LOR-58 Amherst / Lorain

Base Submittal

Prepared for City of Amherst, City of Lorain, ODOT District 3 and ODOT Office of Traffic Operations

November 1, 2022

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BACKGROUND

As part of ODOT's Statewide Signal Timing Program, the DGL team has been tasked to review current traffic conditions on the SR-58 corridor in the Cities of Amherst and Lorain, Lorain County, Ohio. The project involves a 1.5-mile segment of SR-58 between Drug Mart and Tower, shown at right.

The arterial corridor is generally 4-lanes plus a two-way-left-turn-lane and includes dedicated turn lanes at appropriate locations. Historical AADT indicates volumes ranging from approximately 16,000 to 29,000, fairly consistent with data collected in July 2022.

The intent of the project is to evaluate the existing operations at nine (9) intersections located on this corridor, and to develop signal timing plans to reduce congestion, improve safety, and facilitate traffic flow. The southernmost five (5) intersections are owned and maintained by the City of Amherst; the northernmost four (4) intersections are owned and maintained by the City of Lorain, with two (2) of the Lorain intersections communicating with the Amherst system.

Figure 1 - Project Location

METHODOLOGY AND PRELIMINARY ANALYSIS

Field observations have been conducted and data has been collected related to traffic volumes, stop bar locations, crosswalk lengths and locations, and left turn storage availability. Record plans and signal timing have been provided by the project stakeholders. Since the intent is to utilize INRIX for the MOE analysis required for project completion, existing INRIX data will be used as a guideline for corridor timing design.

For this Base Submittal, travel speeds are assumed to be as posted. This assumption will be adjusted on future submittals since the current average speed of 30 mph is less than the 40 mph posted speed. DGL has had success in improving travel speeds on high volume corridors and will design at a speed or combination of speeds expected to be achievable with new timing in place. The design speed will likely vary based on corridor

location, with higher design speeds in areas where intersections have larger spacing. INRIX data for weekday and weekend periods during the month of August 2022 is shown in the following Figures 2 through 5.

