INTEROFFICE COMMUNICATION

TO: Bob Weaver, P.E, P.S., District 3 Deputy Director
ATTENTION: Scott Ockunzzi, P.E., District 3 Planning Engineer
FROM: Adam Koenig, P.E., Administrator, Office of Roadway Engineering
BY: Mary Bapu-Tamaskar, P.E., Studies Engineer, Office of Roadway Engineering
DATE: September 18, 2023
SUBJECT: LOR-90-15.67 (I-90 & SR254/Detroit Rd.) IOS Approval, PID 107714

The Office of Roadway Engineering has reviewed the LOR-90-15.67 Interchange Operations Study. The study proposes improvements to the I-90 & SR254 (Detroit Rd.) interchange to address congestion in the surrounding area. The study includes the following proposed work:

- WB I-90 Exit Ramp - The existing SB L-T/R would be converted to a L-L-T/R-R to create additional exit ramp storage.

- EB I-90 Exit Ramp- The existing right-most turn lane would be converted to a continuous NB Right turn lane. The continuous right turn lane would be physically separated with a concrete island and channelizing. It would enter EB SR254 exclusively as the 3rd EB Thru lane on SR254. The EB Thru lane continues along SR254 for approximately 1200' and terminates as a drop right turn lane at the downstream Abbe (SR301) signal.

- EB I-90 Entrance Ramp - Widen & lengthen the existing 2-lane portion of entrance ramp.

ORE concurs with the recommendations of the study. The study meets ODOT requirements for an Interchange Operation Study and is, therefore, approved. If you have any questions, please contact Mary Bapu-Tamaskar at 614-644-7888.

E-SIGNED by Adam Koenig
on 2023-09-18 19:57:27 GMT

AHK: MBT

cc: J. Cichello (D3) - K. Wade (D3)

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INTERCHANGE OPERATIONS STUDY

LOR-90-15.67

INTERSTATE 90 AND STATE ROUTE 254 INTERCHANGE

ODOT DISTRICT 3
STUDY PID 107714

SEPTEMBER 14, 2023

PREPARED FOR:

ODOT DISTRICT 3
906 N. CLARK AVENUE
ASHLAND, OHIO 44805

PREPARED BY:

CRAWFORD, MURPHY & TILLY, INC.
8101 N. HIGH STREET
SUITE 150
COLUMBUS, OH 43235

CMT

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PROJECT SUMMARY

Location: Interstate 90 and State Route 254

Lorain County, Ohio

PID: 107714

Study Sponsor: ODOT District 3

Proposed Work:

1. **SR-254 at I-90 WB Ramp Intersection**
    a. Increase the capacity of the WB I-90 exit ramp left and right turn movements by adding dual left and right turn lanes.
    b. Widen the WB I-90 exit ramp for 600 feet to accommodate dual right turn lanes and dual left turn lanes.
    c. Remove and repurpose the existing mast arm signal support from EB SR-254 at the I-90 EB ramps and install for the SB movement at the I-90 WB exit ramp.
    d. Adjust the stop line location on the I-90 WB exit ramp to accommodate the additional turn lanes.
    e. Adjust stop line for WB-LT SR-254 to accommodate left turn vehicles from the I-90 WB exit ramp dual left turn lanes.
    f. Add turn arrows to the WB exit ramp.
    g. Add overhead mounted lane assignment signs on the WB exit ramp for the reconfigured turning movements.

2. **SR-254 at I-90 EB Ramp Intersection**
    a. Lengthen the two-lane entrance ramp by 200 feet to improve lane utilization of the dual EB left turn lanes.
    b. Widen the EB I-90 entrance ramp by a length of 400 feet to accommodate the extended two-lane entrance.
    c. Convert the NB right turn shoulder lane to a free flow right turn lane separated from the adjacent right turn lane by a concrete channelizing island to reduce intersection delay.
    d. Install a new mast arm signal support (60 feet) on the concrete island for EB SR-254 traffic.
    e. Install supplemental traffic signal head (5- section head) on the proposed signal pole on the EB I-90 exit ramp.
    f. Install overhead mounted lane assignment and wayfinding signs on the I-90 EB exit ramp.
    g. Add right turn arrow pavement markings to the free flow right turn lane.

Figures 1, 2 and 3 show the Proposed Work described above. Larger scale exhibits of the proposed improvements can be found in **Appendix A**.

