Ohio Department of Transportation, District 3

2023 Signal Evaluation

Huron Co. SR 224, SLM 8.38

SR 61 Intersection

By: Jared Feller, P.E. **Date:** February 2024

Signal Evaluation Background

The Ohio Manual of Uniform Traffic Control Devices (OMUTCD) requires the operation of existing traffic signals to be analyzed every five years. The following report considers whether an existing signal is still warranted per OMUTCD signal warrants, and if any operational changes are required to ensure the signal is performing well.

Existing Signal

The following features are present at the existing signal constructed in 2001:

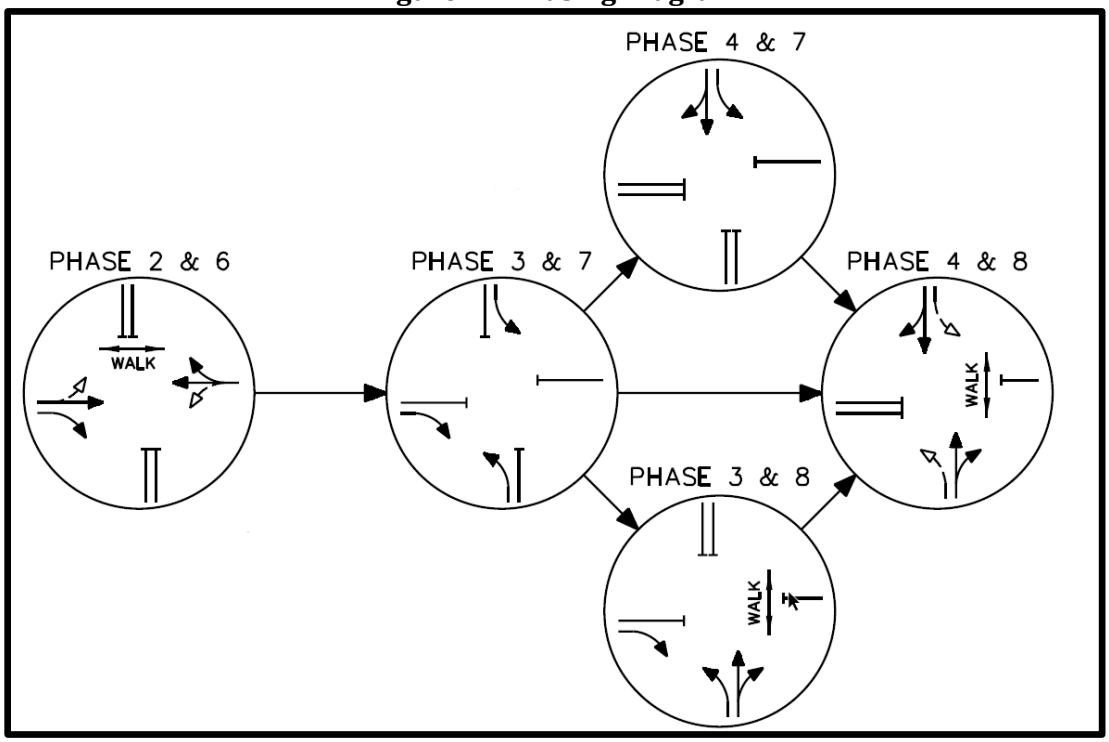
- Signal Type: Box Span
- Signal Heads: Black 12-inch with Reflective Backplates
- Turn Lane Storage:
  - Left Turn Lanes: NB = 180 ft, SB = 185 ft
  - Right Turn Lane: EB = 525 ft
- Detection: Stop bar and advanced loop detection on all approaches.
- Timing: See **Table 1** below.

Table 1 – Traffic Signal Timing

DATE: 02/11/2005			**OVERLAP**				**A**	**B**	**C**	**D**
FLASH MODE: ALL RED			**PHASES**							
INTERVAL OR FEATURE			**CONTROLLER MOVEMENT No.**							
			1	**2**	**3**	**4**	**5**	**6**	**7**	**8**
INTERSECTION MOVEMENT				**EB**	**NB Left**	**SB**		**WB**	**SB Left**	**NB**
MINIMUM GREEN (INITIAL)		(SEC)		15	8	10		15	8	10
PASSAGE TIME (GAP)		(SEC)		5	4	4		5	4	4
MAXIMUM GREEN		(SEC)		40	16	40		40	16	40
YELLOW CHANGE		(SEC)		4	4	4		4	4	4
ALL RED CLEARANCE		(SEC)		2		2		2		2
WALK		(SEC)						5		5
PEDESTRIAN CLEARANCE		(SEC)						16		16
RECALL	MINIMUM	(+/-)	-	+	-	-	-	+	-	-
	MAXIMUM	(+/-)	-	-	-	-	-	-	-	-
	PEDESTRIAN	(+/-)	-	-	-	-	-	-	-	-
NON-LOCK		(+/-)	-	-	+	+	-	-	+	+
ADDED INITIAL		(SEC)		1.5		1.5		1.5		1.5
MAXIMUM INITIAL		(SEC)		30		30		30		30
TIME TO REDUCE		(SEC)								
TIME BEFORE REDUCTION		(SEC)								
MINIMUM GAP		(SEC)		5	4	4		5	4	4

- Phasing: See **Figure 1** below.

Figure 1 – Phasing Diagram



- Photo: See **Image 1** below for a photograph of the intersection.

Image 1 – US 224 & SR 61 Signal from the Southwest Corner (February 2024)

- Speeds: US 224 = 45 MPH, SR 61 = 45 MPH
- Traffic: Medium traffic volumes at the intersection were observed during the field review on February 7, 2024, during the PM peak.
- Other Issues: No operational issues were noted during the field review. Damage to the eastbound 5-section signal head backplate was noted.

Crash Data

Crashes were analyzed at the US 224 & SR-61 intersection from January 1, 2018 through December 31, 2022. The reported crashes are summarized in **Table 2** below.

Table 2 – Crash Data

YEAR		SEVERITY		TYPE		ROAD CONDITION	
2018	4 (21%)	Fatal	0 (0%)	Rear End	13 (68%)	Dry	18 (95%)
2019	5 (26%)	Injury	6 (32%)	Left Turn	3 (16%)	Wet	1 (5%)
2020	2 (11%)	PDO	13 (68%)	Sideswipe – Passing	2 (11%)		
2021	5 (26%)			Sideswipe – Meeting	1 (5%)		
2022	3 (16%)						
TOTAL	**19 (100%)**						

- Younger (25 and under) or older (65 and over) drivers were at fault in seven crashes.
- Distraction was noted in three crashes.
- One at fault driver was under the influence of alcohol.
- While not included in the above total, there were seven crashes at the driveways for the gas station in the northwest corner of the intersection (four along US 224 and three along SR 61).
- The crash pattern at the intersection is similar to the previous evaluation in 2017.

Supplemental Evaluations

The following additional studies were performed to ensure safe and efficient operation of the signal:

1. **Turning Movements:** An updated traffic count was obtained for the intersection. The traffic count was performed on October 26, 2023, between the hours of 7:00 AM – 7:00 PM. The count information can be found in in **Table 3** below:

Table 3 – Turning Movement Count

Peak Hour (Start Time)	SR 61 Southbound				US 224 Westbound				SR 61 Northbound				US 224 Eastbound				Total
	R	T	L	Tot	R	T	L	Tot	R	T	L	Tot	R	T	L	Tot	
Total Count	173	1653	213	2039	180	997	263	1440	258	1621	1791	3670	1743	953	183	2879	10,028
AM Peak (7:00)	17	154	13	184	9	97	32	138	11	126	126	263	168	44	14	226	811
PM Peak (2:15)	18	207	31	256	13	95	29	137	22	169	237	428	230	131	25	386	1207
Total Pedestrians	0				0				0				1				1

2. **Signal Warrant:** The signal warrant was analyzed at this intersection to verify if the existing signal should be retained. The OMUTCD Section 4C lists nine warrants for the installation of a signal. Warrants 1–3 (8-Hour Volume, 4-Hour Volume, Peak Hour Volume) were all analyzed based on the Turning Movement Count data. The intersection met the following signal warrants using the 70 percent volumes for signal retention as shown in **Table 4** on the next page:

Table 4 – Signal Warrant

Warrant		Hours Needed	Hours Met	Warrant Met
1 - Eight Hour Vehicular Volumes		-	-	Yes
1A – Minimum Vehicular Volume		8	10	Yes
1B - Interruption of Continuous Traffic		8	4	No
1 A&B - Combination of Warrants	1A	8	12	No
	1B	8	6	
2 - Four Hour Volumes		4	11	Yes
3 - Peak Hour Volumes		-	-	Yes

3. **Clearance Interval Calculation:** Appropriate yellow and all-red clearance intervals are important to safe operation of a signal. Using the clearance interval calculation method provided by the ODOT Office of Traffic Operations, the calculated clearance intervals are shown in **Table 5** below. District practice is to round clearance intervals up to the nearest 0.5 seconds (minimum All Red is 1 second).

Table 5 – Updated Clearance Intervals

INTERVAL OR FEATURE		CONTROLLER MOVEMENT No.							
		1	2	3	4	5	6	7	8
INTERSECTION MOVEMENT			EB	NB Left	SB		WB	SB Left	NB
YELLOW CHANGE	(SEC)		5	4	5		5	4	5
ALL RED CLEARANCE	(SEC)		1	2	1		1	2	1
WALK**	(SEC)						9		11
PEDESTRIAN CLEARANCE**	(SEC)		20.9		16.9		19		15

**Pedestrian signals and crosswalks are not provided on the west and south approaches at the intersection. The pedestrian clearance times for the west and south approaches are more than the Minimum Green + Yellow Change for the adjacent movement and will be updated. Pedestrian signals and crosswalks are provided on the east and north approaches at the intersection. The walk and pedestrian clearance times for the east and north approaches will be updated based on the time shown in Table 5.

4. **Capacity Analysis:** Highway Capacity Software (HCS) was used to analyze the Level of Service (LOS) of each approach for existing timing at the intersection. The LOS is based on the calculated seconds of delay for each approach at an intersection using the Highway Capacity Manual (HCM) methodology. The results are summarized in **Table 6** below:

Table 6 – Existing Intersection Level of Service by Approach

Existing Delay s/veh and (LOS)	Intersection Approach				Intersection Combined Delay
	US 224		SR 61		
Period	EB	WB	NB	SB	
AM Peak	10.6 (B)	14.2 (B)	13.0 (B)	20.5 (C)	14.2 (B)
PM Peak	12.9 (B)	15.8 (B)	13.9 (B)	21.2 (C)	15.3 (B)

Signal Evaluation Recommendations

- Radar detection is expected to be added with FY23/FY24 Discretionary Safety Funding.
- Update the signal timing as follows:
  - Phases 2/6: Min Green 15 to 16 seconds, yellow change 4 to 5 seconds, red clearance 2 to 1 second
  - Phases 4/8: Min Green 10 to 12 seconds, yellow change 4 to 5 seconds, red clearance 2 to 1 second
  - Phases 3/7: Min Green 8 to 7 seconds, red clearance 2 seconds
- Update the walk and pedestrian clearance timing as follows:
  - Phase 6: Walk 5 to 9 seconds, Pedestrian Clearance 16 to 19 seconds
  - Phase 8: Walk 5 to 11 seconds, Pedestrian Clearance 16 to 15 seconds
- Replace existing eastbound 5-section signal head backplate
- Consider installing a roundabout at the intersection

The signal is operating well based on the capacity analysis and while observed during the field review.

LOOP DETECTOR CHART

LOOP	SIZE (FEET)	NO. OF TURNS	SHAPE	PULSE OR PRESENCE	DELAY (SEC.)	CONNECT TO DETECTOR UNIT NO.	ASSOCIATED CONTROLLER PHASE
L-1	6X6	4	DIAMOND	PULSE	3*	1	8
L-2	6X6	4	DIAMOND	PULSE	3*	2	8
L-3	8X16X40	2-4-2	RECTANGLE	PRESENCE	10*	3	8
L-4	6X30	3	RECTANGLE	PRESENCE	3*	4	3
L-5	6X30	3	RECTANGLE	PRESENCE	3*	5	7
L-6	8X16X40	2-4-2	RECTANGLE	PRESENCE	10*	6	4
L-7	6X6	4	DIAMOND	PULSE	3*	7	4
L-8	6X6	4	DIAMOND	PULSE	3*	8	4
L-9	6X6	4	DIAMOND	PULSE		9	2
L-9A	6X6	4	DIAMOND	PULSE		9	2
L-10	6X6	4	DIAMOND	PULSE		10	2
L-10A	6X6	4	DIAMOND	PULSE		10	2
L-11	6X20	3	RECTANGLE	PRESENCE		11	2
L-11A	6X20	3	RECTANGLE	PRESENCE		12	6
L-12	6X6	4	DIAMOND	PULSE		13	6
L-13	6X6	4	DIAMOND	PULSE		14	6

* NOTE: INHIBIT DELAY DURING ASSOCIATED PHASE GREEN INTERVAL.