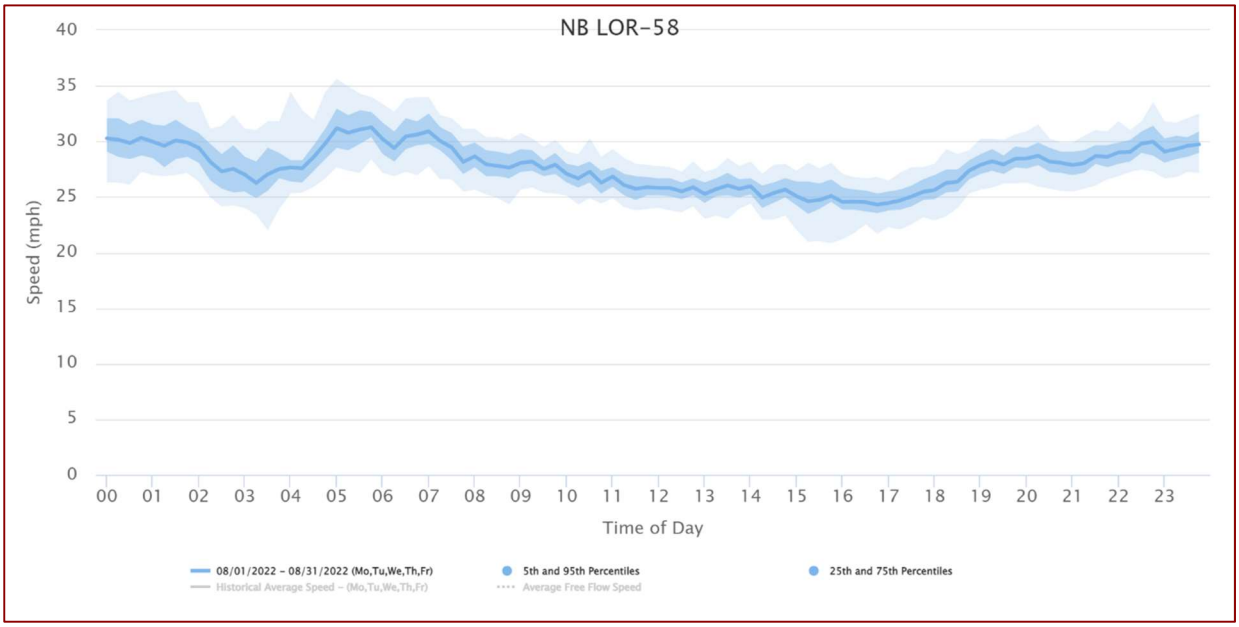


Figure 2 - Existing Weekday NB Speed

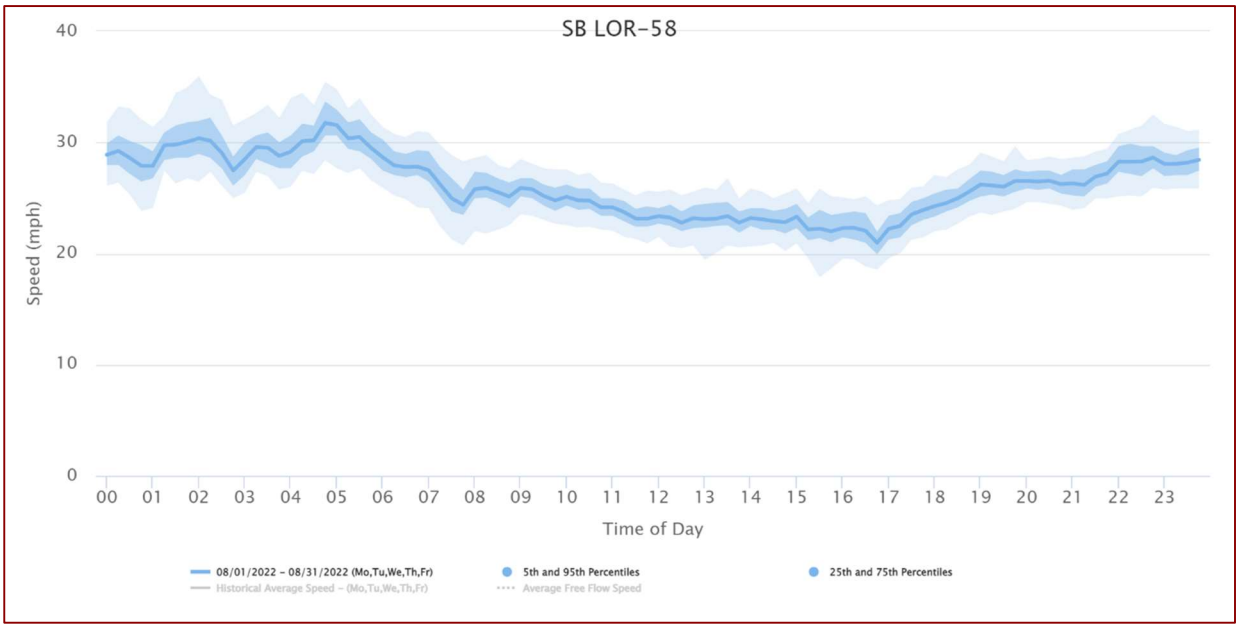


Figure 3 - Existing Weekday SB Speed

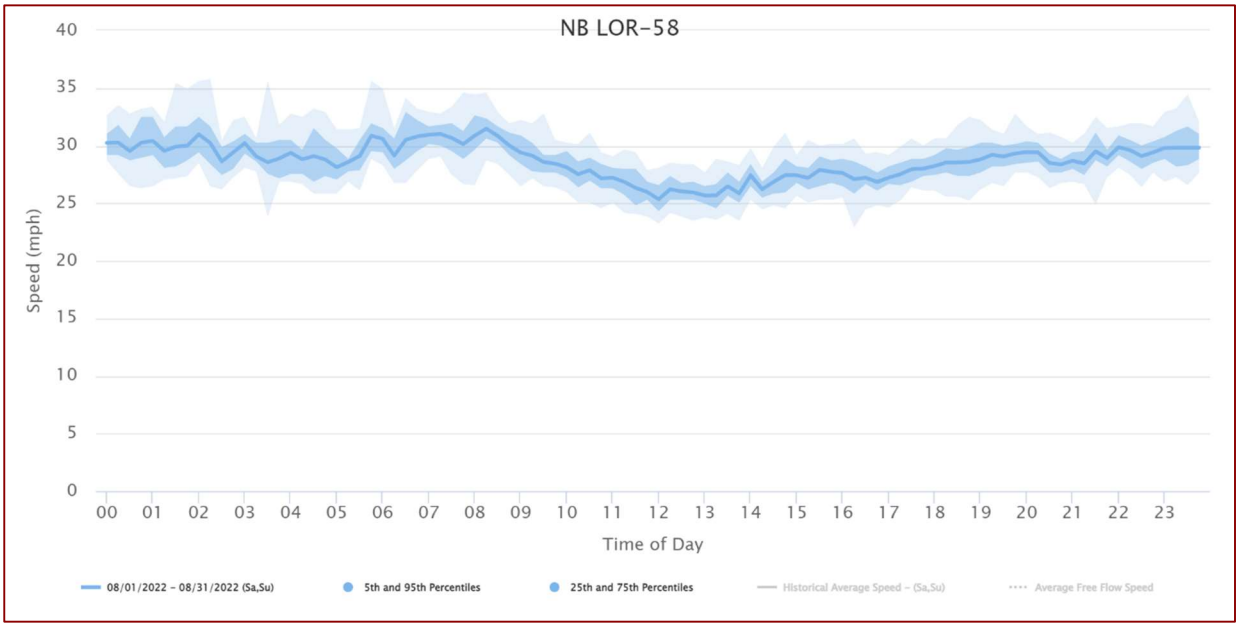


Figure 4 - Existing Weekend NB Speed

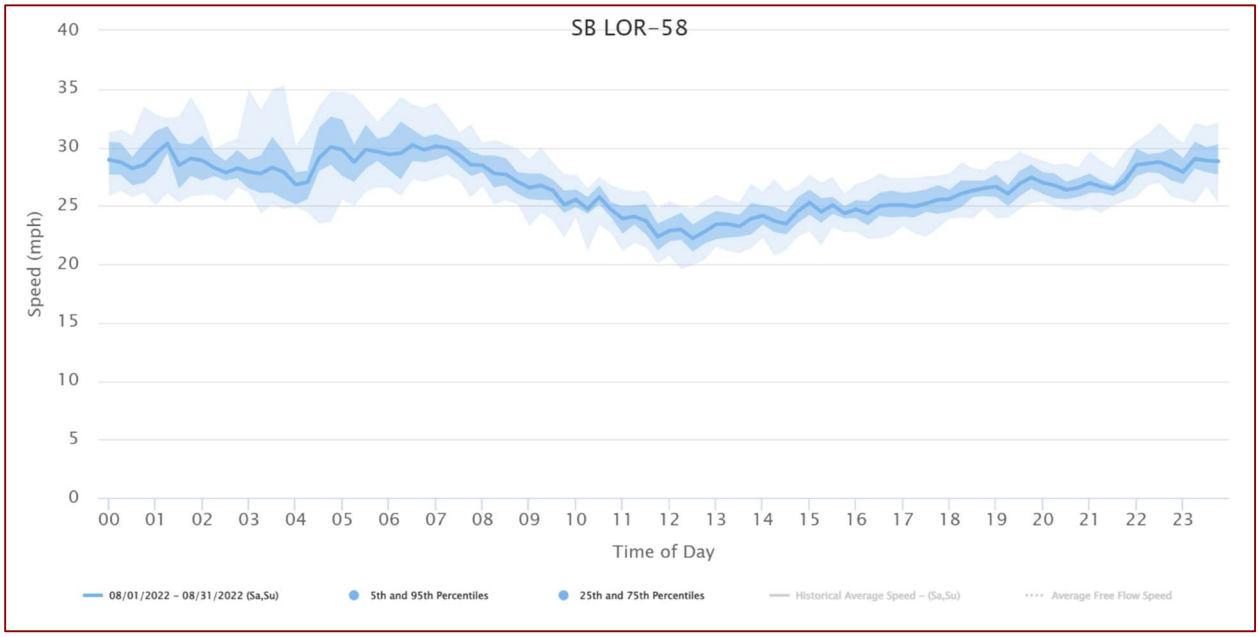


Figure 5 - Existing Weekend SB Speed

Drawings representing existing intersection conditions are provided in Appendix A.

Vehicular Parameters

Vehicular timing parameters have been developed based upon procedures defined by ODOT's Office of Traffic Operations (OTO) and as addressed in the Corridor Information document and at the Kickoff meeting. Recommended Vehicular Timing Parameters are included in Appendix B.

Proposed Y values exceed those currently in use, except for the EB and WB movements at Kresge. With some exceptions, proposed R values exceed existing values, and in most cases where they don't, the proposed R values are generally within 0.2 second of current values. Values for movements at Drug Mart, Cooper-Foster and Meijer vary by a greater amount. For the current base modelling, the calculated / proposed values have been used. ***DGL is not averse to using the greater of the existing / proposed Y and R values in final design models, if so desired.***

A summary that presents the proposed MinGrn, Y & R values for all intersections has been included to facilitate review. Values less than those currently in use are indicated in bold red type.

DGL's recommended timing values provide equal Y & R intervals for phases which normally terminate concurrently, as well as for opposing left turns. ***We recognize that clearance intervals for the opposing left turns do not need to be identical, but this is a condition that some clients desire, and these can be modified to reflect the calculated values, if so desired.***

Pedestrian Parameters

Pedestrian timing parameters have been developed based upon procedures defined by ODOT's Office of Traffic Operations (OTO) and as addressed in the Corridor Information document and at Kickoff. Recommended Pedestrian Timing Parameters are included in Appendix B.

The July 2022 count data revealed that very few pedestrians cross SR-58. The Corridor Information Document indicated an intent to determine whether an intersection should be allowed to leave coordination to serve pedestrians based on the data acquired. Further, as discussed at the Kickoff, calculation of LPI intervals should occur based on the presence of pedestrians at an intersection.

Many project intersections lack pedestrian accommodations but are not signed to prohibit pedestrian crossings. Pedestrians crossing SR-58 at locations not equipped with pedestrian signals and not posted as restricted were documented at the following locations:

- At EB Ramps – 1 pedestrian crossing on south side during AM
- At WB Ramps – 3 pedestrians crossing on north side during MD
- At Meijer – 1 pedestrian crossing on south side during PM and WEOP each
- At Tower – 1 pedestrian crossing on south side during AM; 1 pedestrian crossing on north side during MD and 2 crossing on north side during WEPK

Pedestrian crossing restrictions should be posted at these locations, and consideration should be given to posting restrictions on side-street approaches where long crossings exist.

DGL's evaluation of the data and conditions present on the corridor indicates that:

- ***Based on the congestion present on the corridor between Drug Mart and Meijer, coordination should be maintained at all times in this segment.*** The pedestrian volume at Kresge is high enough that significant disruption could be expected if this intersection were to leave coordination to serve pedestrians.
- ***The Jaeger and Tower intersections are separated enough from one another and from the balance of the corridor that it would be reasonable to allow them to leave coordination to serve pedestrians.***
- It is further noted that pedestrians crossing in the north crosswalk at Tower have no pedestrian indications nor can they observe the vehicular heads from the pedestrian ramps. Similar concerns exist on the shorter west crosswalk. The existing diagonal span layout does not immediately present a cost-effective method for providing pushbuttons and/or ped heads and is scheduled to be upgraded with pedestrian signals within the next 2-3 years. On a more immediate basis, there appear to be some options to go overhead and attach ped signals and pushbuttons to street lighting poles or install temporary poles. DGL has also gathered some information from vendors related to solar / wireless "talking" pushbuttons, and this information is included in the submittal support documents. Concerns remain as to whether pushbuttons alone would resolve safety issues. The absence of pedestrian signals coupled with the lack of signal head visibility continue to be a concern with respect to both pedestrian and driver expectations. ***At a minimum, the north crosswalk needs to either be upgraded to incorporate pushbuttons and / or ped signals or signed as "No Ped Crossing" prior to implementation of any proposed timing.***

- DGL has calculated LPI intervals for crossings associated with side-street movements at locations equipped with pedestrian signals and where, consistent with the TEM, protected / permitted phasing would not create a potentially dangerous condition for pedestrians. ***LPI's have been calculated for crossings at Drug Mart, Spruce Tree & Kresge.***

As in the case of vehicular parameters, the proposed pedestrian parameters have been included in the summary of proposed parameters. In all cases, the calculated combined W + FDW values meet or exceed the current combined values.

Synchro Models

Synchro models have been developed to address the PM Peak Hour condition, which was documented as occurring between 4:00 PM and 5:00 PM. The models developed are described below, with those representing the Existing and most feasible Optimized conditions (Base and Alt), shown in bold italics and included in the submittal.

Existing: This model (***LOR-58 Exist***) has been developed using documented volumes, posted speeds and standard lane balance. Key analysis notes are presented below:

- Private drives have been assumed as 25 mph approaches.
- The Interchange ramps have been assumed as 45 mph approaches.
- ***The interchange operates using Econolite's "stock" Four-Phase Diamond Interchange phasing. DGL would appreciate review by people knowledgeable of this specific phasing to ensure that the model represents true operational conditions of the interchange.***
- The Ideal Saturated Flow Volume has been set per ODOT guidance as 2000 vphpl throughout the corridor, due to the presence and impact of the SR-2 interchange and the posted 40 mph speed limit on the corridor.
- Minimum initial times have been increased for coordinated phases where pedestrian crossings are not restricted but pedestrian signals are not provided.
- ***The model shows that all intersections currently function at LOS C or better during the Peak Hour. However, DGL observations indicated long queues and gridlock-type conditions at various locations - indications of saturated conditions.***

Optimized (Base): Multiple models were developed toward achieving the base condition. The basic timing parameters, as discussed at the Kickoff Meeting and recommended in Appendices A and B were incorporated, including extended minimum green times intended to accommodate pedestrians on non-restricted crossings. ***The intersection of SR-58 & WB SR-2 has been designated as the Master, with an offset of Zero.*** We believe that this is the most appropriate location due to the complexity associated with the Four-Phase Texas Diamond phasing. Cycle lengths ranging from 60" to 160" were considered per ODOT guidance.

The models present the actual *Synchro* optimization output, with splits rounded to a whole number, with slight adjustments to attain better LOS and/or v/c for failing movements. Offset optimization was then conducted in each alternative to achieve the "best" timing plan for the corridor.

- *Synchro* was directed to divide the corridor into zones "rarely" and determined that a single operation zone is appropriate for this corridor. Thus, the intersections currently operating in Free (Drug Mart, Jaeger & Tower) were set to operate in coordination with the balance of the corridor, maintaining coordination while serving pedestrians. The minimum cycle length for this condition is 120", controlled by the specified minimum values at Jaeger.

- The second analysis placed the Jaeger and Tower intersections into a separate zone that allows these two intersections to leave coordination to serve pedestrians. Per *Synchro*, the minimum cycle length required under these conditions is 105", but this creates some split violations at the interchange due to integer value coordination programming.
- The third analysis also allows Jaeger and Tower to leave coordination to serve pedestrians. This model, with a 115" *Synchro*-recommended cycle length, provides another alternative for consideration.
- An additional analysis for a 125" cycle length began to show problems with LOS and queues, so the detailed analysis did not explore cycle lengths greater than 125". ***Due to the intersection spacing and high volumes, queue development is probably the most critical issue, and while longer cycle lengths provide greater flexibility, the potential of queues extending through multiple intersections is increased.***

All viable models indicate that all intersections operate at LOS C or better, but each model has at least one movement at LOS E which cannot be corrected by split adjustments.

The Base Model presented under this submittal ***(LOR-58 BASE-120)*** represents a 120" Cycle, retaining coordination to serve pedestrians crossing SR-58 at all intersections. This cycle length is slightly longer that the current 115" cycle serving peak hour traffic but provides more flexibility in split adjustment. The 115" cycle remains a feasible alternative, as the two cycle lengths appear to have very similar benefits and shortcomings related to intersection and corridor operation. This file ***(LOR-58 ALT-115)*** is included for comparison purposes.

