,200
Construction	\$																				
Preliminary Engineering (15%)	\$																				
Utility Allowance (5%)	\$																				
Right of Way	\$																				
Grand Total	\$																				
Construction	\$216,000																				
Preliminary Engineering (15%)	\$32,400																				
Utility Allowance (5%)	\$10,800																				
Right of Way	\$0																				
Grand Total	\$259,200																				
Project Score: (for INDOT use)																					
Safety Program Score =																					

Miscellaneous Notes:
Attachments:
Attachment A: Preliminary Findings Report Attachment B: Virtual Meeting Minutes & Field Check Minutes Attachment C: Cost Estimates & Schematics Attachment D: Near Miss Analysis

ATTACHMENT A

Preliminary Findings Report

PRELIMINARY FINDINGS

Safety Analysis at 146th Street & Carey Road

Report Prepared for: IMPO & Hamilton County

1. Safety Analysis

A crash data analysis was completed for the intersection of 146th Street & Carey Road (Study Area) in Indianapolis, IN. Before beginning the crash analysis, the project team followed these steps to clean the data:

- Received 2022-2024 crash data from the IMPO. Serious Injury and Fatal crashes had been cleaned by IMPO staff.
- Placed a 250' buffer around the Study Area to identify reported crashes near the intersection.
- Reviewed the police reports for each crash record identified within the 250' buffer.
- Identified and removed any crash records from the analysis that involved a collision with an animal in the roadway or occurred in a parking lot near the intersection or occurred at a different intersection entirely.
- Reviewed the description in the reports to confirm the selected Manner of Collision & Crash Severity accurately reflected how the police officer described the crash.
- Exported the results from ArcGIS Pro into MS Excel.
- Created a collision diagram of the Study Area as well as summary tables of the crash records.
- Developed a crash cost (I_{CC}) and crash frequency (I_{CF}) for the Study Area using RoadHat 4.1.

39 crashes were identified within the Study Area. Two (2) of those reported crashes resulted in incapacitating injuries. Most of the incapacitating injury crashes were reported as Rear End crashes. Other notable results near the Study Area include:

- 48.7% of crashes that occurred were rear end crashes, 23% were left turn crashes, and 18% were same direction sideswipe crashes.
- 67% of reported crashes occurred during Off-Peak travel times. 13% of reported crashes occurred during the morning peak hours (6am-9am), and 13% during the evening peak hours (4pm-7pm).
- 72% of reported crashes occurred in daylight hours and 21% in dark conditions. There appears to be a significant split in the crash data whether the crashes were lighted or not. The remaining 8% of crashes listed lighting conditions as "Dawn/Dusk" in the police report.
- 15% of reported crashes occurred in wet roadway surface conditions. 82% of reported crashes occurred in dry surface conditions. The remaining 3% of reported crashes occurred on icy or snowy roadway surface.
- 56% of reported crashes occurred when the weather conditions were clear. The remaining 44% of reported crashes occurred on cloudy (28%), rainy (13%), or snowy (3%) days.

Attached are the crash summary tables, a collision diagram, images of the intersection, and the results of the RoadHAT 4.1 analysis.

Crash Data Summary 146th Street & Carey Road

2022-2024 Crash Summary	
TOTAL CRASHES	39
TOTAL DEAD	0
TOTAL INJURED	6
PROPERTY DAMAGE ONLY	33
NON-INCAPACITATING	4
INCAPACITATING	2
FATAL	0

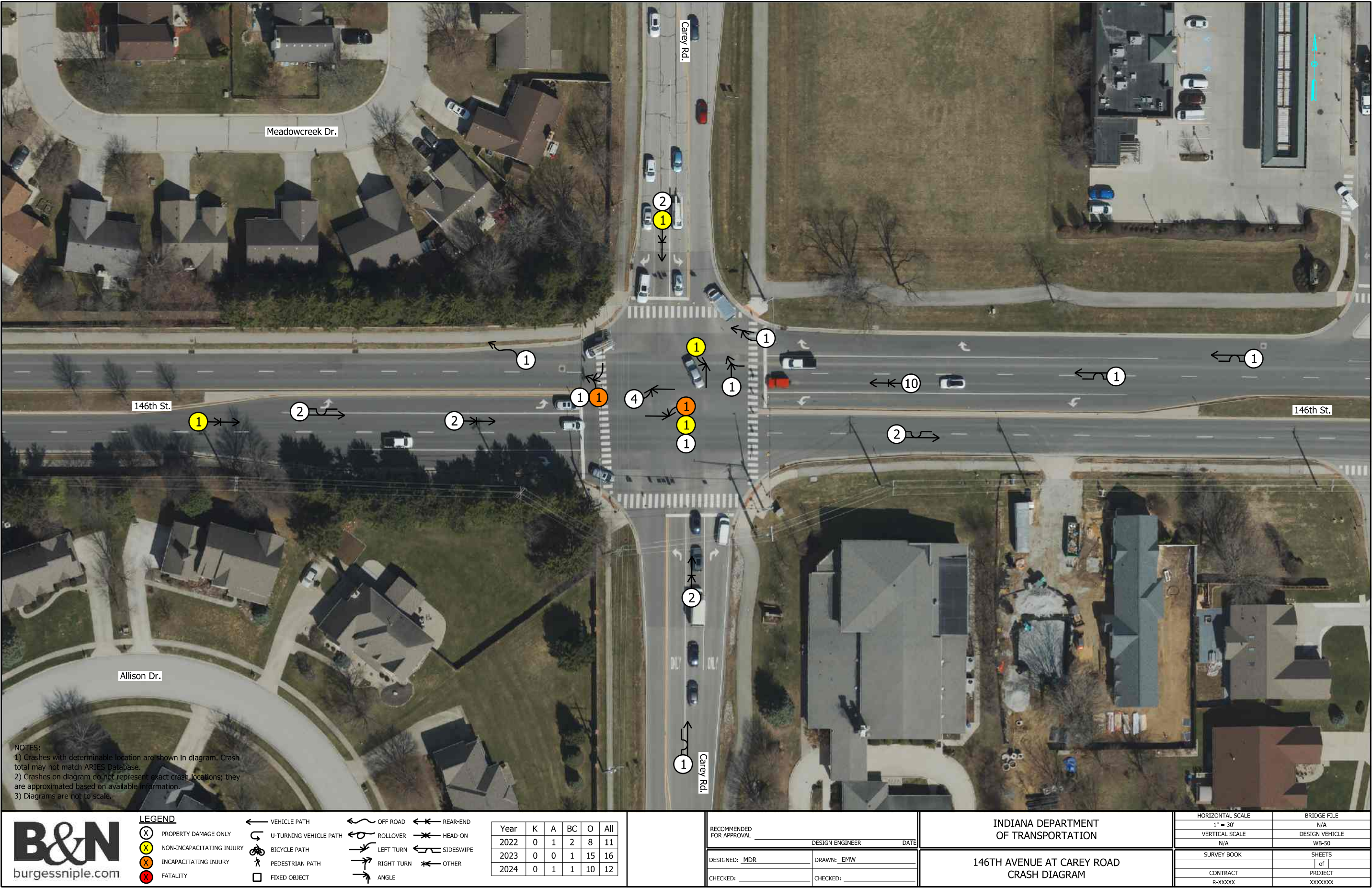
Summary of Primary Factors per Manner of Collision		
Primary Factors per Manner of Collision	Crashes	Percent
LEFT TURN	9	23.08%
FAILURE TO YIELD RIGHT OF WAY	8	
IMPROPER LANE USAGE	1	
RAN OFF ROAD	1	2.56%
UNSAFE LANE MOVEMENT	1	
REAR END	19	48.72%
FOLLOWING TOO CLOSELY	19	
RIGHT TURN	3	7.69%
DISREGARD SIGNAL/REG SIGN	2	
FAILURE TO YIELD RIGHT OF WAY	1	
SAME DIRECTION SIDESWIPE	7	17.95%
FAILURE TO YIELD RIGHT OF WAY	1	
FOLLOWING TOO CLOSELY	1	
IMPROPER LANE USAGE	1	
IMPROPER PASSING	2	
UNSAFE LANE MOVEMENT	2	
Total Crashes	39	100.00%

Summary of Crashes per Time of Day		
Time of Day	Crashes	Percent
Peak AM (6:00-9:00 AM)	5	13%
Peak PM (4:00-7:00 PM)	8	21%
Off Peak	26	67%
Total Crashes	39	100%

Summary of Crashes per Light Conditions		
Light Conditions	Crashes	Percent
DAYLIGHT	28	72%
DARK (LIGHTED)	7	18%
DAWN/DUSK	3	8%
DARK (NOT LIGHTED)	1	3%
Total Crashes	48	100%

Summary of Roadway Surface Conditions				
Manner of Collision	DRY	ICE	WET	Total Crashes
LEFT TURN	6		3	9
RAN OFF ROAD	1			1
REAR END	16	1	2	19
RIGHT TURN	2		1	3
SAME DIRECTION SIDESWIPE	7			7
Total Crashes	32	1	6	39

Summary of Weather Conditions					
Manner of Collision	CLEAR	CLOUDY	RAIN	SNOW	Total Crashes
LEFT TURN	4	2	3		9
RAN OFF ROAD	1				1
REAR END	13	4	1	1	19
RIGHT TURN	2		1		3
SAME DIRECTION SIDESWIPE	2	5			7
Total Crashes	22	11	5	1	39



Intersection Images	146 th Street at Carey Road	
	Study Period: 1/1/2022 to 12/31/2024	Location: Noblesville
	INDOT District: Greenfield	County: Hamilton City/Town: Carmel/Westfield



West Leg – Looking West



West Leg – Looking East



East Leg – Looking West



East Leg – Looking East



South Leg – Looking South



South Leg – Looking North



North Leg – Looking South



North Leg – Looking North

RoadHAT 4D	Index of Crash Frequency and Cost - Form F1		Page 1/2
Settings: Indiana local settings		Version: Version 4.1	
Location	146th Street at Carey Road		
GIS			
Post			
Analyst	Micah Reynolds, PE, RSP2I		
Date	5/7/2026		
INPUT			
Road Facility Type	City Arterial Intersection One AADT		
Busiest Road AADT (veh/day)	30461		
Crossing Road Principal Arterial Indicator (1 if present, 0 otherwise)	0		
Crossing Road Minor Arterial Indicator (1 if present, 0 otherwise)	0		
Crossing Road Major Collector Indicator (1 if present, 0 otherwise)	1		
Crossing Road Minor Collector Indicator (1 if present, 0 otherwise)	0		
First Year with Crash Data (yyyy)	2022		
Last Year with Crash Data (yyyy)	2024		
Number of Crashes (crash/period)			
Fatal and Incapacitating Injury Crashes	2		
Non-Incapacitating and Possible Injury Crashes	4		
Property Damage Only Crashes	33		
Route or Road Type	City Arterial Intersection One AADT		
Average Crash Costs (\$)			
Fatal and Incapacitating Injury Crashes	1840100		
Non-Incapacitating and Possible Injury Crashes	393200		
Property Damage Only Crashes	40200		
Crash Cost Year (yyyy)	2017		
OUTPUT			
Expected Crash Frequency (crash/year)			
Fatal and Incapacitating Injury Crashes	0.399		
Non-Incapacitating and Possible Injury Crashes	0.94		
Property Damage Only Crashes	4.33		
All Crashes	5.67		
Index of Crash Frequency	1.24		
Index of Crash Cost	0.59		

RoadHAT 4D	Index of Crash Frequency and Cost - Form F1		Page 2/2
Settings: Indiana local settings		Version: Version 4.1	
Location	146th Street at Carey Road		
GIS			
Post			
Analyst	Micah Reynolds, PE, RSP2I		
Date	5/7/2026		
Comments: AADT from INDOT TCDS 			

ATTACHMENT B

Virtual Meeting Minutes & Field Check Minutes

251 North Illinois Street | Capital Center Suite 920 | Indianapolis, IN 46204 | 317.237.2760

Project: IMPO Safety On-Call
Location: Carey Road at 146th Street
Hamilton County

Date: June 18, 2026

Attendees

Chris Burt	Hamilton County	Jennifer Dunn	Indy MPO
Bradley Davis	Hamilton County	Mark Rinehart	Corradino LLC
Dan DeYoung	Hamilton County	Dave Cleveland	Corradino LLC
Joel Thurman	Hamilton County	Jeremy VanVleet	Burgess & Niple

Kickoff Meeting Discussion

The purpose of this meeting was to review the selected intersection and gather local insights on existing conditions, safety concerns, planned developments, and previous studies.

The following intersections were confirmed for inclusion in the 2025-2026 Safety Study:

1. 146th Street & Carey Road

- No planned additional development
- Notable severe pedestrian crash reported in 2025 where left turning vehicle ended in northwest corner where pedestrians were residing
- Observations of frequent pedestrian activity on the south side of the intersection
- High pedestrian presence due to nearby residential area and Hagen-Burke trail connection to the west
- Traffic volumes may be an issue at this intersection

2. 146th Street & Lowes Way

- Nearby commercial development includes BJ's
- There are two trail systems nearby, the Hagen-Burke trail and Monon trail
- Recent intersection modifications were completed in late 2024 and include:
 - Added northbound through lane
 - Reconfiguration of right-turn/free-flow lane to yield condition
 - Widened crosswalks
- Crosswalk across free-flow right turn identified as a potential risk area
- Long crossings may require additional safety improvements such as refuge islands
- Significant congestion during weekends and evening rush hour especially eastbound traffic

The next steps include finalization and distribution of the preliminary findings reports, conducting field checks with a target of early to mid-May 2026, and continued coordination with stakeholders on observed issues and potential improvements.

251 North Illinois Street | Capital Center Suite 920 | Indianapolis, IN 46204 | 317.237.2760

Project: IMPO Safety On-Call
Location: Carey Road at 146th Street
Hamilton County

Date: June 9, 2026**Attendees**

Chris Burt	Hamilton County	Jeremy VanVleet	Burgess & Niple
Bradley Davis	Hamilton County		
Jennifer Dunn	Indy MPO		

Field Check Observations

The field check attendees met at the intersection of Carey Road on Friday, May 8th, 2026, at approximately 10:30AM. The existing intersection is a four-leg, signalized intersection.

It was noted that the single pedestrian-involved crash that occurred was a secondary factor in a multi-vehicle collision. It was noted that converting the intersection to protected only would assist with left turning vehicles. Alternatively, a small amount of offset can be attained for opposing left turn lanes. A potential consideration is no turning on red.

Jeremy then discussed with the group the existing safety performance at the intersection. The crash history indicated that there is a significant crash pattern of right angle and left turn crashes at the intersection. The RoadHAT analysis results showed an I_{CF} of 1.24 and an I_{CC} of 0.59 which indicate the intersection is performing worse than expected.

After reviewing the traffic and safety analysis and while watching traffic at the site, the group decided on options that should be analyzed further.

- In the short term, conversion to protected-only left turning should be considered. An alternate solution would be to cut back some of the center curb on the 146th Street approaches to provide additional offset for left turn lanes.

These alternatives will be analyzed, and results will be shared and discussed further.

ATTACHMENT C

Cost Estimates & Schematics

IMPO RSAs - Carey Road at 146th Street

Des N/A

ESTIMATED TOTAL: \$216,000.00

[illegible]



B&N burgessniple.com		RECOMMENDED FOR APPROVAL _____		INDIANAPOLIS METROPOLITAN PLANNING ORGANIZATION	HORIZONTAL SCALE	BRIDGE FILE
		DESIGN ENGINEER _____ DATE _____			1" = 30'	N/A
		DESIGNED: <u>MDR</u>		DRAWN: <u>EMW</u>	VERTICAL SCALE	DESIGN VEHICLE
		CHECKED: _____		CHECKED: _____	N/A	WB-50
				146TH AVENUE AT CAREY ROAD CONCEPT DRAWING	SURVEY BOOK	SHEETS
						of
					CONTRACT	PROJECT
					R-XXXXX	XXXXXXXX

RoadHAT 4D	Economic Evaluation - Form F5	Page 1/2
Settings: Indiana local settings Version: Version 4.1		
Location	146th Street & Carey Road	
Hamilton County		
GIS		
Post		
Analyst	Elaina Wahlman	
Date	6/18/2026	
INPUT		
Alternative	Long-term recommendation	
Number of Crashes (crash/period)		
Fatal and Incapacitating Injury Crashes	2	
Non-Incapacitating and Possible Injury Crashes	4	
Property Damage Only Crashes	33	
Route Type	City Arterial Intersection One AADT	
Average Crash Costs (\$)		
Fatal and Incapacitating Injury Crashes	1840100	
Non-Incapacitating and Possible Injury Crashes	393200	
Property Damage Only Crashes	40200	
Crash Cost Year (yyyy)	2017	
First Year with Crash Data (yyyy)	2022	
Last Year with Crash Data (yyyy)	2024	
Present Year (yyyy)	2026	
Implementation Year (yyyy)	2050	
Inflation Rate (%)	2	
Interest Rate (%)	4	
Annual Traffic Growth Rate (%)	2	
Total Traffic Growth Factor (%)	1.127	
Future Traffic Growth Period (years)	24	
Countermeasure 1		
Countermeasure Description	Provide additional offset for left turn lanes.	
Crash Reduction Factors (%)		
Fatal and Incapacitating Injury Crashes	35.6	
Non-Incapacitating and Possible Injury Crashes	35.6	
Property Damage Only Crashes	33.8	

RoadHAT 4D	Economic Evaluation - Form F5	Page 2/2
Settings: Indiana local settings Version: Version 4.1		
Location	146th Street & Carey Road	
Hamilton County		
GIS		
Post		
Analyst	Elaina Wahlman	
Date	6/18/2026	
Number of Target Crashes (crash/period)		
Fatal and Incapacitating Injury Crashes	2	
Non-Incapacitating and Possible Injury Crashes	4	
Property Damage Only Crashes	33	
Countermeasure Service Life (years)	25	
Countermeasure Capital Cost (\$)	259200	
Countermeasure Annual Maintenance Cost (\$)	0	
Countermeasure Salvage Value (\$)	0	
OUTPUT		
Total Crashes Saved	7.562	
FI Crashes Saved	0.405	
NI Crashes Saved	0.810	
PDO Crashes Saved	6.346	
Equivalent Annual Benefit (\$)	354,067	
Equivalent Annual Cost (\$)	6,473	
Present Worth Benefit (\$)	8,851,685	
Present Worth Cost (\$)	161,821	
Net Annual Benefit (\$)	347,595	
Present Worth Net Benefit (\$)	8,689,864	
Benefit-Cost Ratio	54.70	
Comments: Long term solution: Provide additional offset for left turn lanes.		

ATTACHMENT D

Near Miss Analysis

12 AM – No Instances

1 AM – No Instances

2 AM – No Instances

3 AM – No Instances

4 AM – No Instances

5 AM – No Instances

6 AM – No Instances

7 AM – No Instances

8 AM – No Instances

9 AM – No Instances

10 AM – No Instances

11 AM – No Instances

12 PM – No Instances

1 PM

13:19:36 Left turning vehicles cause right turning vehicles that have the right of way to stop.



2 PM – No Instances

3 PM

15:07:17 Left turning vehicle causes right turning vehicle that have the right of way to stop.



4 PM

16:22:04 Right turning vehicle abruptly stops for cyclist.



5 PM – No Instances

6 PM – No Instances

7 PM – No Instances

8 PM – No Instances

9 PM – No Instances

10 PM – No Instances

11 PM – No Instances

PREPARED FOR:



APPENDIX E:

Fishers RSA



CORRADINO LLC

ABBREVIATED ENGINEERING REVIEW FOR TRAFFIC SAFETY

		Date:	6/25/2026	
		Des. No.:	n/a	

Reviewer Information:	Agency/Firm Name: Corradino LLC			
Primary Author: James Mark Rinehart	Agency: Indianapolis Metropolitan Planning Organization			
Phone Numbers: (317) 488-2363	Email Address: jrinehart@corradino.com			

Purpose of Review:

Corradino LLC was hired by the Indianapolis MPO (IMPO) to conduct a series of roadway safety audits at preselected intersections within its urbanized area. The goal was to identify existing safety issues and recommend near-term and long-term improvements to address them. Improvements may range from lower-cost maintenance items, such as signage and pavement markings, to higher-cost capital improvements, including intersection upgrades, multimodal infrastructure, and upgraded traffic signals, as needed. This form is suitable for Level 1 review. Of the three available levels of engineering review, this represents the least refined, lowest-intensity degree of analysis, development of essential project intent (outline of the certified course of action), scoring, and process documentation.

Project Location:

Route: Southeastern Pkwy & Connecticut Ave	District: Greenfield	City: Fishers	County: Hamilton
--	----------------------	---------------	------------------

Lat & Long (BOP)	39.948595	-85.864858	Lat & Long (EOP):	39.948595	-85.864858	Inside Urban Area Boundary Yes or No (circle)
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IMPO: Indianapolis Metropolitan Planning Organization	Project Type: Roadway Safety Audit
---	------------------------------------

Location: The intersection of Southeastern Parkway & Connecticut Avenue

Existing Conditions:

The Southeastern Pkwy & Connecticut Ave intersection is a two-way stop-controlled intersection with two stop signs on each side of the EB and WB approaches to the intersection. All approaches have one travel lane for through, left turns, and right-turn traffic. The EB and WB approaches at the intersection have wide turn radii due to the skewed angle of the intersection. Trees and vegetation partially obstruct the EB approach's stop-ahead sign, and the crest vertical curve of the road partially obstructs the view of oncoming NB/SB traffic.

There is a shared-use path located in the NW quadrant of the intersection that connects to the neighborhood entrance ~1000' west of the intersection.

Located in each quadrant of the intersection are:

- NW Quadrant: Open space for residential subdivision.
- SW Quadrant: Group of trees with McIntosh Stables nearby.
- SE Quadrant: Forest.
- NE Quadrant: Open field belonging to a residential home.

Corradino staff held a virtual meeting with IMPO staff, Fishers staff, and the Fishers PD on April 17, 2026, to review the Preliminary Findings Report, discuss any past or upcoming projects at or near the intersection, and identify potential near-term and long-term solutions for Corradino to test before the field check. Meeting minutes from the virtual meeting are available in **Attachment D**.

Corradino held a field check with the representatives from the IMPO, the City of Fishers, and the Fishers PD on May 7, 2026, to provide a recap of the discussion held during the virtual meeting, share test results for the near-term and long-term solutions, and build consensus around a series of countermeasures for Corradino to cost as part of the final recommendations. The field check meeting minutes are available in **Attachment D**.

Traffic Operations:

- a) **Mobility/Congestion Performance:** Fishers staff provided peak-hour traffic count data collected in 2021; Corradino adjusted the traffic counts seasonally using INDOT's most recent 2025 Traffic Adjustment Factors to account for seasonal and day-of-week variations to normalize the data. A **1.2%** forecasted annual growth rate, derived from the IMPO's TDM, was used to develop a future no-build traffic scenario at the intersection. The design year for the long-term build alternatives was **2050**. Results from the traffic analysis are available in **Attachment C**.

	Eastbound		Westbound		Northbound		Southbound	
Alternative	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay
AM Peak – 2026	C	20.0	B	12.7	A	7.8	A	7.8
PM Peak - 2026	C	24.6	C	16.0	A	8.4	A	7.8
AM Peak - 2050	E	45.2	B	14.7	A	8.0	A	8.0
PM Peak - 2050	F	65.6	C	21.4	A	8.8	A	8.0

- b) **Safety Performance / Crash Analysis:** According to available crash data from January 1, 2022, to December 31, 2024, there were **17** crashes associated with the study area. Of those crashes, **0** resulted in fatality, **1** resulted in incapacitating injuries, and **3** resulted in non-incapacitating injuries. See attached Crash Summary and output from RoadHAT 4.1 in **Attachment A**.
- It is important to note that 13 of the 17 crashes reported at the intersection (76%) were Right Angle crashes. Additionally, all injury-related crashes were either Right Angle (3) or Left Turn (1) crashes at the intersection. A collision diagram of the crashes is available in **Attachment A**.
- RoadHAT 4.1 was used to develop crash cost (ICC) and crash frequency (ICF) scores for the Campus Parkway & Brooks School Road Intersection. Results from the RoadHAT 4.1 analysis were as follows: $ICC = 1.41$, $ICF = 3.28$. The RoadHAT 4.1 analysis results are available in **Attachment A**.