MATERIAL REQUIRED PROJ. 62-03

REF.	ITEM	UNIT	DESCRIPTION	QTY.
9	625	L.F.	CONDUIT, 2", 713.04	6
13	625	L.F.	TRENCH	6
20	625	EACH	GROUND ROD, APP	1
52	632	L.F.	POWER CABLE, 2/C, NO. 6 AWG	56
94	633	C.Y.	CONCRETE FOR CABINET FND. (TYPE 2)	1.54
95	633	S.F.	CONTROLLER WORKPAD (30"X50")	10.4
113	633	EACH	BATTERY BACKUP SYSTEM W/ ENC.	1

MATERIAL REQUIRED - PROJ. 43(01)

ITEM	UNIT	DESCRIPTION	QTY.
625	EACH	CONNECTOR KIT, TYPE VIII, CU	12
625	EACH	LIGHT POLE FOUNDATION, 24"X6' DEEP	4
625	LIN.FT.	CONDUIT, 713.04, 2"	1697
625	LIN.FT.	CONDUIT, 713.04, 3"	502
625	LIN.FT.	CONDUIT JACKED OR DRILLED UNDER PAVEMENT, 3"	331
625	EACH	PULL BOX, 713.08, 18"	15
625	EACH	PULL BOX, 713.08, 24"	1
625	EACH	GROUND ROD, APP	10
631	EACH	SCHOOL SPEED LIMIT SIGN ASSEMBLY, 36"X48"	4
632	EACH	VEHICULAR SIGNAL HEAD, 3-SECTION, 12" LENS, 1-WAY	5
632	EACH	VEHICULAR SIGNAL HEAD, 5-SECTION, 12" LENS, 1-WAY	3
632	EACH	PEDESTRIAN SIGNAL HEAD, TYPE A2	4
632	EACH	PEDESTRIAN PUSHBUTTON	4
632	EACH	PEDESTRIAN SIGNAL HEAD, TYPE A2	4
632	EACH	LOOP DETECTOR UNIT, DELAY AND EXTENSION TYPE	14
632	LIN.FT.	MESSENGER WIRE, 7-STRAND, 3/8" DIA. W/ ACC.	459
632	LIN.FT.	SIGNAL CABLE, 3/C, #14 AWG	2385
632	LIN.FT.	SIGNAL CABLE, 5/C, #14 AWG	928
632	EACH	STRAIN POLE FOUNDATION, APP	4
632	EACH	PEDESTAL FOUNDATION	3
632	LIN.FT.	LOOP DETECTOR LEAD-IN CABLE, 2/C, NO. 14 AWG	4778
632	LIN.FT.	POWER CABLE, 3/C, NO. 6 AWG	300
632	EACH	POWER SERVICE, APP	1
632	EACH	METER BASE, 100 AMP W/ BYPASS	1
632	EACH	STRAIN POLE, TYPE TC-81.10, DESIGN 7, 30 FEET	4
632	LIN.FT.	LOOP DETECTOR PAVEMENT CUTTING, APP	1115
632	LIN.FT.	LOOP DETECTOR WIRE, TYPE E, APP	3188
632	EACH	WOOD POLE, CLASS 5, 35 FEET	1
632	EACH	PEDESTAL, 8', TRANSFORMER BASE	3
633	EACH	CONTROLLER, ACTUATED, 8-PHASE, SOLID-STATE DIGITAL MICROPROCESSOR	1
633	EACH	WEEKLY PROGRAMMER, SOLID-STATE DIGITAL	1
633	CU.YD.	CONCRETE FOR CABINET FOUNDATION, TC-83.20, TYPE 2	1.82
633	SQ.FT.	CONTROLLER WORKPAD, TC-83.20, TYPE 2 (30"X50")	10.4

INSTALL BATTERY BACKUP W/ ENCLOSURE GROUND MOUNT AND CONCRETE WORKPAD. INSTALL 2" CONDUIT TO CONTROLLER AND ATTACH LB ON SIDE OF EXIST CONTROLLER FND. REPLACE POWER CABLE BACK TO POLE P1.

PB-16 STA 54+35, 26' LT
2" CONDUIT 2-2/C #14 AWG
PB-15 STA 53+19, 30' LT
2" CONDUIT 2-2/C #14 AWG
SCHOOL FLASHER STA. 51+72, 31' LT. R-12-36
2" CONDUIT: 1-3/C
PB-14 STA. 51+68, 29' LT
2" CONDUIT: 2-2/C & 1-3/C
2" CONDUIT: 1-5/C #14 AWG
PB-9 (24") STA. 50+73, 49' LT
CGM-CONTROLLER GROUND MOUNTED STA. 50+76, 54' LT W/ CONCRETE WORKPAD
Ⓐ 3-3" CONDUIT: 16-2/C #14 AWG 3-3/C #14 AWG AND 8-5/C #14 AWG
Ⓑ 2" CONDUIT: 1-2/C #6 POWER
Ⓒ 2-3"CONDUIT: 3-3/C & 4-5/C
P1 - DESIGN 7, 30' STA. 441+05, 63' LT
P5 STA. 441+19, 60' LT
PB-8 STA. 441+04, 37' LT
3"CONDUIT JACKED OR DRILLED 7-2/C #14 AWG
PB-7 STA. 437+27, 39' RT.
2" CONDUIT 1-2/C #14 AWG
PB-6 STA. 438+77, 39' RT.
2" CONDUIT 1-3/C #14 AWG
SCHOOL FLASHER STA. 438+92, 43'm RT.
2" CONDUIT 2-2/C #14 AWG 1-3/C #14 AWG
PB-5 STA. 440+94, 41' RT
PROPOSED POWER SOURCE STA 440+93, 45' RT
P2 - DESIGN 7, 30' STA. 441+17, 58' RT
3" CONDUIT JACKED OR DRILLED: 4-2/C #14 AWG & 1-3/C #14 AWG
3" CONDUIT JACKED OR DRILLED 4-2/C #14 AWG 1-3/C #14 AWG 3-5/C #14 AWG
P6 STA. 442+21, 52' RT.
P3 - DESIGN 7, 30' STA. 442+25, 54' RT.
2" CONDUIT 2-5/C #14 AWG
PB-10 STA. 442+20, 45' RT.
STA. 441+67.39 ~ USR 224
STA. 50+00 ~ SR 61
PB-11 STA 444+67, 21' LT
EXISTING 1" CONDUIT 1-2/C #14 AWG 1-3/C #14 AWG
PB-12 STA 445+76, 21' LT
SCHOOL FLASHER STA. 448+22.5, 26' LT. R-12-36
PB-13 STA. 448+22.5, 20' LT.
2" CONDUIT 1-3/C #14 AWG
2" CONDUIT 2-2/C #14 AWG 1-3/C #14 AWG
3" CONDUIT JACKED OR DRILLED 2-3/C #14 AWG 1-5/C #14 AWG
P7 STA. 442+24, 47' RT.
2"CONDUIT: 1-5/C
PB-4 STA. 442+16, 56' RT.
P4 - DESIGN 7, 30' STA. 442+25, 65' RT.
2" CONDUIT 2-2/C #14 AWG 3-3/C #14 AWG
POWER SOURCE BY AEP #548D1-12 STA 49+03, 50' RT
PB-3 STA. 48+70, 33' RT.
POWER SERVICE BY AEP
2"CONDUIT 4-3/C #14 AWG
WOOD POLE, CLASS 5, 35' W/ WEEKLY PROGRAMMER CONTROLLER. STA 48+55, 46' RT
2" CONDUIT 2-2/C #14 AWG 1-3/C #14 AWG
PB-2 STA. 47+01, 33' RT.
PB-1 STA. 45+71, 33' RT.
2" CONDUIT 1-3/C #14 AWG
SCHOOL FLASHER STA.45+66, 33' RT.
R-12-36

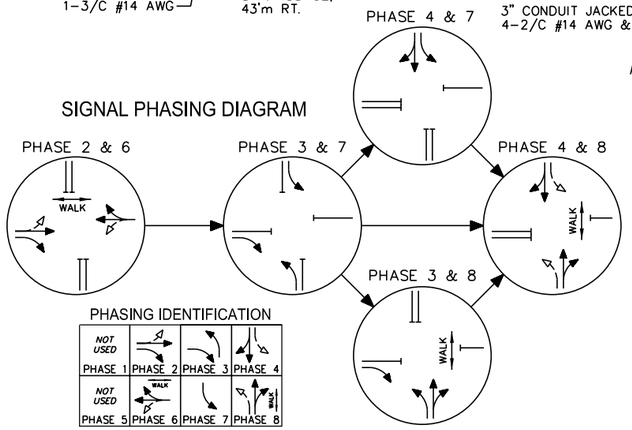
MARATHON GAS STATION
ASPHALT PARKING LOT
ASPHALT PARKING LOT
NEW HAVEN SCHOOL
BLACKTOP DRIVE
ASPHALT DRIVE
GRAVEL DRIVE
CONCRETE DRIVE
ASPHALT COMMERCIAL DRIVE
POWER SOURCE BY AEP #548D1-12 STA 49+03, 50' RT
U.S.R. 224
S.R. 61
U.S.R. 61
N 87°20'00"E
N 86°26'46"E
N 05°47'51"W

LEFT TURN YIELD ON GREEN R-25F-24 S1
NO TURN ON RED R-23-24 S2
SPANWIRE MOUNTED SIGNS

DON'T WALK WALK
TYPICAL PEDESTRIAN SIGNAL HEAD TYPE A2 (ALUMINUM)
9 10 11 12

TYPICAL VEHICULAR SIGNAL HEADS
ALL 12" SIGNAL HEADS (ALUMINUM)
1 3 4 6 8 | 2 | 5 7

SIGNAL PHASING DIAGRAM



PHASING IDENTIFICATION

NOT USED	PHASE 2	PHASE 3	PHASE 4
NOT USED	PHASE 6	PHASE 7	PHASE 8
PHASE 1			
PHASE 5			

FLASHER OPERATIONS
RED TO: SR 61
YELLOW TO: USR 224
SIGNAL NO.: HUR-224-0838S
INSTALLATION DATE: 3-29-73
FILE NUMBER: 0045
OSIS NUMBER: 516

NEW HAVEN SCHOOL
SIGNAL NO.: HUR-224-0838F
FILE NUMBER: 0920
OSIS NUMBER: 2179

0 30 60
SCALE

DATE	REVISIONS	DATE INSTALLED
10-12-01	PLAN REDRAWN PER REBUILD PROJ 315-00 ADDED LEFT TURN PHASING ON SR 61	5-21-01
3-4-05	INSTALLED BATTERY BACKUP PER PROJ. 62-03	5-24-05
11-13-07	REVISED CALL LOOP LOCATIONS ON SR 61	?
6-23-09	CORRECTED NORTH ARROW ORIENTATION	