All models are provided in both *Synchro* 10 and 11 formats.

SUMMARY AND RECOMMENDATIONS

The 115" and 120" cycle lengths presented in the Base and Alternate Models represent viable options. The 120" cycle allows all intersections to retain coordination while serving pedestrians, while the 115" cycle allows Jaeger and Tower to leave coordination to serve pedestrians.

It is recognized that stakeholder comments may result in changes that alter the information presented, but we do not expect resultant analysis results to be significantly different. Stakeholders are asked to review the report and provide input.

DGL strongly recommends that the marked crosswalk across SR-58 at Tower be addressed. The current condition is unsafe, and we do not feel comfortable providing timing recommendations for this intersection. DGL also recommends that pedestrian crossing prohibitions be posted at other locations where pedestrian accommodations do not exist, including crossings of Cooper-Foster and Meijer. Secondary to the safety benefits of attempting to eliminate these crossings, in some cases, it would allow the design to incorporate reduced minimum values and thereby it will improve the ability to adjust the signal timing, both immediate and in the future.

NEXT STEPS

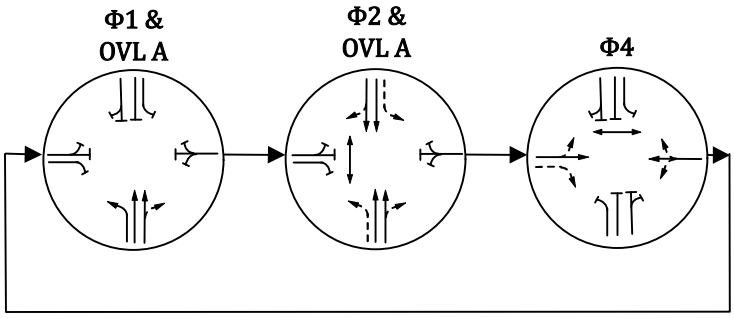
- Stakeholders should review, comment and provide direction regarding Clearance Intervals and model analysis. Specific items highlighted within this report include:
  - Proposed Y & R Values vs current Y & R values where Proposed < Current
  - Master Zero location
  - Minimum Greens on Arterial where proposed > existing
  - Cycle length options
- DGL will modify submittal to incorporate stakeholder comments and re-submit if necessary.
- Subsequently, DGL will proceed with development of all timing plans.
- ***The Equipment inspection noted that project intersections are not all able to sync with one another. The Cities of Amherst and Lorain should pursue ODOT assistance in acquiring GPS units or some other method of time sync. New timing should not be implemented until this issue is resolved.***
- ***The City of Lorain should address safety issues present at Tower. DGL believes that this must be addressed prior to implementing new timing.***

Appendix A
Existing Intersection Condition Diagrams

SR-58 (N. Leavitt Rd) & Drug Mart

EXISTING GEOMETRICS AND SIGNAL LAYOUT

PHASING DIAGRAM

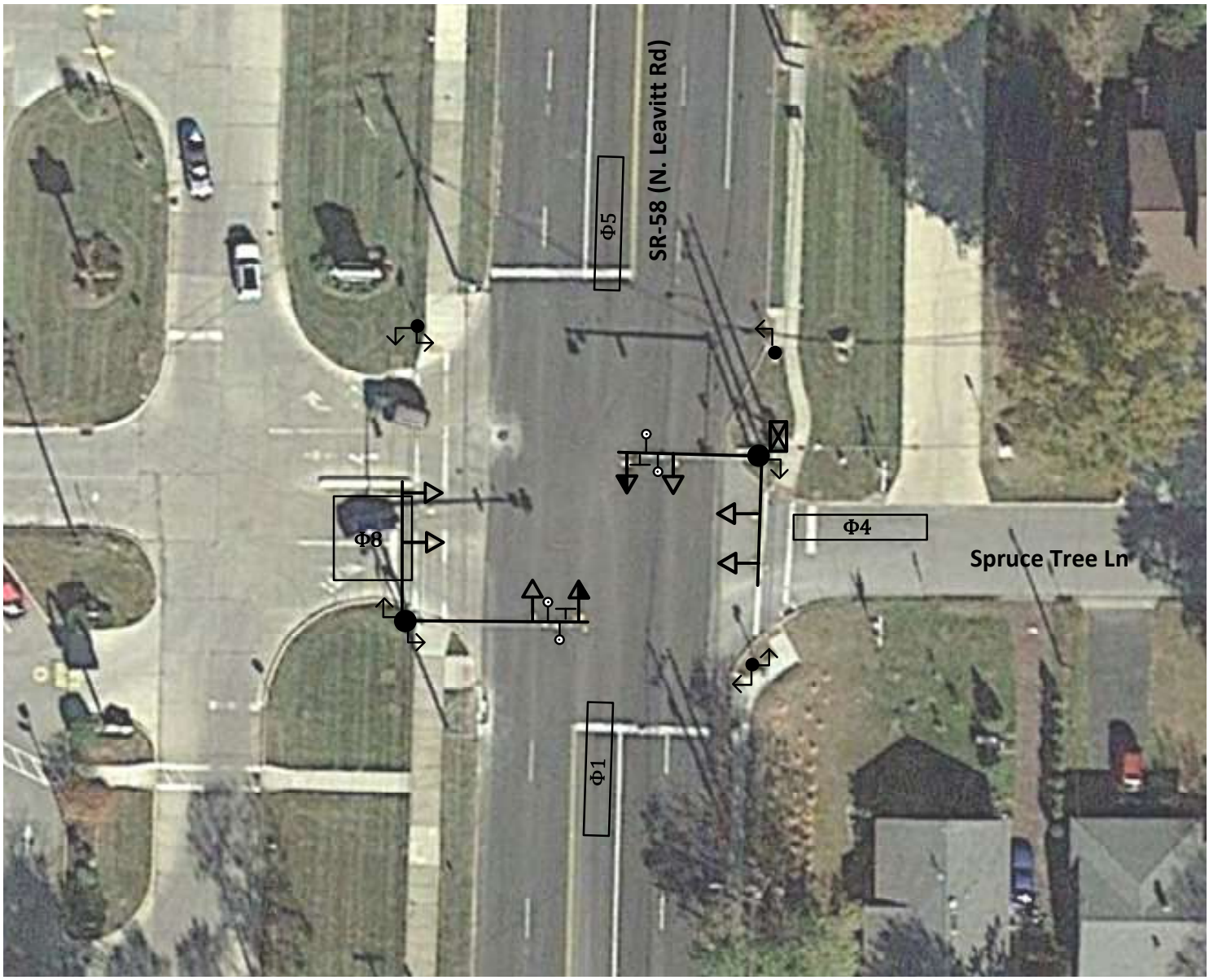


- SIGNAL POLE
- PEDESTAL
- PEDESTRIAN SIGNAL
- 3-SECTION SIGNAL
- 5-SECTION SIGNAL
- 3-SECTION W/ ARROWS
- 4-SECTION W/ ARROWS
- SIGN LOCATION
- CONTROLLER CABINET
- CONTROLLER CABINET W/ UPS
- DETECTION ZONE
- VIDEO DETECTION

PHASING LEGEND
VEHICLE Φ
PERMITTED Φ
PEDESTRIAN Φ

SR-58 (N. Leavitt Rd) & Spruce Tree Ln

EXISTING GEOMETRICS AND SIGNAL LAYOUT



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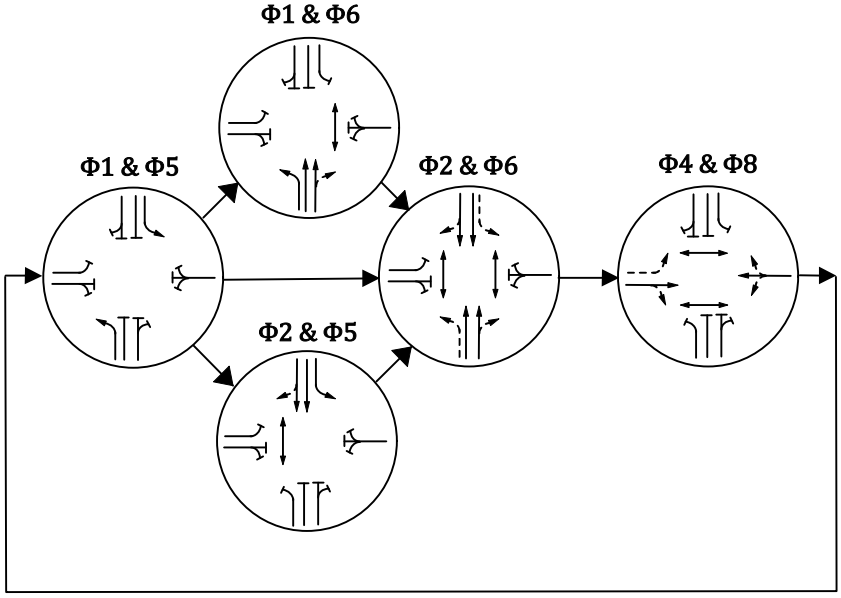

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- 4-SECTION W/ ARROWS
- SIGN LOCATION
- CONTROLLER CABINET
- CONTROLLER CABINET W/ UPS
- DETECTION ZONE
- VIDEO DETECTION