FIGURE 1: PROPOSED WORK AT WB I-90 RAMP AND SR-254

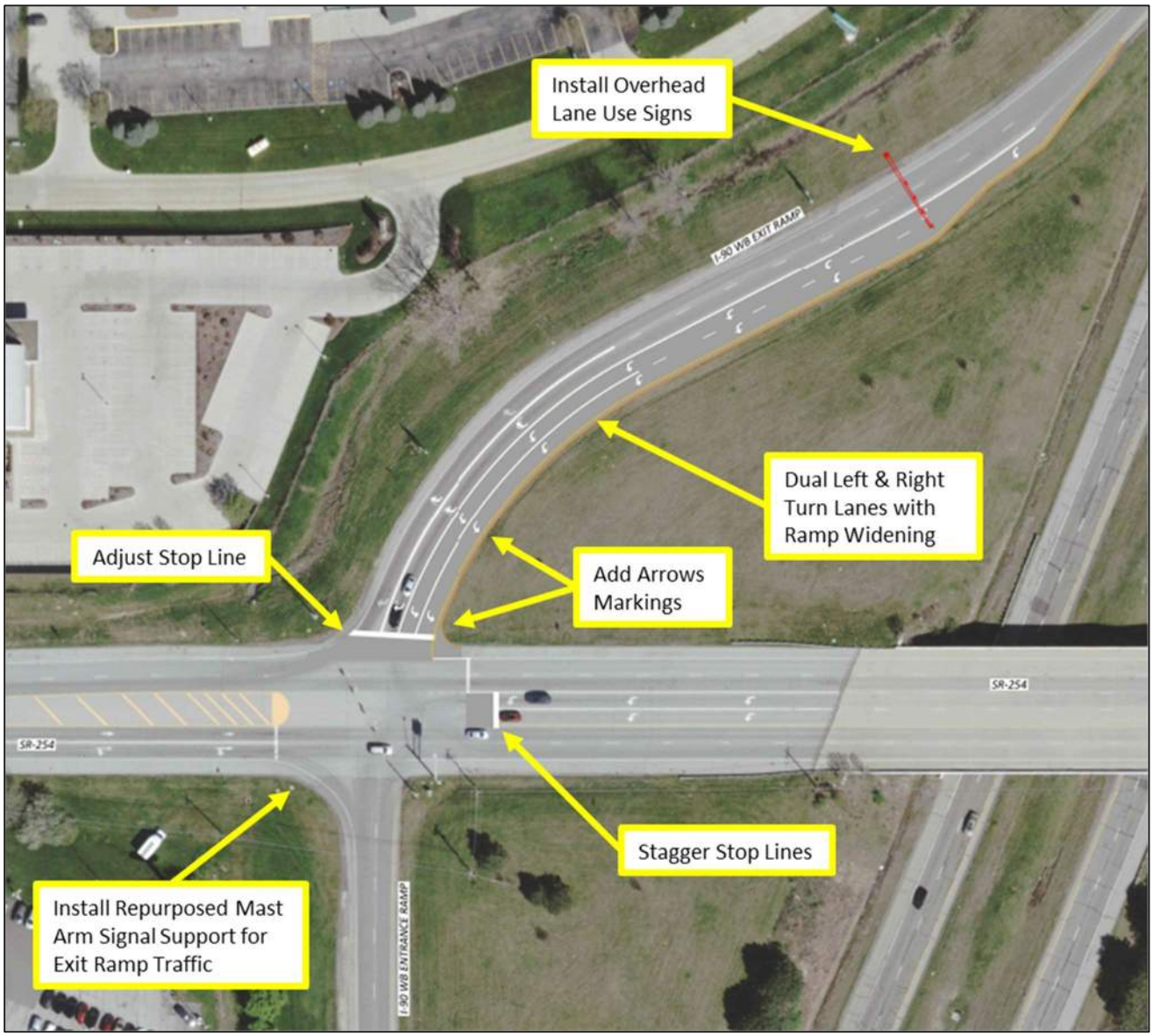


FIGURE 2: PROPOSED WORK AT EB I-90 RAMP AND SR-254

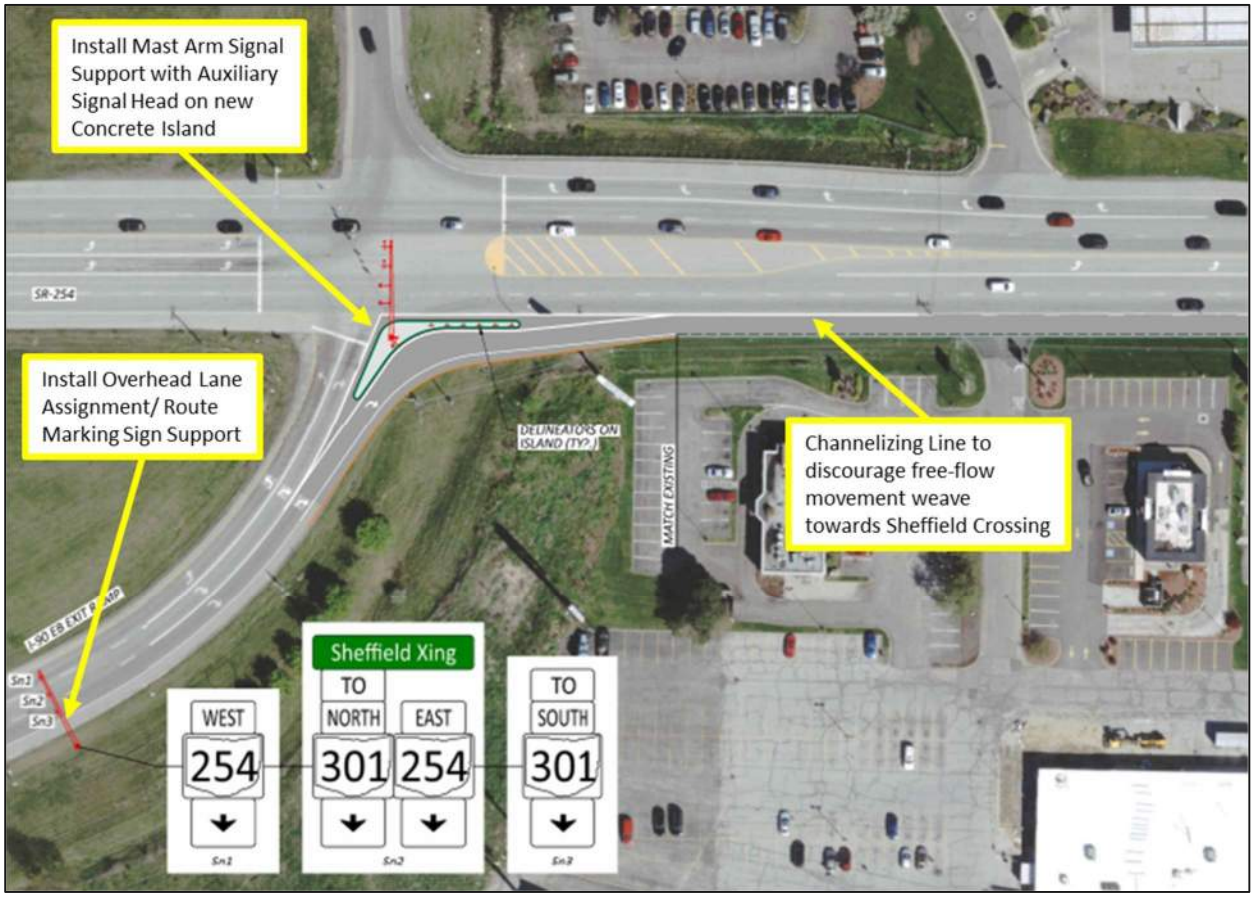


FIGURE 3: PROPOSED WORK AT EB I-90 ENTRANCE RAMP AT SR-254

STUDY AREA

SR-254 is an east-west route located in the northern part of Lorain County. The study area runs along SR-254 west of Transportation Drive to east of SR-301 and includes the I-90/SR-254 interchange. The interchange provides access to commercial and residential development surrounding the area. This section of SR-254 contains five signalized intersections. A study area map in **Figure 4** shows the analysis locations for the study area.

HCS ANALYSIS LOCATIONS

Basic Freeway Analysis

- EB / WB I-90 south of SR-254 interchange
- EB / WB I-90 below SR-254
- EB / WB I-90 north of SR-254 interchange

Ramp Analysis

- EB I-90 exit ramp to SR-254 (Diverge Analysis)
- EB I-90 entrance ramp from SR-254 (Merge Analysis)
- WB I-90 exit ramp to SR-254 (Diverge Analysis)
- WB I-90 entrance ramp from SR-254 (Merge Analysis)

Intersection Analysis (Signalized)

- SR-254 and Transportation Drive
- SR-254 and I-90 WB Ramps
- SR-254 and I-90 EB Ramps
- SR-254 and Sheffield Crossing
- SR-254 and SR-301

SR-254 Weave Analysis

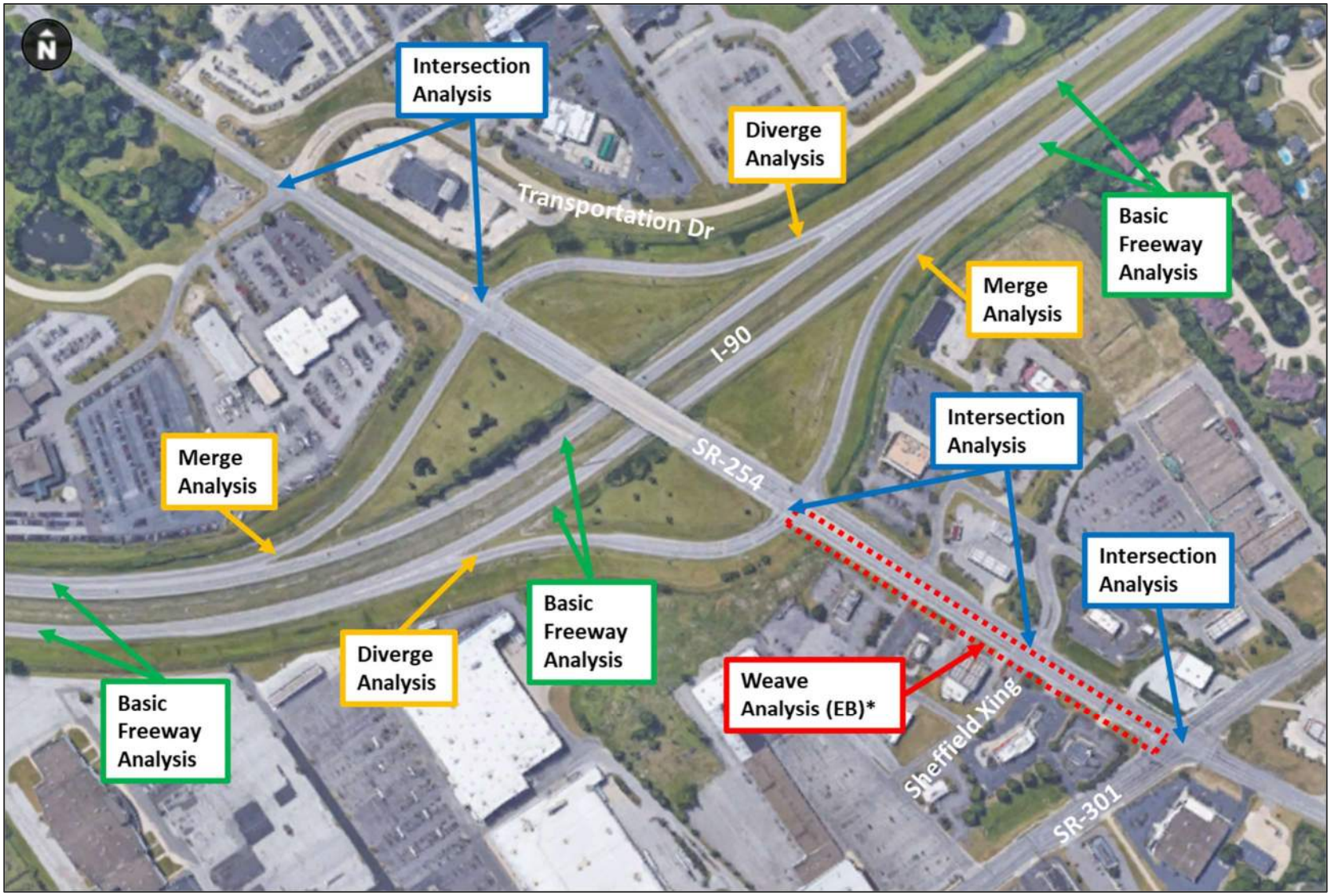
- EB SR-254 between I-90 EB Ramp and SR-301

BACKGROUND

The section of I-90 between SR-2 and SR-611 was identified as the highest need freeway segment in District 3 according to the Traffic Operations Assessment Systems Tool (TOAST). The section has a substandard TOAST score between 34.8% and 44.3%. A TSMO study dated October 2021 recommended widening of I-90 to 6-lanes within the project limits.