OHIO DEPARTMENT OF TRANSPORTATION

ELECTRICAL INSTALLATION LOCATED AT

USR 224 & SR 61

District 3 County HURON

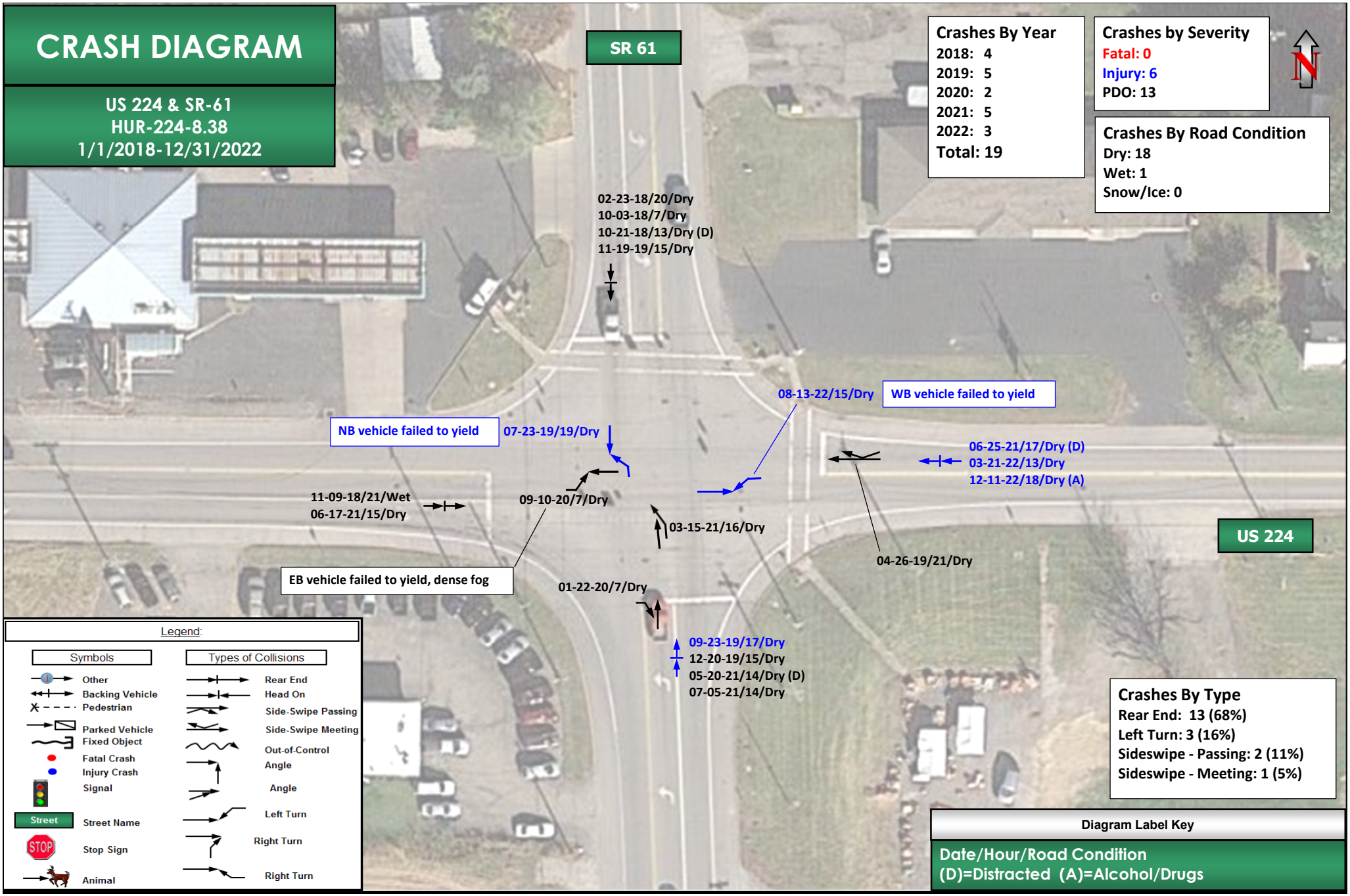
DESIGNED	DRAWN	REVISED	CHECKED	REVIEWED	SHEET
CVH	RJR 10/01				1 OF 1

DESIGN FILE: I:\FIELDINV\ELECTRICAL\SIGNAL\DWG\H224861.dwg
WORKSTATION: rroney DATE: 6/23/2009

TRAFFIC SIGNAL TIMING (In Seconds)								
LOCATION:	**USR 224 / SR61**							
DATE:	2/11/2005							
PERSONNEL:	BP, JC							
	PHASE NUMBER							
	1	2	3	4	5	6	7	8
INTERVAL	**N/A**	**EB USR 224 & EB RIGHT TURN**	**NB SR 61 LEFT TURN**	**SB SR 61**	**N/A**	**WB USR 224**	**SB SR 61 LEFT TURN**	**NB SR 61**
MINIMUM GREEN		15	8	10		15	8	10
PASSAGE TIME		5.0	4.0	4.0		5.0	4.0	4.0
YELLOW CLEARANCE		4.0	4.0	4.0		4.0	4.0	4.0
RED CLEARANCE		2.0	-	2.0		2.0	-	2.0
MAX GREEN 1		40	16	40		40	16	40
MAX GREEN 2		40	16	40		40	16	40
MAX GREEN 3		-	-	-		-	-	-
WALK		0	-	0		5.0	-	5.0
DON'T WALK		0	-	0		16	-	16
MINIMUM RECALL		+	-	-		+	-	-
MAXIMUM RECALL		-	-	-		-	-	-
NON-LOCK		-	+	+		-	+	+
ADDED INITIAL (Sec./act.)		1.5	-	1.5		1.5	-	1.5
MAXIMUM INITIAL		30	-	30		30	-	30
TIME TO REDUCE		0	-	0		0	-	-
TIME BEFORE REDUCTION		0	-	0		0	-	-
MINIMUM GAP		5.0	4.0	4.0		5.0	4.0	4.0

NOTES:

N/A = Not Available or Not Used. CHECK MARK = Yes or On. X = No or Off


CRASH DIAGRAM
US 224 & SR-61
HUR-224-8.38
1/1/2018-12/31/2022
SR 61
Crashes By Year
2018: 4
2019: 5
2020: 2
2021: 5
2022: 3
Total: 19
Crashes by Severity
Fatal: 0
Injury: 6
PDO: 13
Crashes By Road Condition
Dry: 18
Wet: 1
Snow/Ice: 0
N
02-23-18/20/Dry
10-03-18/7/Dry
10-21-18/13/Dry (D)
11-19-19/15/Dry
08-13-22/15/Dry
WB vehicle failed to yield
NB vehicle failed to yield
07-23-19/19/Dry
06-25-21/17/Dry (D)
03-21-22/13/Dry
12-11-22/18/Dry (A)
11-09-18/21/Wet
06-17-21/15/Dry
09-10-20/7/Dry
03-15-21/16/Dry
US 224
04-26-19/21/Dry
EB vehicle failed to yield, dense fog
01-22-20/7/Dry
09-23-19/17/Dry
12-20-19/15/Dry
05-20-21/14/Dry (D)
07-05-21/14/Dry
Legend:
Symbols
Other
Backing Vehicle
Pedestrian
Parked Vehicle
Fixed Object
Fatal Crash
Injury Crash
Signal
Street
Street Name
STOP
Stop Sign
Animal
Types of Collisions
Rear End
Head On
Side-Swipe Passing
Side-Swipe Meeting
Out-of-Control
Angle
Angle
Left Turn
Right Turn
Right Turn
Crashes By Type
Rear End: 13 (68%)
Left Turn: 3 (16%)
Sideswipe - Passing: 2 (11%)
Sideswipe - Meeting: 1 (5%)
Diagram Label Key
Date/Hour/Road Condition
(D)=Distracted (A)=Alcohol/Drugs

Ohio DOT - Traffic Operations
1606 West Broad Street

Columbus, Ohio, United States 43223
+16144667170 D03trafficcounts@dot.ohio.gov

Count Name: HUR-224-8.38 (10-26-23)
Site Code:
Start Date: 10/26/2023

Turning Movement Data

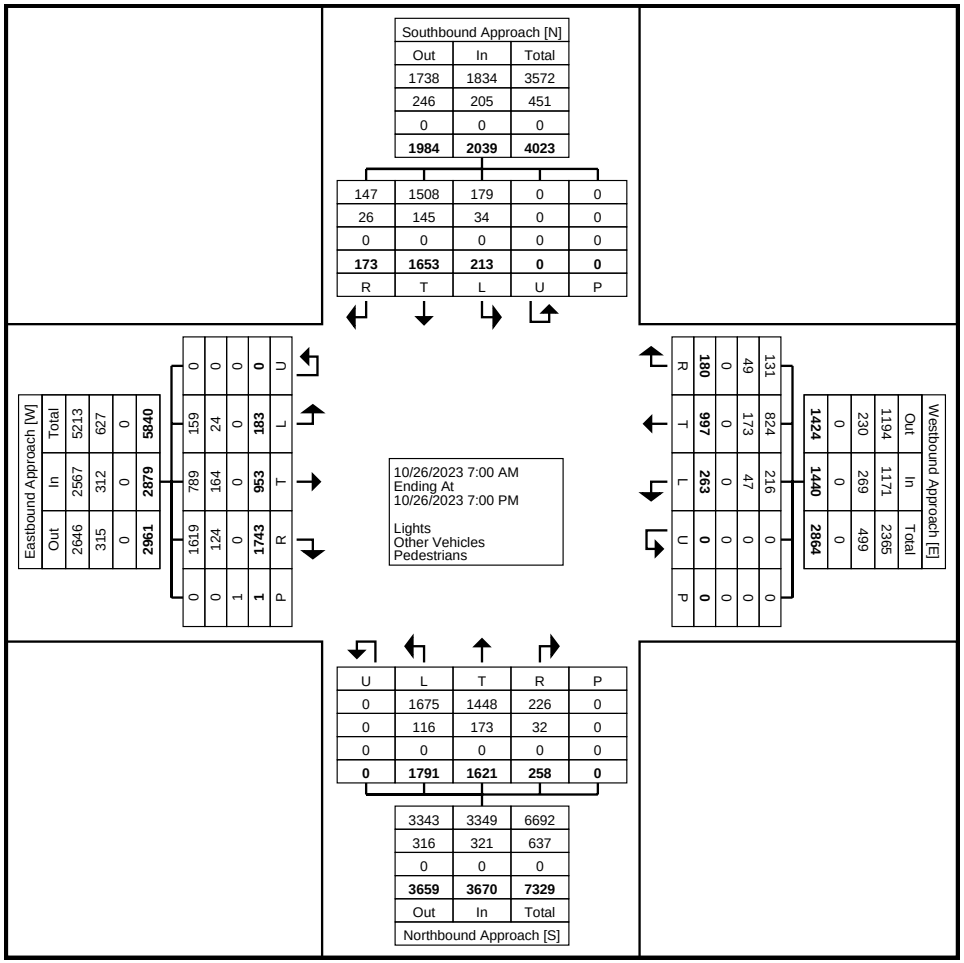
Start Time	Southbound Approach						Westbound Approach						Northbound Approach						Eastbound Approach						Int. Total
	Southbound						Westbound						Northbound						Eastbound						
	Right	Thru	Left	U-Turn	Peds	App. Total	Right	Thru	Left	U-Turn	Peds	App. Total	Right	Thru	Left	U-Turn	Peds	App. Total	Right	Thru	Left	U-Turn	Peds	App. Total	
7:00 AM	6	39	4	0	0	49	1	25	9	0	0	35	3	30	22	0	0	55	40	6	2	0	0	48	187
7:15 AM	5	54	4	0	0	63	2	25	10	0	0	37	2	34	34	0	0	70	53	10	2	0	0	65	235
7:30 AM	3	34	3	0	0	40	3	22	8	0	0	33	1	33	34	0	0	68	49	14	8	0	0	71	212
7:45 AM	3	27	2	0	0	32	3	25	5	0	0	33	5	29	36	0	0	70	26	14	2	0	0	42	177
Hourly Total	17	154	13	0	0	184	9	97	32	0	0	138	11	126	126	0	0	263	168	44	14	0	0	226	811
8:00 AM	3	24	4	0	0	31	5	20	7	0	0	32	3	21	25	0	0	49	31	13	5	0	0	49	161
8:15 AM	6	28	4	0	0	38	3	21	2	0	0	26	2	30	24	0	0	56	22	6	3	0	0	31	151
8:30 AM	1	24	2	0	0	27	2	13	5	0	0	20	5	27	26	0	0	58	31	18	6	0	0	55	160
8:45 AM	3	21	4	0	0	28	9	16	5	0	0	30	2	36	34	0	0	72	26	16	1	0	0	43	173
Hourly Total	13	97	14	0	0	124	19	70	19	0	0	108	12	114	109	0	0	235	110	53	15	0	0	178	645
9:00 AM	1	24	1	0	0	26	5	13	4	0	0	22	6	19	24	0	0	49	29	15	1	0	0	45	142
9:15 AM	7	22	1	0	0	30	3	23	3	0	0	29	3	39	21	0	0	63	28	7	3	0	0	38	160
9:30 AM	3	22	5	0	0	30	2	26	7	0	0	35	3	21	23	0	0	47	32	15	0	0	0	47	159
9:45 AM	2	24	4	0	0	30	4	17	1	0	0	22	5	26	34	0	0	65	30	17	4	0	1	51	168
Hourly Total	13	92	11	0	0	116	14	79	15	0	0	108	17	105	102	0	0	224	119	54	8	0	1	181	629
10:00 AM	6	16	7	0	0	29	5	13	5	0	0	23	5	24	24	0	0	53	30	15	2	0	0	47	152
10:15 AM	3	25	2	0	0	30	8	23	1	0	0	32	5	25	23	0	0	53	30	11	1	0	0	42	157
10:30 AM	2	24	0	0	0	26	2	19	6	0	0	27	7	32	24	0	0	63	23	28	4	0	0	55	171
10:45 AM	3	23	2	0	0	28	4	19	5	0	0	28	3	26	34	0	0	63	29	13	2	0	0	44	163
Hourly Total	14	88	11	0	0	113	19	74	17	0	0	110	20	107	105	0	0	232	112	67	9	0	0	188	643
11:00 AM	3	23	5	0	0	31	2	19	0	0	0	21	6	22	34	0	0	62	29	31	2	0	0	62	176
11:15 AM	3	39	4	0	0	46	3	20	5	0	0	28	2	24	26	0	0	52	35	17	5	0	0	57	183
11:30 AM	5	25	5	0	0	35	5	27	1	0	0	33	3	35	40	0	0	78	29	15	8	0	0	52	198
11:45 AM	1	27	8	0	0	36	2	20	3	0	0	25	4	19	37	0	0	60	23	31	1	0	0	55	176
Hourly Total	12	114	22	0	0	148	12	86	9	0	0	107	15	100	137	0	0	252	116	94	16	0	0	226	733
12:00 PM	6	24	2	0	0	32	5	30	8	0	0	43	6	31	21	0	0	58	39	18	4	0	0	61	194
12:15 PM	2	26	3	0	0	31	6	21	5	0	0	32	4	40	29	0	0	73	32	18	3	0	0	53	189
12:30 PM	1	14	2	0	0	17	4	14	5	0	0	23	3	18	37	0	0	58	39	25	6	0	0	70	168
12:45 PM	4	25	4	0	0	33	4	25	5	0	0	34	6	23	41	0	0	70	35	13	2	0	0	50	187
Hourly Total	13	89	11	0	0	113	19	90	23	0	0	132	19	112	128	0	0	259	145	74	15	0	0	234	738
1:00 PM	0	26	3	0	0	29	2	22	5	0	0	29	0	23	30	0	0	53	27	22	2	0	0	51	162
1:15 PM	7	21	3	0	0	31	2	20	4	0	0	26	7	23	13	0	0	43	35	11	1	0	0	47	147
1:30 PM	4	24	7	0	0	35	3	18	8	0	0	29	8	32	32	0	0	72	33	23	2	0	0	58	194
1:45 PM	5	25	8	0	0	38	4	31	7	0	0	42	5	29	37	0	0	71	32	23	3	0	0	58	209
Hourly Total	16	96	21	0	0	133	11	91	24	0	0	126	20	107	112	0	0	239	127	79	8	0	0	214	712