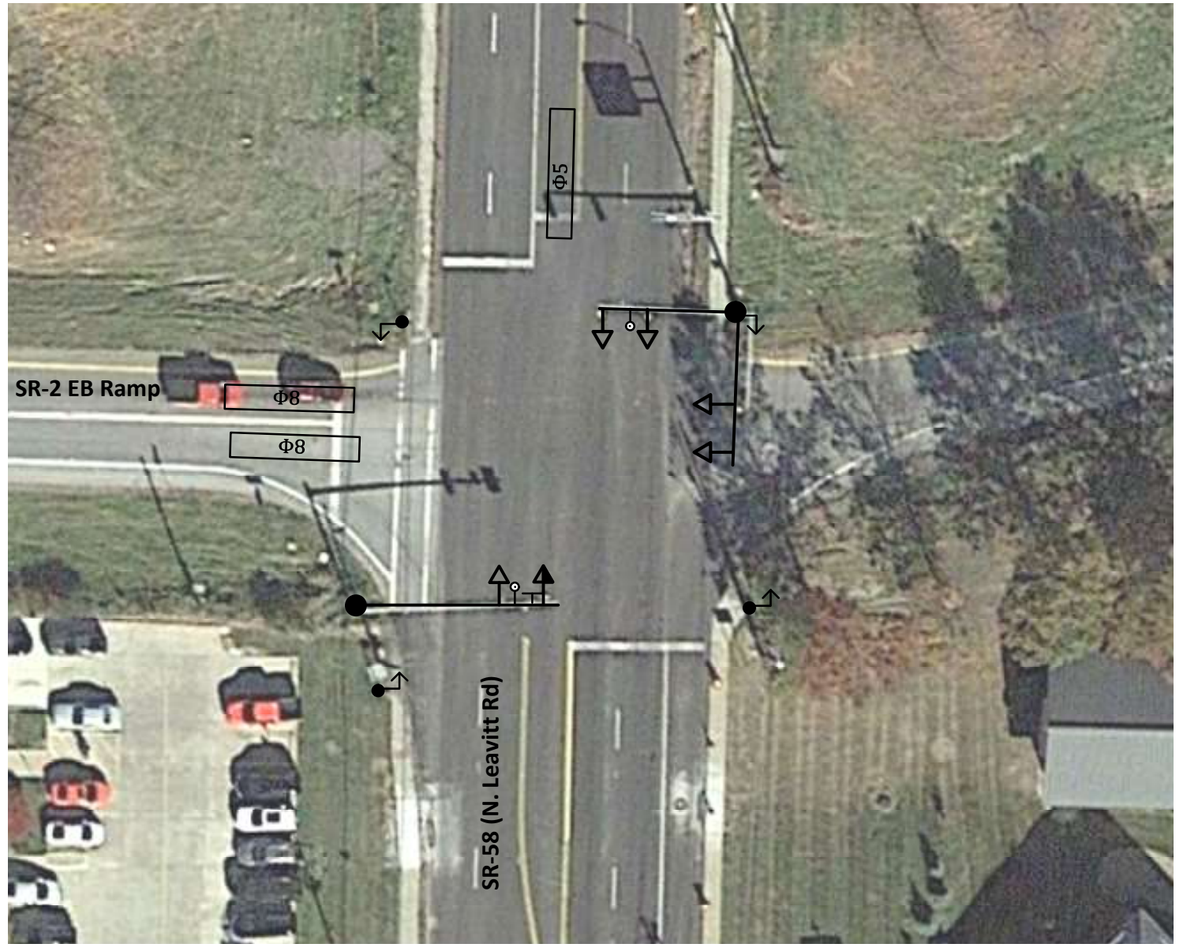
PHASING LEGEND
VEHICLE Φ
PERMITTED Φ
PEDESTRIAN Φ

SR-58 (N. Leavitt Rd) & SR-2 Ramps

EXISTING GEOMETRICS AND SIGNAL LAYOUT

SR-58 (N. Leavitt Rd) & SR-2 WB Ramp

SR-58 (N. Leavitt Rd) & SR-2 EB Ramp



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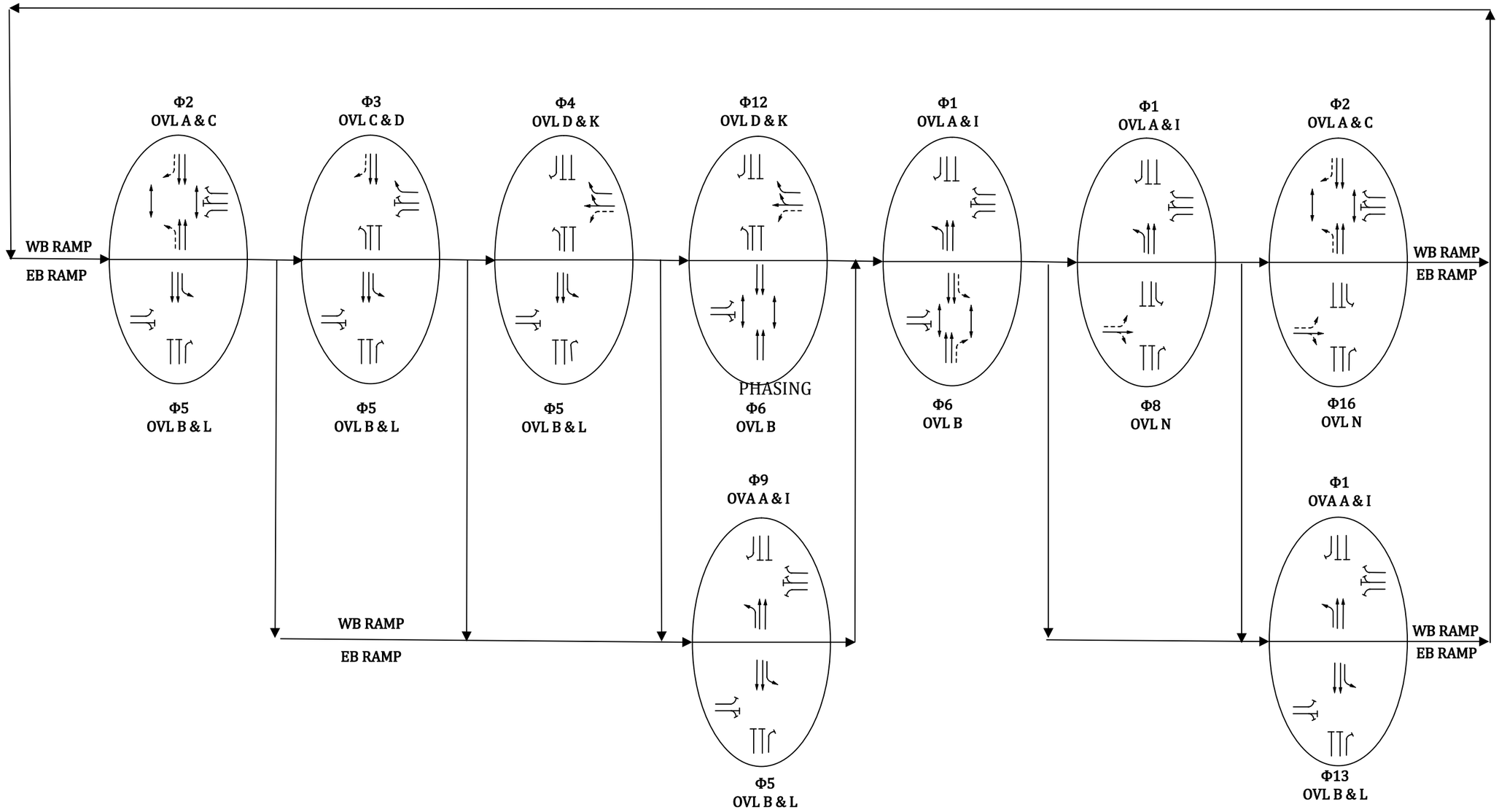
- 4-SECTION W/ ARROWS
- SIGN LOCATION
- CONTROLLER CABINET
- CONTROLLER CABINET W/ UPS
- DETECTION ZONE
- VIDEO DETECTION

PHASING DIAGRAM ON NEXT SHEET (2 OF 2)

SR-58 (N. Leavitt Rd) & SR-2 Ramps

EXISTING GEOMETRICS AND SIGNAL LAYOUT



INTERSECTION DIAGRAM ON PREVIOUS SHEET (1 OF 2)