The I-90/SR-254 interchange is located midway between SR-2 and SR-611 and will be affected by the increase in capacity on I-90. According to ODOT, the section of SR-254 between Transportation Drive and SR-301 has an overall TOAST score between 63.7% and 77.2% for 2022.

FIGURE 4: STUDY AREA MAP WITH ANALYSIS POINTS



** Weave analysis performed for 500 feet of EB SR-254 – Build condition*

The goal of this Interchange Operations Study (IOS) is to document operations of the existing I-90/SR-254 interchange within the study limits for Build and No-Build conditions at design year 2045. In addition, an IOS is required when changing lane configurations at a ramp intersection approach or when changing the traffic control type at a ramp intersection.

EXISTING CONDITIONS

I-90 within the study area is an urban four-lane divided freeway from the SR-2 interchange up to west of SR-611 bridge with two lanes in each direction separated by a grass median. The freeway has a posted speed limit of 65 mph and includes other grade-separated interchanges.

The I-90/SR-254 interchange has a diamond configuration. It has a bridge that carries a six-lane section of SR-254 over I-90. The existing exit lane configuration of the I-90 ramps at the SR-254 interchange is one lane expanding to two lanes SB destined to EB/WB SR-254, and one lane expanding to three lanes NB destined to EB/WB SR-254. The entrance ramp for I-90 WB includes two 500 ft entry lanes that merge into a single lane. The entrance ramp for I-90 EB includes two 300 ft entry lanes that merge into a single lane. All ramps feature single lane merge/diverge points with I-90 and standard parallel acceleration/deceleration lanes.

SR-254 is an urban minor arterial oriented in the east-west direction that provides regional connectivity between SR-57 and SR-611. It serves multiple commercial and retail properties including car dealerships, shopping centers, and restaurants. It is largely residential east of SR-301.

SR-254 is undivided with four lanes west of the I-90 WB ramps, and six lanes between the I-90 WB ramps and SR-301. The posted speed limit in the study area is 35 MPH. This portion of SR-254 contains five signalized intersections: Transportation Drive, I-90 WB ramps, I-90 EB ramps, Sheffield Crossing, and SR-301. SR-254 continues eastward towards SR-611 in Avon and continues westward towards SR-57 in Lorain. The exits at SR-254 for I-90 are signed for Sheffield Village and Avon.

Figure 5 shows the WB SR-254 approach in advance of the interchange, while **Figure 6** shows the EB SR-254 approach in advance of the interchange.

FIGURE 5: WB SR-254 EAST OF I-90 INTERCHANGE

FIGURE 6: EB SR-254 WEST OF I-90 INTERCHANGE

TRAFFIC ANALYSES

A TSMO study dated October 2021 recommended widening I-90 from 4-lanes to 6-lanes within the limits of the analyzed freeway segments. For the purposes of freeway analysis, I-90 segments are assumed to have 6 lanes.

TRAFFIC VOLUMES AND ANALYSES

Opening year (2025) and design year (2045) certified traffic Design Hourly Volume (DHV) plates dated January 27, 2022 developed for the TSMO study were used for analyses. Note that the No-Build and Build volumes are the same because neither alternative is expected to induce additional traffic to the overall roadway network. Certified traffic plate used for the TSMO study was appended to add SR-254 turning movements at the 5 studied intersections. Design traffic volume plates were submitted as part of a count evaluation tech memo dated February 2, 2023. The count evaluation tech memo used to develop volumes for analysis is contained in **Appendix B**.

Capacity analyses of the 2045 design year No-Build and Build conditions were performed using the Highway Capacity Manual (HCM) 7th Edition (Transportation Research Board, 2023). Highway Capacity Software 2023 Version 8.2 was used for all capacity analyses. **Table 1** shows the HCM level of service (LOS) thresholds for the five (5) signalized intersections, the merge/diverge segments of I-90 at the SR-254 interchange, and the 500 ft weave segment on SR-254 east of the I-90 interchange.

TABLE 1: HCM LOS CRITERIA

Level of Service (LOS)	Signalized Intersections	Basic Freeway Segment	Merge & Diverge Segment	Weave Segment
	Delay (sec/veh)	Density (pc/mi/ln)	Density (pc/mi/ln)	Density (pc/mi/ln)
A	0-10	0-11	0-10	0-10
B	>10-20	>11-18	>10-20	>10-20
C	>20-35	>18-26	>20-28	>20-28
D	>33-55	>26-35	>28-35	>28-35
E	>55-80	>35-45	>35	>35-43
F	>80 or V/C ratio > 1.00	>45 or V/C ratio > 1.00	Demand Exceeds Capacity	>43 or Demand Exceeds Capacity

FREEWAY ANALYSIS

HCS 2023 software was utilized to analyze the basic and merge/diverge freeway segments on I-90. No weave analysis was performed on I-90 since the condition does not exist within the study limits. Since there are no changes to the existing ramp configuration from a freeway analysis standpoint, the operations of I-90 are the same for the 2045 No-Build and Build conditions.

The free flow speed of 70 mph (speed limit +5 mph) is assumed on I-90 based on guidance from OATS Section 4.6. A ramp free flow speed of 55 mph is assumed. Per guidance on OATS Section 5.1 level terrain is assumed since the steepest observed grade is less than 2.7%. Because Peak Hour Factors (PHF) are not provided in the certified traffic plates, PHF of 0.94 was applied to both freeway and ramp approaches following OATS Section 5.2 guidance.

Truck percentages presented in the certified traffic plates were used. The results of the HCS analyses are summarized in **Table 2**, and the HCS reports for all freeway capacity analyses on I-90 can be found in **Appendix C**.

TABLE 2: 2045 NO-BUILD AND BUILD FREEWAY ANALYSIS SUMMARY

I-90 EB	Analysis Type	2045 AM				2045 PM			
		LOS	Density (pc/mi/ln)	d/c		LOS	Density (pc/mi/ln)	d/c	
				F*	R*			F*	R*
I-90 west of SR-254	Basic	C	20.7	0.60	-	C	18.6	0.54	-
I-90 Exit Ramp to SR-254	Diverge	C	24.8	0.60	0.29	C	23.0	0.54	0.32
I-90 below SR-254	Basic	B	17.2	0.50	-	B	15.0	0.44	-
I-90 Entrance Ramp from SR-254	Merge	C	23.9	0.62	0.40	C	21.5	0.55	0.38
I-90 east of SR-254	Basic	C	21.5	0.62	-	C	18.9	0.55	-
I-90 WB	Analysis Type	2045 AM				2045 PM			
		LOS	Density (pc/mi/ln)	d/c		LOS	Density (pc/mi/ln)	d/c	
				F*	R*			F*	R*
I-90 east of SR-254	Basic	B	14.9	0.43	-	D	27.1	0.74	-
I-90 Exit Ramp to SR-254	Diverge	B	19.2	0.43	0.28	D	30.7	0.74	0.58
I-90 below SR-254	Basic	B	11.7	0.34	-	C	19.0	0.55	-
I-90 Entrance Ramp from SR-254	Merge	B	15.1	0.40	0.20	C	24.8	0.66	0.36
I-90 west of SR-254	Basic	B	13.6	0.40	-	C	22.8	0.65	-

SIGNALIZED INTERSECTION AND WEAVE SEGMENT ANALYSIS

HCS 2023 software was utilized to analyze the five signalized intersections along SR-254 and a 500 ft weave segment eastbound just east of the I-90 interchange. The guidelines in the ODOT Analysis and Traffic Simulation (OATS) Manual were followed for the capacity analysis. Minimum green times and associated clearance intervals per OATS Section 5.7 were included in the analysis of all intersections. Heaviest lane volume parameter was adjusted for the dual lane

movements at the I-90 EB/WB ramps and EB/WB thru movement at the ramp intersections and Sheffield Crossing to capture lane utilization. Truck percentages presented in the certified traffic plates were used.