Alternatives & Recommendations

During the field check, Corradino shared that they completed an All-Way Stop (AWS) warrant analysis for the intersection. The results indicated that the Southeastern Parkway & Connecticut Avenue intersection does meet the warrant criteria, per FHWA's MUTCD, 11th Edition, Section 2B. Fishers staff agreed that an AWS would make sense at the intersection. Fishers staff also noted that they had begun working on a concept for a roundabout at this intersection. These concepts became the recommended near-and long-term improvements for the Southeastern Parkway & Connecticut Avenue intersection. Field Check notes for this project are available for review in **Attachment D**.

Near-Term

The list of near-term solutions discussed during the field check includes:

- Convert the intersection to an AWS-controlled intersection, which would include:
 - o Add four new large stop signs, two placed on each side of the NB and SB approaches. These signs will include two signposts each.
 - o Remove the existing signs notifying NB and SB traffic that they are approaching the intersection and replace them with two new "stop ahead" signs that include solar-powered flashing beacons.
 - o Restripe the intersection to be an AWS-controlled intersection.
 - o Add retroreflective tape to all new signposts and existing signposts located on the EB and WB approaches.
 - o Trim trees back on the EB approach to prevent them from covering the existing signage.

Long-Term

- Convert the intersection to a single-lane roundabout.

Future Consideration

- N/A

Near-Term & Long-Term Cost Estimates for the Proposed Safety Improvements	
Cost estimates for the near- and long-term improvements are available in Attachment E. <u>Near-Term Recommendation</u> PE - \$10,000 ROW - \$0 Utility CN - \$1,000 Railroad CN - \$0 Construction Inspection/Testing (10% Rounded up to nearest \$1k) - \$0 CN - (including 10% Contingency) - \$44,000 Near-Term Total - \$55,000 <u>Long-Term Recommendation</u> The City of Fishers conducted a long-term cost estimate for the potential single-lane roundabout. Projected Cost 2025 Dollars - \$2,147,301 Projected Cost 2029 Dollars (4% Annual Inflation) - \$2,512,038	
Project Score: (for INDOT use)	
Safety Program Score =	
Miscellaneous Notes:	
Attachments:	
Attachment A: Preliminary Findings Report Attachment B: Traffic Counts Attachment C: Traffic Analysis Attachment D: Virtual Meeting Minutes & Field Check Minutes Attachment E: Cost Estimates & Schematics	

Attachment A

Preliminary Findings

PRELIMINARY FINDINGS

Safety Analysis at Southeastern Parkway & Connecticut Ave.

Report Prepared for: IMPO & City of Fishers

1. **Safety Analysis**

A crash data analysis was completed for the intersection of Southeastern Parkway & Connecticut Avenue (Study Area) in Fishers, IN. Before beginning the crash analysis, the project team followed these steps to clean the data:

- Received 2022-2024 crash data from the IMPO. Serious Injury and Fatal crashes had been cleaned by IMPO staff.
- Placed a 250' buffer around the Study Area to identify reported crashes near the intersection.
- Reviewed the police reports for each crash record identified within the 250' buffer.
- Identified and removed any crash records from the analysis that involved a collision with an animal in the roadway or occurred in a parking lot near the intersection.
- Reviewed the description in the reports to confirm the selected Manner of Collision & Crash Severity accurately reflected how the police officer described the crash.
- Exported the results from ArcGIS Pro into MS Excel.
- Created a collision diagram of the Study Area as well as summary tables of the crash records.
- Developed a crash cost (Icc) and crash frequency (Icf) for the Study Area using RoadHat 4.1.

17 crashes were identified within the Study Area. One of the reported crashes resulted in Incapacitating injuries, and three in Non-incapacitating Injuries. There were no reported fatal crashes within the Study Area. The four reported injury-related crashes were either Left-Turn or Right Angle crashes. Other notable results near the Study Area include:

- 76% of the reported crashes within the Study Area were Right Angle crashes.
- 12% of reported crashes within the Study Area were either Right Turn or Left Turn crashes.
 - The police report narratives for all of the Right Angle, Left Turn, and Right Turn reported crashes referenced difficulty in seeing oncoming vehicles within the Study Area.
- 12% of reported crashes within the Study Area were either Rear End or Ran off Road crashes. These reported crashes all occurred on Southeastern Parkway and were referenced in the police report narratives, which noted excessive speeding.
- 82% of reported crashes occurred during Off-Peak travel times. The remaining 18% of reported crashes occurred during the evening peak hours (4 pm-7 pm).
- 82% of reported crashes occurred in daylight hours and 12% in dark (not lighted) conditions. The remaining 6% of crashes listed lighting conditions as "Dawn/Dusk" in the police reports.
- 12% of reported crashes occurred in wet roadway surface conditions. The remaining 78% of reported crashes occurred on dry roadways.
- 76% of reported crashes occurred when the weather conditions were clear. The remaining 24% of reported crashes occurred in either Cloudy or Rainy weather conditions.

Attached are the crash summary tables, a collision diagram, images of the intersection, and the results of the RoadHAT 4.1 analysis.

2022-2024 Crash Summary	
TOTAL CRASHES	17
TOTAL INJURIES	4
PROPERTY DAMAGE ONLY	11
REFUSED TREATMENT	2
NON-INCAPACITATING	3
INCAPACITATING	1
FATAL	0

Summary of Primary Factors per Manner of Collision		
Primary Factors per Manner of Collision	Crashes	Percent
RIGHT ANGLE	13	76%
FAILURE TO YIELD RIGHT OF WAY	11	
DISREGARD SIGNAL/REG SIGN	1	
UNSAFE LANE MOVEMENT	1	
LEFT TURN	1	6%
DISREGARD SIGNAL/REG SIGN	1	
RAN OFF ROAD	1	6%
OVERCORRECTING/OVERSTEERING	1	
RIGHT TURN	1	6%
FAILURE TO YIELD RIGHT OF WAY	1	
REAR END	1	6%
FOLLOWING TOO CLOSELY	1	
Total Crashes	17	100%

Summary of Crashes per Time of Day		
Time of Day	Crashes	Percent
Peak AM (6:00-9:00 AM)	0	0%
Peak PM (4:00-7:00 PM)	3	18%
Off Peak	14	82%
Total Crashes	17	100%

Summary of Crashes per Light Conditions		
Light Conditions	Crashes	Percent
DAWN/DUSK	1	6%
DARK (NOT LIGHTED)	2	12%
DAYLIGHT	14	82%
Total Crashes	17	100%

Summary of Roadway Surface Conditions			
Manner of Collision	DRY	WET	Total Crashes
RIGHT ANGLE	12	1	13
LEFT TURN		1	1
RIGHT TURN	1		1
RAN OFF ROAD	1		1
REAR END	1		1
Total Crashes	15	2	17

Summary of Weather Conditions				
Manner of Collision	CLEAR	RAIN	CLOUDY	Total Crashes
RIGHT ANGLE	10	1	2	13
LEFT TURN		1		1
RIGHT TURN	1			1
RAN OFF ROAD	1			1
REAR END	1			1
Total Crashes	13	2	2	17

DIAGRAM OF
COLLISION
REPORTS

Southeastern Parkway & Connecticut Avenue

Study Period: 1/1/2022 to 12/31/2024

Location: Fishers

INDOT District: Greenfield County: Hamilton

City/Town: Fishers

Analyst: JMR

QC: DC

Date: 3/18/2026



YEAR	REPORTS
2022	6
2023	6
2024	5
Total	17

NOTES

1) Crashes with determinable location are shown in diagram. Crash total may not match ARIES database.

2) Crashes on diagram do not represent exact crash locations; they are approximated based on available information.

3) Diagram not to scale.

- Object Symbols**
- MOVING VEHICLE
 - TURNING VEHICLE
 - BACKING VEHICLE
 - OUT OF CONTROL
 - PARKED VEHICLE
 - PEDESTRIAN
 - BICYCLE
 - ANIMAL
 - DEBRIS IN ROADWAY
 - DRIVEWAY CRASH

- FATAL CRASH
- INJURY CRASH – INCAPACITATING
- INJURY CRASH – NONINCAPACITATING
- PDO CRASHES (IF > 1)

- SIGNALIZED INTERSECTION
- FIXED OBJECT (See table for # codes)

- Collision Symbols**
- REAR END
 - HEAD ON
 - OTHER
 - SIDESWIPE – SAME
 - SIDESWIPE – OPPOSITE
 - RIGHT ANGLE
 - LEFT/RIGHT TURN
 - RAN OFF ROAD

- Fixed Object Codes**
- 01 – BRIDGE or OVERPASS
 - 02 – BUILDING
 - 03 – CULVERT or DITCH
 - 04 – CURB
 - 05 – GUARDRAIL or BARRIER
 - 06 – EMBANKMENT
 - 07 – FENCE
 - 08 – TRAFFIC POLE
 - 09 – UTILITY POLE
 - 10 – SIGN
 - 11 – TREE / SHRUB
 - 12 – CONSTRUCTION BARRIER
 - 13 – CRASH ATTENUATOR
 - 88 – OTHER
 - 99 - UNKNOWN

Intersection Images	Southeastern Parkway & Connecticut Avenue		
	Study Period: <u>1/1/2022 to 12/31/2024</u>	Location: <u>Fishers</u>	
	INDOT District: <u>Greenfield</u>	County: <u>Hamilton</u>	City/Town: <u>Fishers</u>



West Leg – Looking West



West Leg – Looking East



East Leg – Looking West



East Leg – Looking East



South Leg – Looking South



South Leg – Looking North



North Leg – Looking South



North Leg – Looking North

RoadHAT 4D	Index of Crash Frequency and Cost - Form F1		Page 1/2
Settings: Indiana local settings		Version: Version 4.1	
Location	Southeastern Parkway & Connecticut Avenue		
GIS			
Post			
Analyst	JMR		
Date	3/19/2026		
INPUT			
Road Facility Type	City Arterial Intersection		
Busiest Road AADT (veh/day)	4487		
Crossing Road AADT (veh/day)	1073		
First Year with Crash Data (yyyy)	2022		
Last Year with Crash Data (yyyy)	2024		
Number of Crashes (crash/period)			
Fatal and Incapacitating Injury Crashes	1		
Non-Incapacitating and Possible Injury Crashes	3		
Property Damage Only Crashes	13		
Route or Road Type	City Arterial Intersection		
Average Crash Costs (\$)			
Fatal and Incapacitating Injury Crashes	1840100		
Non-Incapacitating and Possible Injury Crashes	393200		
Property Damage Only Crashes	40200		
Crash Cost Year (yyyy)	2017		
OUTPUT			
Expected Crash Frequency (crash/year)			
Fatal and Incapacitating Injury Crashes	0.060		
Non-Incapacitating and Possible Injury Crashes	0.08		
Property Damage Only Crashes	0.54		
All Crashes	0.68		
Index of Crash Frequency	3.28		
Index of Crash Cost	1.41		

RoadHAT 4D	Index of Crash Frequency and Cost - Form F1		Page 2/2
Settings: Indiana local settings		Version: Version 4.1	
Location	Southeastern Parkway & Connecticut Avenue		
GIS			
Post			
Analyst	JMR		
Date	3/19/2026		
Comments: Traffic Data: INDOT TCDS Crash Data: ARIES provided by the IMPO.			

Attachment B Traffic Counts

Intersection												
Int Delay, s/veh	6.2											
Movement	NBL	NBT	NBR	SBL	SBT	SBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	8	237	0	2	156	72	158	27	16	0	20	7
Future Vol, veh/h	8	237	0	2	156	72	158	27	16	0	20	7
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	6	6	6	6	6	6	6	6	6	6	6	6
Mvmt Flow	9	258	0	2	170	78	172	29	17	0	22	8
Major/Minor	Major1		Major2			Minor2			Minor1			
Conflicting Flow All	248	0	0	258	0	0	499	488	209	464	527	258
Stage 1	-	-	-	-	-	-	213	213	-	275	275	-
Stage 2	-	-	-	-	-	-	286	275	-	189	252	-
Critical Hdwy	4.16	-	-	4.16	-	-	7.16	6.56	6.26	7.16	6.56	6.26
Critical Hdwy Stg 1	-	-	-	-	-	-	6.16	5.56	-	6.16	5.56	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.16	5.56	-	6.16	5.56	-
Follow-up Hdwy	2.254	-	-	2.254	-	-	3.554	4.054	3.354	3.554	4.054	3.354
Pot Cap-1 Maneuver	1295	-	-	1284	-	-	476	474	822	502	451	771
Stage 1	-	-	-	-	-	-	780	719	-	723	675	-
Stage 2	-	-	-	-	-	-	713	675	-	804	691	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1295	-	-	1284	-	-	444	470	822	456	446	771
Mov Cap-2 Maneuver	-	-	-	-	-	-	444	470	-	456	446	-
Stage 1	-	-	-	-	-	-	779	717	-	717	670	-
Stage 2	-	-	-	-	-	-	678	670	-	753	690	-
Approach	NB		SB			NE			SW			
HCM Ctrl Dly, s/v	0.25		0.07			19.46			12.63			
HCM LOS						C			B			
Minor Lane/Major Mvmt	NELn1	NBL	NBT	NBR	SBL	SBT	SBRSWLn1					
Capacity (veh/h)	464	59	-	-	15	-	-	-	501			
HCM Lane V/C Ratio	0.471	0.007	-	-	0.002	-	-	0.059				
HCM Ctrl Dly (s/v)	19.5	7.8	0	-	7.8	0	-	12.6				
HCM Lane LOS	C	A	A	-	A	A	-	B				
HCM 95th %tile Q(veh)	2.5	0	-	-	0	-	-	0.2				

Intersection												
Int Delay, s/veh	4											
Movement	NBL	NBT	NBR	SBL	SBT	SBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	17	250	0	11	330	105	79	15	13	1	26	12
Future Vol, veh/h	17	250	0	11	330	105	79	15	13	1	26	12
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	18	272	0	12	359	114	86	16	14	1	28	13
Major/Minor	Major1		Major2		Minor2		Minor1					
Conflicting Flow All	473	0	0	272	0	0	763	748	416	699	805	272
Stage 1	-	-	-	-	-	-	440	440	-	309	309	-
Stage 2	-	-	-	-	-	-	323	309	-	391	497	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1089	-	-	1292	-	-	321	341	637	354	316	767
Stage 1	-	-	-	-	-	-	596	578	-	701	660	-
Stage 2	-	-	-	-	-	-	689	660	-	634	545	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	1089	-	-	1292	-	-	278	330	637	319	306	767
Mov Cap-2 Maneuver	-	-	-	-	-	-	278	330	-	319	306	-
Stage 1	-	-	-	-	-	-	589	570	-	687	647	-
Stage 2	-	-	-	-	-	-	635	647	-	594	538	-
Approach	NB		SB		NE		SW					
HCM Ctrl Dly, s/v	0.53		0.19		23.82		15.8					
HCM LOS					C		C					
Minor Lane/Major Mvmt	NELn1	NBL	NBT	NBR	SBL	SBT	SBRSWLn1					
Capacity (veh/h)	306	115	-	-	42	-	375					
HCM Lane V/C Ratio	0.38	0.017	-	-	0.009	-	0.113					
HCM Ctrl Dly (s/v)	23.8	8.4	0	-	7.8	0	15.8					
HCM Lane LOS	C	A	A	-	A	A	C					
HCM 95th %tile Q(veh)	1.7	0.1	-	-	0	-	0.4					

Intersection				
Intersection Delay, s/veh	5.2			
Intersection LOS	A			
Approach	NB	SB	NE	SW
Entry Lanes	1	1	1	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	267	250	218	30
Demand Flow Rate, veh/h	283	265	231	31
Vehicles Circulating, veh/h	215	33	182	465
Vehicles Exiting, veh/h	198	463	116	33
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	5.9	4.6	5.2	4.7
Approach LOS	A	A	A	A
Lane	Left	Left	Left	Left
Designated Moves	LTR	LTR	LTR	LTR
Assumed Moves	LTR	LTR	LTR	LTR
RT Channelized				
Lane Util	1.000	1.000	1.000	1.000
Follow-Up Headway, s	2.609	2.609	2.609	2.609
Critical Headway, s	4.976	4.976	4.976	4.976
A (Intercept)	1380	1380	1380	1380
B (Slope)	1.02e-3	1.02e-3	1.02e-3	1.02e-3
Entry Flow, veh/h	283	265	231	31
Cap Entry Lane, veh/h	1108	1334	1146	859
Entry HV Adj Factor	0.942	0.943	0.945	0.958
Flow Entry, veh/h	267	250	218	30
Cap Entry, veh/h	1044	1258	1083	823
V/C Ratio	0.255	0.199	0.202	0.036
Control Delay, s/veh	5.9	4.6	5.2	4.7
LOS	A	A	A	A
95th %tile Queue, veh	1	1	1	0

Intersection				
Intersection Delay, s/veh	5.7			
Intersection LOS	A			
Approach	NB	SB	NE	SW
Entry Lanes	1	1	1	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	290	485	116	42
Demand Flow Rate, veh/h	295	494	118	43
Vehicles Circulating, veh/h	116	48	379	383
Vehicles Exiting, veh/h	381	378	163	28
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	5.1	6.3	5.1	4.3
Approach LOS	A	A	A	A
Lane	Left	Left	Left	Left
Designated Moves	LTR	LTR	LTR	LTR
Assumed Moves	LTR	LTR	LTR	LTR
RT Channelized				
Lane Util	1.000	1.000	1.000	1.000
Follow-Up Headway, s	2.609	2.609	2.609	2.609
Critical Headway, s	4.976	4.976	4.976	4.976
A (Intercept)	1380	1380	1380	1380
B (Slope)	1.02e-3	1.02e-3	1.02e-3	1.02e-3
Entry Flow, veh/h	295	494	118	43
Cap Entry Lane, veh/h	1226	1314	937	934
Entry HV Adj Factor	0.982	0.981	0.980	0.987
Flow Entry, veh/h	290	485	116	42
Cap Entry, veh/h	1203	1290	919	921
V/C Ratio	0.241	0.376	0.126	0.046
Control Delay, s/veh	5.1	6.3	5.1	4.3
LOS	A	A	A	A
95th %tile Queue, veh	1	2	0	0

Attachment C Traffic Analysis

			Existing 2026									
Intersection	Type	MOE	2026 AM Peak Hour					2026 PM Peak Hour				
			EB	WB	NB	SB	INT	EB	WB	NB	SB	INT
Connecticut Ave & Southeastern Pkwy / IN 238	TWSC	LOS	C	B	A	A	N/A	C	C	A	A	N/A
		Delay (sec/veh)	20.0	12.7	7.8	7.8	6.3	24.6	16.0	8.4	7.8	4.0
		Queue Length 95th (ft)	52	4	0	0		36	8	2	0	
		v/c Ratio	0.48	0.06	0.01	0.00		0.39	0.12	0.02	0.01	
		LOS-F Movements	---	---	---	---		---	---	---	---	

			No-Build 2050									
Intersection	Type	MOE	2050 AM Peak Hour					2050 PM Peak Hour				
			EB	WB	NB	SB	INT	EB	WB	NB	SB	INT
Connecticut Ave & Southeastern Pkwy / IN 238	TWSC	LOS	E	B	A	A	N/A	F	C	A	A	N/A
		Delay (sec/veh)	45.2	14.7	8.0	8.0	13.6	65.6	21.4	8.8	8.0	9.3
		Queue Length 95th (ft)	136	6	0	0		104	14	2	0	
		v/c Ratio	0.80	0.09	0.01	0.00		0.77	0.20	0.03	0.01	
		LOS-F Movements	---	---	---	---		EBL	---	---	---	

			Build 2050									
Intersection	Type	MOE	2050 AM Peak Hour					2050 PM Peak Hour				
			EB	WB	NB	SB	INT	EB	WB	NB	SB	INT
Connecticut Ave & Southeastern Pkwy / IN 238	AWS	LOS	B	A	B	B	B	B	B	C	E	D
		Delay (sec/veh)	14.4	9.9	14.8	13.6	14.1	12.3	10.6	16.1	35.4	25.4
		Queue Length 95th (ft)	52	4	64	54		22	6	76	226	
		v/c Ratio	0.48	0.07	0.54	0.49		0.28	0.10	0.58	0.89	
		LOS-F Movements	---	---	---	---		---	---	---	---	

Intersection												
Int Delay, s/veh	6.3											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	161	27	16	0	20	7	8	241	0	2	159	73
Future Vol, veh/h	161	27	16	0	20	7	8	241	0	2	159	73
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	6	6	6	6	6	6	6	6	6	6	6	6
Mvmt Flow	175	29	17	0	22	8	9	262	0	2	173	79
Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	507	496	212	471	536	262	252	0	0	262	0	0
Stage 1	217	217	-	279	279	-	-	-	-	-	-	-
Stage 2	290	279	-	192	257	-	-	-	-	-	-	-
Critical Hdwy	7.16	6.56	6.26	7.16	6.56	6.26	4.16	-	-	4.16	-	-
Critical Hdwy Stg 1	6.16	5.56	-	6.16	5.56	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.16	5.56	-	6.16	5.56	-	-	-	-	-	-	-
Follow-up Hdwy	3.554	4.054	3.354	3.554	4.054	3.354	2.254	-	-	2.254	-	-
Pot Cap-1 Maneuver	470	469	818	496	445	767	1290	-	-	1279	-	-
Stage 1	776	716	-	719	672	-	-	-	-	-	-	-
Stage 2	709	672	-	801	688	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	438	465	818	451	441	767	1290	-	-	1279	-	-
Mov Cap-2 Maneuver	438	465	-	451	441	-	-	-	-	-	-	-
Stage 1	775	715	-	713	667	-	-	-	-	-	-	-
Stage 2	674	667	-	750	687	-	-	-	-	-	-	-
Approach	EB		WB		NB		SB					
HCM Ctrl Dly, s/v	20.01		12.72		0.25		0.07					
HCM LOS	C		B									
Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR				
Capacity (veh/h)	58	-	-	458	496	14	-	-				
HCM Lane V/C Ratio	0.007	-	-	0.484	0.059	0.002	-	-				
HCM Ctrl Dly (s/v)	7.8	0	-	20	12.7	7.8	0	-				
HCM Lane LOS	A	A	-	C	B	A	A	-				
HCM 95th %tile Q(veh)	0	-	-	2.6	0.2	0	-	-				

Intersection

Int Delay, s/veh 4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	80	15	13	1	26	12	17	254	0	11	336	107
Future Vol, veh/h	80	15	13	1	26	12	17	254	0	11	336	107
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	87	16	14	1	28	13	18	276	0	12	365	116

Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	774	760	423	710	818	276	482	0	0	276	0	0
Stage 1	447	447	-	313	313	-	-	-	-	-	-	-
Stage 2	327	313	-	397	505	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	315	335	631	348	310	763	1081	-	-	1287	-	-
Stage 1	591	573	-	698	657	-	-	-	-	-	-	-
Stage 2	686	657	-	628	540	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	272	324	631	313	300	763	1081	-	-	1287	-	-
Mov Cap-2 Maneuver	272	324	-	313	300	-	-	-	-	-	-	-
Stage 1	583	566	-	684	644	-	-	-	-	-	-	-
Stage 2	631	644	-	589	533	-	-	-	-	-	-	-

Approach	EB		WB		NB		SB	
HCM Ctrl Dly, s/v	24.55		16		0.53		0.19	
HCM LOS	C		C					

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1WBLn1	SBL	SBT	SBR
Capacity (veh/h)	113	-	-	300	370	42	-
HCM Lane V/C Ratio	0.017	-	-	0.392	0.115	0.009	-
HCM Ctrl Dly (s/v)	8.4	0	-	24.6	16	7.8	0
HCM Lane LOS	A	A	-	C	C	A	A
HCM 95th %tile Q(veh)	0.1	-	-	1.8	0.4	0	-