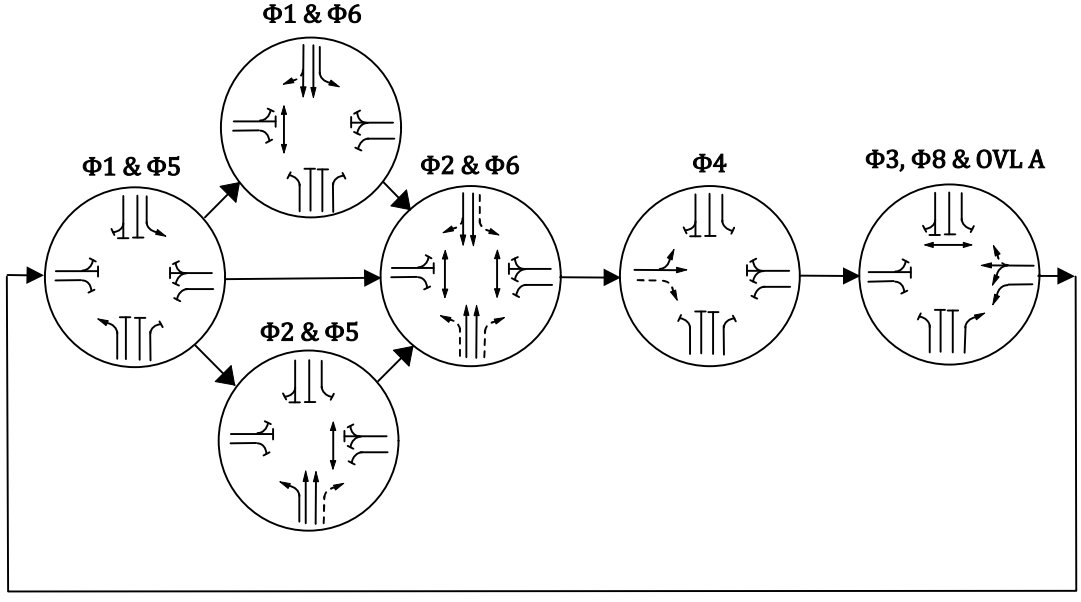
PHASING LEGEND

- VEHICLE Φ
- PERMITTED Φ
- PEDESTRIAN Φ

SR-58 (N. Leavitt Rd) & Kresge Dr

EXISTING GEOMETRICS AND SIGNAL LAYOUT

PHASING DIAGRAM



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- 4-SECTION W/ ARROWS
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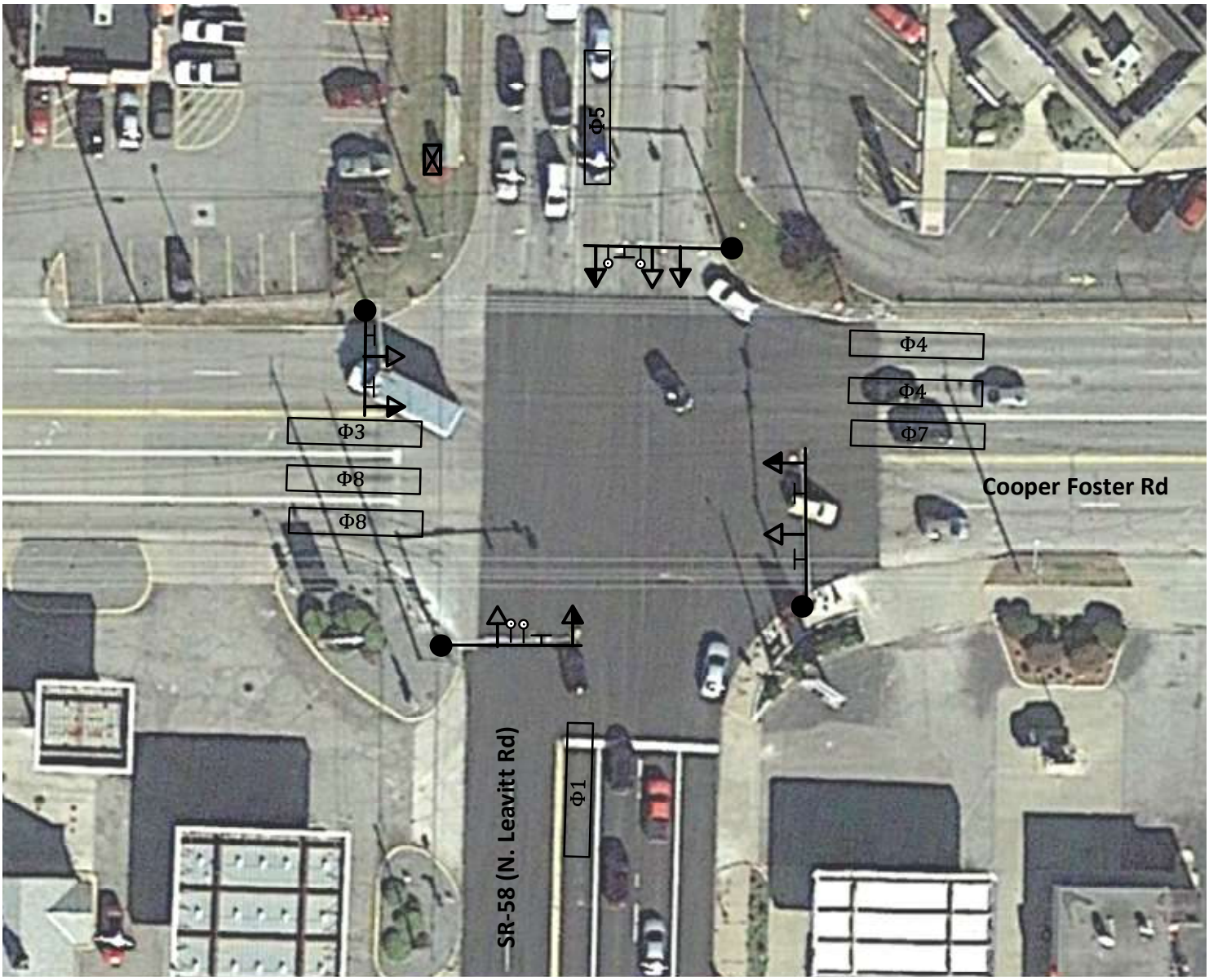
- CONTROLLER CABINET W/ UPS
- DETECTION ZONE
- VIDEO DETECTION

PHASING LEGEND	
VEHICLE Φ	
PERMITTED Φ	
PEDESTRIAN Φ	

SR-58 (N. Leavitt Rd) & Cooper Foster Rd

EXISTING GEOMETRICS AND SIGNAL LAYOUT



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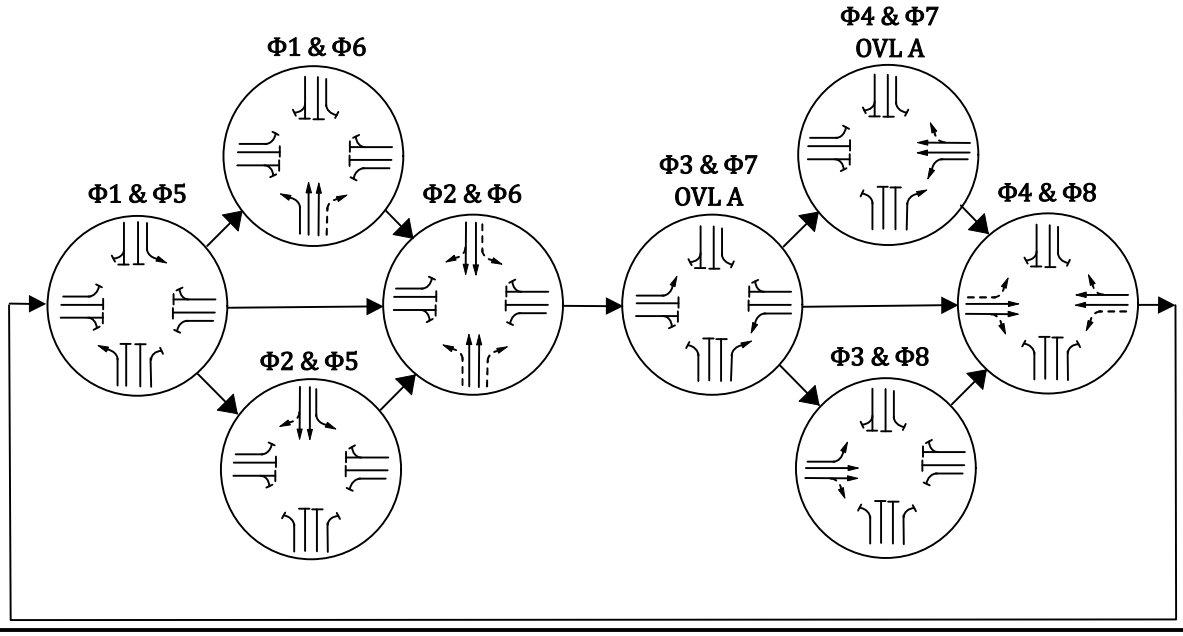

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- CONTROLLER CABINET W/ UPS
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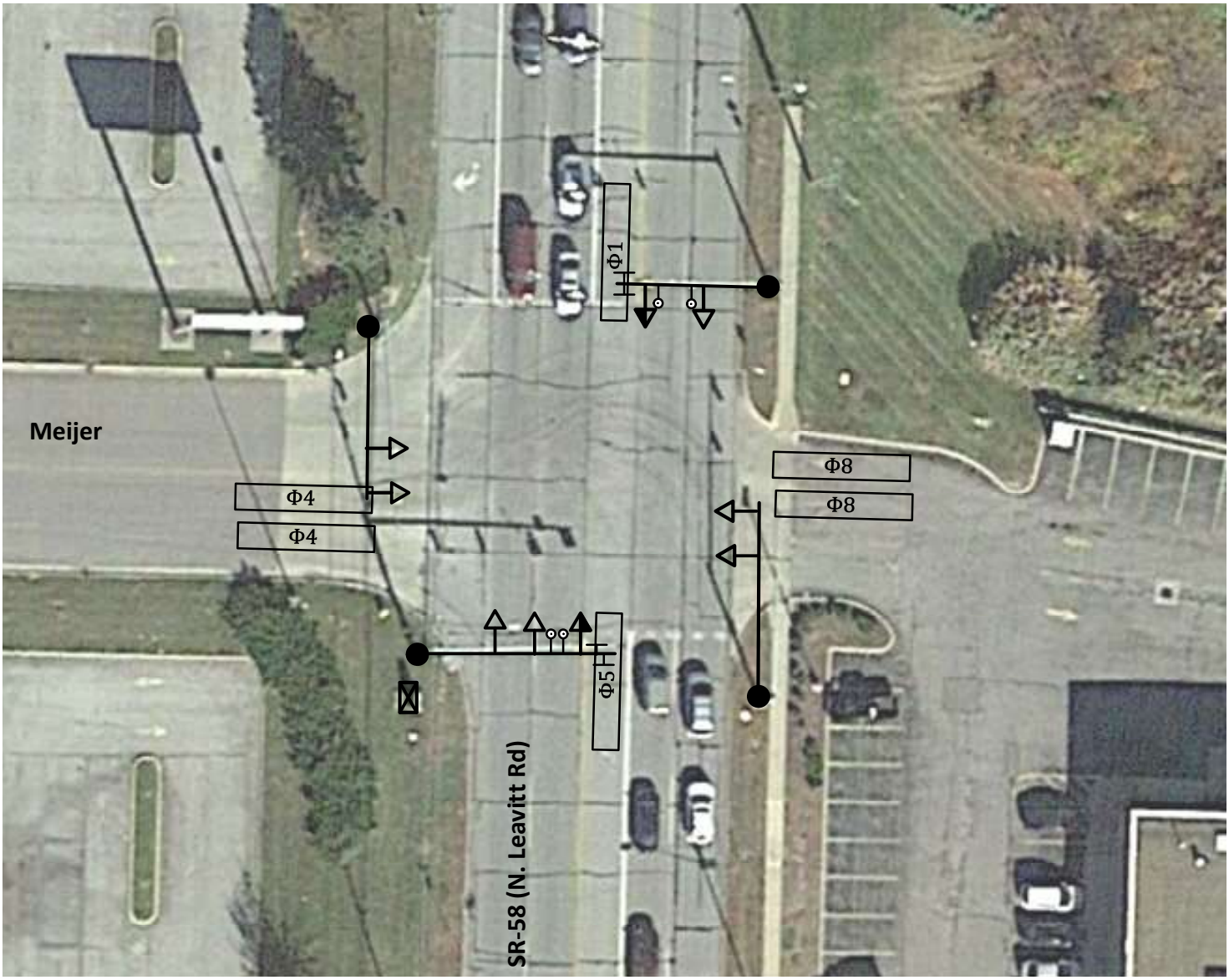
- VIDEO DETECTION