The No-Build condition assumes that the five intersections retain their existing geometry and signal phasing. The Build condition incorporates the following improvements:

- Convert the NB right turn shoulder lane at the I-90 EB ramp intersection to a free-flow right turn lane. The lane configuration coded in HCS is a NB-LT and a NB-RT lane, with traffic volume for NB-RT reduced to be equal to the lowest recorded lane volume rounded to the nearest 50 vehicles. Although the center NB-RT lane is proposed to allow for right-turn on red (RTOR), it is coded as a no RTOR to comply with OATS Section 5.4 and obtain conservative (worse) levels of service than expected.
- Dual SB-LT and SB-RT lanes at the I-90 WB ramp intersection, an even lane distribution for both movements is assumed.

A 120-second cycle length was used for all signalized intersection analyses. Analyses were performed with “Field-Measured Phase Times” checkbox unchecked in HCS following OATS Section 6, resulting in the software estimating phase duration based on input volumes. The results of the HCS signalized intersection analyses are summarized in **Table 3A and Table 3B**. Complete HCS reports for the capacity analyses can be found in **Appendix C**.

SR-254 at I-90 WB Ramp Intersection
Implementing dual SB-LT lanes improves the SB-LT movement level of service in the critical PM peak period (from LOS F to LOS D). While the SB-RT yields an acceptable LOS E per OATS Section 5.9, adding the SB-RT lane helps reduce the EB Queue-Storage-Ratio (1.37 to 0.83) thus eliminating spillback to the adjacent intersection west of the interchange. The overall intersection LOS improves from LOS E (unacceptable per OATS Section 5.9) to LOS D in the PM peak period.

SR-254 at I-90 EB Ramp Intersection
Converting the NB right turn lane to be a free flow right turn lane reduces the amount of green time required to serve the NB approach. The reduced NB approach green time enables for increased WB-Thru green time, resulting in an improved WB-RT movement level of service in the critical AM peak period (from LOS F to LOS A). This countermeasure, combined with the proposed combination lane assignment/ route marking signs (**Figure 1**) and allowing the center lane (NB-RT lane) to turn right on red, is expected to improve the NB-RT lane utilization and NB approach level of service (LOS E to LOS D).

TABLE 3A: SIGNALIZED INTERSECTION CAPACITY SUMMARY

Intersection/Approach	2045 AM								2045 PM							
	NO BUILD				BUILD				NO BUILD				BUILD			
	LOS (Delay, in sec)	v/c	QSR	95th %tile Queue (ft)	LOS (Delay, in sec)	v/c	QSR	95th %tile Queue (ft)	LOS (Delay, in sec)	v/c	QSR	95th %tile Queue (ft)	LOS (Delay, in sec)	v/c	QSR	95th %tile Queue (ft)
SR-254 at Transportation Dr	**A (8.0)**	-	-	-	**A (9.0)**	-	-	-	**B (12.3)**	-	-	-	**B (12.9)**	-	-	-
EB-Left	A (3.4)	0.079	0.10	11.9	A (3.8)	0.083	0.10	11.9	A (8.0)	0.032	0.03	3.0	A (8.4)	0.033	0.03	3.0
EB-Thru-RT	A (8.2)	0.504	0.11	284.3	A (8.2)	0.504	0.11	284.3	B (10.9)	0.592	0.15	375.9	B (10.9)	0.592	0.15	375.9
EB Approach	A (7.8)	-	-	-	A (7.8)	-	-	-	B (10.8)	-	-	-	B (10.8)	-	-	-
WB-Left	A (5.2)	0.065	0.02	8.2	A (5.1)	0.065	0.02	8.1	A (7.0)	0.067	0.02	8.2	A (7.0)	0.067	0.02	8.2
WB-Thru	A (3.1)	0.428	0.18	89.7	A (5.3)	0.428	0.32	162.4	A (7.5)	0.815	0.42	211.1	A (8.7)	0.815	0.48	241.3
WB-Right	A (3.1)	0.095	0.04	21.7	A (5.6)	0.095	0.08	37.9	A (3.3)	0.065	0.03	15.8	A (3.5)	0.065	0.03	17.1
WB Approach	A (3.2)	-	-	-	A (5.3)	-	-	-	A (7.3)	-	-	-	A (8.3)	-	-	-
NB-Left	D (52.3)	0.071	0.06	15.1	D (52.3)	0.071	0.06	15.1	D (51.1)	0.063	0.06	14.1	D (51.1)	0.063	0.06	14.1
NB-Thru-RT	D (52.1)	0.188	0.12	30.3	D (52.1)	0.188	0.12	30.3	D (49.7)	0.261	0.22	56.1	D (49.7)	0.261	0.22	56.1
NB Approach	D (52.2)	-	-	-	D (52.2)	-	-	-	D (50.0)	-	-	-	D (50.0)	-	-	-
SB-Left	D (54.2)	0.226	0.11	45.5	D (54.2)	0.226	0.11	45.5	D (55.0)	0.499	0.29	117.6	D (55.0)	0.499	0.29	117.6
SB-Thru-RT	D (51.6)	0.092	0.04	14.7	D (51.6)	0.092	0.04	14.7	D (49.7)	0.254	0.14	54.7	D (49.7)	0.254	0.14	54.7
SB Approach	D (53.5)	-	-	-	D (53.6)	-	-	-	D (53.2)	-	-	-	D (53.2)	-	-	-
SR-254 at I-90 WB Ramps	**D (37.6)**	-	-	-	**C (28.9)**	-	-	-	**E (69.5)**	-	-	-	**D (40.6)**	-	-	-
EB-Thru	C (25.9)	0.460	0.69	298.8	B (15.3)	0.378	0.51	221.4	F (96.3)	1.051	1.37	590.10	C (33.1)	0.709	0.83	357.8
EB-Thru-RT	C (26.1)	0.461	0.75	313.1	B (15.5)	0.379	0.56	231.6	F (93.3)	1.051	1.63	677.40	C (32.9)	0.710	1.00	416.6
EB Approach	C (26.0)	-	-	-	B (15.4)	-	-	-	F (94.6)	-	-	-	C (33.0)	-	-	-
WB-Left	E (58.6)	0.850	0.53	288.8	D (47.7)	0.872	0.46	252.9	E (67.7)	0.910	0.73	403.80	E (61.7)	0.876	0.74	408.3
WB-Thru	B (12.4)	0.188	0.18	158.7	A (0.5)	0.165	0.01	7.0	C (21.9)	0.339	0.29	254.30	B (10.8)	0.270	0.21	186.1
WB Approach	D (35.2)	-	-	-	C (23.8)	-	-	-	D (44.8)	-	-	-	D (36.3)	-	-	-
SB-Left	E (59.6)	0.911	0.65	455.8	D (51.5)	0.796	0.43	234.7	F (84.7)	1.042	1.33	930.60	D (49.2)	0.848	0.72	389.0
SB-Right	D (45.9)	0.744	0.33	308.9	D (50.7)	0.714	0.21	177.8	E (67.0)	0.970	0.75	710.10	D (51.7)	0.866	0.40	340.7
SB Approach	D (53.8)	-	-	-	D (51.2)	-	-	-	E (76.7)	-	-	-	D (50.3)	-	-	-
SR-254 at I-90 EB Ramps	**D (52.0)**	-	-	-	**B (14.9)**	-	-	-	**D (37.6)**	-	-	-	**B (18.7)**	-	-	-
EB-Left	E (58.1)	0.820	0.73	197.1	D (50.9)	0.813	0.67	182.1	D (52.8)	0.817	0.47	126.7	D (50.1)	0.822	0.60	161.2
EB-Thru	C (23.4)	0.370	0.37	325.8	A (2.9)	0.273	0.08	70.1	C (25.3)	0.543	0.44	390.2	A (5.3)	0.436	0.20	173.8
EB Approach	C (33.2)	-	-	-	B (16.5)	-	-	-	C (30.6)	-	-	-	B (14.0)	-	-	-
WB-Thru	D (37.2)	0.559	0.61	399.1	A (6.7)	0.376	0.19	124.8	D (35.6)	0.781	0.79	514.2	B (17.4)	0.557	0.56	366.7
WB-Right	F (92.6)	1.036	0.67	301.2	A (7.3)	0.698	0.35	157.4	C (33.9)	0.755	0.99	444.2	B (19.2)	0.538	0.79	356.1
WB Approach	E (63.0)	-	-	-	A (7.0)	-	-	-	D (35.1)	-	-	-	B (17.9)	-	-	-
NB-Left	C (28.4)	0.157	0.19	85.8	D (48.5)	0.405	0.25	116.9	C (29.4)	0.116	0.13	61.1	D (46.8)	0.270	0.17	79.9
NB-Right	E (61.5)	0.950	0.56	385.4	E (55.2)	0.853	0.25	230.2	E (61.9)	0.949	0.59	406.7	D (54.9)	0.864	0.26	242.5
NB Approach	E (56.9)	-	-	-	D (52.9)	-	-	-	E (58.8)	-	-	-	D (52.8)	-	-	-