Intersection												
Int Delay, s/veh	13.6											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	207	35	21	0	26	9	10	310	0	3	205	94
Future Vol, veh/h	207	35	21	0	26	9	10	310	0	3	205	94
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	6	6	6	6	6	6	6	6	6	6	6	6
Mvmt Flow	225	38	23	0	28	10	11	337	0	3	223	102
Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	653	639	274	607	690	337	325	0	0	337	0	0
Stage 1	280	280	-	359	359	-	-	-	-	-	-	-
Stage 2	373	359	-	248	332	-	-	-	-	-	-	-
Critical Hdwy	7.16	6.56	6.26	7.16	6.56	6.26	4.16	-	-	4.16	-	-
Critical Hdwy Stg 1	6.16	5.56	-	6.16	5.56	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.16	5.56	-	6.16	5.56	-	-	-	-	-	-	-
Follow-up Hdwy	3.554	4.054	3.354	3.554	4.054	3.354	2.254	-	-	2.254	-	-
Pot Cap-1 Maneuver	375	389	755	403	363	696	1213	-	-	1200	-	-
Stage 1	718	672	-	651	620	-	-	-	-	-	-	-
Stage 2	640	620	-	747	638	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	336	383	755	347	358	696	1213	-	-	1200	-	-
Mov Cap-2 Maneuver	336	383	-	347	358	-	-	-	-	-	-	-
Stage 1	715	669	-	644	613	-	-	-	-	-	-	-
Stage 2	595	613	-	681	636	-	-	-	-	-	-	-
Approach	EB		WB		NB		SB					
HCM Ctrl Dly, s/v	45.15		14.7		0.25		0.08					
HCM LOS	E		B									
Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR				
Capacity (veh/h)	56	-	-	358	409	17	-	-				
HCM Lane V/C Ratio	0.009	-	-	0.799	0.093	0.003	-	-				
HCM Ctrl Dly (s/v)	8	0	-	45.2	14.7	8	0	-				
HCM Lane LOS	A	A	-	E	B	A	A	-				
HCM 95th %tile Q(veh)	0	-	-	6.8	0.3	0	-	-				

Intersection												
Int Delay, s/veh	9.3											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	103	19	17	1	33	15	22	327	0	14	432	138
Future Vol, veh/h	103	19	17	1	33	15	22	327	0	14	432	138
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	112	21	18	1	36	16	24	355	0	15	470	150
Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	996	978	545	914	1053	355	620	0	0	355	0	0
Stage 1	575	575	-	403	403	-	-	-	-	-	-	-
Stage 2	421	403	-	510	650	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	223	250	539	254	226	689	961	-	-	1203	-	-
Stage 1	503	503	-	624	600	-	-	-	-	-	-	-
Stage 2	610	600	-	546	465	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	174	238	539	214	215	689	961	-	-	1203	-	-
Mov Cap-2 Maneuver	174	238	-	214	215	-	-	-	-	-	-	-
Stage 1	493	493	-	604	581	-	-	-	-	-	-	-
Stage 2	541	581	-	495	456	-	-	-	-	-	-	-
Approach	EB		WB		NB		SB					
HCM Ctrl Dly, s/v	65.6		21.42		0.56		0.19					
HCM LOS	F		C									
Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR				
Capacity (veh/h)	113	-	-	197	272	41	-	-				
HCM Lane V/C Ratio	0.025	-	-	0.765	0.196	0.013	-	-				
HCM Ctrl Dly (s/v)	8.8	0	-	65.6	21.4	8	0	-				
HCM Lane LOS	A	A	-	F	C	A	A	-				
HCM 95th %tile Q(veh)	0.1	-	-	5.2	0.7	0	-	-				

Intersection

Intersection Delay, s/veh	14.1
Intersection LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	207	35	21	0	26	9	10	310	0	3	205	94
Future Vol, veh/h	207	35	21	0	26	9	10	310	0	3	205	94
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	6	6	6	6	6	6	6	6	6	6	6	6
Mvmt Flow	225	38	23	0	28	10	11	337	0	3	223	102
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0
Approach	EB			WB			NB			SB		
Opposing Approach	WB			EB			SB			NB		
Opposing Lanes	1			1			1			1		
Conflicting Approach Left	SB			NB			EB			WB		
Conflicting Lanes Left	1			1			1			1		
Conflicting Approach Right	NB			SB			WB			EB		
Conflicting Lanes Right	1			1			1			1		
HCM Control Delay, s/veh	14.4			9.9			14.8			13.6		
HCM LOS	B			A			B			B		

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	3%	79%	0%	1%
Vol Thru, %	97%	13%	74%	68%
Vol Right, %	0%	8%	26%	31%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	320	263	35	302
LT Vol	10	207	0	3
Through Vol	310	35	26	205
RT Vol	0	21	9	94
Lane Flow Rate	348	286	38	328
Geometry Grp	1	1	1	1
Degree of Util (X)	0.535	0.476	0.067	0.491
Departure Headway (Hd)	5.539	5.993	6.321	5.39
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	650	600	563	666
Service Time	3.592	4.048	4.405	3.447
HCM Lane V/C Ratio	0.535	0.477	0.067	0.492
HCM Control Delay, s/veh	14.8	14.4	9.9	13.6
HCM Lane LOS	B	B	A	B
HCM 95th-tile Q	3.2	2.6	0.2	2.7

Intersection

Intersection Delay, s/veh	25.4
Intersection LOS	D

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	103	19	17	1	33	15	22	327	0	14	432	138
Future Vol, veh/h	103	19	17	1	33	15	22	327	0	14	432	138
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	112	21	18	1	36	16	24	355	0	15	470	150
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0
Approach	EB			WB			NB			SB		
Opposing Approach	WB			EB			SB			NB		
Opposing Lanes	1			1			1			1		
Conflicting Approach Left	SB			NB			EB			WB		
Conflicting Lanes Left	1			1			1			1		
Conflicting Approach Right	NB			SB			WB			EB		
Conflicting Lanes Right	1			1			1			1		
HCM Control Delay, s/veh	12.3			10.6			16.1			35.4		
HCM LOS	B			B			C			E		

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	6%	74%	2%	2%
Vol Thru, %	94%	14%	67%	74%
Vol Right, %	0%	12%	31%	24%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	349	139	49	584
LT Vol	22	103	1	14
Through Vol	327	19	33	432
RT Vol	0	17	15	138
Lane Flow Rate	379	151	53	635
Geometry Grp	1	1	1	1
Degree of Util (X)	0.582	0.28	0.101	0.893
Departure Headway (Hd)	5.524	6.66	6.835	5.064
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	649	536	527	711
Service Time	3.591	4.743	4.835	3.12
HCM Lane V/C Ratio	0.584	0.282	0.101	0.893
HCM Control Delay, s/veh	16.1	12.3	10.6	35.4
HCM Lane LOS	C	B	B	E
HCM 95th-tile Q	3.8	1.1	0.3	11.3

Attachment D

Virtual Meeting Minutes & Field Check Minutes

IMPO Safety Study: Fishers RSA Location

Date: April 17, 2026

Time: 11:00 – 11:30 AM

Location: MS Teams

Attendees:

Hatem Mekky - *Absent*

Tami Houston, City of Fishers

Rich Bassett, City of Fishers

Wayne Druelinger, Fisher PD

Jennifer Dunn, IMPO

James Mark Rinehart, Corradino LLC

David Cleveland, Corradino LLC

Agenda

1. Introductions

- a. Corradino staff kicked off the meeting with a round of introductions for all the participants on the Teams call.
- b. Corradino staff then shared that the purpose of the kick-off meeting was to spend some time talking with the City of Fishers about the RSA location they selected to study as part of the Indianapolis MPO's (IMPO) Safety Study. The information from the kick-off meeting will be considered as Corradino completes the safety and traffic analysis and begins identifying potential countermeasures for the RSA location. Corradino then asked Fishers staff to provide an overview of why they selected their RSA location, such as observed safety concerns, changes in traffic related to new development, or existing plans or studies that have identified long-term improvements at the RSA sites.

2. Overview of RSA location

- a. **Southeastern Parkway & Connecticut Avenue**
 - i. Fishers staff stated that the Southeastern Parkway & Connecticut Avenue was part of unincorporated Hamilton County, but annexed into the city limits in 2025.
 - ii. Fishers staff noted the area around the intersection is being redeveloped into single-family neighborhoods. Additionally, the Town of Fortville, located southeast of the intersection, has grown and developed new neighborhoods within half a mile of the intersection. Because of the growth in residential development, Fisher staff said they have seen an increase in traffic and vehicle crashes at the intersection.

- iii. Regarding safety, Fishers staff noted they have observed several Right Angle crashes at the intersection. They believe one reason why these crashes are occurring is that the angle of the intersection, as well as the grade change, makes it difficult to see oncoming traffic.
 - 1. Fishers also noted that Hamilton County has preliminary plans to install an intersection conflict warning system (ICWS) at the intersection. Still, it was placed on hold when negotiations to have Fishers annex the intersection began.
- iv. Fishers noted they intend to pursue funding through the IMPO's annual call for projects to construct a roundabout at this intersection, instead of an ICWS. If awarded, construction would take place in 2029-2030.

3. Preliminary Findings Reports

- a. Corradino staff shared a draft of the Preliminary Findings Report with Fishers staff during the meeting, and intend to finalize before the field check.
- b. Corradino noted that the results in the preliminary findings report indicated over 80% of crashes at the intersection were Right Angle and left-turn crashes. Since a roundabout removes the possibility of right-angle and left-turn crashes at an intersection, Corradino agreed with Fisher's staff that it would be a good long-term infrastructure improvement for the intersection.
- c. Corradino staff also noted a potential near-term solution for the intersection could either be improving the existing signage and striping, or consider converting the intersection to an all-way stop-controlled intersection. However, Corradino did note that converting to an all-way stop-controlled intersection can pose safety challenges until motorists become accustomed to the change. Corradino then asked if an all-way stop would be something Fishers would want to consider if a roundabout is planned to be constructed in the near future
 - i. Fishers staff noted they temporarily converted the Southeastern Parkway & Cyntheanne Road intersection to an all-way stop-controlled intersection while designing a roundabout at the intersection, and would be willing to consider doing the same at this intersection between Southeastern Parkway and Connecticut Avenue.

4. Traffic Counts

- a. Fishers staff provided traffic counts for the intersection to Corradino.

5. Next Steps

- a. The field check to look at the intersection with Fishers staff and local law enforcement was scheduled for May 7, 2026.

Field Check Notes for RSA at Southeastern Parkway & Connecticut Avenue

				Date: 5/28/2026	
				Des. No.: n/a	
Reviewer Information:			Agency/Firm Name: Corradino LLC		
Primary Author: James Mark Rinehart			Agency: Indianapolis Metropolitan Planning Organization		
Phone Numbers: (317) 488-2363			Email Address: jrinehart@corradino.com		
Attendees:					
- Tami Houston, Fishers - Rich Bassett, Fishers, - Jamie Jones, Fishers PD - Jennifer Dunn, IMPO - James Mark Rinehart, Corradino					
Purpose of Field Check:					
The purpose of this field check was to review the crash history at the Southeastern Parkway & Connecticut Avenue intersection, evaluate the current roadway conditions, observe traffic patterns, and collaborate with representatives from Local Public Agencies (LPA) and Law Enforcement to identify safety countermeasures. Participants at the field check were provided a field check packet containing results from the crash data analysis completed for the intersection. The goal of the field check was to identify near-term and long-term improvements and build consensus with the LPAs and Local Law Enforcement on the recommendations. Recommendations from the field check will be used as the final recommendations for the RSA and included in the IMPO's Safety Study.					
Project Location:					
Location: Intersection of Southeastern Parkway & Connecticut Avenue					
INDOT District: Greenfield			City: Fishers	County: Hamilton	
Lat & Long (BOP)	39.948595	-85.864858	Urban/Rural - URBAN	Functional Class of Major Roadway: Major Collector	
Traffic Control Type: Two-Way Stop Controlled			Posted Speed Limit: Southeastern Pkwy – 50mph; Connecticut Ave. – 40mph		
Site Observations					
- Corradino kicked off the field check, discussing the observed crash pattern at the intersection. 82% of reported crashes at the intersection were right-angle (76%) or left-turn (6%) crashes. - Fishers staff noted that before the Southeastern Parkway & Connecticut Avenue intersection was incorporated into the city limits, Hamilton County was considering constructing an ICWS at the intersection. - Corradino shared that the ICWS can be a good safety improvement for an intersection with geometric or sight distance challenges, such as the subject skewed intersection with the crest vertical curve along Southeastern Parkway on the north leg. Still, since Southeastern Parkway has much higher traffic volume than Connecticut Avenue, the ICWS could lose some of its benefit because the light notifying of approaching traffic is rarely turned off during peak periods. - Fishers staff agreed and plan not to pursue installing an ICWS. - Corradino noted that they ran through the All-Way Stop (AWS) and Traffic Signal Warrant Analysis per MUTCD guidelines. - The intersection met 4 of the 5 AWS warrant criteria due to crash data, sight distance, the need to control left turns, and the intent to improve the intersection to either a traffic signal or roundabout. - The intersection met one of the 10 Traffic Signal Warrant Criteria, which was the number of crashes occurring at an intersection where the posted speed is above 40 mph (Southeastern Parkway is					

posted at 50 mph).

- o Corradino noted that while the intersection does meet at least one of the traffic signal warrant criteria, the key conflict points at the intersection that result in right-angle and left-turn crashes would not be removed by a signal. This means that a traffic signal would not be the best recommendation for addressing the safety concerns at the intersection.
 - Fishers staff agreed with this and believed a roundabout would be a better long-term improvement because the conflict points in the intersection that correlated with 82% of the reported crashes would be removed from the intersection.
- o Corradino staff noted that for the near-term improvement, maintaining the current two-way stop-controlled intersection could be an option. At the same time, the City of Fishers prepares to construct a roundabout or considers converting the intersection to an AWS-controlled intersection.
 - Fishers staff and Fishers PD both appreciated the idea of converting the intersection to an AWS-controlled intersection, plus adding some signage on Southeastern Parkway to notify of the change in traffic patterns at the intersection. They believed stopping all traffic at the intersection would have helped with speeding and sight-distance issues at the intersection (because of the crest vertical curve and the skewed angle).

Potential Alternatives Discussed

Near-Term

- Convert the intersection to an AWS-controlled intersection, which would include:
 - o Two new large stop signs on each side of the NB and SB approaches.
 - o Remove the existing signs notifying NB and SB traffic that they are approaching the intersection and replace them with two new “stop ahead” signs that include a solar-powered flashing beacon.
 - o Update striping at the intersection for an AWS-controlled intersection.
 - o Add retroreflective tape to all new signage and existing signage locations on the EB and WB approaches.
 - o Trim trees back on the EB approach to prevent them from covering the existing signage.

Long-Term

- Convert the intersection to a roundabout.

Future Consideration

- N/A

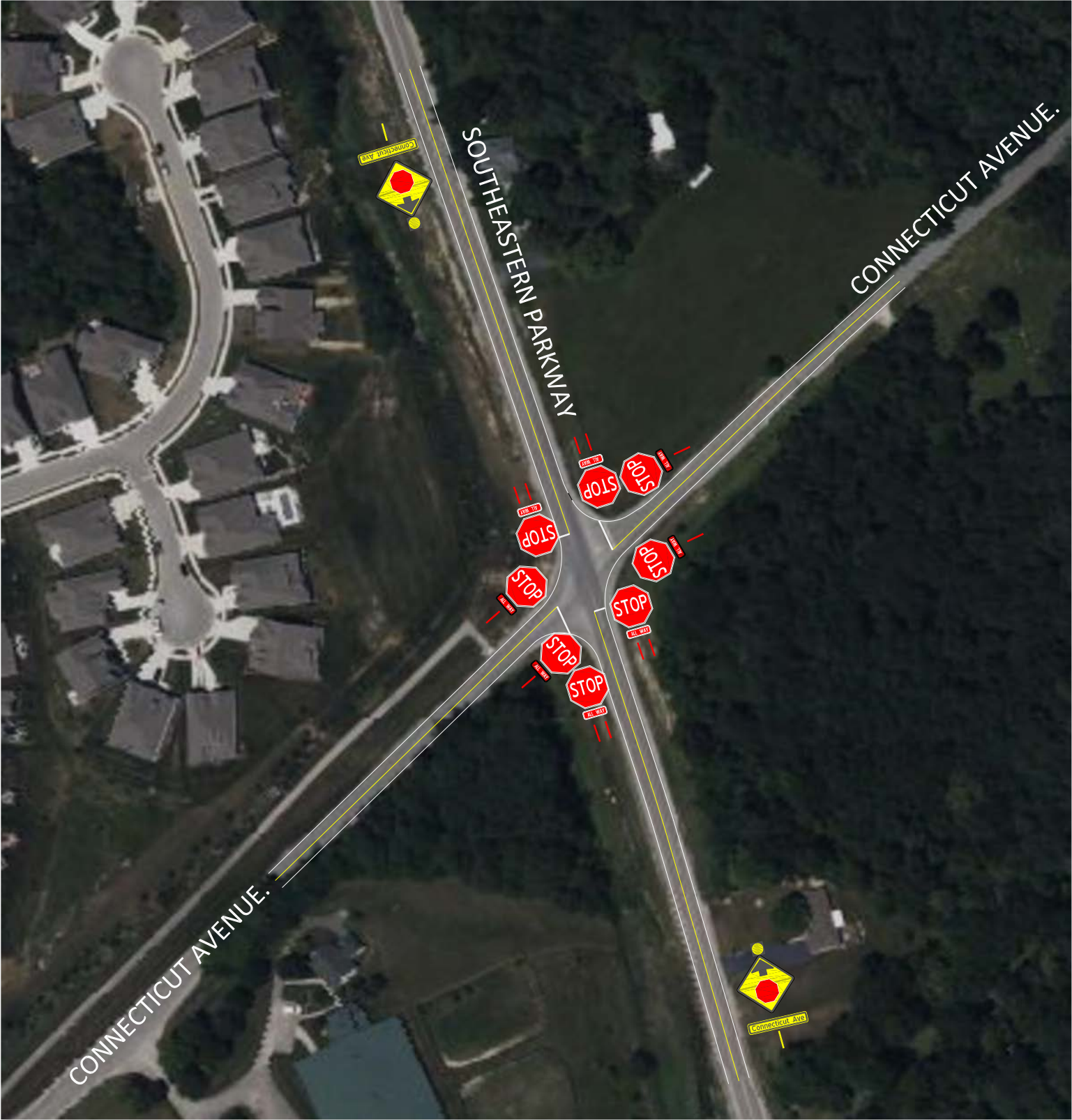
Consensus on Key Items for Alternatives

- Consensus was met that the Potential Alternatives identified above will be the recommended alternatives for the RSA.

Attachment E

Cost Estimates & Schematics

Near-Term Improvements Southeastern Parkway & Connecticut Avenue



PRELIMINARY COST ESTIMATE - NEAR TERM
Southeastern Parkway & Connecticut Avenue

LINE ITEM	ITEM NO.	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	AMOUNT
1	110-01001	MOBILIZATION AND DEMOBILIZATION	1	LS	\$ 5,000.00	\$ 5,000.00
2	201-52370	CLEARING RIGHT-OF-WAY	1	LS	\$ 1,500.00	\$ 1,500.00
3	202-74045	SIGN AND SUPPORTS, CHANNEL POSTS, REMOVE	2	EACH	\$ 140.00	\$ 280.00
4	622-03680	TREE PRUNING	1	LS	\$ 1,200.00	\$ 1,200.00
5	801-06775	MAINTAINING TRAFFIC	1	LS	\$ 3,000.00	\$ 3,000.00
6	802-05705	SIGN POST, SQUARE, TYPE 2, UNREINFORCED ANCHOR BASE	112	LFT	\$ 29.00	\$ 3,248.00
7	802-05706	SIGN POST, SQUARE, TYPE 3, UNREINFORCED ANCHOR BASE	28	LFT	\$ 35.00	\$ 980.00
8	802-09838	SIGN, SHEET, WITH LEGEND, 0.080 IN. THICKNESS	26	SFT	\$ 45.00	\$ 1,170.00
9	802-09840	SIGN, SHEET, WITH LEGEND, 0.100 IN. THICKNESS	58	SFT	\$ 50.00	\$ 2,900.00
10	802-11648	SIGN POST, TYPE	16	EACH	\$ 125.00	\$ 2,000.00
11	805-06742	SOLAR POWERED FLASHING BEACON ASSEMBLY	2	EACH	\$ 3,000.00	\$ 6,000.00
12	808-06703	LINE, THERMOPLASTIC, SOLID, WHITE, 4 IN.	3960	LFT	\$ 1.25	\$ 4,950.00
13	808-06716	LINE, REMOVE	160	LFT	\$ 11.00	\$ 1,760.00
14	808-75240	LINE, THERMOPLASTIC, BROKEN, YELLOW, 4 IN.	110	LFT	\$ 2.50	\$ 275.00
15	808-75245	LINE, THERMOPLASTIC, SOLID, YELLOW, 4 IN.	3520	LFT	\$ 1.25	\$ 4,400.00
16	808-75297	TRANSVERSE MARKING, THERMOPLASTIC, STOP LINE, WHITE, 24 IN.	100	LFT	\$ 14.00	\$ 1,400.00
TOTAL						\$ 40,063.00

CONSTRUCTION TOTAL	\$40,000.00
CONTINGENCY (10%)	\$4,000.00
OVERALL PROJECT TOTAL	\$44,000.00

This cost estimate makes the following assumptions:
1.) Unit price estimates based on stand-alone project

Project Phases		
Task No.	Task	Cost
1	Preliminary Engineering	\$ 10,000
2	Right of Way	\$ -
3	Utility CN	\$ 1,000
4	Railroad CN	\$ -
5	Construction Inspection/Testing (10%)	\$ -
TOTAL		\$ 11,000

The Preliminary Cost Estimate portion of this document was prepared by me or under my supervision and represents a planning level cost estimate of the project's scope.