2:00 PM	1	31	4	0	0	36	6	19	3	0	0	28	9	36	37	0	0	82	42	43	1	0	0	86	232
2:15 PM	6	54	9	0	0	69	2	22	8	0	0	32	8	36	54	0	0	98	60	33	4	0	0	97	296
2:30 PM	3	65	10	0	0	78	2	24	5	0	0	31	3	47	47	0	0	97	72	32	10	0	0	114	320
2:45 PM	6	30	3	0	0	39	4	29	9	0	0	42	6	44	67	0	0	117	38	40	4	0	0	82	280
Hourly Total	16	180	26	0	0	222	14	94	25	0	0	133	26	163	205	0	0	394	212	148	19	0	0	379	1128
3:00 PM	3	58	9	0	0	70	5	20	7	0	0	32	5	42	69	0	0	116	60	26	7	0	0	93	311
3:15 PM	3	36	8	0	0	47	5	32	5	0	0	42	9	40	60	0	0	109	39	22	5	0	0	66	264
3:30 PM	4	49	7	0	0	60	5	20	6	0	0	31	10	32	43	0	0	85	51	18	2	0	0	71	247
3:45 PM	7	67	6	0	0	80	3	16	10	0	0	29	7	48	53	0	0	108	41	23	8	0	0	72	289
Hourly Total	17	210	30	0	0	257	18	88	28	0	0	134	31	162	225	0	0	418	191	89	22	0	0	302	1111
4:00 PM	4	30	4	0	0	38	9	25	3	0	0	37	13	45	44	0	0	102	56	26	8	0	0	90	267
4:15 PM	3	45	6	0	0	54	1	19	4	0	0	24	7	63	66	0	0	136	33	33	2	0	0	68	282
4:30 PM	4	50	4	0	0	58	5	20	9	0	0	34	7	43	48	0	0	98	42	23	6	0	0	71	261
4:45 PM	8	56	12	0	0	76	6	33	5	0	0	44	15	56	46	0	0	117	48	14	2	0	0	64	301
Hourly Total	19	181	26	0	0	226	21	97	21	0	0	139	42	207	204	0	0	453	179	96	18	0	0	293	1111
5:00 PM	8	61	8	0	0	77	1	14	5	0	0	20	12	56	48	0	0	116	44	23	6	0	0	73	286
5:15 PM	3	60	4	0	0	67	3	22	12	0	0	37	8	51	54	0	0	113	34	29	8	0	0	71	288
5:30 PM	1	54	1	0	0	56	5	16	7	0	0	28	6	44	61	0	0	111	37	19	6	0	0	62	257
5:45 PM	5	33	3	0	0	41	3	20	5	0	0	28	3	31	36	0	0	70	25	13	3	0	0	41	180
Hourly Total	17	208	16	0	0	241	12	72	29	0	0	113	29	182	199	0	0	410	140	84	23	0	0	247	1011
6:00 PM	0	28	3	0	0	31	2	13	6	0	0	21	6	43	38	0	0	87	34	14	5	0	0	53	192
6:15 PM	1	43	2	0	0	46	3	11	4	0	0	18	2	29	39	0	0	70	36	21	5	0	0	62	196
6:30 PM	2	31	5	0	0	38	2	18	6	0	0	26	2	37	32	0	0	71	20	21	4	0	0	45	180
6:45 PM	3	42	2	0	0	47	5	17	5	0	0	27	6	27	30	0	0	63	34	15	2	0	0	51	188
Hourly Total	6	144	12	0	0	162	12	59	21	0	0	92	16	136	139	0	0	291	124	71	16	0	0	211	756
Grand Total	173	1653	213	0	0	2039	180	997	263	0	0	1440	258	1621	1791	0	0	3670	1743	953	183	0	1	2879	10028
Approach %	8.5	81.1	10.4	0.0	-	-	12.5	69.2	18.3	0.0	-	-	7.0	44.2	48.8	0.0	-	-	60.5	33.1	6.4	0.0	-	-	-
Total %	1.7	16.5	2.1	0.0	-	20.3	1.8	9.9	2.6	0.0	-	14.4	2.6	16.2	17.9	0.0	-	36.6	17.4	9.5	1.8	0.0	-	28.7	-
Lights	147	1508	179	0	-	1834	131	824	216	0	-	1171	226	1448	1675	0	-	3349	1619	789	159	0	-	2567	8921
% Lights	85.0	91.2	84.0	-	-	89.9	72.8	82.6	82.1	-	-	81.3	87.6	89.3	93.5	-	-	91.3	92.9	82.8	86.9	-	-	89.2	89.0
Other Vehicles	26	145	34	0	-	205	49	173	47	0	-	269	32	173	116	0	-	321	124	164	24	0	-	312	1107
% Other Vehicles	15.0	8.8	16.0	-	-	10.1	27.2	17.4	17.9	-	-	18.7	12.4	10.7	6.5	-	-	8.7	7.1	17.2	13.1	-	-	10.8	11.0
Pedestrians	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	1	-	-
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	100.0	-	-

Ohio DOT - Traffic Operations
1606 West Broad Street

Columbus, Ohio, United States 43223
+16144667170 D03trafficcounts@dot.ohio.gov

Count Name: HUR-224-8.38 (10-26-23)
Site Code:
Start Date: 10/26/2023
Page No: 3



Turning Movement Data Plot

Ohio DOT - Traffic Operations
1606 West Broad Street

Columbus, Ohio, United States 43223
+16144667170 D03trafficcounts@dot.ohio.gov

Count Name: HUR-224-8.38 (10-26-23)
Site Code:
Start Date: 10/26/2023

Turning Movement Peak Hour Data (7:00 AM)

Start Time	Southbound Approach						Westbound Approach						Northbound Approach						Eastbound Approach						
	Southbound						Westbound						Northbound						Eastbound						
	Right	Thru	Left	U-Turn	Peds	App. Total	Right	Thru	Left	U-Turn	Peds	App. Total	Right	Thru	Left	U-Turn	Peds	App. Total	Right	Thru	Left	U-Turn	Peds	App. Total	Int. Total
7:00 AM	6	39	4	0	0	49	1	25	9	0	0	35	3	30	22	0	0	55	40	6	2	0	0	48	187
7:15 AM	5	54	4	0	0	63	2	25	10	0	0	37	2	34	34	0	0	70	53	10	2	0	0	65	235
7:30 AM	3	34	3	0	0	40	3	22	8	0	0	33	1	33	34	0	0	68	49	14	8	0	0	71	212
7:45 AM	3	27	2	0	0	32	3	25	5	0	0	33	5	29	36	0	0	70	26	14	2	0	0	42	177
Total	17	154	13	0	0	184	9	97	32	0	0	138	11	126	126	0	0	263	168	44	14	0	0	226	811
Approach %	9.2	83.7	7.1	0.0	-	-	6.5	70.3	23.2	0.0	-	-	4.2	47.9	47.9	0.0	-	-	74.3	19.5	6.2	0.0	-	-	-
Total %	2.1	19.0	1.6	0.0	-	22.7	1.1	12.0	3.9	0.0	-	17.0	1.4	15.5	15.5	0.0	-	32.4	20.7	5.4	1.7	0.0	-	27.9	-
PHF	0.708	0.713	0.813	0.000	-	0.730	0.750	0.970	0.800	0.000	-	0.932	0.550	0.926	0.875	0.000	-	0.939	0.792	0.786	0.438	0.000	-	0.796	0.863
Lights	14	146	12	0	-	172	6	89	28	0	-	123	9	117	120	0	-	246	158	34	12	0	-	204	745
% Lights	82.4	94.8	92.3	-	-	93.5	66.7	91.8	87.5	-	-	89.1	81.8	92.9	95.2	-	-	93.5	94.0	77.3	85.7	-	-	90.3	91.9
Other Vehicles	3	8	1	0	-	12	3	8	4	0	-	15	2	9	6	0	-	17	10	10	2	0	-	22	66
% Other Vehicles	17.6	5.2	7.7	-	-	6.5	33.3	8.2	12.5	-	-	10.9	18.2	7.1	4.8	-	-	6.5	6.0	22.7	14.3	-	-	9.7	8.1
Pedestrians	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Ohio DOT - Traffic Operations
1606 West Broad Street

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Count Name: HUR-224-8.38 (10-26-23)
Site Code:
Start Date: 10/26/2023
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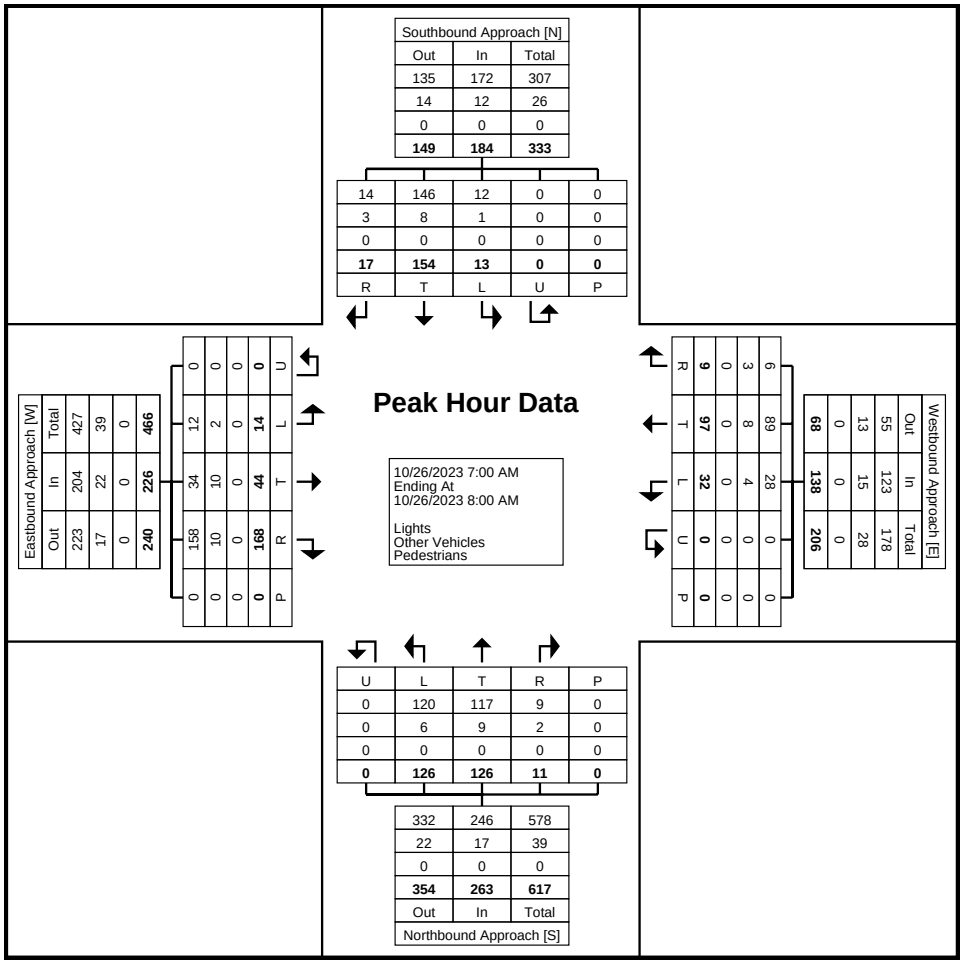