TABLE 3B: SIGNALIZED INTERSECTION CAPACITY SUMMARY, CONTINUED

Intersection/Approach	2045 AM								2045 PM							
	NO BUILD				BUILD				NO BUILD				BUILD			
	LOS (Delay, in sec)	v/c	QSR	95th %tile Queue (ft)	LOS (Delay, in sec)	v/c	QSR	95th %tile Queue (ft)	LOS (Delay, in sec)	v/c	QSR	95th %tile Queue (ft)	LOS (Delay, in sec)	v/c	QSR	95th %tile Queue (ft)
SR-254 at Sheffield Crossing	**B (16.9)**	-	-	-	**B (11.4)**	-	-	-	**D (35.1)**	-	-	-	**C (33.0)**	-	-	-
EB-Left	A (9.5)	0.256	0.07	31.3	A (7.2)	0.164	0.05	21.6	D (47.1)	0.894	0.39	165.8	C (33.8)	0.765	0.27	113.5
EB-Thru	B (13.7)	0.343	0.41	265.4	A (7.3)	0.238	0.17	111.7	C (25.9)	0.585	0.63	411.3	C (25.2)	0.459	0.53	346.1
EB-Right	B (15.5)	0.344	0.44	278.4	A (7.5)	0.239	0.17	109.4	C (23.9)	0.585	0.57	358.7	C (25.3)	0.460	0.51	323.6
EB Approach	B (14.0)	-	-	-	A (7.4)	-	-	-	C (27.7)	-	-	-	C (26.2)	-	-	-
WB-Left	A (7.7)	0.128	0.12	16.6	A (6.5)	0.091	0.12	16.6	B (19.3)	0.273	0.31	42.9	B (16.3)	0.221	0.28	39.2
WB-Thru	B (13.5)	0.566	0.89	329.1	A (6.8)	0.560	0.45	168.1	D (45.0)	0.950	1.52	563.4	D (39.0)	0.915	1.43	529.0
WB-Right	B (13.5)	0.566	0.97	352.5	A (6.6)	0.561	0.48	174.9	D (41.5)	0.953	1.96	713.6	D (36.0)	0.917	1.84	670.3
WB Approach	B (13.3)	-	-	-	A (6.7)	-	-	-	D (42.0)	-	-	-	D (36.3)	-	-	-
NB-Left	D (52.2)	0.624	0.42	198.7	D (52.5)	0.634	0.42	199.2	D (51.3)	0.768	0.73	343.0	D (51.3)	0.768	0.73	343.0
NB-Thru-Right	D (44.3)	0.218	0.14	67.9	D (44.5)	0.221	0.14	68.1	C (30.6)	0.272	0.31	143.6	C (30.6)	0.272	0.31	143.6
NB Approach	D (50.0)	-	-	-	D (50.3)	-	-	-	D (44.2)	-	-	-	D (44.2)	-	-	-
SB-Left	D (46.0)	0.048	0.14	13.7	D (46.3)	0.049	0.14	13.8	C (35.0)	0.145	0.58	58.4	C (35.0)	0.145	0.58	58.4
SB-Thru-Right	D (44.3)	0.218	0.24	67.9	D (44.5)	0.221	0.24	68.1	C (31.1)	0.319	0.60	168.4	C (31.1)	0.319	0.60	168.4
SB Approach	D (44.6)	-	-	-	D (44.8)	-	-	-	C (32.1)	-	-	-	C (32.1)	-	-	-
SR-254 at SR-301	**D (40.1)**	-	-	-	**C (31.7)**	-	-	-	**D (43.3)**	-	-	-	**D (39.4)**	-	-	-
EB-Left	C (20.4)	0.407	0.86	129.4	C (21.8)	0.319	0.63	94.9	C (27.8)	0.639	1.50	224.3	C (26.4)	0.536	1.25	187.9
EB-Thru	D (40.2)	0.485	1.16	407.0	C (21.2)	0.180	0.28	96.8	E (64.6)	0.898	1.88	657.4	D (35.8)	0.365	0.67	233.9
EB-Right	D (46.6)	0.616	1.31	460.0	B (15.0)	0.549	0.46	160.7	C (21.3)	0.499	0.91	319.4	C (25.4)	0.715	1.46	510.8
EB Approach	D (41.1)	-	-	-	B (17.8)	-	-	-	D (37.2)	-	-	-	C (29.1)	-	-	-
WB-Left	C (21.5)	0.403	0.37	119.3	B (19.8)	0.279	0.38	121.4	D (47.9)	0.895	0.87	278.1	C (23.6)	0.564	0.70	223.4
WB-Thru	C (27.7)	0.407	0.57	269.9	C (27.6)	0.406	0.57	269.0	D (35.2)	0.502	0.66	308.3	C (33.4)	0.479	0.64	300.4
WB-Right	C (27.8)	0.409	0.56	263.4	C (27.7)	0.407	0.56	262.8	D (35.5)	0.506	0.63	294.0	C (33.6)	0.483	0.61	286.4
WB Approach	C (26.4)	-	-	-	C (26.0)	-	-	-	D (39.3)	-	-	-	C (30.4)	-	-	-
NB-Left	E (57.0)	0.888	0.36	342.9	D (49.3)	0.873	0.34	321.6	E (61.7)	0.934	0.50	471.0	E (61.7)	0.934	0.50	471.0
NB-Thru	D (35.8)	0.468	0.18	253.4	C (34.4)	0.446	0.17	248.7	D (40.0)	0.700	0.28	402.3	D (39.7)	0.696	0.28	401.0
NB-Right	C (28.2)	0.290	0.46	152.6	C (26.8)	0.276	0.45	148.0	C (23.7)	0.351	0.61	201.3	C (23.6)	0.349	0.61	200.8
NB Approach	D (46.7)	-	-	-	D (41.7)	-	-	-	D (49.1)	-	-	-	D (49.0)	-	-	-
SB-Left	D (39.6)	0.171	0.26	60.9	D (38.5)	0.164	0.26	59.9	D (46.8)	0.578	0.18	40.5	D (46.5)	0.574	0.17	39.6
SB-Thru	D (47.1)	0.523	0.39	178.5	D (45.9)	0.489	0.38	175.8	E (58.1)	0.800	0.53	241.5	E (57.5)	0.790	0.52	240.5
SB-Right	D (44.8)	0.644	1.07	267.3	D (43.4)	0.656	1.05	262.3	D (39.9)	0.489	0.84	209.5	D (41.6)	0.524	0.85	213.5
SB Approach	D (45.5)	-	-	-	D (44.2)	-	-	-	D (50.8)	-	-	-	D (50.9)	-	-	-

EB SR-254 between I-90 EB ramps and SR-301 was analyzed as a 500 ft weave segment during the Build condition due, in part, to the free flow NB-RT lane. The analysis assumes a worst-case scenario where all NB-RT traffic from the EB I-90 exit ramp travels to the EB-LT lane at the SR-301 intersection. The results of the weave analysis are shown in **Table 4**.