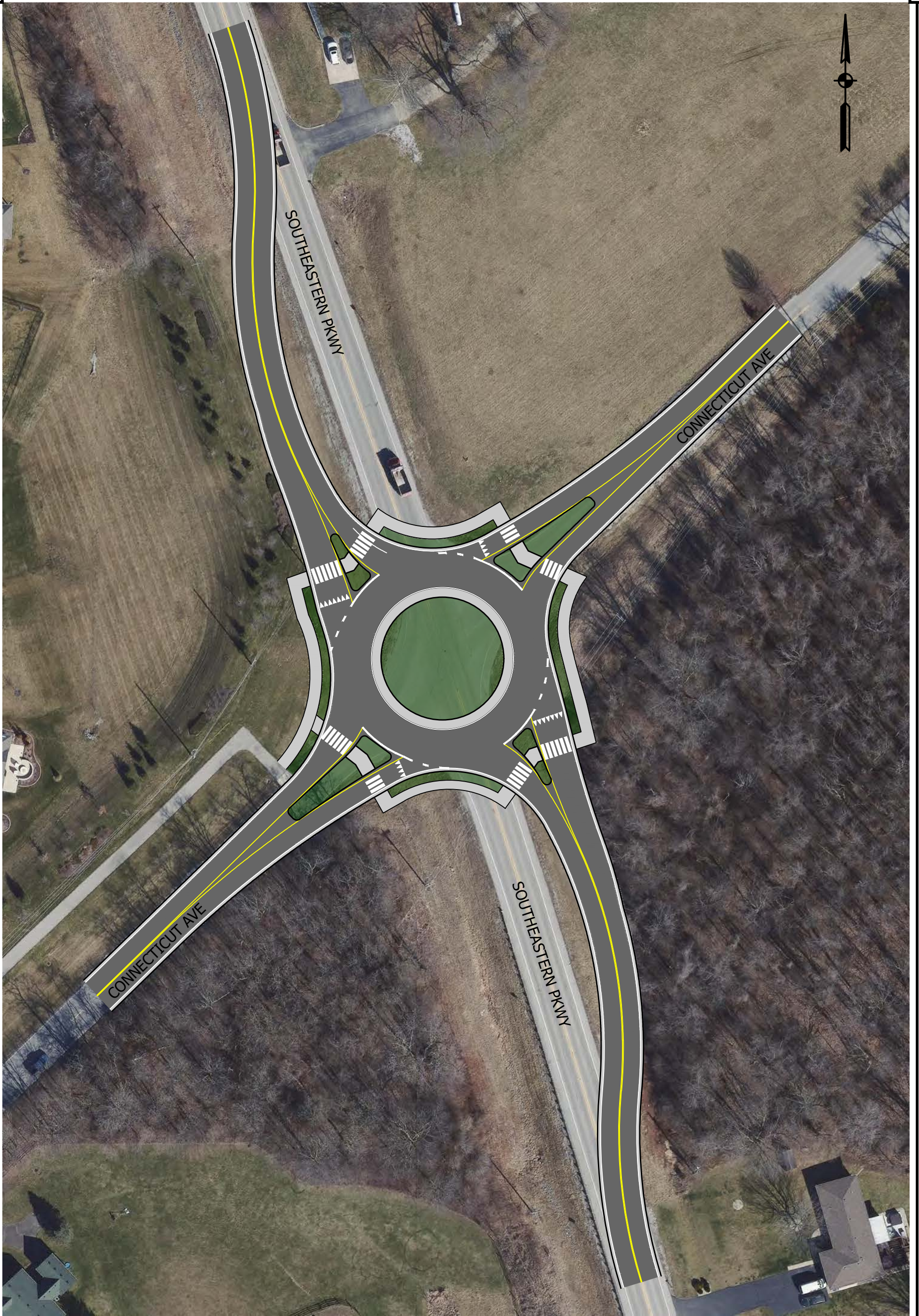
Signature Gary L. Yellig

Todd Johnson
Estimate Completed By
6/5/2026
Date



ABBREVIATED ENGINEERING NOTES FOR PRELIMINARY COST ESTIMATE - NEAR TERM
Southeastern Parkway & Connecticut Avenue

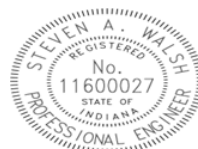
LINE ITEM	ITEM NO.	DESCRIPTION	NOTES
1	110-01001	MOBILIZATION AND DEMOBILIZATION	
2	201-52370	CLEARING RIGHT-OF-WAY	Bulk tree/brush removal at EB Stop Ahead sign
3	202-74045	SIGN AND SUPPORTS, CHANNEL POSTS, REMOVE	removes the existing cross intersection warning signs on SE Pkwy
4	622-03680	TREE PRUNING	Select tree pruning at EB Stop Ahead sign
5	801-06775	MAINTAINING TRAFFIC	
6	802-05705	SIGN POST, SQUARE, TYPE 2, UNREINFORCED ANCHOR BASE	for the 48" by 48" Stop signs. Need 2 per each sign for four signs and use 14' per post say 112 LFT
7	802-05706	SIGN POST, SQUARE, TYPE 3, UNREINFORCED ANCHOR BASE	heavier sign post - used for the Stop Ahead w/Beacon. One post per sign and use 14' per post or 28 LFT
8	802-09838	SIGN, SHEET, WITH LEGEND, 0.080 IN. THICKNESS	for W3-1 Stop Ahead (30" by 30") and All Way (R1-3P) 18" by 6" (4 each on Conn.); 30" by 12" (4 each on SE Pkwy) total say 26 SFT
9	802-09840	SIGN, SHEET, WITH LEGEND, 0.100 IN. THICKNESS	for 48"by 48" Stop Signs (R1-1) (4 each at 13.25 sft/ea)and Connecticut advance street name sign W16-8P (45" by 8") (2 each at 2.5 sft/ea) say 58 SFT total
10	802-11648	SIGN POST, TYPE	use this item for reflective strips on existing and new sign posts (assume 7 ft per each post) 12-Red and 4-Yellow for a total of 16 each
11	805-06742	SOLAR POWERED FLASHING BEACON ASSEMBLY	used for the beacons on the Stop Ahead signs - 2 each
12	808-06703	LINE, THERMOPLASTIC, SOLID, WHITE, 4 IN.	sepyk 2200 CON - 1760 TOTAL =3960
13	808-06716	LINE, REMOVE	this removes the double yellow lines that wil be downstream of the new stop lines=160
14	808-75240	LINE, THERMOPLASTIC, BROKEN, YELLOW, 4 IN.	CON SKIP-110
15	808-75245	LINE, THERMOPLASTIC, SOLID, YELLOW, 4 IN.	sepyk 2200, CONE=880 CONW= 440 TOTAL=3520
16	808-75297	TRANSVERSE MARKING, THERMOPLASTIC, STOP LINE, WHITE, 24 IN.	TOTAL =100



*Southeastern Pkwy and Connecticut Ave.
Preliminary Exhibit*

PRELIMINARY COST ESTIMATE
SOUTHEASTERN PWKY AND CONNECTICUT AVE ROUNDABOUT

	Description	Unit	Quantity	Engineer's Estimate	
				Unit Price	Total
	EXCAVATION, COMMON	CYS	2324	\$30.24	\$70,268.80
	SUBGRADE TREATMENT, TYPE IBC	SYS	6466	\$13.87	\$89,688.75
	SUBGRADE, TREATMENT, TYPE III	SYS	400	\$3.35	\$1,341.34
	STRUCTURE BACKFILL, TYPE 2	CYS	1324	\$56.20	\$74,408.80
	COMPACTED AGGREGATE NO. 53	TON	2255	\$46.89	\$105,736.95
	HMA, TYPE B, 70, SURFACE, 9.5 mm	TON	411	\$112.52	\$46,245.72
	HMA, TYPE B, 64, INTERMEDIATE, 19.0 mm	TON	684	\$98.92	\$67,661.28
	HMA, TYPE B, 64, BASE, 25.0 mm	TON	1915	\$89.04	\$170,511.60
	PCCP, 10 IN., STAMPED AND COLORED	SYS	329	\$96.57	\$31,782.26
	HMA FOR SIDEWALK	TON	49	\$138.95	\$6,869.69
	CURB RAMP, CONCRETE	SYS	129	\$208.86	\$26,919.73
	DETECTABLE WARNING SURFACES	SYS	26	\$332.62	\$8,781.17
	CURB, CONCRETE	LFT	795	\$45.86	\$36,458.70
	CURB AND GUTTER, CONCRETE	LFT	2769	\$36.37	\$100,708.53
	CURB AND GUTTER, ROLL CURB	LFT	322	\$33.19	\$10,687.18
	PIPE, TYPE 4, CIRCULAR, 6 IN.	LFT	2769	\$9.86	\$27,302.34
	PIPE, TYPE 2, CIRCULAR, 12 IN.	LFT	1000	\$71.21	\$71,210.00
	PIPE, TYPE 2, CIRCULAR, 15 IN.	LFT	300	\$75.01	\$22,503.00
	PIPE, TYPE 2, CIRCULAR, 18 IN.	LFT	200	\$86.39	\$17,278.00
	PIPE, TYPE 2, CIRCULAR, 24 IN.	LFT	100	\$108.02	\$10,802.00
	GEOTEXTILES FOR UNDERDRAIN, TYPE 1A	SYS	2615	\$2.18	\$5,701.06
	AGGREGATE FOR UNDERDRAINS	CYS	249	\$85.08	\$21,202.79
	INLET, F7/E7	EA	8	\$3,214.63	\$25,717.04
	INLET, TYPE J10/M10	EA	32	\$3,960.00	\$126,720.00
	MANHOLE, C4	EA	12	\$4,732.85	\$56,794.20
	MANHOLE, J4	EA	4	\$7,439.69	\$29,758.76
	LIGHTING	LS	1	\$125,000.00	\$125,000.00
SUBTOTAL MAJOR ROADWAY ITEMS =					\$1,388,060
	EROSION CONTROL	LS		5.0%	\$69,402.98
	SEEDING AND SODDING	LS		5.0%	\$69,402.98
	SIGNING	LS		2.0%	\$27,761.19
	PAVEMENT MARKINGS	LS		2.0%	\$27,761.19
SUBTOTAL MINOR ROADWAY ITEMS =					\$194,328
SUBTOTAL ROADWAY ITEMS =					\$1,582,388
	CONSTRUCTION ENGINEERING	LS		2.0%	\$31,647.76
	MOBILIZATION AND DEMOBILIZATION	LS		5.0%	\$79,119.40
	CLEARING RIGHT OF WAY	LS		4.0%	\$63,295.52
	MAINTAINING TRAFFIC	LS		7.0%	\$110,767.16
PROJECT SUBTOTAL =					\$1,867,218
CONTINGENCY (15%) =					\$280,083
PROJECT TOTAL 2025 DOLLARS =					\$2,147,301
PROJECT TOTAL 2029 DOLLARS (4% Annual Inflation) =					\$2,512,038



Steven Walsh
Attachment E - 5

Economic Evaluation - Form F5		Form <u>1</u> <u>2</u> <u>3</u> <u>4</u> <u>5</u> <u>6</u> <u>7</u> CDB Tool
Alternative Southeastern Pkwy & Connecticut Ave - Long-Term Improvements	Calculate New Save Reports Guidelines Equations General Improvements Table Service Life Table Crash Reduction Factors Table - Indiana Crash Modification Factors Clearinghouse Load Crashes Open Save As Exit Help	
INPUT Collapse		
Number of Crashes (crash/period)		
Fatal and Incapacitating Injury Crashes		1
Non-Incapacitating and Possible Injury Crashes		3
Property Damage Only Crashes		13
Road Type City Arterial Intersection ▾		
Average Crash Costs (\$)		
Fatal and Incapacitating Injury Crashes		1840100
Non-Incapacitating and Possible Injury Crashes		393200
Property Damage Only Crashes		40200
Crash Cost Year (yyyy)		2017
First Year with Crash Data (yyyy)		2022
Last Year with Crash Data (yyyy)		2024
Present Year (yyyy)		2026
Implementation Year (yyyy)		2030
Inflation Rate (%)		2
Interest Rate (%)		4
Annual Traffic Growth Rate (%)		2
Total Traffic Growth Factor		1.33
Future Traffic Growth Period (years)		24
COUNTERMEASURES Collapse All		
Countermeasure 1 Collapse [C] Copy		
Description	Convert a stop-controlled intersection into a single-lane roundabout.	
Crash Reduction Factors (%)		
Fatal and Incapacitating Injury Crashes		78
Non-Incapacitating and Possible Injury Crashes		78
Property Damage Only Crashes		78
Number of Target Crashes (crash/period)		
Fatal and Incapacitating Injury Crashes		1
Non-Incapacitating and Possible Injury Crashes		3
Property Damage Only Crashes		13
Countermeasure Service Life (years)		20
Countermeasure Capital Cost (\$)		2512038
Countermeasure Annual Maintenance Cost (\$)		0
Countermeasure Salvage Value (\$)		0
[+] Add		
Location Southeastern Parkway & Connecticut Ave GIS Post Analyst JMR Date 3/19/2026 15 Comments Traffic Data: INDOT TCDS Crash Data: ARIES provided by the IMPO.		

OUTPUT	
Total Crashes Saved	3.112
FI Crashes Saved	0.102
NI Crashes Saved	0.292
PDO Crashes Saved	2.718
Equivalent Annual Benefit (\$)	496,827
Equivalent Annual Cost (\$)	158,002
Present Worth Benefit (\$)	12,420,670
Present Worth Cost (\$)	3,950,053
Net Annual Benefit (\$)	338,825
Present Worth Net Benefit (\$)	8,470,617
Benefit-Cost Ratio	3.14

Post

Analyst

Date

Comments

JMR

3/19/2026

Traffic Data: INDOT TCDS
Crash Data: ARIES provided by the IMPO.

Settings: Indiana local settings

Version 4.1 Southeastern & Connecticut

PREPARED FOR:



APPENDIX F:

Noblesville RSA



CORRADINO LLC

ABBREVIATED ENGINEERING REVIEW FOR TRAFFIC SAFETY

						Date: 7/23/2026	
						Des. No.: N/A	
Reviewer Information:				Agency/Firm Name: Burgess & Niple			
Primary Author: Micah Reynolds, PE, RSP ₂₁				Agency: Indianapolis Metropolitan Planning Organization			
Phone Numbers: (260) 452-7171				Email Address: micah.reynolds@burgessniple.com			
Purpose of Review:							
Burgess & Niple was hired by the Indianapolis MPO (IMPO) to conduct a series of roadway safety audits at preselected intersections within its urbanized area. The goal was to identify existing safety issues and recommend near-term and long-term improvements to address them. Improvements may range from lower-cost maintenance items, such as signage and pavement markings, to higher-cost capital improvements, including intersection upgrades, multimodal infrastructure, and upgraded traffic signals, as needed. This form is suitable for Level 1 review. Of the three available levels of engineering review, this represents the least refined, lowest-intensity degree of analysis, development of essential project intent (outline of the certified course of action), scoring, and process documentation.							
Project Location:							
Route: Boden Road		District: Greenfield		City: Noblesville		County: Hamilton	
Lat & Long (BOP):	39.810757	-86.121594	Lat & Long (EOP):	39.810757	-86.121594	Inside Urban Area Boundary: Yes	
IMPO: Indianapolis Metropolitan Planning Organization			Project Type: Roadway Safety Audit				
Location: The intersection of Boden Road & 146 th Street/Greenfield Avenue							
Existing Conditions:							
The Boden Road & 146th Street/Greenfield Avenue intersection is a signalized four-leg intersection. 146th Street/Greenfield Avenue is a two-lane roadway at the intersection, with left and right turn lanes in each direction. Boden Road is a 4-lane roadway at the intersection with left turn lanes in each direction. There are two southbound and two northbound through lanes along Boden Road. The posted speed limit on Boden Road and 146th Street/Greenfield Avenue at the intersection is 45 MPH. Ruoff Music Center is in the northwest quadrant of the intersection, which provides significant traffic on concert days. There doesn't appear to be significant geometric deficiencies that are contributing to the crashes that are occurring. There is insignificant pedestrian traffic that attempts to cross Boden Road at this location; however, there is a trail that runs along Boden Road in the northwest and southeast quadrants which does lead to occasional pedestrian traffic. During concert days, pedestrian traffic is guided to a crossing farther east and are otherwise discouraged to walk in this area to maximize vehicular throughput entering and exiting the parking lot for concerts. Located in each quadrant of the intersection are: • NW Quadrant: Empty lot (Agricultural) • SW Quadrant: Empty lot (Agricultural) • SE Quadrant: Empty lot • NE Quadrant: Commercial property (Ruoff Music Center) Burgess & Niple held a field check with the representatives from the IMPO and City of Noblesville Engineering on April 27, 2026, to discuss some near-term and long-term solutions and build consensus around a series of countermeasures for Burgess & Niple to cost as part of the final recommendations. The field check meeting minutes are available in Attachment D.							
Traffic Operations:							
Mobility/Congestion Performance: Traffic counts were collected for AM and PM peak periods (7:30AM-9:30AM and 4:15 PM-6:00PM) on April 23, 2026, the PM Peak features the highest volumes. For the PM Peak hour, eastbound traffic entering the intersection is 573, westbound traffic entering the intersection is 525, northbound traffic entering the intersection is 856, and southbound traffic entering the intersection is 459. These counts were adjusted using INDOT's standard Adjustment Factors, and the adjusted counts can be viewed in the traffic data in Attachment B. The existing conditions were analyzed in the design year conditions (using a 0.5% annual growth rate) for existing conditions, existing conditions with protected only phasing, and also for a roundabout alternative. Each alternative was analyzed in the AM and PM peak periods, the results of which can be found summarized in the following table:							

	Eastbound		Westbound		Northbound		Southbound	
Alternative	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay
'26 AM Peak	B	17.9	B	17.6	B	11.6	B	14.4
'26 PM Peak	B	20.0	B	19.6	B	19.9	B	16.5
'26 AM Peak - Protected	B	18.1	C	20.6	C	23.7	C	21.5
'26 PM Peak - Protected	C	28.9	C	30.5	C	31.9	C	29.1
'48 AM Peak	B	17.8	B	17.6	B	11.9	B	14.6
'48 PM Peak	C	24.0	C	23.8	B	19.1	B	18.8
'48 AM Peak - Protected	B	18.1	C	20.8	C	25.2	C	23.3
'48 PM Peak - Protected	C	31.0	C	32.8	D	36.3	C	30.2
'48 AM Peak - 2x2 RAB	A	6.5	A	6.1	A	7.6	A	6.7
'48 PM Peak - 2x2 RAB	A	5.7	A	6.9	A	8.2	A	7.3
'48 PM Peak - 2x1 RAB	A	8.0	B	10.3	A	8.2	A	7.5

The results indicate the protected only phasing is not recommended. Rather than protecting the left turns, there is room to provide a small amount of offset for the left turn lanes.

Safety Performance / Crash Analysis: According to available crash data, there were **48** crashes associated with the study area from January 1, 2022, to December 31, 2024. Of those crashes, **seven** resulted in incapacitating injuries, and **seven** resulted in non-incapacitating injuries. The most prevalent crashes that occur are rear end crashes and left turn crashes. See attached Crash Summary, crash diagram, and report from RoadHAT 4.1 in **Attachment A**.

2022-2024 Crash Data - analyzed as **City Arterial Intersection One AADT** $I_{CC} = 2.69$, $I_{CF} = 3.12$

Alternatives & Recommendations

Near-Term

Near-term solutions will include:

Provide additional offset for left turns for the Boden Road approach, by cutting back the median raised curb. The traffic data shows these approaches have higher traffic volumes and have the highest crash rates and numbers. Providing additional offset would improve visibility for vehicles turning during the permitted phase. Convert the existing 5-section heads to new 3-section heads with backplates and utilize a flashing yellow arrow instead of the green light.

Relocate the pedestrian push button on the pole in the northwest quadrant.

Long-Term

The long-term recommended improvement for the intersection will be conversion to a roundabout. This should be considered in the future. At the time of the field check it was noted that the interest was to pursue near-term solutions as managing a roundabout during concert season drew some concerns. A roundabout was analyzed for future reference, but layouts and cost estimates were not provided.

Future Consideration

Due to the roundabout's performance relative to existing signal configurations, it is encouraged to pursue a roundabout option in the future. It is possible to add signalization that can be utilized during concert times.

Near-Term & Long-Term Cost Estimates for the Proposed Safety Improvements

Detailed cost estimates for the near- and long-term improvements are available in **Attachment E**.

<u>Near-Term Recommendation</u>		<u>Long-Term Recommendation</u>	
Construction	\$410,840	Construction	\$3,144,990
Preliminary Engineering (15%)	\$51,400	Preliminary Engineering (15%)	\$471,800
Utility Allowance (5%)	\$17,200	Utility Allowance (5%)	\$157,300
Right of Way	\$0	Right of Way	\$0
Grand Total	\$410,840	Grand Total	\$3,774,090

Project Score: (for INDOT use)

Safety Program Score =

Miscellaneous Notes:

Attachments:

Attachment A: Preliminary Findings Report

Attachment B: Traffic Counts

Attachment C: Traffic Analysis

Attachment D: Virtual Meeting Minutes & Field Check Minutes

Attachment E: Cost Estimates & Schematics

ATTACHMENT A

Preliminary Findings Report

PRELIMINARY FINDINGS

Safety Analysis at 146th Street & Boden Road

Report Prepared for: IMPO & City of Noblesville

1. Safety Analysis

A crash data analysis was completed for the intersection of 146th Street/Greenfield Avenue & Boden Road (Study Area) in Noblesville, IN. Before beginning the crash analysis, the project team followed these steps to clean the data:

- Received 2022-2024 crash data from the IMPO. Serious Injury and Fatal crashes had been cleaned by IMPO staff.
- Placed a 250' buffer around the Study Area to identify reported crashes near the intersection.
- Reviewed the police reports for each crash record identified within the 250' buffer.
- Identified and removed any crash records from the analysis that involved a collision with an animal in the roadway or occurred in a parking lot near the intersection or occurred at a different intersection entirely.
- Reviewed the description in the reports to confirm the selected Manner of Collision & Crash Severity accurately reflected how the police officer described the crash.
- Exported the results from ArcGIS Pro into MS Excel.
- Created a collision diagram of the Study Area as well as summary tables of the crash records.
- Developed a crash cost (I_{CC}) and crash frequency (I_{CF}) for the Study Area using RoadHat 4.1.

48 crashes were identified within the Study Area. Seven (7) of those reported crashes resulted in incapacitating injuries. Most of the incapacitating injury crashes were reported as Right Angle crashes. Other notable results near the Study Area include:

- 38% of crashes that occurred were rear end crashes, 27% were left turn crashes, and 17% were right angle crashes.
- 63% of reported crashes occurred during Off-Peak travel times. 17% of reported crashes occurred during the morning peak hours (6am-9am), and 21% during the evening peak hours (4pm-7pm).
- 52% of reported crashes occurred in daylight hours and 44% in dark conditions. There appears to be a significant split in the crash data whether the crashes were lighted or not. The remaining 4% of crashes listed lighting conditions as "Dawn/Dusk" in the police report.
- 17% of reported crashes occurred in wet roadway surface conditions. 77% of reported crashes occurred in dry surface conditions. The remaining 6% of reported crashes occurred on icy or snowy roadway surface.
- 63% of reported crashes occurred when the weather conditions were clear. The remaining 37% of reported crashes occurred on cloudy (17%), rainy (15%), or sleet/snow (6%) days.

Attached are the crash summary tables, a collision diagram, images of the intersection, and the results of the RoadHAT 4.1 analysis.