Turning Movement Peak Hour Data Plot (7:00 AM)

Ohio DOT - Traffic Operations
1606 West Broad Street

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Count Name: HUR-224-8.38 (10-26-23)
Site Code:
Start Date: 10/26/2023

Turning Movement Peak Hour Data (2:15 PM)

Start Time	Southbound Approach Southbound						Westbound Approach Westbound						Northbound Approach Northbound						Eastbound Approach Eastbound						Int. Total
	Right	Thru	Left	U-Turn	Peds	App. Total	Right	Thru	Left	U-Turn	Peds	App. Total	Right	Thru	Left	U-Turn	Peds	App. Total	Right	Thru	Left	U-Turn	Peds	App. Total	
2:15 PM	6	54	9	0	0	69	2	22	8	0	0	32	8	36	54	0	0	98	60	33	4	0	0	97	296
2:30 PM	3	65	10	0	0	78	2	24	5	0	0	31	3	47	47	0	0	97	72	32	10	0	0	114	320
2:45 PM	6	30	3	0	0	39	4	29	9	0	0	42	6	44	67	0	0	117	38	40	4	0	0	82	280
3:00 PM	3	58	9	0	0	70	5	20	7	0	0	32	5	42	69	0	0	116	60	26	7	0	0	93	311
Total	18	207	31	0	0	256	13	95	29	0	0	137	22	169	237	0	0	428	230	131	25	0	0	386	1207
Approach %	7.0	80.9	12.1	0.0	-	-	9.5	69.3	21.2	0.0	-	-	5.1	39.5	55.4	0.0	-	-	59.6	33.9	6.5	0.0	-	-	-
Total %	1.5	17.1	2.6	0.0	-	21.2	1.1	7.9	2.4	0.0	-	11.4	1.8	14.0	19.6	0.0	-	35.5	19.1	10.9	2.1	0.0	-	32.0	-
PHF	0.750	0.796	0.775	0.000	-	0.821	0.650	0.819	0.806	0.000	-	0.815	0.688	0.899	0.859	0.000	-	0.915	0.799	0.819	0.625	0.000	-	0.846	0.943
Lights	18	196	27	0	-	241	12	85	20	0	-	117	16	152	230	0	-	398	219	118	24	0	-	361	1117
% Lights	100.0	94.7	87.1	-	-	94.1	92.3	89.5	69.0	-	-	85.4	72.7	89.9	97.0	-	-	93.0	95.2	90.1	96.0	-	-	93.5	92.5
Other Vehicles	0	11	4	0	-	15	1	10	9	0	-	20	6	17	7	0	-	30	11	13	1	0	-	25	90
% Other Vehicles	0.0	5.3	12.9	-	-	5.9	7.7	10.5	31.0	-	-	14.6	27.3	10.1	3.0	-	-	7.0	4.8	9.9	4.0	-	-	6.5	7.5
Pedestrians	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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Count Name: HUR-224-8.38 (10-26-23)
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Start Date: 10/26/2023
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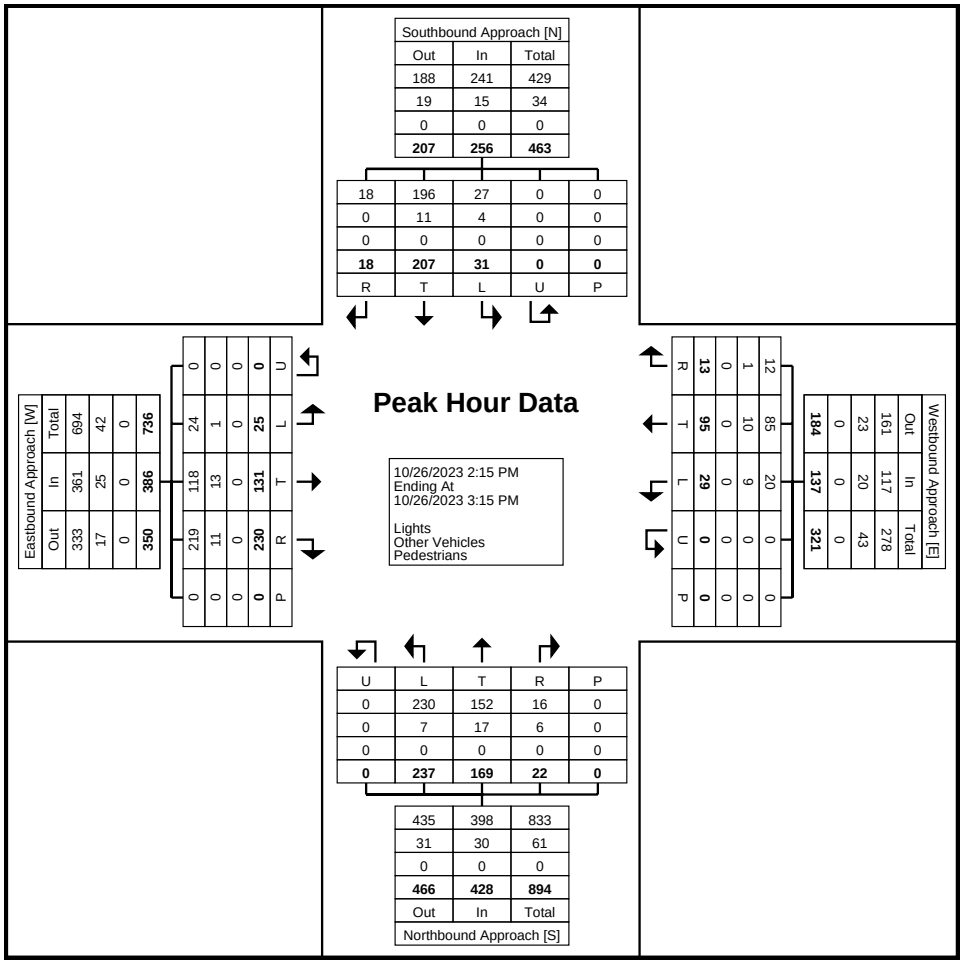


Turning Movement Peak Hour Data Plot (2:15 PM)

Report Title 1
Report Title 2
Report Title 3

Study Name: HUR-224_61 Warrant
Study Date : 12/27/2023

Signal Warrants - Summary

Major Street Approaches

Northbound: SR 61
Number of Lanes : 1

Total Approach Volume: 3,670

Southbound: SR 61
Number of Lanes :1

Total Approach Volume: 2,039

Minor Street Approaches

Eastbound: US 224
Number of Lanes :1

Total Approach Volume: 2,879

Westbound: US 224
Number of Lanes :1

Total Approach Volume: 1,440

Warrant Summary (Rural Values Apply)

Warrant 1 - Eight Hour Vehicular Volumes.....**Satisfied**

Warrant 1A - Minimum Vehicular Volume.....**Satisfied**
Required volumes reached for 10 hours, 8 are needed

Warrant 1B - Interruption of Continuous Traffic.....**Not Satisfied**
Required volumes reached for 4 hours, 8 are needed

Warrant 1C - Combination of Warrants.....**Not Satisfied**
Required 1A volumes reached for 12 hours, 8 are needed
Required 1B volumes reached for 6 hours, 8 are needed

Warrant 2 - Four Hour Volumes.....**Satisfied**
Number of hours (11) volumes exceed minimum >= minimum required (4).

Warrant 3 - Peak Hour.....**Satisfied**

Warrant 3A - Peak Hour Delay.....**Satisfied**
Number of one hour periods (18) volumes exceed minimum >= required (1). Delay data not evaluated.

Warrant 3B - Peak Hour Volumes.....**Satisfied**
Volumes exceed minimums for at least one hour period.

Warrant 4 - Pedestrian Volumes.....**Not Evaluated**

Warrant 5 - School Crossing.....**Not Evaluated**

Warrant 6 - Coordinated Signal System.....**Not Evaluated**

Warrant 7 - Crash Experience.....**Not Evaluated**

Warrant 8 - Roadway Network.....**Not Evaluated**

Warrant 9 - Intersection Near a Grade Crossing.....**Not Evaluated**

Report Title 1
Report Title 2
Report Title 3

Study Name: HUR-224_61 Warrant
Study Date : 12/27/2023

Warrant 1A - Minimum Volumes

Description

Intended for sites where the volume of intersecting traffic is the principal reason for consideration of a signal installation.

Summary

10 one hour periods meet minimums.
Warrant IS met.

Site Data Required

Rural Settings Apply = **True**
Number of Major Lanes = **1**
Number of Minor Lanes = **1**

Volume Requirements

Rural Factor of 70 % applied
Veh/Hr Major = **350**

Veh/Hr Minor = **105**

	Major Road SR 61					Minor Road US 224		
Time	Major NB	+	Major SB	=	Total	Minor EB	Minor WB	Met?
16:15 - 17:15	467	+	265	=	732	276	122	Yes
14:15 - 15:15	428	+	256	=	684	386	137	Yes
15:15 - 16:15	404	+	225	=	629	299	139	Yes
17:15 - 18:15	381	+	195	=	576	227	114	Yes
07:00 - 08:00	263	+	184	=	447	226	138	Yes
13:15 - 14:15	268	+	140	=	408	249	125	Yes
11:15 - 12:15	248	+	149	=	397	225	129	Yes
12:15 - 13:15	254	+	110	=	364	224	118	Yes
08:00 - 09:00	235	+	124	=	359	178	108	Yes
10:15 - 11:15	241	+	115	=	356	203	108	Yes
09:45 - 10:45	234	+	115	=	349	195	104	No
09:15 - 10:15	228	+	119	=	347	183	109	No
10:00 - 11:00	232	+	113	=	345	188	110	No
06:45 - 07:45	193	+	152	=	345	184	105	No
09:00 - 10:00	224	+	116	=	340	181	108	No
09:30 - 10:30	218	+	119	=	337	187	112	No
18:15 - 19:15	204	+	131	=	335	158	71	No
06:30 - 07:30	125	+	112	=	237	113	72	No
18:30 - 19:30	134	+	85	=	219	96	53	No
18:45 - 19:45	63	+	47	=	110	51	27	No
06:15 - 07:15	55	+	49	=	104	48	35	No
22:15 - 23:15	0	+	0	=	0	0	0	No
23:45 - 00:45	0	+	0	=	0	0	0	No
22:00 - 23:00	0	+	0	=	0	0	0	No
21:45 - 22:45	0		0		0	0	0	No

Report Title 1
Report Title 2
Report Title 3

Study Name: HUR-224_61 Warrant

Study Date : 12/27/2023

Warrant 1B - Interruption of Continuous Traffic

Description

Intended for sites where the volume of the major street is so heavy that traffic on the minor street suffers excessive delay or hazard.

Summary

Only 4 one hour periods meet minimums.
Warrant is NOT met.

Site Data Required

Rural Settings Apply = **True**
Number of Major Lanes = **1**
Number of Minor Lanes = **1**

Volume Requirements

Rural Factor of 70 % applied
Veh/Hr Major = **525**

Veh/Hr Minor = **52**

	Major Road SR 61					Minor Road US 224		
Time	Major NB	+	Major SB	=	Total	Minor EB	Minor WB	Met?
16:45 - 17:45	457	+	276	=	733	270	129	Yes
15:45 - 16:45	444	+	230	=	674	301	124	Yes
14:45 - 15:45	427	+	216	=	643	312	147	Yes
13:45 - 14:45	348	+	221	=	569	355	133	Yes
13:30 - 14:30	323	+	178	=	501	299	131	No
17:45 - 18:45	298	+	156	=	454	201	93	No
18:00 - 19:00	291	+	162	=	453	211	92	No
07:00 - 08:00	263	+	184	=	447	226	138	No
07:15 - 08:15	257	+	166	=	423	227	135	No
13:15 - 14:15	268	+	140	=	408	249	125	No
11:30 - 12:30	269	+	134	=	403	221	133	No
11:00 - 12:00	252	+	148	=	400	226	107	No
11:15 - 12:15	248	+	149	=	397	225	129	No
10:45 - 11:45	255	+	140	=	395	215	110	No
07:30 - 08:30	243	+	141	=	384	193	124	No
12:00 - 13:00	259	+	113	=	372	234	132	No
13:00 - 14:00	239	+	133	=	372	214	126	No
10:30 - 11:30	240	+	131	=	371	218	104	No
12:45 - 13:45	238	+	128	=	366	206	118	No
11:45 - 12:45	249	+	116	=	365	239	123	No
12:15 - 13:15	254	+	110	=	364	224	118	No
07:45 - 08:45	233	+	128	=	361	177	111	No
08:00 - 09:00	235	+	124	=	359	178	108	No
10:15 - 11:15	241	+	115	=	356	203	108	No
08:15 - 09:15	235		119		354	174	98	No

Report Title 1
Report Title 2
Report Title 3

Study Name: HUR-224_61 Warrant
Study Date : 12/27/2023

Warrant 1C Combination of Warrants

Description

Intended for sites where the traffic volumes don't meet individual warrants but where Warrants 1A and 1B are both met to 80% of their stated values.