PHASING LEGEND
VEHICLE Φ
PERMITTED Φ
PEDESTRIAN Φ

SR-58 (N. Leavitt Rd) & Meijer

EXISTING GEOMETRICS AND SIGNAL LAYOUT



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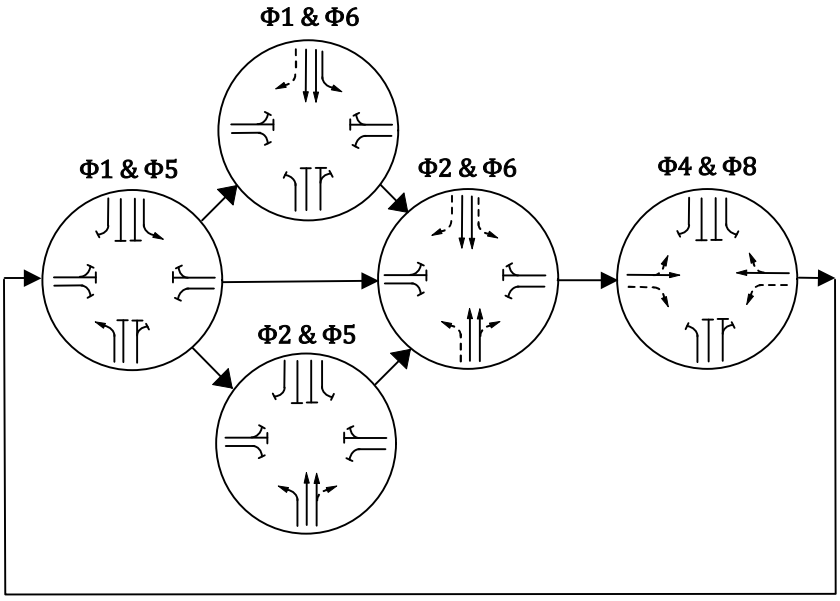

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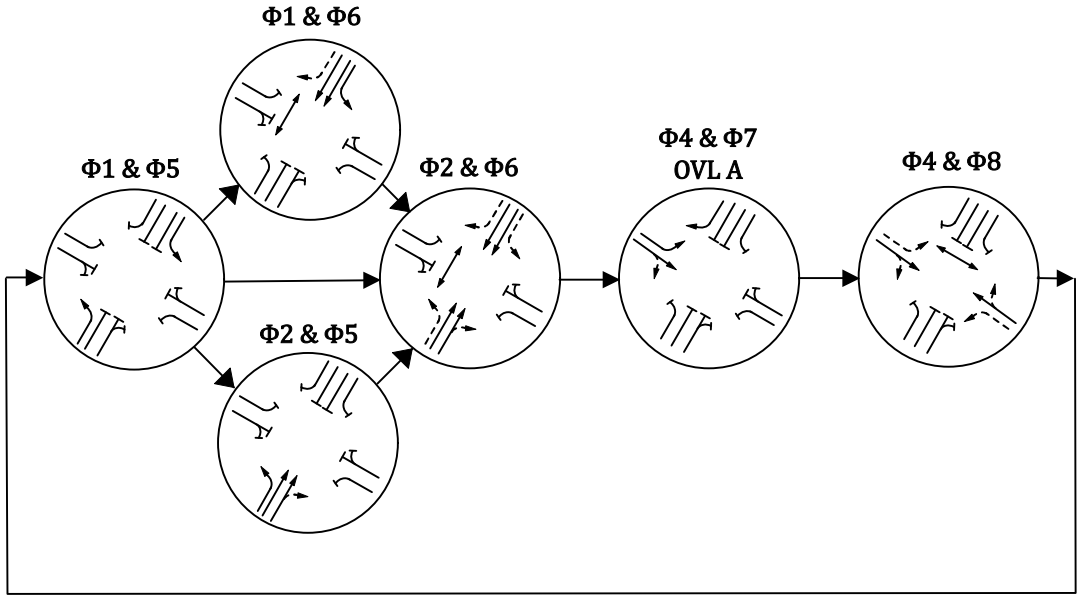
- CONTROLLER CABINET W/ UPS
- DETECTION ZONE
- VIDEO DETECTION

PHASING LEGEND	
VEHICLE Φ	
PERMITTED Φ	
PEDESTRIAN Φ	

SR-58 (N. Leavitt Rd) & Jaeger Rd/Nantucket Dr

EXISTING GEOMETRICS AND SIGNAL LAYOUT

PHASING DIAGRAM



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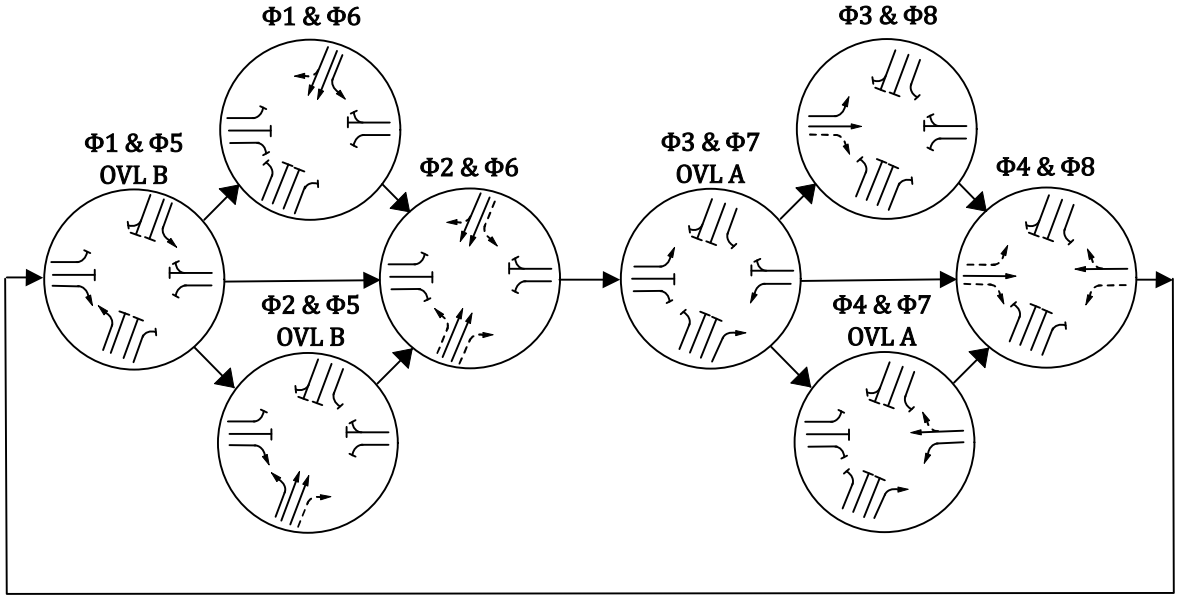
- DETECTION ZONE
- VIDEO DETECTION

PHASING LEGEND	
VEHICLE Φ	
PERMITTED Φ	
PEDESTRIAN Φ	

SR-58 (N. Leavitt Rd) & Tower Blvd

EXISTING GEOMETRICS AND SIGNAL LAYOUT

PHASING DIAGRAM



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- CONTROLLER CABINET W/ UPS
- DETECTION ZONE
- VIDEO DETECTION

PHASING LEGEND	
VEHICLE Φ	
PERMITTED Φ	
PEDESTRIAN Φ	

Appendix B
Proposed Basic Timing Parameters

LOR-58 Amherst_ Lorain

INTERSECTION	PHASE	MOVEMENT	PROPOSED TIMING PARAMETER VALUE				
			MINGRN	Y	R	W	FDW
LOR-58 AND DRUG MART	1	NB LT	7	3.7	**1.3**	-	-
	2	SB	20	4.6	**1.0**	9	**11**
	-	-	-	-	-	-	-
	4	EB / WB	10	3.4	**1.5**	10	14
	-	-	-	-	-	-	-
	-	-	-	-	-	-	-
	-	-	-	-	-	-	-
	-	-	-	-	-	-	-
LOR-58 AND SPRUCE TREE	1	NB LT	7	4.6	2.1	-	-
	2	SB	20	4.6	2.1	9	16
	-	-	-	-	-	-	-
	4	WB	10	3.4	**2.0**	12	19
	5	SB LT	7	4.6	2.1	-	-
	6	NB	20	4.6	2.1	7	**7**
	-	-	-	-	-	-	-
	8	EB	10	3.4	**2.0**	14	**16**
LOR-58 & SR-2	1	NB LT	7	4.5	2.2	-	-
	2	SB	20	4.5	2.2	10	16
	-	-	-	-	-	-	-
	4	WB	10	5.1	**1.6**	-	-
	5	SB LT	7	4.5	2.2	-	-
	6	NB	20	4.5	2.2	10	22
	-	-	-	-	-	-	-
	8	EB	10	5.1	**1.6**	-	-
	12	WB EXT	7	5.1	**1.6**	-	-
	16	EB EXT	7	5.1	**1.6**	-	-
LOR-58 AND KRESGE	1	SB LT	7	4.5	2.3	-	-
	2	NB	20	4.5	2.3	14	23
	3	WB LT	7	**3.3**	2.7	-	-
	4	EB	10	**3.4**	1.6	-	-
	5	NB LT	7	4.5	2.3	-	-
	6	SB	20	4.5	2.3	12	19
	-	-		-	-	-	-
	8	WB	10	**3.3**	2.7	9	16
LOR-58 AND COOPER-FOSTER PARK	1	NB LT	7	3.6	2.8	-	-
	2	SB	**33**	4.5	1.0	-	-
	3	EB LT	7	3.2	**1.9**	-	-
	4	WB	10	4.1	1.0	-	-
	5	SB LT	7	3.6	2.8	-	-
	6	NB	**35**	4.5	1.0	-	-
	7	WB LT	7	3.2	**1.9**	-	-
	8	EB	10	4.1	1.0	-	-