TABLE 4: EB SR-254 BETWEEN EB I-90 RAMP AND SR-301 WEAVE SUMMARY

Segment (EB)	Analysis Type	2045 AM BUILD				2045 PM BUILD			
		LOS	Density (pc/mi/ln)	d/c		LOS	Density (pc/mi/ln)	d/c	
				F*	R*			F*	R*
SR-254 b/w I-90 EB Exit and SR-301	Weave	B	16.9	0.38	-	C	22.7	0.47	-

The actual weave condition is expected to perform better due to the combination lane assignment/ route marking signs shown on **Figure 1** and allowing RTOR for the center NB-RT lane**.** The combination lane assignment/ route marking signs are to minimize an increase of weaving between I-90 and SR301.

In addition to the combination lane assignment/ route marking signs and RTOR on the center NB-RT lane, efforts to further discourage weaving on EB SR-254 between the I-90 EB ramps and Sheffield Crossing, design of the channelized right-turn lane design, pavement markings, and potential to use lane separator treatments are also proposed. Therefore, weave analysis for this movement is not performed. Conceptual plans of the proposed improvements can be found in **Appendix A**.

STORAGE LENGTH ANALYSIS

Storage length analyses were performed at the five intersections within the study area. The required turn lane storage length was calculated based on ODOT Location and Design (L&D) Volume 1 Section 400 procedures and compared to the 95th percentile queue lengths provided by HCS. Turn lane lengths calculated within the L&D procedures were based on the 120 second cycle length used in the capacity analysis. Based on L&D Section 104.2 guidance, a design speed equal to the speed limit was used on SR-254. Additionally, a design speed of 50 MPH was used on the I-90 ramps following L&D Section 503.2 guidance.

The results of the turn lane analyses are summarized in **Table 5**, and the calculation details for each location can be found in **Appendix D**. Note that the storage lengths in **Table 5** include the 50-foot diverging taper.

TABLE 5: STORAGE LENGTH ANALYSIS SUMMARY

Turn Lane	2045 DHV		L&D Method		HCS 95% Queue (feet)	Existing Storage Length (feet)	Proposed Storage Length (feet)
	AM	PM	Calculated Turn Lane Storage	No Block Storage Length			
SR254 and Transportation Dr							
WB Left	30	30	100	413	8.2	450	EX
EB Left	50	10	133	858	11.9	165	EX
SR254 and I-90 Westbound Ramps							
SB Left	330	640	442	396	389.0	750	650 / 530 (Dual Left)
SB Right	240	530	396	442	340.7	650	650 / 650 (Dual Right)
WB Left	360	610	429	429	408.3	600 / 600	EX
SR254 and I-90 Eastbound Ramps							
WB Right	550	500	683	708	356.1	500	EX
NB Left	80	60	183	239	116.9	510	EX
NB Right	431	433	561	239	242.5	510	EX (Free Flow)
EB Left	260	270	238	692	182.1	320 / 320	EX
SR254 and Sheffield Crossing							
SB Left	10	50	133	250	58.4	150	EX
WB Left	40	60	150	783	39.2	190	EX
EB Left	80	180	300	597	113.5	470	EX
SR254 and SR301 (Abbe Rd)							
SB Left	50	140	242	275	59.9	280	EX
SB Right	210	170	325	275	262.3	300	EX
WB Left	150	260	392	413	223.4	370	EX
NB Left	510	710	492	508	471.0	470 / 470	EX
NB Right	150	220	342	508	200.8	380	EX
EB Left	150	240	375	633	187.9	200	EX
EB Right	610	720	500	633	510.8	350 / 350	EX

Note 1: Analysis performed using 2045 design year volumes. Storage lengths were calculated based on Condition A (Storage Only) per ODOT L&D Figure 401-9 unless noted otherwise.

Note 2: Ramp storage and blockage lengths were calculated using Condition A (Storage Only) per ODOT L&D Figure 401-9. Blockage lengths calculated using through volumes divided by number of through lanes.

State Route 254 and I-90 Westbound Ramps – SB Left Turn

Dual SB left-turn lanes are proposed at the WB I-90 ramp intersection to reduce congestion and to avoid spillback of the WB I-90 exit ramp traffic to mainline I-90. The dual SB left-turn lanes would be developed by widening the inside (left) shoulder, with the proposed storage lengths (650 feet and 530 feet). The proposed lengths exceed the L&D turn lane storage length (442 feet) and the HCS 95th percentile queue length (389 feet).

While Condition A is typically used in calculating storage lengths at an exit ramp, deceleration is expected to occur downstream of the exit gore due to the length of the proposed storage lane lengths. 50 MPH is the middle range for a diamond ramp design speed per L&D Section 503.2.1 and Figure 503-1 with a mainline design speed of 70 MPH (65 MPH speed limit + 5 MPH) per L&D Section 104.2. The proposed storage lengths account for deceleration.

CONCLUSIONS

The capacity analyses results for the signalized intersections show that the proposed improvements yield acceptable levels of service at the signalized intersections for the Design Year.

- Adding lanes at the I-90 WB ramps shows capacity improvements during the PM peak hour.
- WB right movement at the I-90 EB ramps improves from LOS F to LOS A by implementing a NB-RT free flow lane. The eastbound weave section on SR-254 is expected to function at an acceptable LOS C or better during the peak hour periods.
- The combination lane assignment/ route marking sign and allowing center NB-RT lane to RTOR are expected to improve the NB-RT lane utilization and NB approach level of service (LOS E to LOS D).

This report finds that the proposed upgrades at the intersections are recommended to improve traffic operations in the study area. Cost estimates can be found in **Appendix E**.

INTERCHANGE OPERATIONS STUDY
LOR-90-15.67

APPENDIX A: CONCEPTUAL PLAN

CMT

LOR-90-10.76

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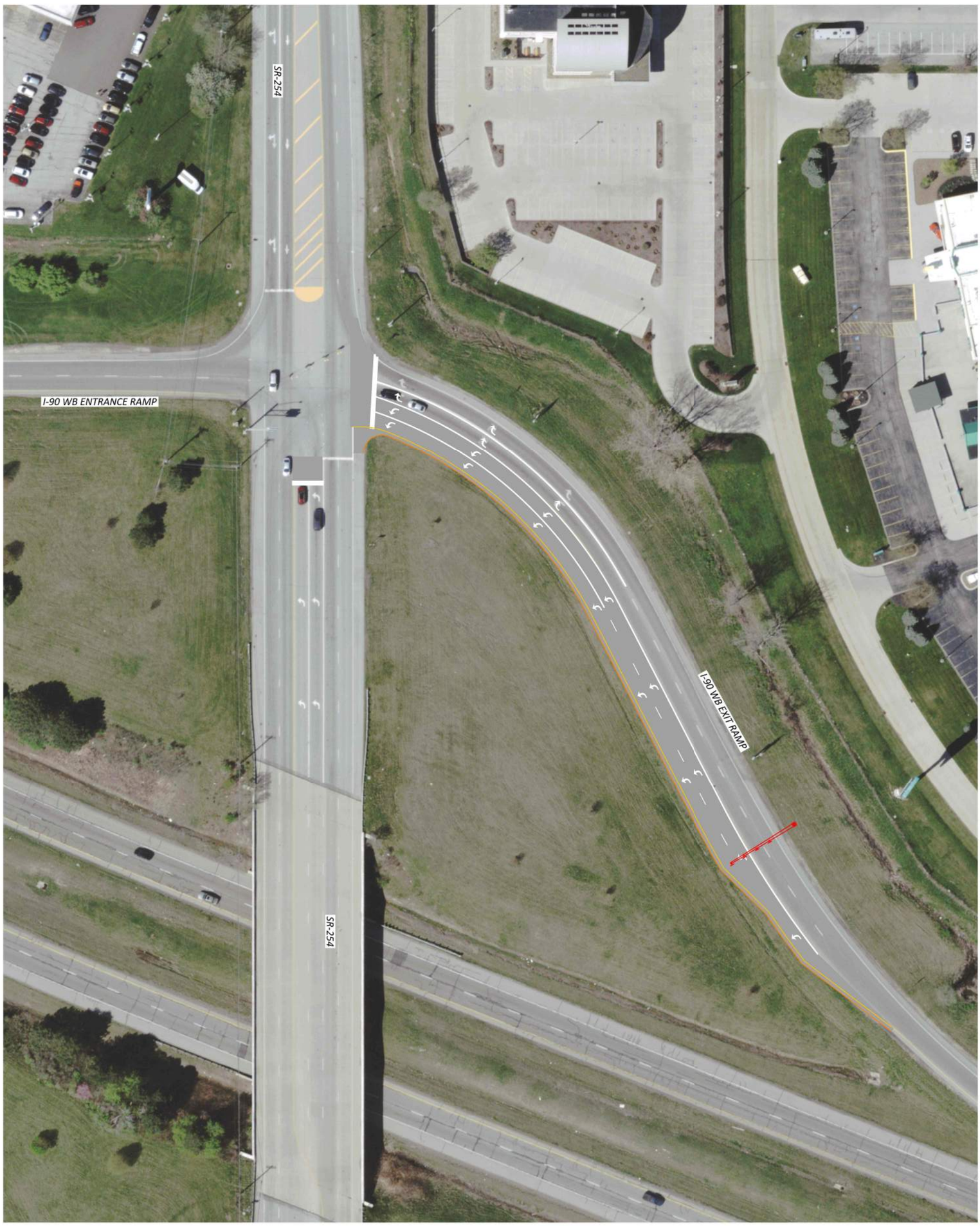