Summary

12 hours meet 1A minimums.
Only 6 hours meet 1B minimums.
Warrant is NOT met.

Site Data Required

Rural Settings Apply = **True**
Number of Major Lanes = **1**
Number of Minor Lanes = **1**

Volume Requirements

Rural Factor of 70% applied

Warrant	1A	1B
Veh/Hr Major =	**280**	**420**
Veh/Hr Minor =	**84**	**42**

Major Road	Minor Road
SR 61	US 224

Time	Major NB	+	Major SB	=	Total	Minor EB	Minor WB	Met1A?
16:45 - 17:45	457	+	276	=	733	270	129	Yes
15:45 - 16:45	444	+	230	=	674	301	124	Yes
14:45 - 15:45	427	+	216	=	643	312	147	Yes
13:45 - 14:45	348	+	221	=	569	355	133	Yes
17:45 - 18:45	298	+	156	=	454	201	93	Yes
10:45 - 11:45	255	+	140	=	395	215	110	Yes
12:45 - 13:45	238	+	128	=	366	206	118	Yes
11:45 - 12:45	249	+	116	=	365	239	123	Yes
07:45 - 08:45	233	+	128	=	361	177	111	Yes
09:45 - 10:45	234	+	115	=	349	195	104	Yes
06:45 - 07:45	193	+	152	=	345	184	105	Yes
08:45 - 09:45	231	+	114	=	345	173	116	Yes

Time	Major NB	+	Major SB	=	Total	Minor EB	Minor WB	Met1B?
16:30 - 17:30	444	+	278	=	722	279	135	Yes
14:30 - 15:30	439	+	234	=	673	355	147	Yes
15:30 - 16:30	431	+	232	=	663	301	121	Yes
17:30 - 18:30	338	+	174	=	512	218	95	Yes
13:30 - 14:30	323	+	178	=	501	299	131	Yes
07:00 - 08:00	263	+	184	=	447	226	138	Yes
13:15 - 14:15	268	+	140	=	408	249	125	No
11:30 - 12:30	269	+	134	=	403	221	133	No
11:00 - 12:00	252	+	148	=	400	226	107	No
11:15 - 12:15	248	+	149	=	397	225	129	No
10:45 - 11:45	255	+	140	=	395	215	110	No
12:00 - 13:00	259	+	113	=	372	234	132	No

Report Title 1
Report Title 2
Report Title 3

Study Name: HUR-224_61 Warrant
Study Date : 12/27/2023

Warrant 2 - Four Hour Volumes

Description

Intended for sites where the volume of intersecting traffic during any four hours of the day is the principal reason for consideration of a signal installation.

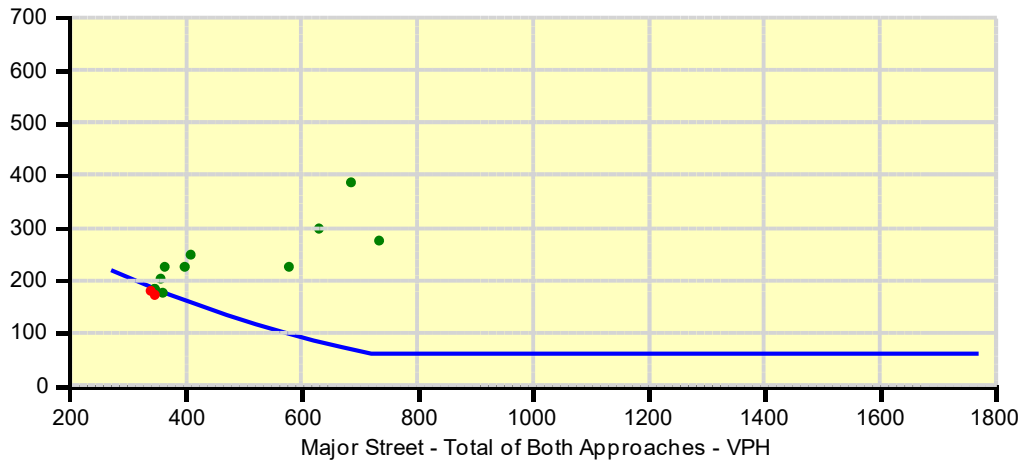
Summary

11 one hour periods meet minimums.
Warrant IS met.

Site Data Required

Rural Settings Apply =	**True**
Number of Major Lanes =	**1**
Number of Minor Lanes =	**1**

	Major Road SR 61					Minor Road US 224		
Time	Major NB	+	Major SB	=	Total	Minor EB	Minor WB	Met?
16:15 - 17:15	467	+	265	=	732	276	122	Yes
14:15 - 15:15	428	+	256	=	684	386	137	Yes
15:15 - 16:15	404	+	225	=	629	299	139	Yes
17:15 - 18:15	381	+	195	=	576	227	114	Yes
13:15 - 14:15	268	+	140	=	408	249	125	Yes
11:15 - 12:15	248	+	149	=	397	225	129	Yes
12:15 - 13:15	254	+	110	=	364	224	118	Yes
07:45 - 08:45	233	+	128	=	361	177	111	Yes
10:15 - 11:15	241	+	115	=	356	203	108	Yes
09:15 - 10:15	228	+	119	=	347	183	109	Yes
06:45 - 07:45	193	+	152	=	345	184	105	Yes
							116	No



Report Title 1
Report Title 2
Report Title 3

Study Name: HUR-224_61 Warrant
Study Date : 12/27/2023

Warrant 3A - Peak Hour Delay

Description

Intended for sites where for one hour of the day minor street traffic suffers undue traffic delay entering or crossing the major street.

Summary

18 one hour periods meet minimums.
Warrant IS met.

Site Data Required

Number of Minor Lanes = **1**

Volume and Delay Requirements

Veh/Hr All Approaches = **800**
Veh/Hr Minor = **100**
Total Delay (Veh-Hrs) = **4**

Major Road	Minor Road
SR 61	US 224

Time	Total of All Approaches	Met?	Minor EB	Delay EB	Met?	Minor WB	Delay WB	Met?	Warrant Met?
14:15 - 15:15	1207	Yes	386	-	Yes	137	-	---	Yes
14:30 - 15:30	1175	Yes	355	-	Yes	147	-	---	Yes
16:30 - 17:30	1136	Yes	279	-	Yes	135	-	---	Yes
16:45 - 17:45	1132	Yes	270	-	Yes	129	-	---	Yes
16:15 - 17:15	1130	Yes	276	-	Yes	122	-	---	Yes
14:00 - 15:00	1128	Yes	379	-	Yes	133	-	---	Yes
16:00 - 17:00	1111	Yes	293	-	Yes	139	-	---	Yes
15:00 - 16:00	1111	Yes	302	-	Yes	134	-	---	Yes
14:45 - 15:45	1102	Yes	312	-	Yes	147	-	---	Yes
15:45 - 16:45	1099	Yes	301	-	Yes	124	-	---	Yes
15:30 - 16:30	1085	Yes	301	-	Yes	121	-	---	Yes
15:15 - 16:15	1067	Yes	299	-	Yes	139	-	---	Yes
13:45 - 14:45	1057	Yes	355	-	Yes	133	-	---	Yes
17:00 - 18:00	1011	Yes	247	-	Yes	113	-	---	Yes
13:30 - 14:30	931	Yes	299	-	Yes	131	-	---	Yes
17:15 - 18:15	917	Yes	227	-	Yes	114	-	---	Yes
17:30 - 18:30	825	Yes	218	-	Yes	95	-	---	Yes
07:00 - 08:00	811	Yes	226	-	Yes	138	-	---	Yes
07:15 - 08:15	785	No	227	-	Yes	135	-	---	No
13:15 - 14:15	782	No	249	-	Yes	125	-	---	No
11:30 - 12:30	757	No	221	-	Yes	133	-	---	No
18:00 - 19:00	756	No	211	-	Yes	92	-	---	No
11:15 - 12:15	751	No	225	-	Yes	129	-	---	No
17:45 - 18:45	748	No	201	-	Yes	93	-	---	No
12:00 - 13:00	738	No	234	-	Yes	132	-	---	No

Report Title 1
Report Title 2
Report Title 3

Study Name: HUR-224_61 Warrant
Study Date : 12/27/2023

Warrant 3B - Peak Hour Volumes

Description

Intended for sites where the volume of intersecting traffic during one hour of the day is the principal reason for consideration of a signal installation.

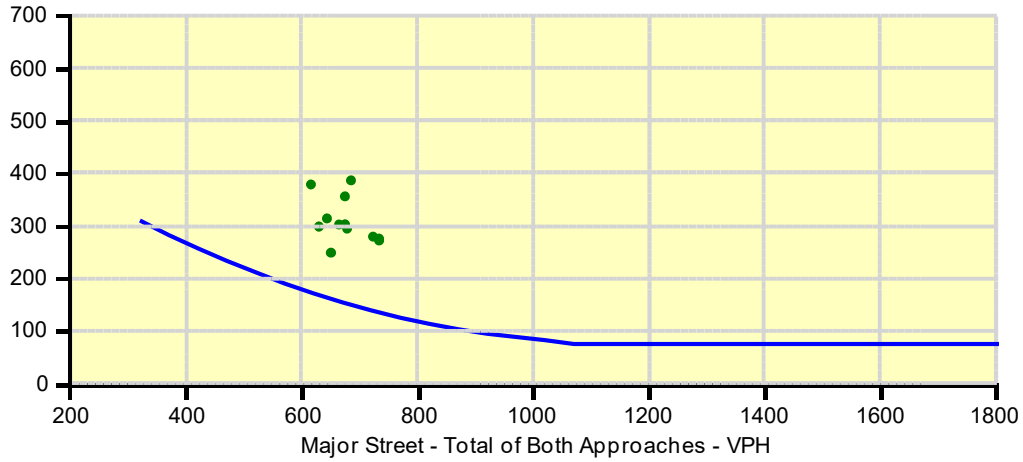
Summary

17 one hour periods meet minimums.
Warrant IS met.

Site Data Required

Rural Settings Apply =	**True**
Number of Major Lanes =	**1**
Number of Minor Lanes =	**1**

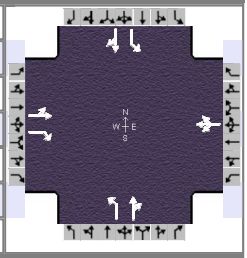
	Major Road SR 61					Minor Road US 224		
Time	Major NB	+	Major SB	=	Total	Minor EB	Minor WB	Met?
16:45 - 17:45	457	+	276	=	733	270	129	Yes
16:15 - 17:15	467	+	265	=	732	276	122	Yes
16:30 - 17:30	444	+	278	=	722	279	135	Yes
14:15 - 15:15	428	+	256	=	684	386	137	Yes
16:00 - 17:00	453	+	226	=	679	293	139	Yes
15:00 - 16:00	418	+	257	=	675	302	134	Yes
15:45 - 16:45	444	+	230	=	674	301	124	Yes
14:30 - 15:30	439	+	234	=	673	355	147	Yes
15:30 - 16:30	431	+	232	=	663	301	121	Yes
17:00 - 18:00	410	+	241	=	651	247	113	Yes
14:45 - 15:45	427	+	216	=	643	312	147	Yes
							139	Yes