Crash Data Summary 146th Street & Boden Road

2022-2024 Crash Summary	
TOTAL CRASHES	48
TOTAL DEAD	0
TOTAL INJURED	28
PROPERTY DAMAGE ONLY	34
NON-INCAPACITATING	7
INCAPACITATING	7
FATAL	0

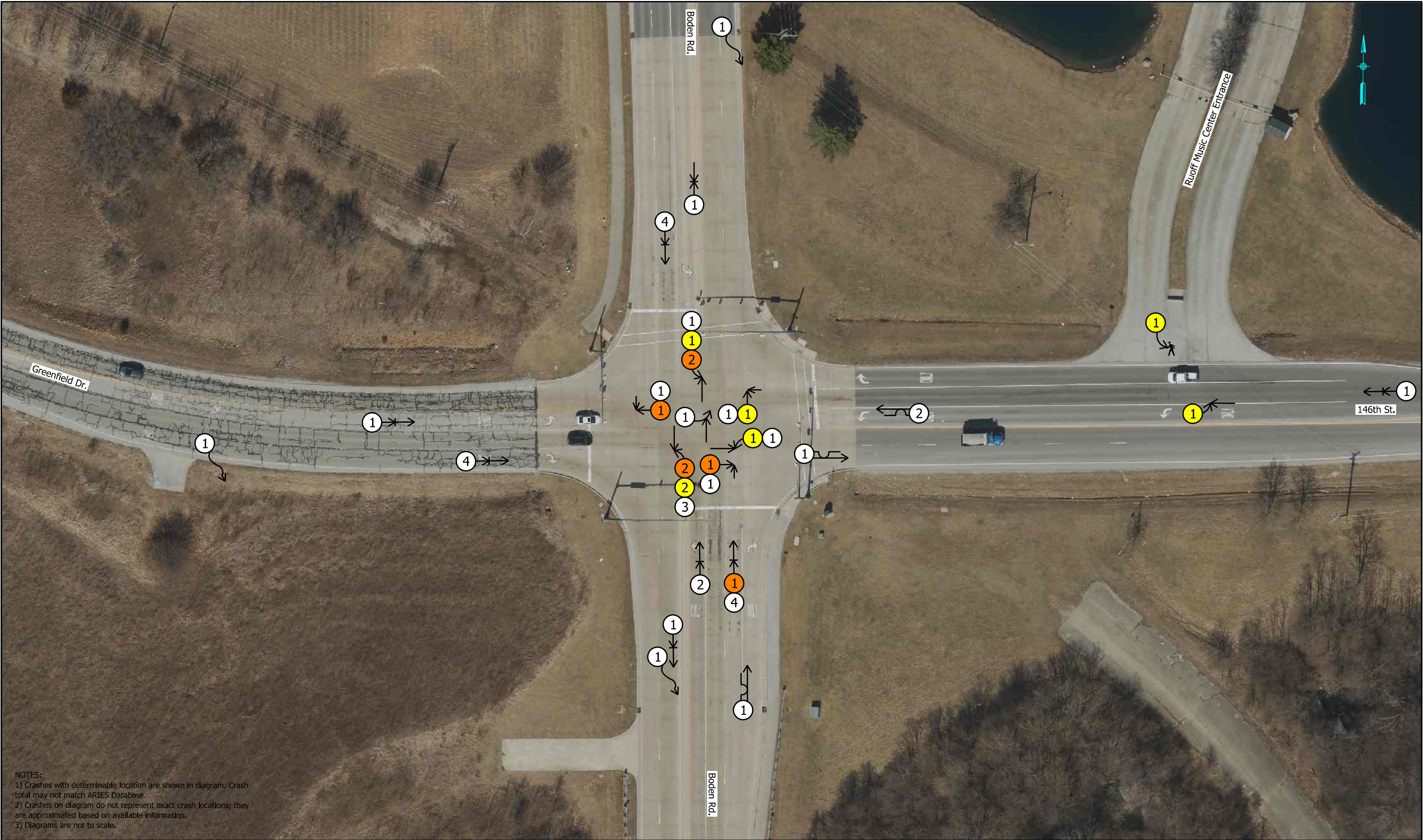
Summary of Primary Factors per Manner of Collision		
Primary Factors per Manner of Collision	Crashes	Percent
REAR END	18	37.5%
FOLLOWING TOO CLOSELY	15	
UNSAFE SPEED	3	
LEFT TURN	13	27.1%
DISREGARD SIGNAL/REG SIGN	2	
FAILURE TO YIELD RIGHT OF WAY	9	
IMPROPER TURNING	1	
UNSAFE SPEED	1	
RIGHT ANGLE	8	16.7%
DISREGARD SIGNAL/REG SIGN	3	
FAILURE TO YIELD RIGHT OF WAY	4	
OTHER (DRIVER) - EXPLAIN IN NARRATIVE	1	
SAME DIRECTION SIDESWIPE	4	8.3%
FAILURE TO YIELD RIGHT OF WAY	1	
IMPROPER LANE USAGE	2	
UNSAFE LANE MOVEMENT	1	
RAN OFF ROAD	3	6.3%
RAN OFF ROAD RIGHT	3	
HEAD ON	2	
FAILURE TO YIELD RIGHT OF WAY	1	
WRONG WAY ON ONE WAY	1	
Total Crashes	48	100.0%

Summary of Crashes per Time of Day		
Time of Day	Crashes	Percent
Peak AM (6:00-9:00 AM)	9	22.5%
Peak PM (4:00-7:00 PM)	10	25.0%
Off Peak	21	52.5%
Total Crashes	40	100%

Summary of Crashes per Light Conditions		
Light Conditions	Crashes	Percent
DAYLIGHT	25	52%
DARK (LIGHTED)	12	25%
DARK (NOT LIGHTED)	9	19%
DAWN/DUSK	2	4%
Total Crashes	48	100%

Summary of Roadway Surface Conditions					
Manner of Collision	DRY	ICE	SNOW/SLUSH	WET	Total Crashes
HEAD ON	2				2
LEFT TURN	10			3	13
RAN OFF ROAD	1			2	3
REAR END	14	2	1	1	18
RIGHT ANGLE	7			1	8
SAME DIRECTION SIDESWIPE	3			1	4
Total Crashes	37	2	1	8	48

Summary of Weather Conditions						
Manner of Collision	CLEAR	CLOUDY	RAIN	FREEZING RAIN	SNOW	Total Crashes
REAR END	12	2	1	2	1	18
LEFT TURN	8	3	2			13
RIGHT ANGLE	4	3	1			8
SAME DIRECTION SIDESWIPE	3		1			4
RAN OFF ROAD	1		2			3
HEAD ON	2					2
Total Crashes	30	8	7	2	1	48



NOTES:
1) Crashes with determinable location are shown in diagram, Crash total may not match ARIES Database.
2) Crashes on diagram do not represent exact crash locations; they are approximated based on available information.
3) Diagrams are not to scale.

LEGEND

(X)	PROPERTY DAMAGE ONLY	VEHICLE PATH	OFF ROAD	REAR-END
(Y)	NON-INCAPACITATING INJURY	U-TURNING VEHICLE PATH	ROLLOVER	HEAD-ON
(Z)	INCAPACITATING INJURY	BICYCLE PATH	LEFT TURN	SIDESWIPE
(A)	FATALITY	PEDESTRIAN PATH	RIGHT TURN	OTHER
		FIXED OBJECT	ANGLE	

Year	K	A	BC	O	All
2022	0	1	1	18	20
2023	0	3	3	7	13
2024	0	3	3	9	15

RECOMMENDED FOR APPROVAL _____
DESIGN ENGINEER _____ DATE _____

DESIGNED: MDR
CHECKED: _____

DRAWN: EMW
CHECKED: _____

INDIANA DEPARTMENT OF TRANSPORTATION

146TH AVENUE/GREENFIELD DRIVE AT BODEN ROAD
CRASH DIAGRAM

HORIZONTAL SCALE 1" = 30'	BRIDGE FILE N/A
VERTICAL SCALE N/A	DESIGN VEHICLE WB-50
SURVEY BOOK	SHEETS of
CONTRACT R-XXXXX	PROJECT XXXXXXX

Intersection Images	146 th Street at Boden Road		
	Study Period: 1/1/2022 to 12/31/2024 Location: Noblesville		
	INDOT District: Greenfield	County: Hamilton	City/Town: Noblesville



West Leg – Looking West



West Leg – Looking East



East Leg – Looking West



East Leg – Looking East



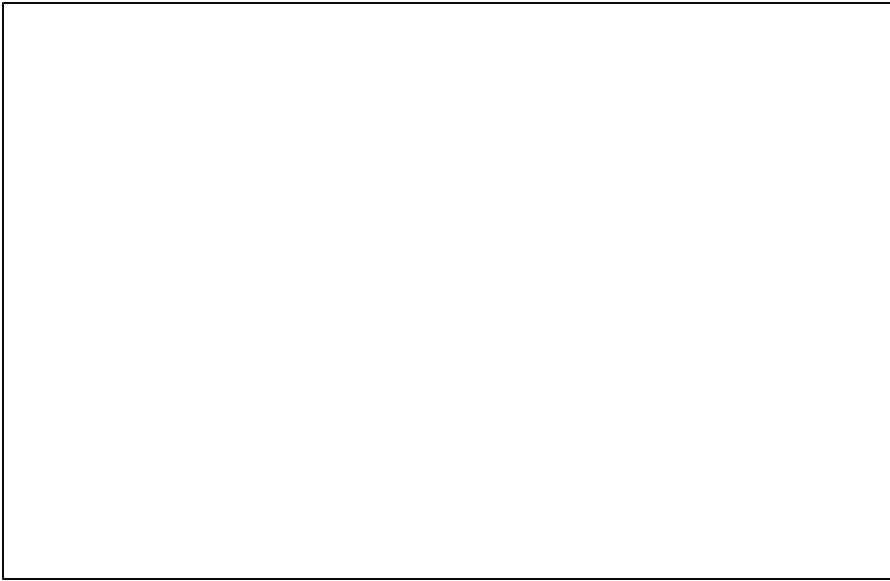
South Leg – Looking South



South Leg – Looking North



North Leg – Looking South



RoadHAT 4D	Index of Crash Frequency and Cost - Form F1		Page 1/2
Settings: Indiana local settings		Version: Version 4.1	
Location	146th Street/Greenfield Avenue at Boden Road		
GIS			
Post			
Analyst	Micah Reynolds, PE, RSP2I		
Date	4/30/2026		
INPUT			
Road Facility Type	City Arterial Intersection		
Busiest Road AADT (veh/day)	10858		
Crossing Road AADT (veh/day)	8421		
First Year with Crash Data (yyyy)	2022		
Last Year with Crash Data (yyyy)	2024		
Number of Crashes (crash/period)			
Fatal and Incapacitating Injury Crashes	7		
Non-Incapacitating and Possible Injury Crashes	7		
Property Damage Only Crashes	34		
Route or Road Type	City Arterial Intersection		
Average Crash Costs (\$)			
Fatal and Incapacitating Injury Crashes	1840100		
Non-Incapacitating and Possible Injury Crashes	393200		
Property Damage Only Crashes	40200		
Crash Cost Year (yyyy)	2017		
OUTPUT			
Expected Crash Frequency (crash/year)			
Fatal and Incapacitating Injury Crashes	0.229		
Non-Incapacitating and Possible Injury Crashes	0.53		
Property Damage Only Crashes	3.01		
All Crashes	3.77		
Index of Crash Frequency	3.12		
Index of Crash Cost	2.69		

RoadHAT 4D	Index of Crash Frequency and Cost - Form F1		Page 2/2
Settings: Indiana local settings		Version: Version 4.1	
Location	146th Street/Greenfield Avenue at Boden Road		
GIS			
Post			
Analyst	Micah Reynolds, PE, RSP2I		
Date	4/30/2026		
Comments: AADT from INDOT TCDS			

ATTACHMENT B

Traffic Counts

Leg	Greenfield				146th					Boden					Boden					Season Adj. Factor		Weekday Adj. Factor		Growth Rate	
Direction	Eastbound				Westbound					Northbound					Southbound					Boden 0.967		Boden 0.942		Design Year 2048	
Start Time	EBL	EBT	EBR	EBU	Total	WBL	WBT	WBR	WBU	Total	NBL	NBT	NBR	NBU	Total	SBL	SBT	SBR	SBU	Total	Int Total	146th/Greenfield 0.967	146th/Greenfield 0.942	Growth Factor 1.12	
4/23/26 7:30 AM	7	41	46	0	94	10	37	8	0	55	39	32	3	0	74	25	121	2	0	148	371	1205			
4/23/26 7:45 AM	4	72	58	0	134	18	53	6	0	77	31	48	5	0	84	43	94	4	0	141	436	1215			
4/23/26 8:00 AM	1	24	9	0	34	1	5	1	0	7	1	4	1	0	6	1	7	1	0	9	56	1163			
4/23/26 8:15 AM	0	42	48	0	90	14	36	4	0	54	37	57	7	0	101	28	69	0	0	97	342	1420			
4/23/26 8:30 AM	1	51	33	0	85	8	51	15	0	74	42	42	6	0	90	21	103	8	0	132	381	1388			
4/23/26 8:45 AM	2	60	32	0	94	10	56	18	0	84	41	40	9	0	90	25	87	4	0	116	384				
4/23/26 9:00 AM	3	42	50	0	95	6	43	8	0	57	25	33	9	0	67	26	67	1	0	94	313				
4/23/26 9:15 AM	3	36	37	0	76	11	50	12	0	73	41	34	4	0	79	19	61	2	0	82	310				
Grand Total	21	368	313	0	702	78	331	72	0	481	257	290	44	0	591	188	609	22	0	819	2593				
% Approach	3.0%	52.4%	44.6%	0.0%		16.2%	68.8%	15.0%	0.0%		43.5%	49.1%	7.4%	0.0%		23.0%	74.4%	2.7%	0.0%						
% Total	0.8%	14.2%	12.1%	0.0%	27.1%	3.0%	12.8%	2.8%	0.0%	18.5%	9.9%	11.2%	1.7%	0.0%	22.8%	7.3%	23.5%	0.8%	0.0%	31.6%					
PHF (8:15 AM - 9:15 AM)	0.500	0.813	0.815		0.958	0.864	0.830	0.625		0.801	0.863	1.024	0.861		0.967	0.962	0.791	0.406		0.831	0.924				
Lights	15	339	302	0	0	66	310	61	0	0	233	249	34	0	0	184	536	21	0	0	0				
% Lights	71.4%	92.1%	96.5%	0.0%	0.0%	84.6%	93.7%	84.7%	0.0%	0.0%	90.7%	85.9%	77.3%	0.0%	0.0%	97.9%	88.0%	95.5%	0.0%	0.0%	0.0%				
Articulated Trucks	4	18	6	0	0	11	15	4	0	0	15	27	9	0	0	2	53	1	0	0	0				
% Articulated Trucks	19.0%	4.9%	1.9%	0.0%	0.0%	14.1%	4.5%	5.6%	0.0%	0.0%	5.8%	9.3%	20.5%	0.0%	0.0%	1.1%	8.7%	4.5%	0.0%	0.0%	0.0%				
Buses and Single-Unit Trucks	1	7	5	0	0	1	5	7	0	0	8	14	1	0	0	2	18	0	0	0	0				
% Buses and Single-Unit Trucks	4.8%	1.9%	1.6%	0.0%	0.0%	1.3%	1.5%	9.7%	0.0%	0.0%	3.1%	4.8%	2.3%	0.0%	0.0%	1.1%	3.0%	0.0%	0.0%	0.0%	0.0%				
Peak Hour Total	6	195	163	0	364	38	186	45	0	269	145	172	31	0	348	100	326	13	0	439	1420				
Thursday	Eastbound				Westbound					Northbound					Southbound										
	Left	Thru	Right	U-Turn	Total	Left	Thru	Right	U-Turn	Total	Left	Thru	Right	U-Turn	Total	Left	Thru	Right	U-Turn	Total	Int Total				
Adjusted Total (2026)	5	178	148	0	332	35	169	41	0	245	132	157	28	0	317	91	297	12	0	400	1,293				
Heavy %)	23.8%	6.8%	3.5%	0.0%	0.0%	15.4%	6.0%	15.3%	0.0%	0.0%	8.9%	14.1%	22.7%	0.0%	0.0%	2.1%	11.7%	4.5%	0.0%	0.0%	0.0%				
Adjusted Total (2048)	6	198	166	0	370	39	189	46	0	273	147	175	32	0	354	102	331	13	0	446	1,444				

Leg	Greenfield Eastbound					146th Westbound					Boden Northbound					Boden Southbound					Season Adj. Factor		Weekday Adj. Factor		Growth Rate 0.50%	
Direction																					Boden 0.967		Boden 0.942		Design Year 2048	
Start Time	EBL	EBT	EBR	EBU	Total	WBL	WBT	WBR	WBU	Total	NBL	NBT	NBR	NBU	Total	SBL	SBT	SBR	SBU	Total	Int Total	146th/Greenfield 0.967	146th/Greenfield 0.942	Growth Factor 1.12		
4/23/26 4:15 PM	4	63	41	0	108	4	62	23	0	89	77	111	8	0	196	19	65	4	0	88	481	2255				
4/23/26 4:30 PM	2	73	48	0	123	18	103	32	0	153	90	98	11	0	199	34	85	4	0	123	598	2413				
4/23/26 4:45 PM	8	88	60	0	156	11	67	29	0	107	76	114	11	0	201	27	85	1	0	113	577	2397				
4/23/26 5:00 PM	4	88	64	0	156	17	85	30	0	132	93	100	16	0	209	30	66	6	0	102	599	2361				
4/23/26 5:15 PM	13	77	48	0	138	7	100	26	0	133	102	137	8	0	247	26	89	6	0	121	639					
4/23/26 5:30 PM	6	94	62	0	162	5	61	29	0	95	86	103	7	0	196	22	104	3	0	129	582					
4/23/26 5:45 PM	2	69	59	0	130	12	74	21	0	107	75	107	8	0	190	32	77	5	0	114	541					
Grand Total	39	552	382	0	973	74	552	190	0	816	599	770	69	0	1438	190	571	29	0	790	4017					
% Approach	4.0%	56.7%	39.3%	0.0%		9.1%	67.6%	23.3%	0.0%		41.7%	53.5%	4.8%	0.0%		24.1%	72.3%	3.7%	0.0%							
% Total	1.0%	13.7%	9.5%	0.0%	24.2%	1.8%	13.7%	4.7%	0.0%	20.3%	14.9%	19.2%	1.7%	0.0%	35.8%	4.7%	14.2%	0.7%	0.0%	19.7%						
PHF (4:30 PM - 5:30 PM)	0.519	0.926	0.859		0.918	0.736	0.862	0.914		0.858	0.885	0.819	0.719		0.866	0.860	0.913	0.708		0.933	0.944					
Lights	39	534	373	0	0	71	535	186	0	0	586	745	62	0	0	188	553	28	0	0	0					
% Lights	100.0%	96.7%	97.6%		0.0%	95.9%	96.9%	97.9%		0.0%	97.8%	96.8%	89.9%		0.0%	98.9%	96.8%	96.6%		0.0%	0.0%					
Articulated Trucks	0	8	9	0	0	3	6	1	0	0	9	19	6	0	0	1	13	0	0	0	0					
% Articulated Trucks	0.0%	1.4%	2.4%		0.0%	4.1%	1.1%	0.5%		0.0%	1.5%	2.5%	8.7%		0.0%	0.5%	2.3%	0.0%		0.0%	0.0%					
Buses and Single-Unit Trucks	0	3	0	0	0	0	8	3	0	0	3	5	0	0	0	1	5	1	0	0	0					
% Buses and Single-Unit Trucks	0.0%	0.5%	0.0%		0.0%	0.0%	1.4%	1.6%		0.0%	0.5%	0.6%	0.0%		0.0%	0.5%	0.9%	3.4%		0.0%	0.0%					
Peak Hour Total	27	326	220	0	573	53	355	117	0	525	361	449	46	0	856	117	325	17	0	459	2413					
Thursday	Eastbound					Westbound					Northbound					Southbound										
	Left	Thru	Right	U-Turn	Total	Left	Thru	Right	U-Turn	Total	Left	Thru	Right	U-Turn	Total	Left	Thru	Right	U-Turn	Total	Int Total					
Adjusted Total (2026)	25	297	200	0	522	48	323	107	0	478	329	409	42	0	780	107	296	15	0	418	2,198					
Heavy %)	0.0%	2.0%	2.4%	0.0%	0.0%	4.1%	2.5%	2.1%	0.0%	0.0%	2.0%	3.1%	8.7%	0.0%	0.0%	1.1%	3.2%	3.4%	0.0%	0.0%	0.0%					
Adjusted Total (2048)	27	331	224	0	582	54	361	119	0	534	367	456	47	0	870	119	330	17	0	467	2,452					

ATTACHMENT C

Traffic Analysis

Lanes, Volumes, Timings

3:

06/11/2026

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	5	178	148	35	169	41	132	157	28	91	297	12
Future Volume (vph)	5	178	148	35	169	41	132	157	28	91	297	12
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	350		350	350		350	500		125	350		0
Storage Lanes	1		1	1		1	1		1	1		0
Taper Length (ft)	150			150			100			150		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	0.95
Frt			0.850			0.850			0.850		0.994	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1456	1776	1553	1570	1792	1404	1656	3167	1313	1770	3212	0
Flt Permitted	0.641			0.493			0.508			0.644		
Satd. Flow (perm)	982	1776	1553	815	1792	1404	886	3167	1313	1200	3212	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			161			101			101		6	
Link Speed (mph)		35			35			35			35	
Link Distance (ft)		1560			642			1548			1457	
Travel Time (s)		30.4			12.5			30.2			28.4	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	24%	7%	4%	15%	6%	15%	9%	14%	23%	2%	12%	5%
Adj. Flow (vph)	5	193	161	38	184	45	143	171	30	99	323	13
Shared Lane Traffic (%)												
Lane Group Flow (vph)	5	193	161	38	184	45	143	171	30	99	336	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			16			16	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2	1	1	2	1	1	2	1	1	2	
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	
Leading Detector (ft)	20	100	20	20	100	20	20	100	20	20	100	
Trailing Detector (ft)	0	0	0	0	0	0	0	0	0	0	0	
Detector 1 Position(ft)	0	0	0	0	0	0	0	0	0	0	0	
Detector 1 Size(ft)	20	6	20	20	6	20	20	6	20	20	6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	pm+pt	NA	pm+ov	pm+pt	NA	pm+ov	pm+pt	NA	pm+ov	pm+pt	NA	
Protected Phases	7	4	5	3	8	1	5	2	3	1	6	

AM Peak - 2026 11:35 am 06/10/2026 Baseline

Synchro 12 Report

Page 1

Lanes, Volumes, Timings

3:

06/11/2026

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	4		4	8		8	2		2	6		
Detector Phase	7	4	5	3	8	1	5	2	3	1	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	
Minimum Split (s)	9.5	22.5	9.5	9.5	22.5	9.5	9.5	22.5	9.5	9.5	22.5	
Total Split (s)	9.5	22.5	10.0	9.5	22.5	9.8	10.0	23.2	9.5	9.8	23.0	
Total Split (%)	14.6%	34.6%	15.4%	14.6%	34.6%	15.1%	15.4%	35.7%	14.6%	15.1%	35.4%	
Maximum Green (s)	5.0	18.0	5.5	5.0	18.0	5.3	5.5	18.7	5.0	5.3	18.5	
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	
Lead/Lag	Lead	Lag	Lead	Lead	Lag	Lead	Lead	Lag	Lead	Lead	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	None	None	None	None	None	None	C-Max	None	None	C-Max	
Walk Time (s)		7.0			7.0			7.0			7.0	
Flash Dont Walk (s)		11.0			11.0			11.0			11.0	
Pedestrian Calls (#/hr)		0			0			0			0	
Act Effct Green (s)	15.3	12.3	24.1	17.1	16.1	27.3	35.0	28.8	38.3	32.9	26.2	
Actuated g/C Ratio	0.24	0.19	0.37	0.26	0.25	0.42	0.54	0.44	0.59	0.51	0.40	
v/c Ratio	0.01	0.57	0.23	0.13	0.41	0.06	0.25	0.12	0.03	0.14	0.25	
Control Delay (s/veh)	12.8	30.3	3.2	14.9	22.3	0.5	9.8	14.9	0.0	9.3	15.8	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay (s/veh)	12.8	30.3	3.2	14.9	22.3	0.5	9.8	14.9	0.0	9.3	15.8	
LOS	B	C	A	B	C	A	A	B	A	A	B	
Approach Delay (s/veh)		17.9			17.6			11.6			14.4	
Approach LOS		B			B			B			B	
Queue Length 50th (ft)	1	70	0	10	53	0	27	24	0	18	50	
Queue Length 95th (ft)	7	117	29	25	112	3	63	48	0	46	87	
Internal Link Dist (ft)		1480			562			1468			1377	
Turn Bay Length (ft)	350		350	350		350	500		125	350		
Base Capacity (vph)	267	491	677	272	548	647	564	1404	815	666	1298	
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	
Reduced v/c Ratio	0.02	0.39	0.24	0.14	0.34	0.07	0.25	0.12	0.04	0.15	0.26	
Intersection Summary												
Area Type:	Other											
Cycle Length: 65												
Actuated Cycle Length: 65												
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green												
Natural Cycle: 65												
Control Type: Actuated-Coordinated												
Maximum v/c Ratio: 0.58												
Intersection Signal Delay (s/veh): 15.2				Intersection LOS: B								
Intersection Capacity Utilization 44.4%				ICU Level of Service A								
Analysis Period (min) 15												

AM Peak - 2026 11:35 am 06/10/2026 Baseline

Synchro 12 Report
Page 2

Splits and Phases: 3:



Lanes, Volumes, Timings

3:

06/11/2026

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	25	297	200	48	323	107	329	409	42	107	296	15
Future Volume (vph)	25	297	200	48	323	107	329	409	42	107	296	15
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	350		350	350		350	500		125	350		0
Storage Lanes	1		1	1		1	1		1	1		0
Taper Length (ft)	150			150			100			150		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	0.95
Frt			0.850			0.850			0.850		0.993	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1805	1863	1583	1736	1845	1583	1770	3505	1482	1787	3480	0
Flt Permitted	0.415			0.341			0.475			0.499		
Satd. Flow (perm)	788	1863	1583	623	1845	1583	885	3505	1482	939	3480	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			213			114			101		8	
Link Speed (mph)		35			35			35			35	
Link Distance (ft)		1560			642			1548			1457	
Travel Time (s)		30.4			12.5			30.2			28.4	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Heavy Vehicles (%)	0%	2%	2%	4%	3%	2%	2%	3%	9%	1%	3%	3%
Adj. Flow (vph)	27	316	213	51	344	114	350	435	45	114	315	16
Shared Lane Traffic (%)												
Lane Group Flow (vph)	27	316	213	51	344	114	350	435	45	114	331	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			16			16	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2	1	1	2	1	1	2	1	1	2	
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	
Leading Detector (ft)	20	100	20	20	100	20	20	100	20	20	100	
Trailing Detector (ft)	0	0	0	0	0	0	0	0	0	0	0	
Detector 1 Position(ft)	0	0	0	0	0	0	0	0	0	0	0	
Detector 1 Size(ft)	20	6	20	20	6	20	20	6	20	20	6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	pm+pt	NA	pm+ov	pm+pt	NA	pm+ov	pm+pt	NA	pm+ov	pm+pt	NA	
Protected Phases	7	4	5	3	8	1	5	2	3	1	6	