SHEET 1 | TOTAL 3

PROJECT ID 107714

REVIEWER SAK 8/28/23

DESIGNER GSH

DESIGN AGENCY
CMT
CRAWFORD, MURPHY & TILLY, INC.
8101 N. HIGH STREET
SUITE 150
COLUMBUS, OHIO 43235
PH (614)468-1200
www.cmtengr.com

CONCEPT PLAN
SR-254 AT I-90 WB RAMP

HORIZONTAL SCALE IN FEET
0 40
20 80

MODEL: 107714_GP902 PAPERSIZE: 17x11 (in.) DATE: 8/31/2023 TIME: 4:11:43 PM USER: ghansel
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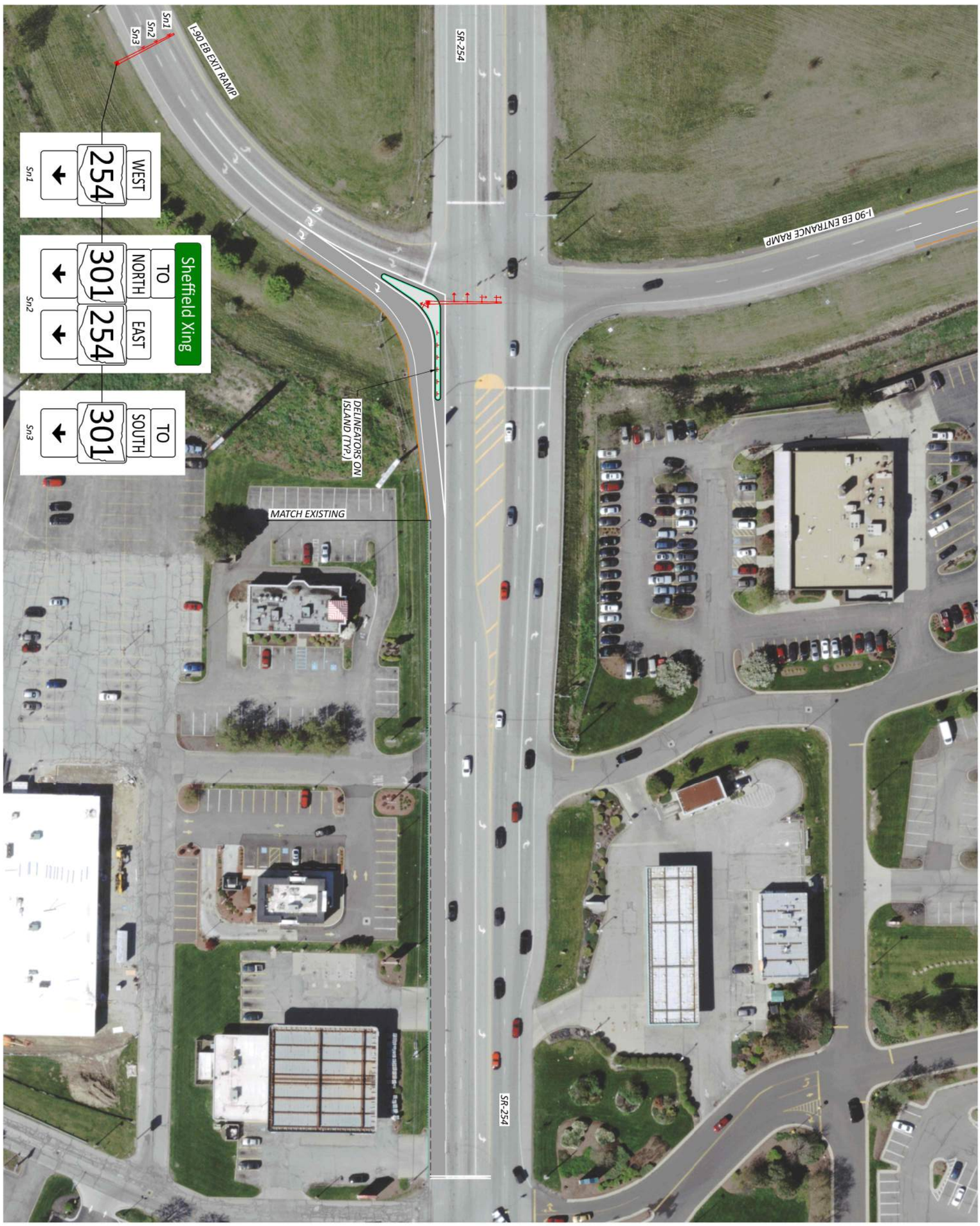

CONCEPT PLAN
SR-254 AT I-90 EB RAMP

HORIZONTAL SCALE IN FEET
0 40
20 80

SHEET	TOTAL	PROJECT ID	REVIEWER	DESIGNER	DESIGN AGENCY
2	3	107714	SAK 8/28/23	GSH	CMT CRAWFORD, MURPHY & TILLY, INC. 8101 N. HIGH STREET SUITE 150 COLUMBUS, OHIO 43235 PH (614)468-1200 www.cmtengr.com

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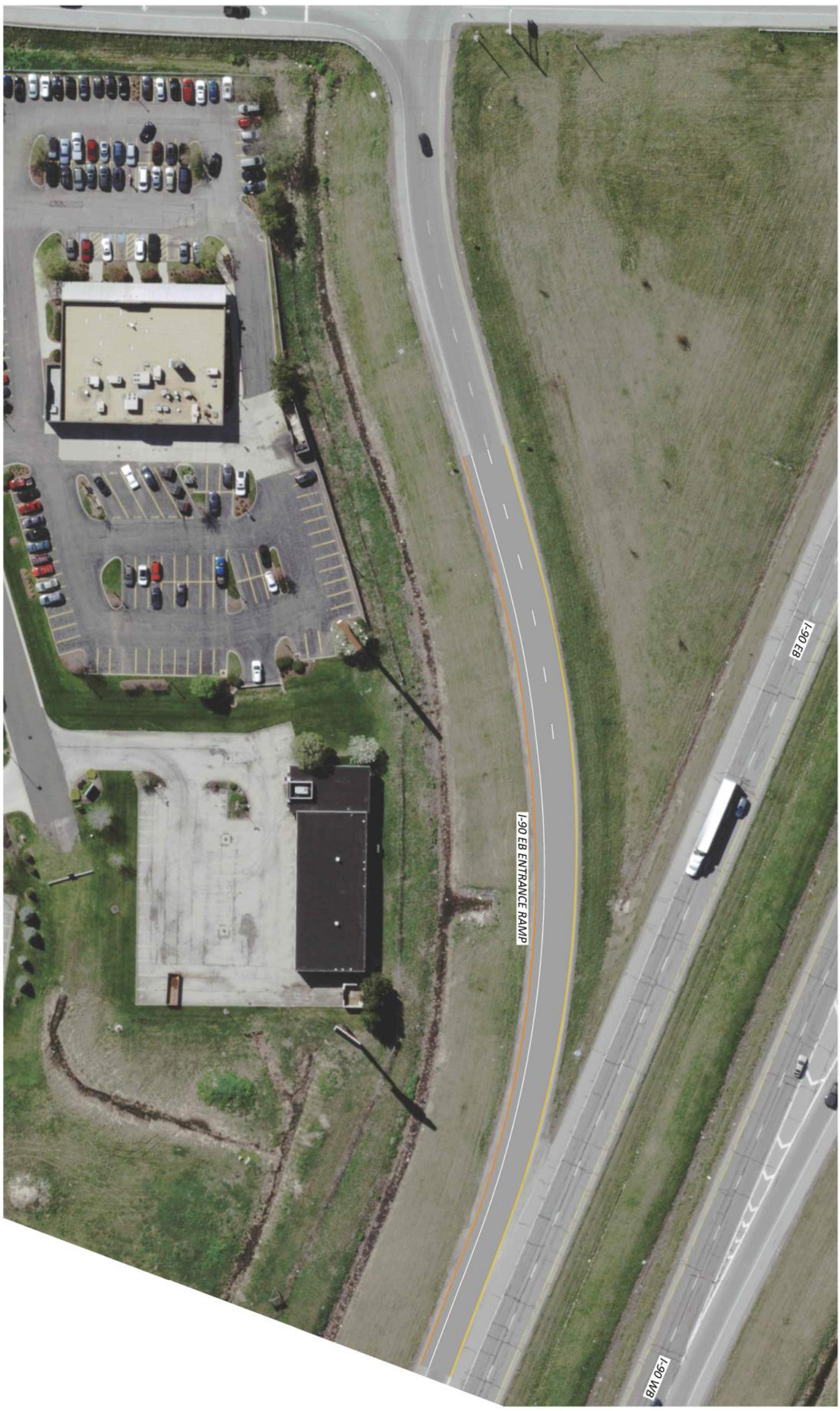