ASSOCIATED PHASE	DIRECTION	MOVEMENT	TRAFFIC SIGNAL														PEDESTRIAN													
			FACTORS *(TEM 403-2)								CALCULATED (TEM 403-2)			FINAL CLEARANCE											3 fps CHECKS (OMUTCD 4E.06, 01-14)				FINAL PED TIMING	
			POSTED SPEED LIMIT	PERCEPTION/REACTION TIME (1s TYP)	YELLOW CHANGE APPROACH SPEED*	RED APPROACH SPEED*	DECELERATION RATE (10 fps TYP)	WIDTH OF INTERSECTION*	LENGTH OF VEHICLE (20 ft TYP)	APPROACH GRADE	YELLOW	RED	Y + R	YELLOW	RED	Y + R	PED MOVEMENT	ASSOCIATED PHASE	CROSSWALK LENGTH	PUSHBUTTON PROVIDED	DISTANCE TO PUSHBUTTON FROM CURB (furthest of the two corners)	WALK INTERVAL (4-7s TYP)	CALCULATED PED CLEARANCE	PED CHANGE INTERVAL (FDW)	(L+P)/(3 fps) (NOTE: P=6 IF NO PUSHBUTTON)	WALK + PED CHANGE INTERVALS + YELLOW	IS Y>=X?	ADDITIONAL WALK INTERVAL REQUIRED	FINAL WALK INTERVAL	FINAL PED CHANGE INTERVAL (FDW)
				t	V_Y	V_R	a	W	L	g	Y	R	TOTAL	Y (3-6s TYP)	R (1-6s TYP)	TOTAL			L		P		= 3.5 fps WALK TIME	= 3.5 fps WALK TIME - YELLOW	X	Y				
			MPH	SEC	MPH	MPH	FPS	FT	FT	%	SEC	SEC	SEC	SEC	SEC	SEC			FT		FT	SEC	SEC	SEC	SEC	SEC		SEC	SEC	SEC
1	-	-	-	1	-	-	10	-	20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2	EB	THROUGH/RT	45	1	52	52	10	85	20	0	4.8	0.4	5.2	5	1	6.0	EB	2	73	NO	-	-	20.9	15.9	26.3	-	-	-	-	16
3	NB LT	LEFT TURN	45	1	40	25	10	75	20	0	3.9	1.6	5.5	4	2	6.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4	SB	THROUGH/RT	45	1	52	52	10	80	20	0	4.8	0.3	5.1	5	1	6.0	SB	4	59	NO	-	-	16.9	11.9	21.7	-	-	-	-	12
5	-	-	-	1	-	-	10	-	20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6	WB	THROUGH/RT	45	1	52	52	10	89	20	0	4.8	0.4	5.2	5	1	6.0	WB	6	82	YES	14.17	5	23.4	18.4	32.1	28.4	NO	3.6	9	19
7	SB LT	LEFT TURN	45	1	40	25	10	80	20	0	3.9	1.7	5.6	4	2	6.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-
8	NB	THROUGH/RT	45	1	52	52	10	70	20	0	4.8	0.2	5.0	5	1	6.0	NB	8	69	YES	20.33	5	19.7	14.7	29.8	24.7	NO	5.1	11	15

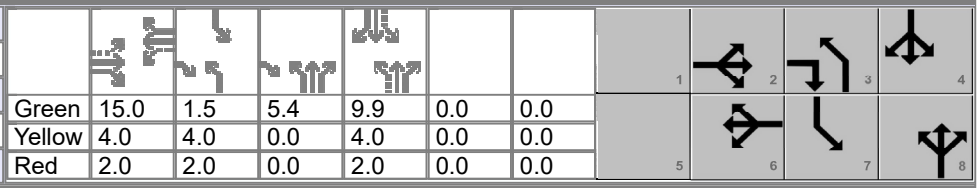
HCS Signalized Intersection Results Summary

General Information				Intersection Information	
Agency				Duration, h	0.250
Analyst		Analysis Date	12/28/2023	Area Type	Other
Jurisdiction		Time Period		PHF	0.86
Urban Street	US 224 & SR 61	Analysis Year	2023	Analysis Period	1> 7:00
Intersection		File Name	AM Peak_Ex Timing.xus		
Project Description	AM Peak				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	14	44	168	32	97	9	126	126	11	13	154	17

Signal Information			
Cycle, s	49.9	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	15.0	1.5	5.4	9.9	0.0	0.0
Yellow	4.0	4.0	0.0	4.0	0.0	0.0
Red	2.0	2.0	0.0	2.0	0.0	0.0

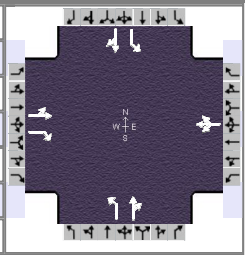
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		2		6	3	8	7	4
Case Number		7.0		8.0	1.1	4.0	1.1	4.0
Phase Duration, s		21.0		21.0	13.0	21.4	7.5	15.9
Change Period, ($Y+R_c$), s		6.0		6.0	6.0	6.0	6.0	6.0
Max Allow Headway (*MAH*), s		6.1		6.1	5.0	5.0	5.0	5.0
Queue Clearance Time (g_s), s		6.7		5.9	5.2	5.7	2.4	7.6
Green Extension Time (g_e), s		3.7		3.7	0.5	2.0	0.0	2.0
Phase Call Probability		1.00		1.00	0.87	1.00	0.19	0.99
Max Out Probability		0.00		0.00	0.03	0.00	0.00	0.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate (*v*), veh/h		67	195		160		147	159		15	199	
Adjusted Saturation Flow Rate (*s*), veh/h/ln		1532	1367		1524		1576	1631		1576	1625	
Queue Service Time (g_s), s		0.0	4.7		0.0		3.2	3.7		0.4	5.6	
Cycle Queue Clearance Time (g_c), s		1.5	4.7		3.9		3.2	3.7		0.4	5.6	
Green Ratio (*g/C*)		0.30	0.44		0.30		0.37	0.31		0.23	0.20	
Capacity (*c*), veh/h		550	602		547		464	503		420	324	
Volume-to-Capacity Ratio (*X*)		0.123	0.325		0.293		0.316	0.317		0.036	0.614	
Back of Queue (*Q*), ft/ln (95 th percentile)		22.4	51.8		57.9		43.2	53.9		5.4	92.3	
Back of Queue (*Q*), veh/ln (95 th percentile)		0.8	1.9		2.1		1.6	2.0		0.2	3.5	
Queue Storage Ratio (*RQ*) (95 th percentile)		0.00	0.10		0.00		0.24	0.00		0.03	0.00	
Uniform Delay (d_1), s/veh		12.7	9.1		13.6		11.6	13.2		14.9	18.2	
Incremental Delay (d_2), s/veh		0.2	0.7		0.6		0.6	0.5		0.0	2.7	
Initial Queue Delay (d_3), s/veh		0.0	0.0		0.0		0.0	0.0		0.0	0.0	
Control Delay (*d*), s/veh		12.9	9.8		14.2		12.1	13.7		15.0	20.9	
Level of Service (LOS)		B	A		B		B	B		B	C	
Approach Delay, s/veh / LOS	10.6	B		14.2	B		13.0	B		20.5	C	
Intersection Delay, s/veh / LOS	14.2						B					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	1.90	B	1.90	B	1.67	B	1.91	B
Bicycle LOS Score / LOS	0.92	A	0.75	A	0.99	A	0.84	A

HCS Signalized Intersection Results Summary

General Information				Intersection Information	
Agency				Duration, h	0.250
Analyst		Analysis Date	12/28/2023	Area Type	Other
Jurisdiction		Time Period		PHF	0.94
Urban Street	US 224 & SR 61	Analysis Year	2023	Analysis Period	1> 7:00
Intersection		File Name	PM Peak_Ex Timing.xus		
Project Description	PM Peak				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	25	131	230	29	95	13	237	169	22	31	207	18

Signal Information			
Cycle, s	53.1	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

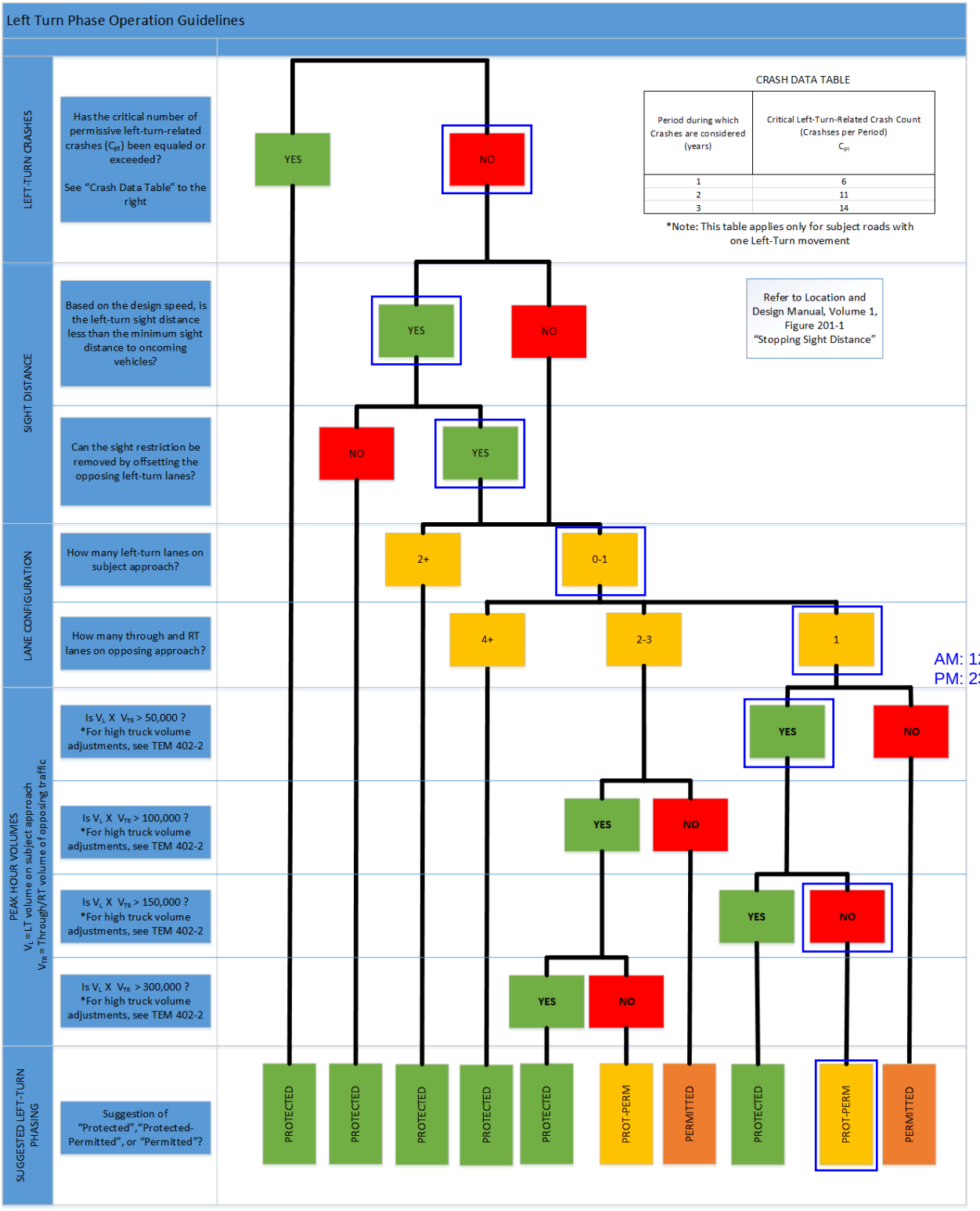
							1	2	3	4
Green	15.0	3.1	5.5	11.5	0.0	0.0	5	6	7	8
Yellow	4.0	4.0	0.0	4.0	0.0	0.0				
Red	2.0	2.0	0.0	2.0	0.0	0.0				

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		2		6	3	8	7	4
Case Number		7.0		8.0	1.1	4.0	1.1	4.0
Phase Duration, s		21.0		21.0	14.6	23.0	9.1	17.5
Change Period, ($Y+R_c$), s		6.0		6.0	6.0	6.0	6.0	6.0
Max Allow Headway (*MAH*), s		6.1		6.1	5.0	5.0	5.0	5.0
Queue Clearance Time (g_s), s		8.2		6.0	8.0	7.2	2.8	9.1
Green Extension Time (g_e), s		5.0		5.0	0.8	2.5	0.1	2.5
Phase Call Probability		1.00		1.00	0.98	1.00	0.39	1.00
Max Out Probability		0.01		0.01	0.26	0.00	0.00	0.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate (*v*), veh/h		166	245		146		252	203		33	239	
Adjusted Saturation Flow Rate (*s*), veh/h/ln		1611	1402		1454		1576	1621		1589	1644	
Queue Service Time (g_s), s		0.0	6.2		0.0		6.0	5.2		0.8	7.1	
Cycle Queue Clearance Time (g_c), s		4.2	6.2		4.0		6.0	5.2		0.8	7.1	
Green Ratio (*g/C*)		0.28	0.44		0.28		0.41	0.32		0.28	0.22	
Capacity (*c*), veh/h		534	622		493		482	520		440	357	
Volume-to-Capacity Ratio (*X*)		0.311	0.393		0.296		0.523	0.391		0.075	0.670	
Back of Queue (*Q*), ft/ln (95 th percentile)		66.5	72.3		61.8		81.5	75.8		11.9	119.8	
Back of Queue (*Q*), veh/ln (95 th percentile)		2.5	2.7		2.2		3.1	2.9		0.5	4.6	
Queue Storage Ratio (*RQ*) (95 th percentile)		0.00	0.14		0.00		0.45	0.00		0.06	0.00	
Uniform Delay (d_1), s/veh		15.2	10.0		15.1		12.0	14.0		14.3	19.0	
Incremental Delay (d_2), s/veh		0.7	0.9		0.7		1.3	0.7		0.1	3.1	
Initial Queue Delay (d_3), s/veh		0.0	0.0		0.0		0.0	0.0		0.0	0.0	
Control Delay (*d*), s/veh		15.9	10.8		15.8		13.3	14.7		14.4	22.1	
Level of Service (LOS)		B	B		B		B	B		B	C	
Approach Delay, s/veh / LOS	12.9	B		15.8	B		13.9	B		21.2	C	
Intersection Delay, s/veh / LOS	15.3						B					