PM Peak - 2026 11:36 am 06/10/2026 Baseline

Synchro 12 Report

Page 1

Lanes, Volumes, Timings

3:

06/11/2026

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	4		4	8		8	2		2	6		
Detector Phase	7	4	5	3	8	1	5	2	3	1	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	
Minimum Split (s)	9.5	22.5	9.5	9.5	22.5	9.5	9.5	22.5	9.5	9.5	22.5	
Total Split (s)	9.5	22.5	10.0	9.5	22.5	10.0	10.0	23.0	9.5	10.0	23.0	
Total Split (%)	14.6%	34.6%	15.4%	14.6%	34.6%	15.4%	15.4%	35.4%	14.6%	15.4%	35.4%	
Maximum Green (s)	5.0	18.0	5.5	5.0	18.0	5.5	5.5	18.5	5.0	5.5	18.5	
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	
Lead/Lag	Lead	Lag	Lead	Lead	Lag	Lead	Lead	Lag	Lead	Lead	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	None	None	None	None	None	None	C-Max	None	None	C-Max	
Walk Time (s)		7.0			7.0			7.0			7.0	
Flash Dont Walk (s)		11.0			11.0			11.0			11.0	
Pedestrian Calls (#/hr)		0			0			0			0	
Act Effct Green (s)	19.4	15.4	27.3	21.2	19.2	29.9	30.0	24.3	33.8	27.3	21.1	
Actuated g/C Ratio	0.30	0.24	0.42	0.33	0.30	0.46	0.46	0.37	0.52	0.42	0.32	
v/c Ratio	0.08	0.71	0.27	0.17	0.63	0.14	0.68	0.33	0.05	0.24	0.29	
Control Delay (s/veh)	12.1	32.1	2.9	13.2	25.9	3.2	24.7	18.0	0.4	11.9	18.0	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay (s/veh)	12.1	32.1	2.9	13.2	25.9	3.2	24.7	18.0	0.4	11.9	18.0	
LOS	B	C	A	B	C	A	C	B	A	B	B	
Approach Delay (s/veh)		20.0			19.6			19.9			16.5	
Approach LOS		B			B			B			B	
Queue Length 50th (ft)	6	113	0	12	98	0	87	73	0	24	52	
Queue Length 95th (ft)	19	185	33	29	#205	25	#220	111	3	53	84	
Internal Link Dist (ft)		1480			562			1468			1377	
Turn Bay Length (ft)	350		350	350		350	500		125	350		
Base Capacity (vph)	314	515	788	288	583	789	508	1312	819	474	1136	
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	
Reduced v/c Ratio	0.09	0.61	0.27	0.18	0.59	0.14	0.69	0.33	0.05	0.24	0.29	
Intersection Summary												
Area Type:	Other											
Cycle Length: 65												
Actuated Cycle Length: 65												
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green												
Natural Cycle: 65												
Control Type: Actuated-Coordinated												
Maximum v/c Ratio: 0.72												
Intersection Signal Delay (s/veh): 19.2						Intersection LOS: B						
Intersection Capacity Utilization 63.1%						ICU Level of Service B						
Analysis Period (min) 15												

Lanes, Volumes, Timings

3:

06/11/2026

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 3:



Lanes, Volumes, Timings

3:

06/11/2026

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	5	178	148	35	169	41	132	157	28	91	297	12
Future Volume (vph)	5	178	148	35	169	41	132	157	28	91	297	12
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	350		350	350		350	500		125	350		0
Storage Lanes	1		1	1		1	1		1	1		0
Taper Length (ft)	150			150			100			150		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	0.95
Frt			0.850			0.850			0.850		0.994	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1456	1776	1553	1570	1792	1404	1656	3167	1313	1770	3212	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1456	1776	1553	1570	1792	1404	1656	3167	1313	1770	3212	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			161			101			101		6	
Link Speed (mph)		35			35			35			35	
Link Distance (ft)		1560			642			1548			1457	
Travel Time (s)		30.4			12.5			30.2			28.4	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	24%	7%	4%	15%	6%	15%	9%	14%	23%	2%	12%	5%
Adj. Flow (vph)	5	193	161	38	184	45	143	171	30	99	323	13
Shared Lane Traffic (%)												
Lane Group Flow (vph)	5	193	161	38	184	45	143	171	30	99	336	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			16			16	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2	1	1	2	1	1	2	1	1	2	
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	
Leading Detector (ft)	20	100	20	20	100	20	20	100	20	20	100	
Trailing Detector (ft)	0	0	0	0	0	0	0	0	0	0	0	
Detector 1 Position(ft)	0	0	0	0	0	0	0	0	0	0	0	
Detector 1 Size(ft)	20	6	20	20	6	20	20	6	20	20	6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Prot	NA	pm+ov	Prot	NA	pm+ov	Prot	NA	pm+ov	Prot	NA	
Protected Phases	7	4	5	3	8	1	5	2	3	1	6	

AM Peak - 2026 - Protected Only 11:36 am 06/10/2026 Baseline

Synchro 12 Report

Page 1

Lanes, Volumes, Timings

3:

06/11/2026

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	4			8			2					
Detector Phase	7	4	5	3	8	1	5	2	3	1	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	
Minimum Split (s)	9.5	22.5	9.5	9.5	22.5	9.5	9.5	22.5	9.5	9.5	22.5	
Total Split (s)	9.5	22.5	10.0	9.5	22.5	9.5	10.0	23.5	9.5	9.5	23.0	
Total Split (%)	14.6%	34.6%	15.4%	14.6%	34.6%	14.6%	15.4%	36.2%	14.6%	14.6%	35.4%	
Maximum Green (s)	5.0	18.0	5.5	5.0	18.0	5.0	5.5	19.0	5.0	5.0	18.5	
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	
Lead/Lag	Lead	Lag	Lead	Lead	Lag	Lead	Lead	Lag	Lead	Lead	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	None	None	None	None	None	None	C-Max	None	None	C-Max	
Walk Time (s)		7.0			7.0			7.0			7.0	
Flash Dont Walk (s)		11.0			11.0			11.0			11.0	
Pedestrian Calls (#/hr)		0			0			0			0	
Act Effct Green (s)	5.0	12.3	27.0	5.0	16.1	28.4	10.2	27.9	37.4	7.8	23.3	
Actuated g/C Ratio	0.08	0.19	0.42	0.08	0.25	0.44	0.16	0.43	0.58	0.12	0.36	
v/c Ratio	0.04	0.57	0.21	0.31	0.41	0.06	0.55	0.12	0.03	0.46	0.29	
Control Delay (s/veh)	28.8	30.3	3.0	35.7	22.3	0.5	38.5	15.4	0.0	36.0	17.2	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay (s/veh)	28.8	30.3	3.0	35.7	22.3	0.5	38.5	15.4	0.0	36.0	17.2	
LOS	C	C	A	D	C	A	D	B	A	D	B	
Approach Delay (s/veh)		18.1			20.6			23.7			21.5	
Approach LOS		B			C			C			C	
Queue Length 50th (ft)	2	70	0	15	53	0	52	25	0	36	54	
Queue Length 95th (ft)	11	117	29	41	112	3	#149	47	0	#98	87	
Internal Link Dist (ft)		1480			562			1468			1377	
Turn Bay Length (ft)	350		350	350		350	500		125	350		
Base Capacity (vph)	112	491	738	120	548	670	259	1357	797	213	1156	
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	
Reduced v/c Ratio	0.04	0.39	0.22	0.32	0.34	0.07	0.55	0.13	0.04	0.46	0.29	
Intersection Summary												
Area Type:	Other											
Cycle Length: 65												
Actuated Cycle Length: 65												
Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of Green												
Natural Cycle: 65												
Control Type: Actuated-Coordinated												
Maximum v/c Ratio: 0.58												
Intersection Signal Delay (s/veh): 21.0						Intersection LOS: C						
Intersection Capacity Utilization 44.4%						ICU Level of Service A						
Analysis Period (min) 15												

AM Peak - 2026 - Protected Only 11:36 am 06/10/2026 Baseline

Synchro 12 Report
Page 2

Lanes, Volumes, Timings

3:

06/11/2026

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Splits and Phases: 3:



Lanes, Volumes, Timings

3:

06/11/2026

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	25	297	200	48	323	107	329	409	42	107	296	15
Future Volume (vph)	25	297	200	48	323	107	329	409	42	107	296	15
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	350		350	350		350	500		125	350		0
Storage Lanes	1		1	1		1	1		1	1		0
Taper Length (ft)	150			150			100			150		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	0.95
Frt			0.850			0.850			0.850		0.993	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1752	1845	1568	1752	1845	1568	1752	3505	1568	1752	3480	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1752	1845	1568	1752	1845	1568	1752	3505	1568	1752	3480	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			213			143			82		6	
Link Speed (mph)		35			35			35			35	
Link Distance (ft)		1560			642			1548			1457	
Travel Time (s)		30.4			12.5			30.2			28.4	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Heavy Vehicles (%)	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%
Adj. Flow (vph)	27	316	213	51	344	114	350	435	45	114	315	16
Shared Lane Traffic (%)												
Lane Group Flow (vph)	27	316	213	51	344	114	350	435	45	114	331	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			16			16	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2	1	1	2	1	1	2	1	1	2	
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	
Leading Detector (ft)	20	100	20	20	100	20	20	100	20	20	100	
Trailing Detector (ft)	0	0	0	0	0	0	0	0	0	0	0	
Detector 1 Position(ft)	0	0	0	0	0	0	0	0	0	0	0	
Detector 1 Size(ft)	20	6	20	20	6	20	20	6	20	20	6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Prot	NA	pm+ov	Prot	NA	pm+ov	Prot	NA	pm+ov	Prot	NA	
Protected Phases	7	4	5	3	8	1	5	2	3	1	6	

PM Peak - 2026 - Protected Only 11:37 am 06/10/2026 Baseline

Synchro 12 Report

Page 1

Lanes, Volumes, Timings

3:

06/11/2026

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	4			8			2					
Detector Phase	7	4	5	3	8	1	5	2	3	1	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	
Minimum Split (s)	9.5	22.5	9.5	9.5	22.5	9.5	9.5	22.5	9.5	9.5	22.5	
Total Split (s)	9.5	23.0	24.0	9.5	23.0	16.3	24.0	31.2	9.5	16.3	23.5	
Total Split (%)	11.9%	28.8%	30.0%	11.9%	28.8%	20.4%	30.0%	39.0%	11.9%	20.4%	29.4%	
Maximum Green (s)	5.0	18.5	19.5	5.0	18.5	11.8	19.5	26.7	5.0	11.8	19.0	
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	
Lead/Lag	Lead	Lag	Lead	Lead	Lag	Lead	Lead	Lag	Lead	Lead	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	None	None	None	None	None	None	C-Max	None	None	C-Max	
Walk Time (s)		7.0			7.0			7.0			7.0	
Flash Dont Walk (s)		11.0			11.0			11.0			11.0	
Pedestrian Calls (#/hr)		0			0			0			0	
Act Effct Green (s)	5.0	17.2	40.2	5.0	21.0	35.4	18.5	31.8	41.3	9.9	23.2	
Actuated g/C Ratio	0.06	0.22	0.50	0.06	0.26	0.44	0.23	0.40	0.52	0.12	0.29	
v/c Ratio	0.24	0.79	0.23	0.46	0.71	0.14	0.86	0.31	0.05	0.53	0.32	
Control Delay (s/veh)	41.5	45.7	2.2	50.8	36.9	2.0	51.8	18.9	1.1	41.5	24.7	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay (s/veh)	41.5	45.7	2.2	50.8	36.9	2.0	51.8	18.9	1.1	41.5	24.7	
LOS	D	D	A	D	D	A	D	B	A	D	C	
Approach Delay (s/veh)		28.9			30.5			31.9			29.1	
Approach LOS		C			C			C			C	
Queue Length 50th (ft)	13	147	0	25	135	0	166	83	0	54	72	
Queue Length 95th (ft)	38	#262	30	#66	#297	19	#303	124	7	103	110	
Internal Link Dist (ft)		1480			562			1468			1377	
Turn Bay Length (ft)	350		350	350		350	500		125	350		
Base Capacity (vph)	109	426	910	109	504	807	427	1393	849	258	1012	
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	
Reduced v/c Ratio	0.25	0.74	0.23	0.47	0.68	0.14	0.82	0.31	0.05	0.44	0.33	
Intersection Summary												
Area Type:	Other											
Cycle Length: 80												
Actuated Cycle Length: 80												
Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of Green												
Natural Cycle: 80												
Control Type: Actuated-Coordinated												
Maximum v/c Ratio: 0.86												
Intersection Signal Delay (s/veh): 30.3						Intersection LOS: C						
Intersection Capacity Utilization 63.1%						ICU Level of Service B						
Analysis Period (min) 15												

PM Peak - 2026 - Protected Only 11:37 am 06/10/2026 Baseline

Synchro 12 Report
Page 2

Lanes, Volumes, Timings

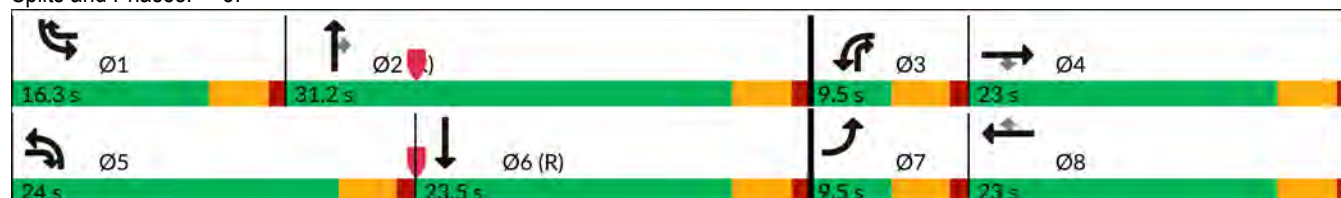
3:

06/11/2026

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Splits and Phases: 3:



Lanes, Volumes, Timings

3:

06/11/2026

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	5	178	148	35	169	41	132	157	28	91	297	12
Future Volume (vph)	5	178	148	35	169	41	132	157	28	91	297	12
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	350		350	350		350	500		125	350		0
Storage Lanes	1		1	1		1	1		1	1		0
Taper Length (ft)	150			150			100			150		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	0.95
Frt			0.850			0.850			0.850		0.994	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1752	1845	1568	1752	1845	1568	1752	3505	1568	1752	3484	0
Flt Permitted	0.629			0.457			0.477			0.632		
Satd. Flow (perm)	1160	1845	1568	843	1845	1568	880	3505	1568	1166	3484	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			180			101			101		6	
Link Speed (mph)		35			35			35			35	
Link Distance (ft)		1560			642			1548			1457	
Travel Time (s)		30.4			12.5			30.2			28.4	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	112%	112%	112%	112%	112%	112%	112%	112%	112%	112%	112%	112%
Heavy Vehicles (%)	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%
Adj. Flow (vph)	6	217	180	43	206	50	161	191	34	111	362	15
Shared Lane Traffic (%)												
Lane Group Flow (vph)	6	217	180	43	206	50	161	191	34	111	377	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			16			16	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2	1	1	2	1	1	2	1	1	2	
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	
Leading Detector (ft)	20	100	20	20	100	20	20	100	20	20	100	
Trailing Detector (ft)	0	0	0	0	0	0	0	0	0	0	0	
Detector 1 Position(ft)	0	0	0	0	0	0	0	0	0	0	0	
Detector 1 Size(ft)	20	6	20	20	6	20	20	6	20	20	6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	pm+pt	NA	pm+ov	pm+pt	NA	pm+ov	pm+pt	NA	pm+ov	pm+pt	NA	

AM Peak - 2048 4:42 pm 06/09/2026 Baseline

Synchro 12 Report

Page 1

Lanes, Volumes, Timings

3:

06/11/2026

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Protected Phases	7	4	5	3	8	1	5	2	3	1	6	
Permitted Phases	4		4	8		8	2		2	6		
Detector Phase	7	4	5	3	8	1	5	2	3	1	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	
Minimum Split (s)	9.5	22.5	9.5	9.5	22.5	9.5	9.5	22.5	9.5	9.5	22.5	
Total Split (s)	9.5	22.5	10.0	9.5	22.5	10.0	10.0	23.0	9.5	10.0	23.0	
Total Split (%)	14.6%	34.6%	15.4%	14.6%	34.6%	15.4%	15.4%	35.4%	14.6%	15.4%	35.4%	
Maximum Green (s)	5.0	18.0	5.5	5.0	18.0	5.5	5.5	18.5	5.0	5.5	18.5	
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	
Lead/Lag	Lead	Lag	Lead	Lead	Lag	Lead	Lead	Lag	Lead	Lead	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	None	None	None	None	None	None	C-Max	None	None	C-Max	
Walk Time (s)		7.0			7.0			7.0			7.0	
Flash Dont Walk (s)		11.0			11.0			11.0			11.0	
Pedestrian Calls (#/hr)		0			0			0			0	
Act Effct Green (s)	15.8	12.8	24.5	17.6	16.6	27.9	34.2	28.2	37.7	32.6	25.8	
Actuated g/C Ratio	0.24	0.20	0.38	0.27	0.26	0.43	0.53	0.43	0.58	0.50	0.40	
v/c Ratio	0.01	0.59	0.25	0.14	0.43	0.06	0.28	0.12	0.03	0.17	0.27	
Control Delay (s/veh)	12.3	30.1	3.1	14.5	22.2	0.8	10.5	15.2	0.0	9.7	16.0	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay (s/veh)	12.3	30.1	3.1	14.5	22.2	0.8	10.5	15.2	0.0	9.7	16.0	
LOS	B	C	A	B	C	A	B	B	A	A	B	
Approach Delay (s/veh)		17.8			17.6			11.9			14.6	
Approach LOS		B			B			B			B	
Queue Length 50th (ft)	2	79	0	11	59	0	31	27	0	21	58	
Queue Length 95th (ft)	7	128	31	26	122	5	71	52	0	51	96	
Internal Link Dist (ft)		1480			562			1468			1377	
Turn Bay Length (ft)	350		350	350		350	500		125	350		
Base Capacity (vph)	327	510	702	298	570	730	559	1520	951	646	1387	
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	
Reduced v/c Ratio	0.02	0.43	0.26	0.14	0.36	0.07	0.29	0.13	0.04	0.17	0.27	

Intersection Summary

Area Type: Other

Cycle Length: 65

Actuated Cycle Length: 65

Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green

Natural Cycle: 65

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.60

Intersection Signal Delay (s/veh): 15.3

Intersection LOS: B

Intersection Capacity Utilization 47.5%

ICU Level of Service A

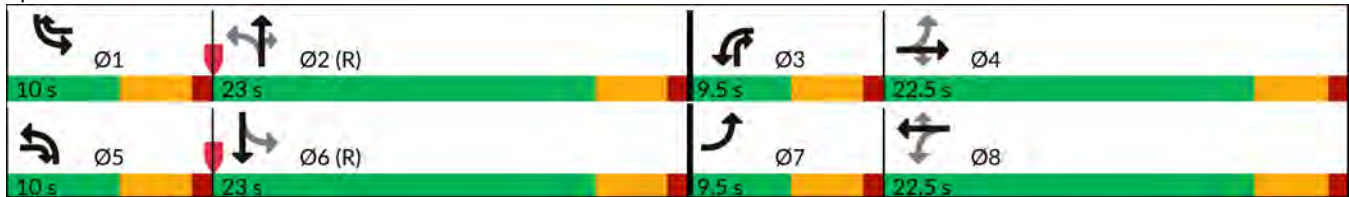
AM Peak - 2048 4:42 pm 06/09/2026 Baseline

Synchro 12 Report

Page 2

Analysis Period (min) 15

Splits and Phases: 3:



Lanes, Volumes, Timings

3:

06/11/2026

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	25	297	200	48	323	107	329	409	42	107	296	15
Future Volume (vph)	25	297	200	48	323	107	329	409	42	107	296	15
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	350		350	350		350	500		125	350		0
Storage Lanes	1		1	1		1	1		1	1		0
Taper Length (ft)	150			150			100			150		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	0.95
Frt			0.850			0.850			0.850		0.993	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1805	1863	1583	1736	1845	1583	1770	3505	1482	1787	3480	0
Flt Permitted	0.335			0.280			0.394			0.475		
Satd. Flow (perm)	636	1863	1583	512	1845	1583	734	3505	1482	894	3480	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			238			127			94		7	
Link Speed (mph)		35			35			35			35	
Link Distance (ft)		1560			642			1548			1457	
Travel Time (s)		30.4			12.5			30.2			28.4	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Growth Factor	112%	112%	112%	112%	112%	112%	112%	112%	112%	112%	112%	112%
Heavy Vehicles (%)	0%	2%	2%	4%	3%	2%	2%	3%	9%	1%	3%	3%
Adj. Flow (vph)	30	354	238	57	385	127	392	487	50	127	353	18
Shared Lane Traffic (%)												
Lane Group Flow (vph)	30	354	238	57	385	127	392	487	50	127	371	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			16			16	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2	1	1	2	1	1	2	1	1	2	
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	
Leading Detector (ft)	20	100	20	20	100	20	20	100	20	20	100	
Trailing Detector (ft)	0	0	0	0	0	0	0	0	0	0	0	
Detector 1 Position(ft)	0	0	0	0	0	0	0	0	0	0	0	
Detector 1 Size(ft)	20	6	20	20	6	20	20	6	20	20	6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	pm+pt	NA	pm+ov	pm+pt	NA	pm+ov	pm+pt	NA	pm+ov	pm+pt	NA	

PM Peak - 2048 8:52 am 05/18/2026 Baseline

Synchro 12 Report

Page 1

Lanes, Volumes, Timings

3:

06/11/2026

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Protected Phases	7	4	5	3	8	1	5	2	3	1	6	
Permitted Phases	4		4	8		8	2		2	6		
Detector Phase	7	4	5	3	8	1	5	2	3	1	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	
Minimum Split (s)	9.5	22.5	9.5	9.5	22.5	9.5	9.5	22.5	9.5	9.5	22.5	
Total Split (s)	9.5	22.5	15.0	9.5	22.5	10.8	15.0	27.2	9.5	10.8	23.0	
Total Split (%)	13.6%	32.1%	21.4%	13.6%	32.1%	15.4%	21.4%	38.9%	13.6%	15.4%	32.9%	
Maximum Green (s)	5.0	18.0	10.5	5.0	18.0	6.3	10.5	22.7	5.0	6.3	18.5	
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	
Lead/Lag	Lead	Lag	Lead	Lead	Lag	Lead	Lead	Lag	Lead	Lead	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	None	None	None	None	None	None	C-Max	None	None	C-Max	
Walk Time (s)		7.0			7.0			7.0			7.0	
Flash Dont Walk (s)		11.0			11.0			11.0			11.0	
Pedestrian Calls (#/hr)		0			0			0			0	
Act Effct Green (s)	20.8	16.8	32.0	22.6	20.6	31.5	36.2	25.7	35.2	27.8	21.4	
Actuated g/C Ratio	0.30	0.24	0.46	0.32	0.29	0.45	0.52	0.37	0.50	0.40	0.31	
v/c Ratio	0.11	0.79	0.27	0.22	0.70	0.16	0.72	0.37	0.06	0.29	0.34	
Control Delay (s/veh)	14.3	39.2	2.6	15.9	31.6	3.4	22.2	18.5	0.9	12.5	20.9	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay (s/veh)	14.3	39.2	2.6	15.9	31.6	3.4	22.2	18.5	0.9	12.5	20.9	
LOS	B	D	A	B	C	A	C	B	A	B	C	
Approach Delay (s/veh)		24.0			23.8			19.1			18.8	
Approach LOS		C			C			B			B	
Queue Length 50th (ft)	8	140	0	15	123	0	107	85	0	29	67	
Queue Length 95th (ft)	23	#256	33	36	#291	28	#171	125	6	57	104	
Internal Link Dist (ft)		1480			562			1468			1377	
Turn Bay Length (ft)	350		350	350		350	500		125	350		
Base Capacity (vph)	272	479	856	252	565	784	542	1287	792	439	1070	
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	
Reduced v/c Ratio	0.11	0.74	0.28	0.23	0.68	0.16	0.72	0.38	0.06	0.29	0.35	