XXXX = LESS THAN EXISTING

XXXX = POTENTIAL CO-TERMINATING PHASES (ARTERIAL)

XXXX = POTENTIAL CO-TERMINATING PHASES (CROSS-STREET)

XXXX = PROPOSED VALUES NEEDED TO SERVE PEDESTRIANS (MIN OR W+FDW)

XXXX = MINGRN REQ'D TO SATISFY COORD PHASE PEDS

LOR-58 Amherst_ Lorain

INTERSECTION	*PHASE*	*MOVEMENT*	*PROPOSED TIMING PARAMETER VALUE*				
			MINGRN	*Y*	*R*	*W*	*FDW*
LOR-58 AND MEIJER	1	SB LT	7	4.5	1.6	-	-
	2	NB	20	4.5	1.6	-	-
	-	-	-	-	-	-	-
	4	EB	10	3.4	**1.5**	-	-
	5	NB LT	7	4.5	1.6	-	-
	6	SB	**27**	4.5	1.6	-	-
	-	-	-	-	-	-	-
	8	WB	10	3.4	**1.5**	-	-
LOR-58 AND JAEGER	1	SB LT	7	4.5	1.9	-	-
	2	NB	20	4.5	1.9	-	-
	-	-		-	-	-	-
	4	EB	10	4.0	1.9	-	-
	5	NB LT	7	4.5	1.9	-	-
	6	SB	20	4.5	1.9	12	25
	7	EB LT	7	4.0	1.9	-	-
	8	WB	10	4.0	1.9	12	30
LOR-58 AND TOWER	1	SB LT	7	4.4	2.5	-	-
	2	NB	20	4.4	2.5	-	-
	3	EB LT	7	4.0	3.1	-	-
	4	WB	**32**	4.0	3.1	**10**	**22**
	5	NB LT	7	4.4	2.5	-	-
	6	SB	**30**	4.4	2.5	-	-
	7	WB LT	7	4.0	3.1	-	-
	8	EB	10	4.0	3.1	-	-

XXXX = LESS THAN EXISTING
XXXX = POTENTIAL CO-TERMINATING PHASES (ARTERIAL)
XXXX = POTENTIAL CO-TERMINATING PHASES (CROSS-STREET)
XXXX = PROPOSED VALUES NEEDED TO SERVE PEDESTRIANS (MIN OR W+FDW)
XXXX = MINGRN REQ'D TO SATISFY COORD PHASE PEDS

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	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	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 - 3 sec BUFFER	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	NB LT	LEFT TURN	40	1	35	25	10	66	20	-1.5	3.7	1.3	5.0	3.7	1.3	5.0	-	-	-	-	-	-	-	-	-	-	-	-	-
2	SB	THROUGH/RT	40	1	47	47	10	63	20	0.75	4.4	0.2	4.6	4.6	1	5.6	SB	2	47	YES	9	7	13.4	10.4	18.7	17.4	NO	1.2	9	11
OVLA	NB	THROUGH/RT	40	1	47	47	10	60	20	-1.5	4.6	0.2	4.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4	EB	LEFT TURN	25	1	20	25	10	73	20	0	2.5	1.5	4.0	3.4	1.5	4.9	WB	4	59	YES	11	7	16.9	13.9	23.3	20.9	NO	2.5	10	14
4	EB	THROUGH/RT	25	1	32	32	10	78	20	0	3.4	1.1	4.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4	WB	LEFT TURN	25	1	20	25	10	61	20	0	2.5	1.2	3.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4	WB	THROUGH/RT	25	1	32	32	10	70	20	0	3.4	0.9	4.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	1	-	-	10	-	20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

ASSOCIATED PHASE	DIRECTION	WALKING SPEED (ft/sec)	WIDTH OF FIRST LANE OF MOVING TRAFFIC (ft)	WIDTH OF SHOULDER, BIKE LANE, AND/OR PARKING LANE (ft)	LPI DURATION (sec)
1	-	3.5	-	-	-
2	-	3.5	-	-	-
3	-	3.5	-	-	-
4	WB	3.5	10	0	3
5	-	3.5	-	-	-
6	-	3.5	-	-	-
7	-	3.5	-	-	-
8	-	3.5	-	-	-

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	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	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 - 3 sec BUFFER	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	NB LT	LEFT TURN	40	1	35	25	10	86	20	-1.5	3.7	1.9	5.6	4.6	2.1	6.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2	SB	THROUGH/RT	40	1	47	47	10	85	20	0.5	4.4	0.5	4.9	4.6	2.1	6.7	SB	2	66	NO	-	7	18.9	15.9	24.0	22.9	NO	1.1	9	16
4	WB	LEFT TURN	25	1	20	25	10	75	20	-0.25	2.5	1.6	4.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4	WB	THROUGH/RT	25	1	32	32	10	87	20	-0.25	3.4	1.3	4.7	3.4	2	5.4	WB	4	77	YES	15	7	22.0	19.0	30.7	26.0	NO	4.7	12	19
5	SB LT	LEFT TURN	40	1	35	25	10	94	20	0.5	3.5	2.1	5.6	4.6	2.1	6.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6	NB	THROUGH/RT	40	1	47	47	10	90	20	-1.5	4.6	0.6	5.2	4.6	2.1	6.7	NB	6	34	NO	-	7	9.7	6.7	13.3	13.7	YES	N/A	7	7
8	EB	LEFT TURN	25	1	20	25	10	90	20	0.25	2.5	2.0	4.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
8	EB	THROUGH/RT	25	1	32	32	10	83	20	0.25	3.3	1.2	4.5	3.4	2	5.4	EB	8	65	YES	21	7	18.6	15.6	28.7	22.6	NO	6.1	14	16

PRIVATE DRIVE ASSUMED 25 MPH

X-WALKS AND PUSHBUTTON LOCATIONS FIELD MEASURED

CURRENT PRACTICE IS TO ASSIGN EQUAL Y & R VALUES TO ALL PHASES IN SAME DIRECTION, IN ADDITION TO CO-TERMINATING PHASES

ASSOCIATED PHASE	DIRECTION	WALKING SPEED (ft/sec)	WIDTH OF FIRST LANE OF MOVING TRAFFIC (ft)	WIDTH OF SHOULDER, BIKE LANE, AND/OR PARKING LANE (ft)	LPI DURATION (sec)
1	-	3.5	-	-	-
2	-	3.5	-	-	-
3	-	3.5	-	-	-
4	WB	3.5	12	11	6
5	-	3.5	-	-	-
6	-	3.5	-	-	-
7	-	3.5	-	-	-
8	EB	3.5	12	2	4

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	OMUTCD 4E.06-12 WALK INTERVAL (4-7s TYP)	OMUTCD 4E.06-07 CALCULATED PED CLEARANCE	PED CHANGE INTERVAL (FDW)	(L+P)/(3 fps) (NOTE: P=6 IF NO PUSHBUTTON)	WALK + PED CHANGE INTERVALS	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 - 3 sec BUFFER	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	-	-	10	-	20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	1	-	-	10	-	20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	1	-	-	10	-	20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
OVLB	SB	THROUGH/RT	40	1	47	47	10	53	20	0.25	4.4	0.1	4.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5	SB LT	LEFT TURN	40	1	35	25	10	82	20	0.25	3.6	1.8	5.4	4.5	2.2	6.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6	NB	THROUGH/RT	40	1	47	47	10	66	20	-0.25	4.5	0.2	4.7	4.5	2.2	6.7	SB	6	86	YES	6	7	24.6	21.6	30.7	28.6	NO	2.1	10	22
8	EB LT	LEFT TURN	45	1	40	25	10	69	20	-2	4.1	1.4	5.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
8	EB	THROUGH/RT	45	1	52	52	10	98	20	-2	5.1	0.5	5.6	5.1	1.6	6.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-

RAMPS ASSUMED 45 MPH
ALSO SEE 04 WB SR-2 CLEARANCE INTERVALS
CURRENT PRACTICE IS TO ASSIGN EQUAL Y & R VALUES TO ALL PHASES IN SAME DIRECTION, IN ADDITION TO CO-TERMINATING PHASES
CURRENT PRACTICE IS TO ASSIGH EQUAL Y & R VALUES TO EB & WB RAMPS, AS WELL

X-WALKS AND PUSHBUTTON LOCATIONS FIELD-MEASURED

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	OMUTCD 4E.06-12 WALK INTERVAL (4-7s TYP)	OMUTCD 4E.06-07 CALCULATED PED CLEARANCE	PED CHANGE INTERVAL (FDW)	(L+P)/(3 fps) (NOTE: P=6 IF NO PUSHBUTTON)	WALK + PED CHANGE INTERVALS	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 - 3 sec BUFFER	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	NB LT	LEFT TURN	40	1	35	25	10	99	20	-0.5	3.6	2.2	5.8	4.5	2.2	6.7	-	-	-	-	-	-	-	-	-	-	-	-	-
2	SB	THROUGH/RT	40	1	47	47	10	90	20	0.25	4.4	0.6	5.0	4.5	2.2	6.7	NB	2	66	YES	11	7	18.9	15.9	25.7	22.9	NO	2.8	10	16
4	WB LT	LEFT TURN	45	1	40	25	10	74	20	-2	4.1	1.6	5.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4	WB	THROUGH/RT	45	1	52	52	10	97	20	-2	5.1	0.5	5.6	5.1	1.6	6.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-
OVLA	NB	THROUGH/RT	40	1	47	47	10	74	20	-0.5	4.5	0.4	4.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	1	-	-	10	-	20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	1	-	-	10	-	20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	1	-	-	10	-	20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

RAMPS ASSUMED 45 MPH
ALSO SEE 03 EB SR-2 CLEARANCE INTERVALS
CURRENT PRACTICE IS TO ASSIGN EQUAL Y & R VALUES TO ALL PHASES IN SAME DIRECTION, IN ADDITION TO CO-TERMINATING PHASES
CURRENT PRACTICE IS TO ASSIGH EQUAL Y & R VALUES TO EB & WB RAMPS, AS WELL