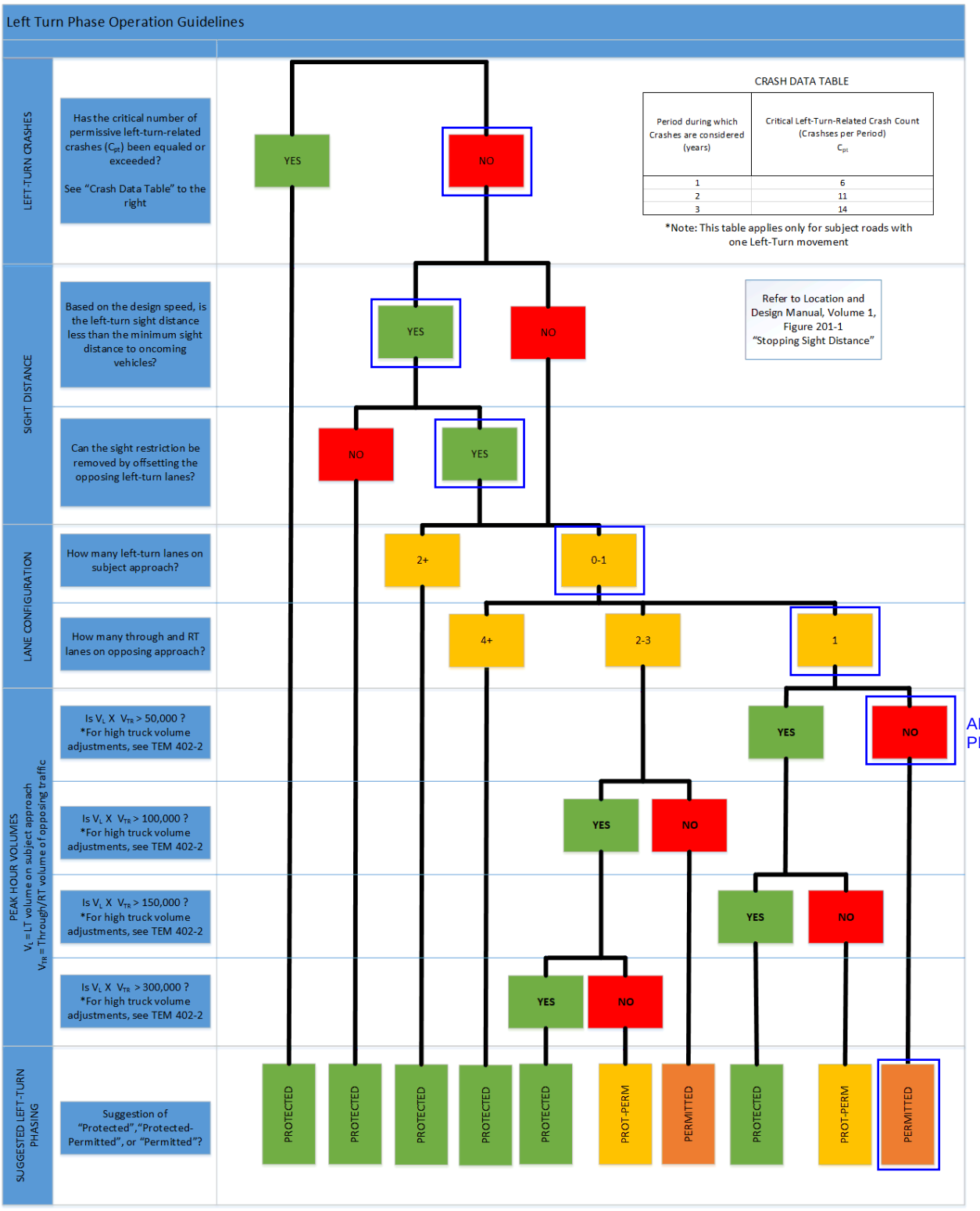
Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	1.90	B	1.90	B	1.67	B	1.91	B
Bicycle LOS Score / LOS	1.17	A	0.73	A	1.24	A	0.94	A

NB Left Turn Phase Operation Guidelines



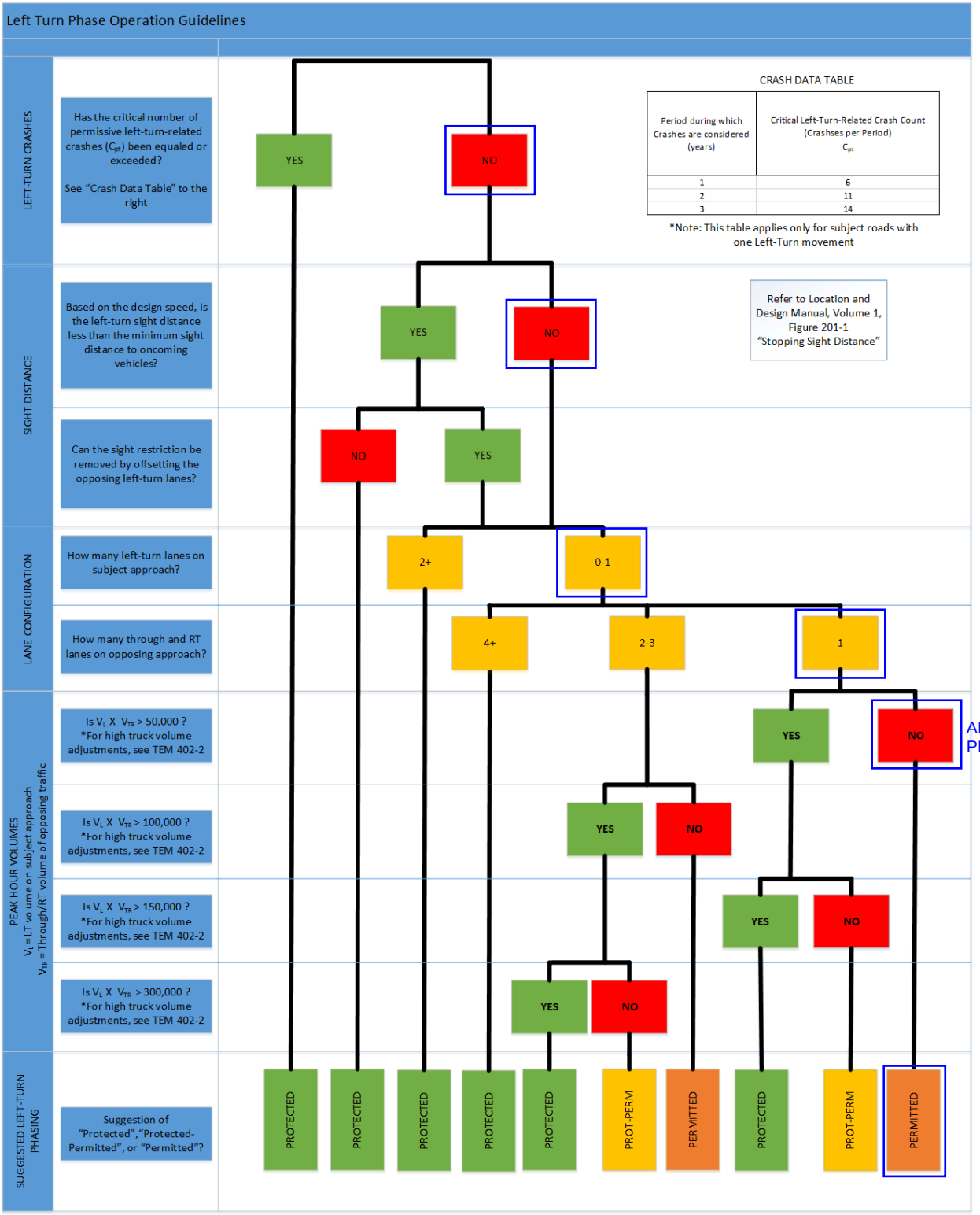
Link to Location and Design Manual, Volume 1

SB Left Turn Phase Operation Guidelines



Link to Location and Design Manual, Volume 1

EB Left Turn Phase Operation Guidelines



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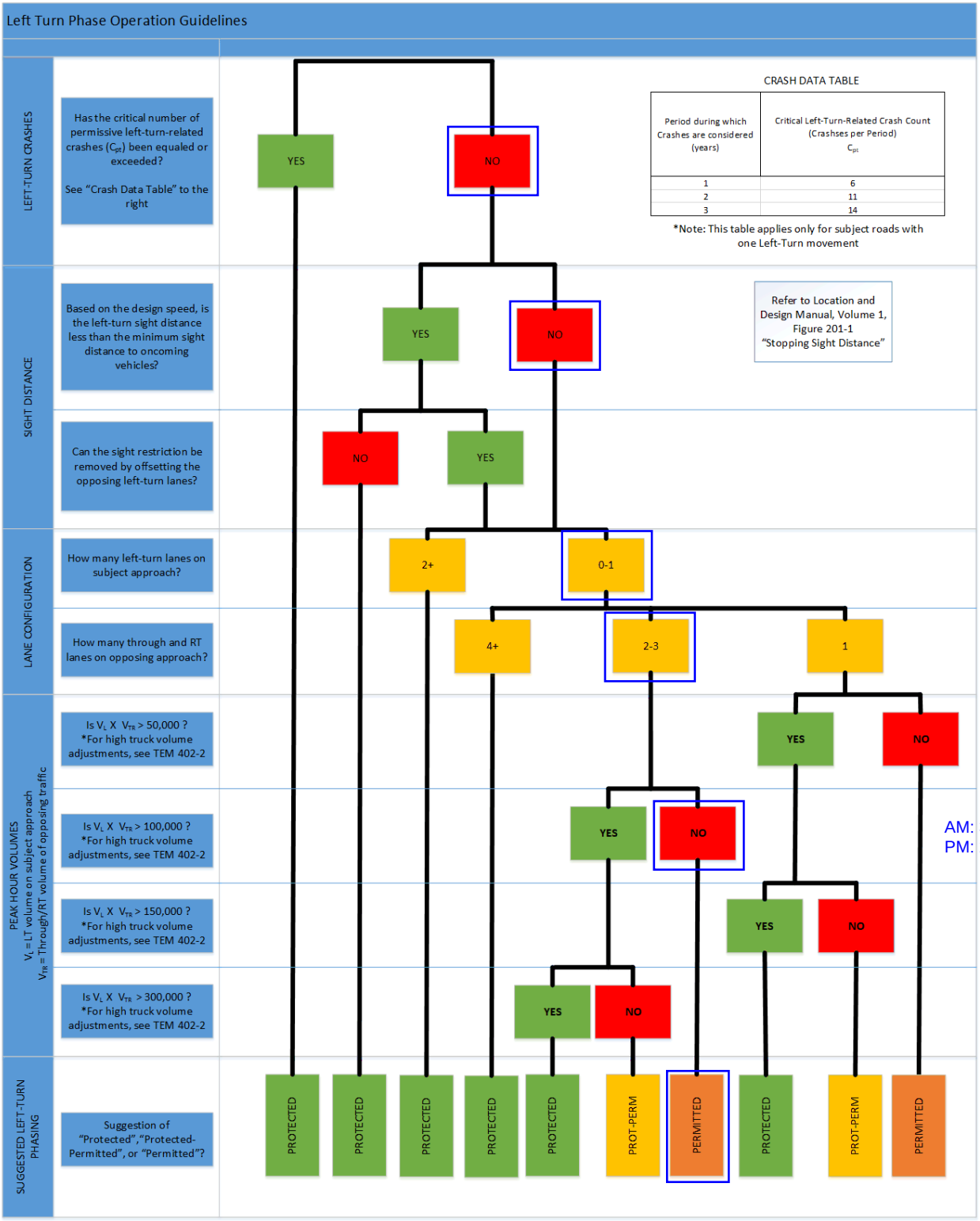
WB Left Turn Phase Operation Guidelines



AM: 32x212=6,784
PM: 29x361=10,469

Link to Location and Design Manual, Volume 1