Intersection Summary

Area Type: Other

Cycle Length: 70

Actuated Cycle Length: 70

Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green

Natural Cycle: 70

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.79

Intersection Signal Delay (s/veh): 21.2

Intersection LOS: C

Intersection Capacity Utilization 68.3%

ICU Level of Service C

PM Peak - 2048 8:52 am 05/18/2026 Baseline

Synchro 12 Report

Page 2

Lanes, Volumes, Timings

3:

06/11/2026

Analysis Period (min) 15

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Splits and Phases: 3:



Lanes, Volumes, Timings

3:

06/11/2026

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	5	178	148	35	169	41	132	157	28	91	297	12
Future Volume (vph)	5	178	148	35	169	41	132	157	28	91	297	12
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	350		350	350		350	500		125	350		0
Storage Lanes	1		1	1		1	1		1	1		0
Taper Length (ft)	150			150			100			150		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	0.95
Frt			0.850			0.850			0.850		0.994	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1456	1776	1553	1570	1792	1404	1656	3167	1313	1770	3212	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1456	1776	1553	1570	1792	1404	1656	3167	1313	1770	3212	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			180			101			101		6	
Link Speed (mph)		35			35			35			35	
Link Distance (ft)		1560			642			1548			1457	
Travel Time (s)		30.4			12.5			30.2			28.4	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	112%	112%	112%	112%	112%	112%	112%	112%	112%	112%	112%	112%
Heavy Vehicles (%)	24%	7%	4%	15%	6%	15%	9%	14%	23%	2%	12%	5%
Adj. Flow (vph)	6	217	180	43	206	50	161	191	34	111	362	15
Shared Lane Traffic (%)												
Lane Group Flow (vph)	6	217	180	43	206	50	161	191	34	111	377	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			16			16	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2	1	1	2	1	1	2	1	1	2	
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	
Leading Detector (ft)	20	100	20	20	100	20	20	100	20	20	100	
Trailing Detector (ft)	0	0	0	0	0	0	0	0	0	0	0	
Detector 1 Position(ft)	0	0	0	0	0	0	0	0	0	0	0	
Detector 1 Size(ft)	20	6	20	20	6	20	20	6	20	20	6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Prot	NA	pm+ov	Prot	NA	pm+ov	Prot	NA	pm+ov	Prot	NA	

AM Peak - 2048 - Protected Only 4:52 pm 06/09/2026 Baseline

Synchro 12 Report

Page 1

Lanes, Volumes, Timings

3:

06/11/2026

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Protected Phases	7	4	5	3	8	1	5	2	3	1	6	
Permitted Phases			4			8			2			
Detector Phase	7	4	5	3	8	1	5	2	3	1	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	
Minimum Split (s)	9.5	22.5	9.5	9.5	22.5	9.5	9.5	22.5	9.5	9.5	22.5	
Total Split (s)	9.5	22.5	10.0	9.5	22.5	9.5	10.0	23.5	9.5	9.5	23.0	
Total Split (%)	14.6%	34.6%	15.4%	14.6%	34.6%	14.6%	15.4%	36.2%	14.6%	14.6%	35.4%	
Maximum Green (s)	5.0	18.0	5.5	5.0	18.0	5.0	5.5	19.0	5.0	5.0	18.5	
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	
Lead/Lag	Lead	Lag	Lead	Lead	Lag	Lead	Lead	Lag	Lead	Lead	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	None	None	None	None	None	None	C-Max	None	None	C-Max	
Walk Time (s)		7.0			7.0			7.0			7.0	
Flash Dont Walk (s)		11.0			11.0			11.0			11.0	
Pedestrian Calls (#/hr)		0			0			0			0	
Act Effct Green (s)	5.0	13.1	28.3	5.0	16.9	29.2	10.7	24.9	34.4	7.8	22.0	
Actuated g/C Ratio	0.08	0.20	0.44	0.08	0.26	0.45	0.16	0.38	0.53	0.12	0.34	
v/c Ratio	0.05	0.60	0.23	0.35	0.44	0.07	0.59	0.15	0.04	0.52	0.34	
Control Delay (s/veh)	29.0	30.3	2.9	37.2	22.1	0.8	41.3	16.0	0.1	40.7	18.1	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay (s/veh)	29.0	30.3	2.9	37.2	22.1	0.8	41.3	16.0	0.1	40.7	18.1	
LOS	C	C	A	D	C	A	D	B	A	D	B	
Approach Delay (s/veh)		18.1			20.8			25.2			23.3	
Approach LOS		B			C			C			C	
Queue Length 50th (ft)	2	79	0	17	59	0	60	29	0	40	62	
Queue Length 95th (ft)	12	127	31	45	121	5	#181	52	0	#125	97	
Internal Link Dist (ft)		1480			562			1468			1377	
Turn Bay Length (ft)	350		350	350		350	500		125	350		
Base Capacity (vph)	112	491	777	120	558	685	272	1215	743	211	1092	
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	
Reduced v/c Ratio	0.05	0.44	0.23	0.36	0.37	0.07	0.59	0.16	0.05	0.53	0.35	

Intersection Summary

Area Type: Other

Cycle Length: 65

Actuated Cycle Length: 65

Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of Green

Natural Cycle: 65

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.61

Intersection Signal Delay (s/veh): 22.0

Intersection LOS: C

Intersection Capacity Utilization 47.5%

ICU Level of Service A

AM Peak - 2048 - Protected Only 4:52 pm 06/09/2026 Baseline

Synchro 12 Report

Page 2

Lanes, Volumes, Timings

3:

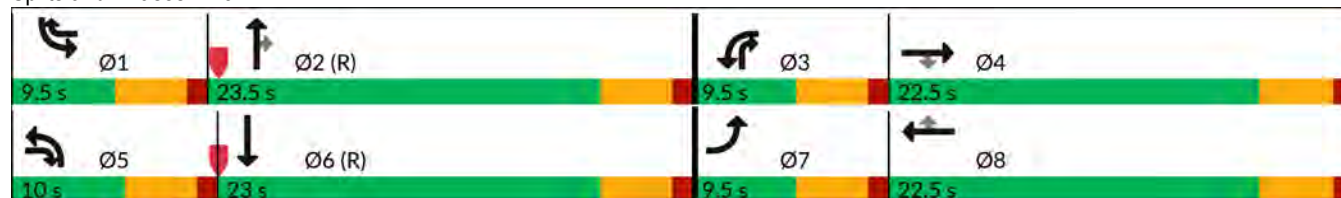
06/11/2026

Analysis Period (min) 15

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Splits and Phases: 3:



Lanes, Volumes, Timings

3:

06/11/2026

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	25	297	200	48	323	107	329	409	42	107	296	15
Future Volume (vph)	25	297	200	48	323	107	329	409	42	107	296	15
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	350		350	350		350	500		125	350		0
Storage Lanes	1		1	1		1	1		1	1		0
Taper Length (ft)	150			150			100			150		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	0.95
Frt			0.850			0.850			0.850		0.993	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1805	1863	1583	1736	1845	1583	1770	3505	1482	1787	3480	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1805	1863	1583	1736	1845	1583	1770	3505	1482	1787	3480	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			192			143			82		6	
Link Speed (mph)		35			35			35			35	
Link Distance (ft)		1560			642			1548			1457	
Travel Time (s)		30.4			12.5			30.2			28.4	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.99	0.94	0.94	0.94	0.94
Growth Factor	112%	112%	112%	112%	112%	112%	112%	112%	112%	112%	112%	112%
Heavy Vehicles (%)	0%	2%	2%	4%	3%	2%	2%	3%	9%	1%	3%	3%
Adj. Flow (vph)	30	354	238	57	385	127	392	463	50	127	353	18
Shared Lane Traffic (%)												
Lane Group Flow (vph)	30	354	238	57	385	127	392	463	50	127	371	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			16			16	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2	1	1	2	1	1	2	1	1	2	
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	
Leading Detector (ft)	20	100	20	20	100	20	20	100	20	20	100	
Trailing Detector (ft)	0	0	0	0	0	0	0	0	0	0	0	
Detector 1 Position(ft)	0	0	0	0	0	0	0	0	0	0	0	
Detector 1 Size(ft)	20	6	20	20	6	20	20	6	20	20	6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Prot	NA	pm+ov	Prot	NA	pm+ov	Prot	NA	pm+ov	Prot	NA	

PM Peak - 2048 - Protected Only 4:51 pm 06/09/2026 Baseline

Synchro 12 Report

Page 1

Lanes, Volumes, Timings

3:

06/11/2026

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Protected Phases	7	4	5	3	8	1	5	2	3	1	6	
Permitted Phases			4			8			2			
Detector Phase	7	4	5	3	8	1	5	2	3	1	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	
Minimum Split (s)	9.5	22.5	9.5	9.5	22.5	9.5	9.5	22.5	9.5	9.5	22.5	
Total Split (s)	9.5	23.0	24.0	9.5	23.0	16.6	24.0	30.9	9.5	16.6	23.5	
Total Split (%)	11.9%	28.8%	30.0%	11.9%	28.8%	20.8%	30.0%	38.6%	11.9%	20.8%	29.4%	
Maximum Green (s)	5.0	18.5	19.5	5.0	18.5	12.1	19.5	26.4	5.0	12.1	19.0	
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	
Lead/Lag	Lead	Lag	Lead	Lead	Lag	Lead	Lead	Lag	Lead	Lead	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	None	None	None	None	None	None	C-Max	None	None	C-Max	
Walk Time (s)		7.0			7.0			7.0			7.0	
Flash Dont Walk (s)		11.0			11.0			11.0			11.0	
Pedestrian Calls (#/hr)		0			0			0			0	
Act Effct Green (s)	5.0	18.2	41.9	5.0	22.0	36.7	19.2	30.5	40.0	10.2	21.5	
Actuated g/C Ratio	0.06	0.23	0.52	0.06	0.28	0.46	0.24	0.38	0.50	0.13	0.27	
v/c Ratio	0.26	0.83	0.25	0.52	0.75	0.15	0.92	0.34	0.06	0.55	0.39	
Control Delay (s/veh)	42.0	48.6	3.3	55.2	39.4	2.6	60.1	19.9	1.5	42.0	26.1	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay (s/veh)	42.0	48.6	3.3	55.2	39.4	2.6	60.1	19.9	1.5	42.0	26.1	
LOS	D	D	A	E	D	A	E	B	A	D	C	
Approach Delay (s/veh)		31.0			32.8			36.3			30.2	
Approach LOS		C			C			D			C	
Queue Length 50th (ft)	15	169	10	28	156	0	191	90	0	60	82	
Queue Length 95th (ft)	41	#307	43	#76	#347	24	#352	133	9	111	123	
Internal Link Dist (ft)		1480			562			1468			1377	
Turn Bay Length (ft)	350		350	350		350	500		125	350		
Base Capacity (vph)	112	430	925	108	514	837	431	1336	782	270	940	
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	
Reduced v/c Ratio	0.27	0.82	0.26	0.53	0.75	0.15	0.91	0.35	0.06	0.47	0.39	

Intersection Summary

Area Type: Other

Cycle Length: 80

Actuated Cycle Length: 80

Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of Green

Natural Cycle: 80

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.92

Intersection Signal Delay (s/veh): 33.1

Intersection LOS: C

Intersection Capacity Utilization 68.3%

ICU Level of Service C

PM Peak - 2048 - Protected Only 4:51 pm 06/09/2026 Baseline

Synchro 12 Report

Page 2

Lanes, Volumes, Timings

3:

06/11/2026

Analysis Period (min) 15

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Splits and Phases: 3:

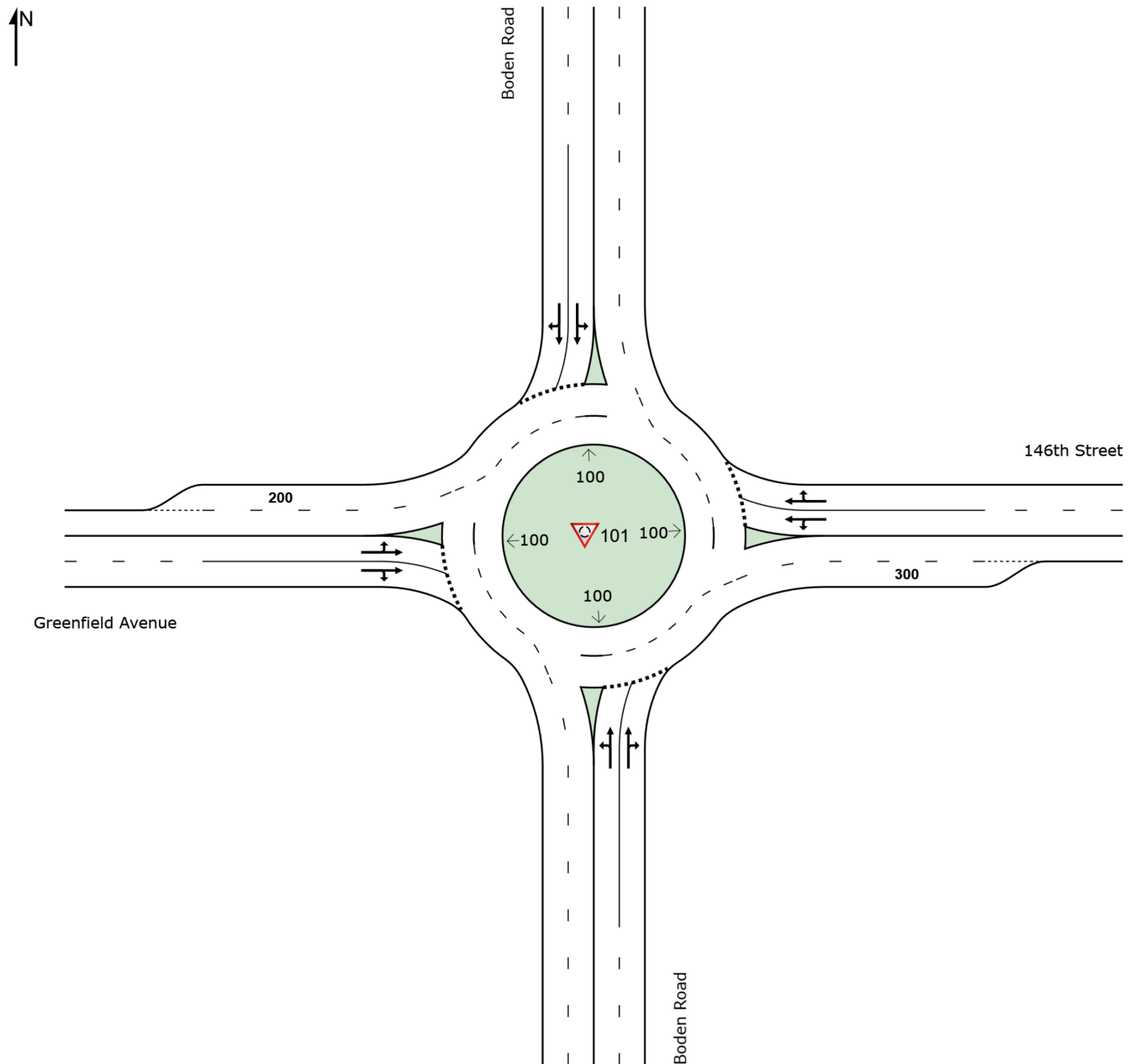


SITE LAYOUT

 Site: 101 [AM Peak - 2048 (Site Folder: General)]

New Site
Site Category: (None)
Roundabout

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



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Organisation: BURGESS & NIPLE, INC. | Licence: PLUS / 1PC | Created: Thursday, June 11, 2026 12:17:16 PM
Project: P:\PR63966\07 146th Street at Boden\Synchro\Boden.sip9

MOVEMENT SUMMARY

 Site: 101 [AM Peak - 2048 (Site Folder: General)]

New Site

Site Category: (None)

Roundabout

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[Total veh/h	HV] %	[Total veh/h	HV] %	v/c	sec		[Veh. veh	Dist] ft				mph
South: Boden Road														
3	L2	132	9.0	143	9.0	0.165	11.0	LOS B	0.6	16.3	0.40	0.69	0.40	34.3
8	T1	157	14.0	171	14.0	0.165	5.1	LOS A	0.6	17.0	0.39	0.52	0.39	36.1
18	R2	28	23.0	30	23.0	0.165	5.9	LOS A	0.6	17.0	0.39	0.49	0.39	34.9
Approach		317	12.7	345	12.7	0.165	7.6	LOS A	0.6	17.0	0.39	0.59	0.39	35.2
East: 146th Street														
1	L2	39	15.0	42	15.0	0.190	11.0	LOS B	0.7	19.3	0.39	0.52	0.39	35.9
6	T1	189	6.0	205	6.0	0.190	5.1	LOS A	0.7	19.3	0.40	0.53	0.40	36.2
16	R2	46	15.0	50	15.0	0.096	5.8	LOS A	0.3	9.1	0.41	0.58	0.41	35.2
Approach		274	8.8	298	8.8	0.190	6.1	LOS A	0.7	19.3	0.40	0.54	0.40	36.0
North: Boden Road														
7	L2	102	2.0	111	2.0	0.230	11.0	LOS B	0.9	22.6	0.43	0.64	0.43	35.5
4	T1	331	12.0	360	12.0	0.230	5.4	LOS A	0.9	23.5	0.43	0.54	0.43	35.9
14	R2	13	5.0	14	5.0	0.230	5.6	LOS A	0.9	23.5	0.42	0.49	0.42	35.3
Approach		446	9.5	485	9.5	0.230	6.7	LOS A	0.9	23.5	0.43	0.56	0.43	35.8
West: Greenfield Avenue														
5	L2	6	24.0	7	24.0	0.207	11.8	LOS B	0.8	20.1	0.47	0.50	0.47	35.6
2	T1	198	7.0	215	7.0	0.207	5.3	LOS A	0.8	20.1	0.47	0.50	0.47	36.2
12	R2	166	4.0	180	4.0	0.191	5.6	LOS A	0.7	17.5	0.47	0.64	0.47	35.5
Approach		370	5.9	402	5.9	0.207	5.6	LOS A	0.8	20.1	0.47	0.56	0.47	35.9
All Vehicles		1407	9.1	1529	9.1	0.230	6.5	LOS A	0.9	23.5	0.43	0.56	0.43	35.7

Site Level of Service (LOS) Method: Delay & Degree of Saturation (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Roundabout LOS Method: Same as Signalised Intersections.

Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.

Intersection and Approach LOS values are based on average delay for all movements (v/c not used).

Roundabout Capacity Model: SIDRA Standard.

Delay Model: SIDRA Standard (Geometric Delay is included).

Queue Model: SIDRA Standard.

Gap-Acceptance Capacity: Traditional M1.

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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Project: P:\PR63966\07 146th Street at Boden\Synchro\Boden.sip9

SITE LAYOUT

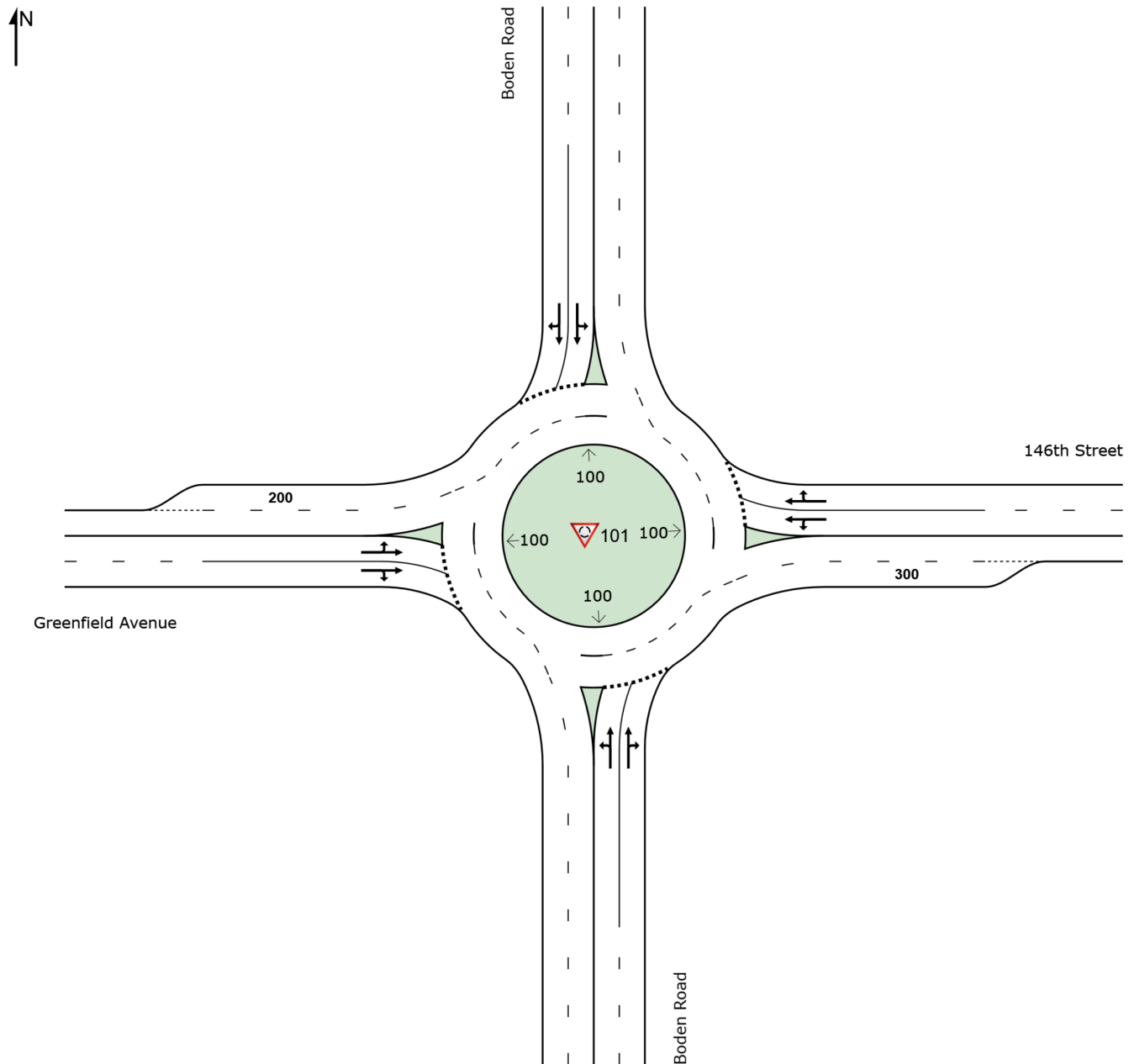
 **Site: 101 [PM Peak - 2048 (Site Folder: General)]**

New Site

Site Category: (None)

Roundabout

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



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Project: P:\PR63966\07 146th Street at Boden\Synchro\Boden.sip9

MOVEMENT SUMMARY

 **Site: 101 [PM Peak - 2048 (Site Folder: General)]**

New Site

Site Category: (None)

Roundabout

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[Total veh/h	HV] %	[Total veh/h	HV] %				[Veh. veh	Dist] ft				
South: Boden Road														
3	L2	367	2.0	390	2.0	0.436	11.7	LOS B	2.1	53.0	0.58	0.80	0.61	34.0
8	T1	456	3.0	485	3.0	0.436	5.6	LOS A	2.1	54.3	0.56	0.56	0.59	35.8
18	R2	47	9.0	50	9.0	0.436	6.6	LOS A	2.1	54.3	0.56	0.54	0.59	34.7
Approach		870	2.9	926	2.9	0.436	8.2	LOS A	2.1	54.3	0.57	0.66	0.60	35.0
East: 146th Street														
1	L2	54	4.0	57	4.0	0.435	12.0	LOS B	2.0	50.1	0.65	0.64	0.72	35.5
6	T1	361	3.0	384	3.0	0.435	6.2	LOS A	2.0	50.1	0.65	0.65	0.71	35.5
16	R2	119	2.0	127	2.0	0.220	6.7	LOS A	0.8	19.1	0.59	0.74	0.59	35.2
Approach		534	2.9	568	2.9	0.435	6.9	LOS A	2.0	50.1	0.63	0.67	0.69	35.4
North: Boden Road														
7	L2	119	1.0	127	1.0	0.266	11.8	LOS B	0.9	23.8	0.56	0.75	0.56	35.0
4	T1	330	3.0	351	3.0	0.266	5.7	LOS A	1.0	24.8	0.55	0.59	0.55	35.7
14	R2	17	3.0	18	3.0	0.266	6.9	LOS A	1.0	24.8	0.54	0.53	0.54	34.9
Approach		466	2.5	496	2.5	0.266	7.3	LOS A	1.0	24.8	0.55	0.63	0.55	35.5
West: Greenfield Avenue														
5	L2	27	0.0	29	0.0	0.335	11.0	LOS B	1.4	36.0	0.52	0.52	0.52	36.2
2	T1	331	2.0	352	2.0	0.335	5.3	LOS A	1.4	36.0	0.52	0.52	0.52	36.0
12	R2	224	2.0	238	2.0	0.260	5.7	LOS A	1.0	25.2	0.51	0.65	0.51	35.4
Approach		582	1.9	619	1.9	0.335	5.7	LOS A	1.4	36.0	0.52	0.57	0.52	35.8
All Vehicles		2452	2.6	2609	2.6	0.436	7.2	LOS A	2.1	54.3	0.57	0.63	0.59	35.4

Site Level of Service (LOS) Method: Delay & Degree of Saturation (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Roundabout LOS Method: Same as Signalised Intersections.

Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.

Intersection and Approach LOS values are based on average delay for all movements (v/c not used).

Roundabout Capacity Model: SIDRA Standard.

Delay Model: SIDRA Standard (Geometric Delay is included).

Queue Model: SIDRA Standard.

Gap-Acceptance Capacity: Traditional M1.

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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SITE LAYOUT

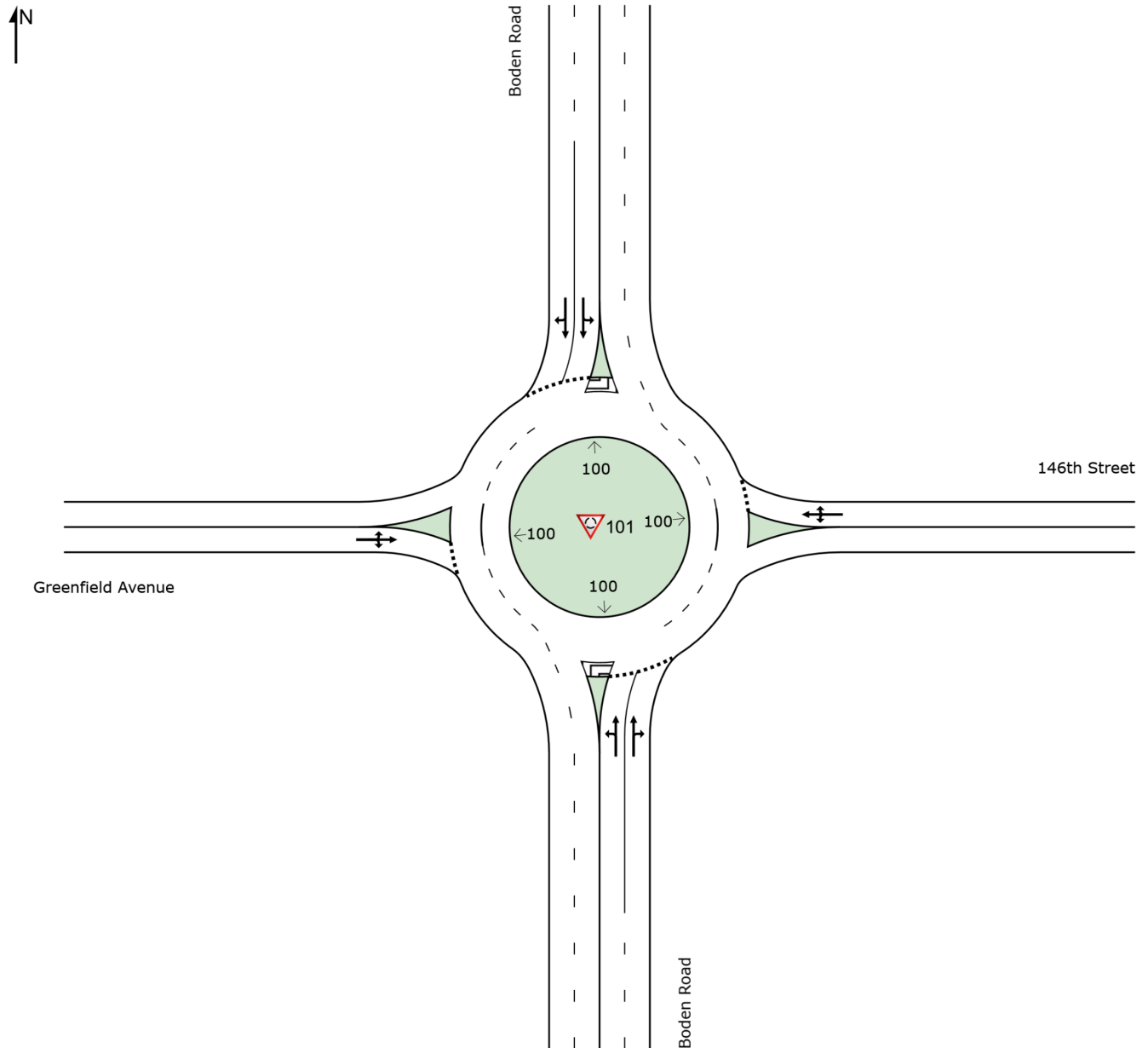
 **Site: 101 [PM Peak - 2048 - 2x1 (Site Folder: General)]**

New Site

Site Category: (None)

Roundabout

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



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Project: P:\PR63966\07 146th Street at Boden\Synchro\Boden.sip9

MOVEMENT SUMMARY

 **Site: 101 [PM Peak - 2048 - 2x1 (Site Folder: General)]**

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES [Total HV] veh/h %		DEMAND FLOWS [Total HV] veh/h %		Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. Dist] veh ft		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed mph
South: Boden Road														
3	L2	367	2.0	390	2.0	0.410	11.9	LOS B	2.3	58.2	0.66	0.81	0.68	33.6
8	T1	456	3.0	485	3.0	0.410	5.4	LOS A	2.4	61.8	0.64	0.52	0.65	35.7
18	R2	47	9.0	50	9.0	0.410	5.7	LOS A	2.4	61.8	0.64	0.52	0.64	34.4
Approach		870	2.9	926	2.9	0.410	8.2	LOS A	2.4	61.8	0.65	0.64	0.66	34.7
East: 146th Street														
1	L2	54	4.0	57	4.0	0.767	15.7	LOS B	5.2	133.1	0.85	1.04	1.24	34.7
6	T1	361	3.0	384	3.0	0.767	9.8	LOS A	5.2	133.1	0.85	1.04	1.24	34.6
16	R2	119	2.0	127	2.0	0.767	9.5	LOS A	5.2	133.1	0.85	1.04	1.24	33.6
Approach		534	2.9	568	2.9	0.767	10.3	LOS B	5.2	133.1	0.85	1.04	1.24	34.4
North: Boden Road														
7	L2	119	1.0	127	1.0	0.258	12.3	LOS B	1.1	28.6	0.66	0.80	0.66	34.6
4	T1	330	3.0	351	3.0	0.258	5.8	LOS A	1.2	31.2	0.65	0.59	0.65	35.4
14	R2	17	3.0	18	3.0	0.258	5.6	LOS A	1.2	31.2	0.64	0.53	0.64	34.5
Approach		466	2.5	496	2.5	0.258	7.5	LOS A	1.2	31.2	0.65	0.64	0.65	35.2
West: Greenfield Avenue														
5	L2	27	0.0	29	0.0	0.680	13.5	LOS B	4.9	124.6	0.77	0.87	0.97	35.6
2	T1	331	2.0	352	2.0	0.680	7.8	LOS A	4.9	124.6	0.77	0.87	0.97	35.4
12	R2	224	2.0	238	2.0	0.680	7.6	LOS A	4.9	124.6	0.77	0.87	0.97	34.3
Approach		582	1.9	619	1.9	0.680	8.0	LOS A	4.9	124.6	0.77	0.87	0.97	35.0
All Vehicles		2452	2.6	2609	2.6	0.767	8.5	LOS A	5.2	133.1	0.73	0.78	0.86	34.8

Site Level of Service (LOS) Method: Delay & Degree of Saturation (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Roundabout LOS Method: Same as Signalised Intersections.

Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.

Intersection and Approach LOS values are based on average delay for all movements (v/c not used).

Roundabout Capacity Model: SIDRA Standard.

Delay Model: SIDRA Standard (Geometric Delay is included).

Queue Model: SIDRA Standard.

Gap-Acceptance Capacity: Traditional M1.

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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ATTACHMENT D

Virtual Meeting Minutes & Field Check Minutes

251 North Illinois Street | Capital Center Suite 920 | Indianapolis, IN 46204 | 317.237.2760

Project: IMPO Safety On-Call
Location: Boden Road at 146th Street
Hamilton County

Date: May 21, 2026**Attendees**

Andrew Rodewald	Noblesville Engineering	Jeremy VanVleet	Burgess & Niple
Marley Pagel	Noblesville Police	Micah Reynolds	Burgess & Niple
Jennifer Dunn	Indy MPO		

Field Check Observations

The field check attendees met on the east side of Boden Road at the driveway to Ruoff Music Center on Monday, May 5th, 2026, at approximately 9:30AM. The existing intersection is a four-leg, signalized intersection.

It was noted that a lighting project is planned, likely funding in 2027. Pedestrian traffic seems low, but is increasing due to nearby development to the north. There are a significant number of pedestrians that walk from Hamilton Town Center to Ruoff Music Center, but they tend to gravitate to the crossing at Gate 3, which has a police-directed pedestrian crossing. Police actively attempt to direct pedestrians away from the intersection. The available right of way is significant.

Jeremy then discussed with the group the existing safety performance at the intersection. The crash history indicated that there is a significant crash pattern of right angle and left turn crashes at the intersection. The RoadHAT analysis results showed an I_{CF} of 3.12 and an I_{CC} of 2.69 which indicate the intersection is performing significantly worse than expected.

After reviewing the traffic and safety analysis and while watching traffic at the site, the group decided on options that should be analyzed further.

- In the short term, conversion to protected-only left turning with new signal backplates and updated signal heads should also be considered. Providing offset for left turns on the minor approaches should be considered.
- In the long term, a roundabout may be a good option to keep speeds controlled, as the intersection exists with ample right of way.

These alternatives will be analyzed, and results will be shared and discussed further.

251 North Illinois Street | Capital Center Suite 920 | Indianapolis, IN 46204 | 317.237.2760

Project: IMPO Safety On-Call
Location: Boden Road at 146th Street
Hamilton County

Date: June 18, 2026

Attendees

Andrew Rodewald	City of Noblesville	Jennifer Dunn	Indy MPO
Collin Whitesell	Noblesville PD	Mark Rinehart	Corradino LLC
Marley Pagel	Noblesville PD	Jeremy VanVleet	Burgess & Niple
Dennis Coffey	Noblesville PD		

Kickoff Meeting Discussion

The purpose of this meeting was to review the selected intersection and gather local insights on existing conditions, safety concerns, planned developments, and previous studies. 146th Street at Boden Road was confirmed for inclusion in the 2025-2026 Safety Study for Indy MPO.

The intersection has recently had the pavement marking refreshes in late 2024. The City of Noblesville mentioned that there will be street light replacement likely installed in 2027 with Duke working on the lighting design. It was also noted that the city is trying to widen Boden Road to 4 lanes to 156th Street with a median. In 5 years, this intersection is expected to look drastically different and support more non-local traffic. The Ruoff Music Center would like to keep this intersection signalized for flexibility.

The Noblesville Police Department had several comments:

- Traffic has increased
- Ruoff Music Center is a substantial traffic generator with 20-25k people coming for concerts
- Intoxicated pedestrians are frequently observed
- Intoxication and frustration are leading causes of bad driver behavior
- Walking paths for pedestrians have helped but the intersection is not well lit at night and makes it difficult to see pedestrians
- Speeding does not seem to be an issue
- Will still need traffic control
- Traveling eastbound from Greenfield there is a stopping sight distance issue

The next steps include finalization and distribution of the preliminary findings reports, conducting field checks with a target of early to mid-May 2026, and continued coordination with stakeholders on observed issues and potential improvements.

ATTACHMENT E

Cost Estimates & Schematics

IMPO RSAs - Boden Road at 146th Street

Des N/A

ESTIMATED TOTAL: \$342,240.00

Prepared By: _____ Date: _____ Checked By: _____ Date: _____ Cost Estimate | Page 1 of 1



B&N burgessniple.com		RECOMMENDED FOR APPROVAL _____ DESIGN ENGINEER _____ DATE _____		INDIANAPOLIS METROPOLITAN PLANNING ORGANIZATION		HORIZONTAL SCALE 1" = 30'	BRIDGE FILE N/A
		DESIGNED: MDR		DRAWN: EMW		VERTICAL SCALE N/A	DESIGN VEHICLE WB-50
		CHECKED: _____		CHECKED: _____		SURVEY BOOK	SHEETS of
				146TH AVENUE/GREENFIELD DRIVE AT BODEN ROAD CONCEPT DRAWING		CONTRACT R-XXXXX	PROJECT XXXXXXX

RoadHAT 4D	Economic Evaluation - Form F5	Page 1/2
Settings: Indiana local settings Version: Version 4.1		
Location	146th Street & Boden Road	
Hamilton County		
GIS		
Post		
Analyst	Elaina Wahlman	
Date	6/18/2026	
INPUT		
Alternative	Near-term recommendation	
Number of Crashes (crash/period)		
Fatal and Incapacitating Injury Crashes	7	
Non-Incapacitating and Possible Injury Crashes	7	
Property Damage Only Crashes	34	
Route Type	City Arterial Intersection	
Average Crash Costs (\$)		
Fatal and Incapacitating Injury Crashes	1840100	
Non-Incapacitating and Possible Injury Crashes	393200	
Property Damage Only Crashes	40200	
Crash Cost Year (yyyy)	2017	
First Year with Crash Data (yyyy)	2022	
Last Year with Crash Data (yyyy)	2024	
Present Year (yyyy)	2026	
Implementation Year (yyyy)	2050	
Inflation Rate (%)	2	
Interest Rate (%)	4	
Annual Traffic Growth Rate (%)	2	
Total Traffic Growth Factor (%)	1.127	
Future Traffic Growth Period (years)	24	
Countermeasure 1		
Countermeasure Description	Provide additional offset for left turn lanes.	
Crash Reduction Factors (%)		
Fatal and Incapacitating Injury Crashes	35.6	
Non-Incapacitating and Possible Injury Crashes	35.6	
Property Damage Only Crashes	33.8	

RoadHAT 4D

Economic Evaluation - Form F5

Page 2/2

Settings: Indiana local settings

Version: Version 4.1

Location

146th Street & Boden Road

Hamilton County

GIS

Post

Analyst

Elaina Wahlman

Date

6/18/2026

Number of Target Crashes (crash/period)

Fatal and Incapacitating Injury Crashes

7

Non-Incapacitating and Possible Injury Crashes

7

Property Damage Only Crashes

34

Countermeasure Service Life (years)

25

Countermeasure Capital Cost (\$)

410840

Countermeasure Annual Maintenance Cost (\$)

0

Countermeasure Salvage Value (\$)

0

OUTPUT

Total Crashes Saved

9,374

FI Crashes Saved

1,418

NI Crashes Saved

1,418

PDO Crashes Saved

6,539

Equivalent Annual Benefit (\$)

751,909

Equivalent Annual Cost (\$)

10,260

Present Worth Benefit (\$)

18,797,718

Present Worth Cost (\$)

256,492

Net Annual Benefit (\$)

741,649

Present Worth Net Benefit (\$)

18,541,226

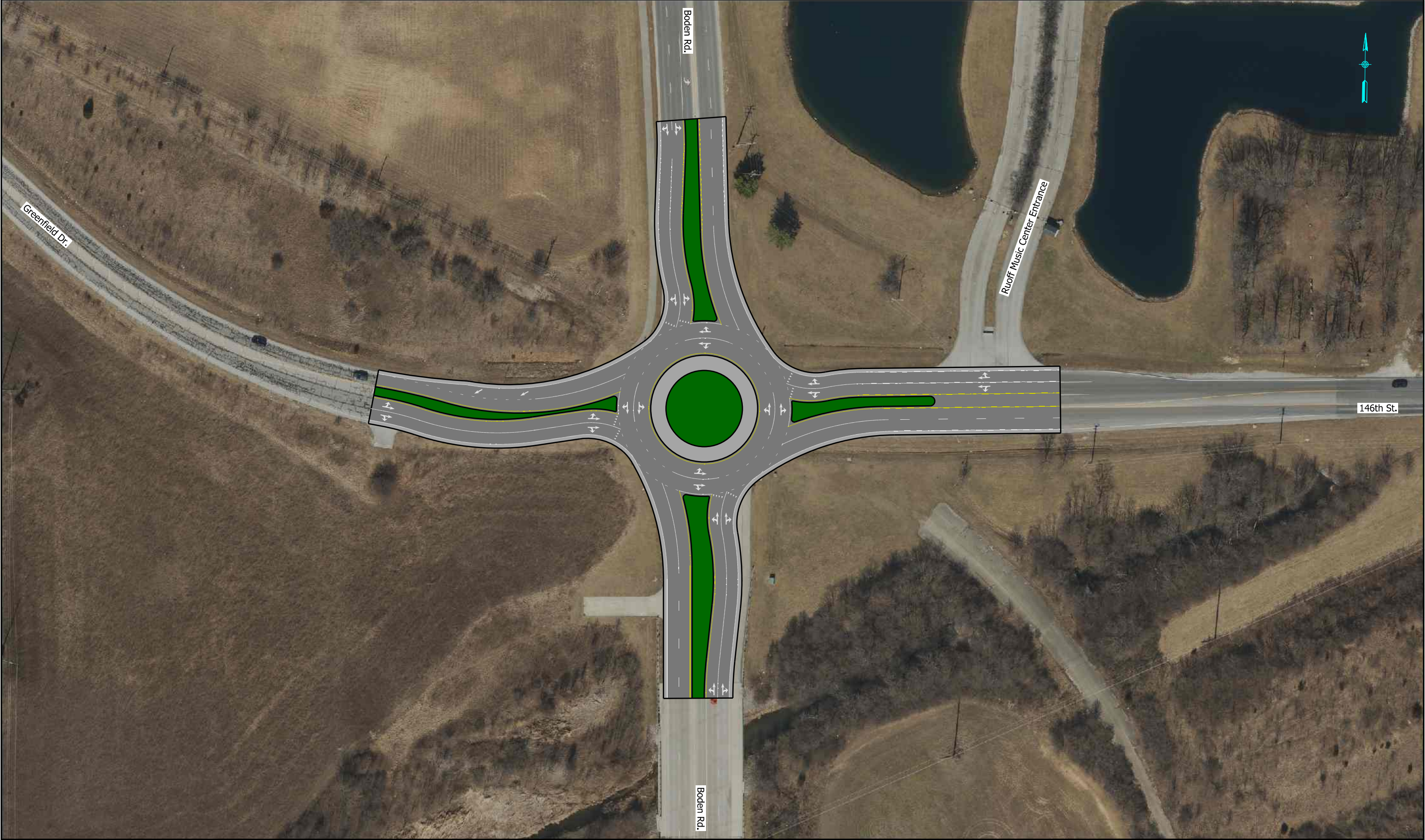
Benefit-Cost Ratio

73.29**Comments:** Near term solution: Provide additional offset for left turn lanes.

IMPO RSAs - Boden Road at 146th Street

Des N/A

ESTIMATED TOTAL: \$3,144,990.00Cost Estimate | Page 1 of 1



B&N burgessniple.com		RECOMMENDED FOR APPROVAL _____		INDIANAPOLIS METROPOLITAN PLANNING ORGANIZATION	HORIZONTAL SCALE		BRIDGE FILE	
		DESIGN ENGINEER _____			1" = 30'		N/A	
		DATE _____			VERTICAL SCALE		DESIGN VEHICLE	
					N/A		WB-50	
DESIGNED: _MDR		DRAWN: _EMW			146TH AVENUE/GREENFIELD DRIVE AT BODEN ROAD CONCEPT DRAWING - ROUNDABOUT	SURVEY BOOK		SHEETS
CHECKED: _____		CHECKED: _____		of		PROJECT		
				CONTRACT		R-XXXXX		
							XXXXXXX	

RoadHAT 4D	Economic Evaluation - Form F5	Page 1/2
Settings: Indiana local settings Version: Version 4.1		
Location	146th Street & Boden Road	
Hamilton County		
GIS		
Post		
Analyst	Elaina Hendrix	
Date	7/23/2026	
INPUT		
Alternative	Long-term recommendation	
Number of Crashes (crash/period)		
Fatal and Incapacitating Injury Crashes	7	
Non-Incapacitating and Possible Injury Crashes	7	
Property Damage Only Crashes	34	
Route Type	City Arterial Intersection	
Average Crash Costs (\$)		
Fatal and Incapacitating Injury Crashes	1840100	
Non-Incapacitating and Possible Injury Crashes	393200	
Property Damage Only Crashes	40200	
Crash Cost Year (yyyy)	2017	
First Year with Crash Data (yyyy)	2022	
Last Year with Crash Data (yyyy)	2024	
Present Year (yyyy)	2026	
Implementation Year (yyyy)	2050	
Inflation Rate (%)	2	
Interest Rate (%)	4	
Annual Traffic Growth Rate (%)	2	
Total Traffic Growth Factor (%)	1.127	
Future Traffic Growth Period (years)	24	
Countermeasure 1		
Countermeasure Description	Convert signal to a multilane roundabout.	
Crash Reduction Factors (%)		
Fatal and Incapacitating Injury Crashes	71.2	
Non-Incapacitating and Possible Injury Crashes	71.2	
Property Damage Only Crashes	19.1	

RoadHAT 4D

Economic Evaluation - Form F5

Page 2/2

Settings: Indiana local settings

Version: Version 4.1

Location

146th Street & Boden Road

Hamilton County

GIS

Post

Analyst

Elaina Hendrix

Date

7/23/2026

Number of Target Crashes (crash/period)

Fatal and Incapacitating Injury Crashes

7

Non-Incapacitating and Possible Injury Crashes

7

Property Damage Only Crashes

34

Countermeasure Service Life (years)

25

Countermeasure Capital Cost (\$)

3774090

Countermeasure Annual Maintenance Cost (\$)

0

Countermeasure Salvage Value (\$)

0

OUTPUT

Total Crashes Saved

9,366

FI Crashes Saved

2,836

NI Crashes Saved

2,836

PDO Crashes Saved

3,695

Equivalent Annual Benefit (\$)

1,432,037

Equivalent Annual Cost (\$)

94,248

Present Worth Benefit (\$)

35,800,920

Present Worth Cost (\$)

2,356,206

Net Annual Benefit (\$)

1,337,789

Present Worth Net Benefit (\$)

33,444,714

Benefit-Cost Ratio

15.19**Comments:** Long term solution: Convert existing traffic signal to a 2x2 roundabout.