X-WALKS AND PUSHBUTTON LOCATIONS FIELD-MEASURED

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	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	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 - 3 sec BUFFER	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	SB LT	LEFT TURN	40	1	35	25	10	100	20	0.5	3.5	2.3	5.8	4.5	2.3	6.8	-	-	-	-	-	-	-	-	-	-	-	-	-
2	NB	THROUGH/RT	40	1	47	47	10	104	20	-0.25	4.5	0.8	5.3	4.5	2.3	6.8	NB	2	91	YES	18	7	26.0	23.0	36.3	30.0	NO	6.3	14	23
3	WB LT	LEFT TURN	25	1	20	25	10	116	20	0.25	2.5	2.7	5.2	3.3	2.7	6.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4	EB	THROUGH/RT	25	1	32	32	10	92	20	0	3.4	1.4	4.8	3.4	1.6	5.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5	NB LT	LEFT TURN	40	1	35	25	10	87	20	-0.25	3.6	1.9	5.5	4.5	2.3	6.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6	SB	THROUGH/RT	40	1	47	47	10	89	20	0.5	4.4	0.6	5.0	4.5	2.3	6.8	SB	6	74	YES	15	7	21.1	18.1	29.7	25.1	NO	4.5	12	19
4	EB LT	LEFT TURN	25	1	20	25	10	77	20	0	2.5	1.6	4.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
8	WB	THROUGH/RT	25	1	32	32	10	103	20	0.25	3.3	1.6	4.9	3.3	2.7	6.0	WB	8	66	YES	8	7	18.9	15.9	24.7	22.9	NO	1.8	9	16

PRIVATE DRIVE ASSUMED 25 MPH

X-WALKS AND PUSHBUTTON LOCATIONS FIELD-MEASURED

CURRENT PRACTICE IS TO ASSIGN EQUAL Y & R VALUES TO ALL PHASES IN SAME DIRECTION, IN ADDITION TO CO-TERMINATING PHASES

ASSOCIATED PHASE	DIRECTION	WALKING SPEED (ft/sec)	WIDTH OF FIRST LANE OF MOVING TRAFFIC (ft)	WIDTH OF SHOULDER, BIKE LANE, AND/OR PARKING LANE (ft)	LPI DURATION (sec)
1	-	3.5	-	-	-
2	-	3.5	-	-	-
3	-	3.5	-	-	-
4	-	3.5	-	-	-
5	-	3.5	-	-	-
6	-	3.5	-	-	-
7	-	3.5	-	-	-
8	WB	3.5	12	1	4

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	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	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 - 3 sec BUFFER	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	NB LT	LEFT TURN	40	1	35	25	10	121	20	-0.5	3.6	2.8	6.4	3.6	2.8	6.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2	SB	THROUGH/RT	40	1	47	47	10	87	20	0.5	4.4	0.5	4.9	4.5	1	5.5	SB	2	89	NO	-	7	25.4	22.4	31.7	29.4	NO	2.2	10	23
3	EB LT	LEFT TURN	35	1	30	25	10	84	20	0.5	3.2	1.8	5.0	3.2	1.9	5.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4	WB	THROUGH/RT	35	1	42	42	10	89	20	-0.25	4.1	0.8	4.9	4.1	1	5.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5	SB LT	LEFT TURN	40	1	35	25	10	93	20	0.5	3.5	2.1	5.6	3.6	2.8	6.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6	NB	THROUGH/RT	40	1	47	47	10	117	20	-0.5	4.5	1.0	5.5	4.5	1	5.5	NB	6	95	NO	-	7	27.1	24.1	33.7	31.1	NO	2.5	10	25
7	WB LT	LEFT TURN	35	1	30	25	10	88	20	-0.25	3.2	1.9	5.1	3.2	1.9	5.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
8	EB	THROUGH/RT	35	1	42	42	10	95	20	0.5	4.0	0.9	4.9	4.1	1	5.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-

THERE ARE NOT PEDESTRIAN ACCOMMODATIONS AT THIS INTERSECTION, BUT THERE ARE NO RESTRICTIONS POSTED
VALUES SHOWN ARE INTENDED TO CHECK COORDINATED PHASE MINIMUM GREEN FOR POTENTIAL MODIFICATION TO ACCOMMODATE PEDESTRIANS
@ THIS INTERSECTION, CURRENT PRACTICE HAS BEEN TO ASSIGN EQUAL Y & R VALUES TO "COMMON" MVMTS ON EACH SIDE OF THE BARRIER

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	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	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 - 3 sec BUFFER	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	SB LT	LEFT TURN	40	1	35	25	10	69	20	1.25	3.5	1.4	4.9	4.5	1.6	6.1	-	-	-	-	-	-	-	-	-	-	-	-	-
2	NB	THROUGH/RT	40	1	47	47	10	63	20	-0.75	4.5	0.2	4.7	4.5	1.6	6.1	NB	2	42	NO	-	7	12.0	9.0	16.0	16.0	YES	N/A	7	9
4	EB LT	LEFT TURN	25	1	20	25	10	72	20	0.25	2.5	1.5	4.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4	EB	THROUGH/RT	25	1	32	32	10	74	20	0.25	3.3	1.0	4.3	3.4	1.5	4.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5	NB LT	LEFT TURN	40	1	35	25	10	77	20	-0.75	3.6	1.6	5.2	4.5	1.6	6.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6	SB	THROUGH/RT	40	1	47	47	10	68	20	1.25	4.3	0.3	4.6	4.5	1.6	6.1	SB	6	72	NO	-	7	20.6	17.6	26.0	24.6	NO	1.4	9	18
8	WB LT	LEFT TURN	25	1	20	25	10	73	20	0	2.5	1.5	4.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
8	WB	THROUGH/RT	25	1	32	32	10	90	20	0	3.4	1.3	4.7	3.4	1.5	4.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-

PRIVATE DRIVES ASSUMED 25 MPH

THERE ARE NOT PEDESTRIAN ACCOMMODATIONS AT THIS INTERSECTION, BUT THERE ARE NO RESTRICTIONS POSTED
VALUES SHOWN ARE INTENDED TO CHECK MINIMUM GREEN FOR POTENTIAL MODIFICATION TO ACCOMMODATE PEDESTRIANS
CURRENT PRACTICE IS TO ASSIGN EQUAL Y & R VALUES TO ALL PHASES IN SAME DIRECTION, IN ADDITION TO CO-TERMINATING PHASES

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	OMUTCD 4E.06-12 WALK INTERVAL (4-7s TYP)	OMUTCD 4E.06-07 CALCULATED PED CLEARANCE	PED CHANGE INTERVAL (FDW)	(L+P)/(3 fps) (NOTE: P=6 IF NO PUSHBUTTON)	WALK + PED CHANGE INTERVALS	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 - 3 sec BUFFER	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	SB LT	LEFT TURN	40	1	35	25	10	86	20	0	3.6	1.9	5.5	4.5	1.9	6.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2	NB	THROUGH/RT	40	1	47	47	10	73	20	0	4.5	0.3	4.8	4.5	1.9	6.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-
8	WB LT	LEFT TURN	25	1	20	25	10	85	20	0	2.5	1.9	4.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4	EB	THROUGH/RT	35	1	42	42	10	92	20	1.25	4.0	0.8	4.8	4	1.9	5.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5	NB LT	LEFT TURN	40	1	35	25	10	84	20	0	3.6	1.8	5.4	4.5	1.9	6.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6	SB	THROUGH/RT	40	1	47	47	10	71	20	0	4.5	0.3	4.8	4.5	1.9	6.4	SB	6	97	YES	11	7	27.7	24.7	36.0	31.7	NO	4.3	12	25
7	EB LT	LEFT TURN	35	1	30	25	10	77	20	1.25	3.1	1.6	4.7	4	1.9	5.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-
8	WB	THROUGH/RT	25	1	32	32	10	94	20	0	3.4	1.4	4.8	4	1.9	5.9	WB	8	114	YES	9	7	32.6	29.6	41.0	36.6	NO	4.4	12	30

X-WALKS AND PUSHBUTTON LOCATIONS FIELD-MEASURED

CLR INT BASED ON CURRENT PRACTICE FOR BALANCE OF CORRIDOR: EQUAL Y & R VALUES - ALL PH SAME DIRECTION, PLUS CO-TERM PH

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	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	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 - 3 sec BUFFER	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	SB LT	LEFT TURN	40	1	35	25	10	104	20	0.25	3.6	2.4	6.0	4.4	2.5	6.9	-	-	-	-	-	-	-	-	-	-	-	-	-
2	NB	THROUGH/RT	40	1	47	47	10	94	20	0.25	4.4	0.7	5.1	4.4	2.5	6.9	-	-	-	-	-	-	-	-	-	-	-	-	-
3	EB LT	LEFT TURN	25	1	20	25	10	129	20	0.75	2.4	3.1	5.5	4	3.1	7.1	-	-	-	-	-	-	-	-	-	-	-	-	-
4	WB	THROUGH/RT	35	1	42	42	10	117	20	0.75	4.0	1.2	5.2	4	3.1	7.1	WB	4	87	NO	-	7	24.9	21.9	31.0	28.9	NO	2.1	10	22
5	NB LT	LEFT TURN	40	1	35	25	10	110	20	0.25	3.6	2.5	6.1	4.4	2.5	6.9	-	-	-	-	-	-	-	-	-	-	-	-	-
6	SB	THROUGH/RT	40	1	47	47	10	127	20	0.25	4.4	1.1	5.5	4.4	2.5	6.9	SB	6	83	NO	-	7	23.7	20.7	29.7	27.7	NO	2.0	9	21
7	WB LT	LEFT TURN	35	1	30	25	10	77	20	0.75	3.2	1.6	4.8	4	3.1	7.1	-	-	-	-	-	-	-	-	-	-	-	-	-
8	EB	THROUGH/RT	25	1	32	32	10	136	20	0.75	3.3	2.3	5.6	4	3.1	7.1	-	-	-	-	-	-	-	-	-	-	-	-	-

X-WALKS FIELD-MEASURED
MARKED X-WALKS SB & WB - NO PUSHBUTTONS OR PED HEADS
CLR INT BASED ON CURRENT PRACTICE FOR MAJORITY OF CORRIDOR: EQUAL Y & R VALUES - ALL PH SAME DIRECTION, PLUS CO-TERM PH