SHEET	TOTAL	PROJECT ID	REVIEWER	DESIGNER	DESIGN AGENCY
3	3	107714	SAK 8/28/23	GSH	CMT CRAWFORD, MURPHY & TILLY, INC. 8101 N. HIGH STREET SUITE 150 COLUMBUS, OHIO 43235 PH (614)468-1200 www.cmtengr.com

CONCEPT PLAN
I-90 EB ENTRANCE RAMP

HORIZONTAL SCALE IN FEET
0 40
20 80

INTERCHANGE OPERATIONS STUDY
LOR-90-15.67

APPENDIX B: COUNT EVALUATION TECH MEMO

Count Evaluation Tech Memo
LOR-90-10.76 Traffic Volumes

DATE: February 2, 2023

TO: Scott Ockunzzi, ODOT D3

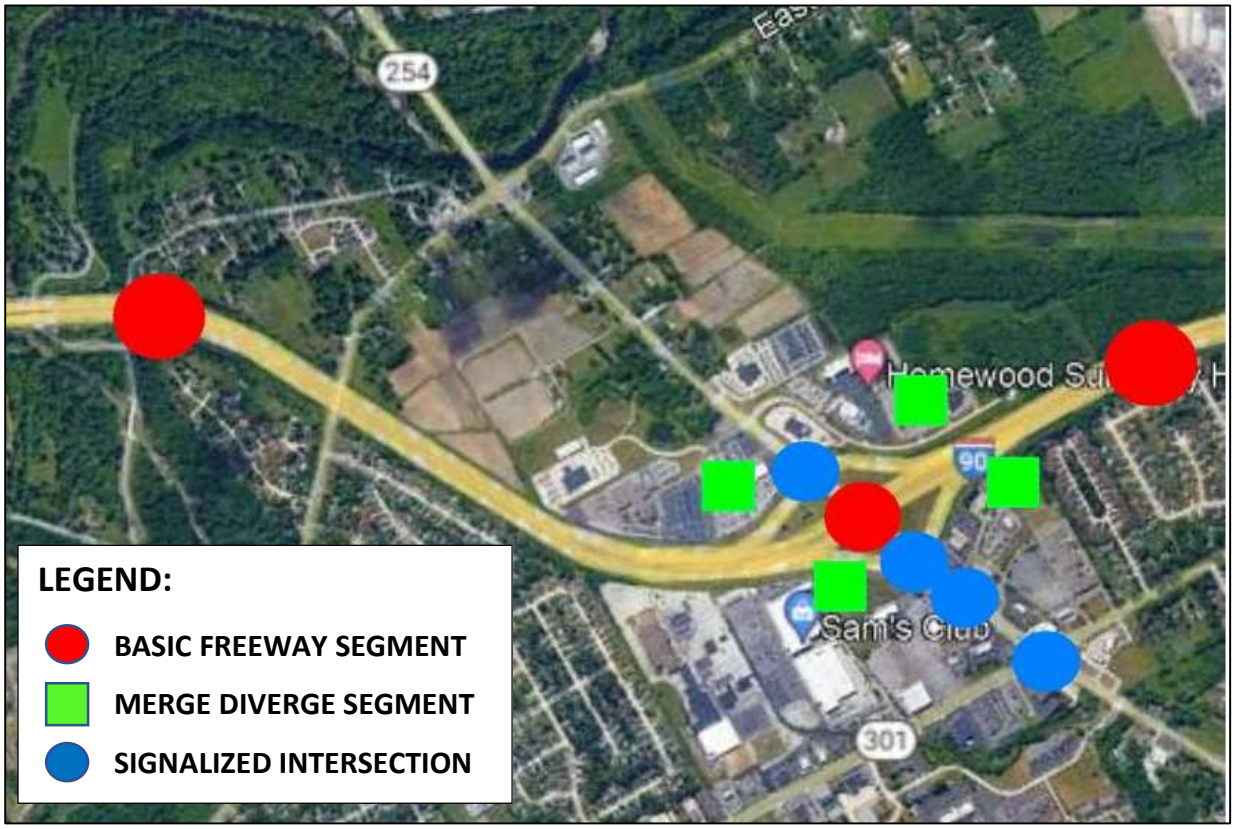
CC: Julie Cichello, D3
Kathryn Wade, D3
Scott Knebel, CMT

FROM: Giovanni Hansel, CMT

SUBJECT: Count Evaluation Technical Memo
I-90 at SR-254 interchange

This technical memo provides supporting documentation that was used to expand the existing 2025 / 2045 LOR-90-10.76 Certified Traffic Plate. AADT and DHV on the original certified traffic plate dated January 2022 were expanded using volumes adjusted with Seasonal, P&A/B&C, COVID, and growth factors as applicable. The study area map (**Figure 1**) shows the types of analyses that will be performed as part of the interchange operations study (IOS): basic freeway segments (red circle), merge/diverge (green squares), and signalized intersection (blue circle).

FIGURE 1: STUDY AREA MAP



Section 1: Data Collection

8-hour Turning Movement Counts (TMC) within the project area were collected on Thursday May 19, 2022, between the hours of 6 AM to 10 AM and 3 PM to 7 PM at five signalized intersections:

- State Route 254 at Transportation Drive
- State Route 254 at Interstate 90 WB Ramps
- State Route 254 at Interstate 90 EB Ramps
- State Route 254 at Sheffield Crossing
- State Route 254 at State Route 301

2025 / 2045 Certified Traffic Plates (see **Figures 2-5**) have been developed for the Build condition that include volumes on mainline and ramps at Interstate 90 that assumes a 6-lane configuration between the State Route 2 and State Route 611 interchanges. Volumes in the Certified Traffic Plate have been adjusted using *COVID Adjustment factor* hence represent 2025 / 2045 volumes with no reduction due to COVID. The Certified Traffic Plate was to be expanded to include turning movement volumes at the five intersections using the same growth rate of 0.68% per year used in the Certified Traffic Plate developed by NOACA.

In addition to the volume data above, the following data and tools provided by ODOT were used to develop expanded Certified Traffic Plate:

- 2021 Seasonal Adjustment Factors Table
- Peak-to-DHV Adjustment Factors Table
- Partial Count Form Spreadsheet
- Partial Count Adjustment (P&A, B&C) Factor Spreadsheet
- Statewide and Regional Traffic Analysis Dashboard

The use of these data and tools will be described in the next section(s) of the memo.

Section 2: Estimating 2025 and 2045 DHVs

Section 2.7.2 of the Ohio Traffic Forecasting Manual (Volume 2) states that one of the methods of determining DHV involves multiplying peak hour volumes by a *Peak-to-DHV Adjustment Factor*. Using this method, 2025 and 2045 DHVs at the five intersections were estimated by applying *Peak-to-DHV factor* and *Growth Factor* (based on 0.68% per year) to the 2022 AM and PM peak hour volumes.

FIGURE 2: 2025 AND 2045 CERTIFIED TRAFFIC ADT VOLUMES

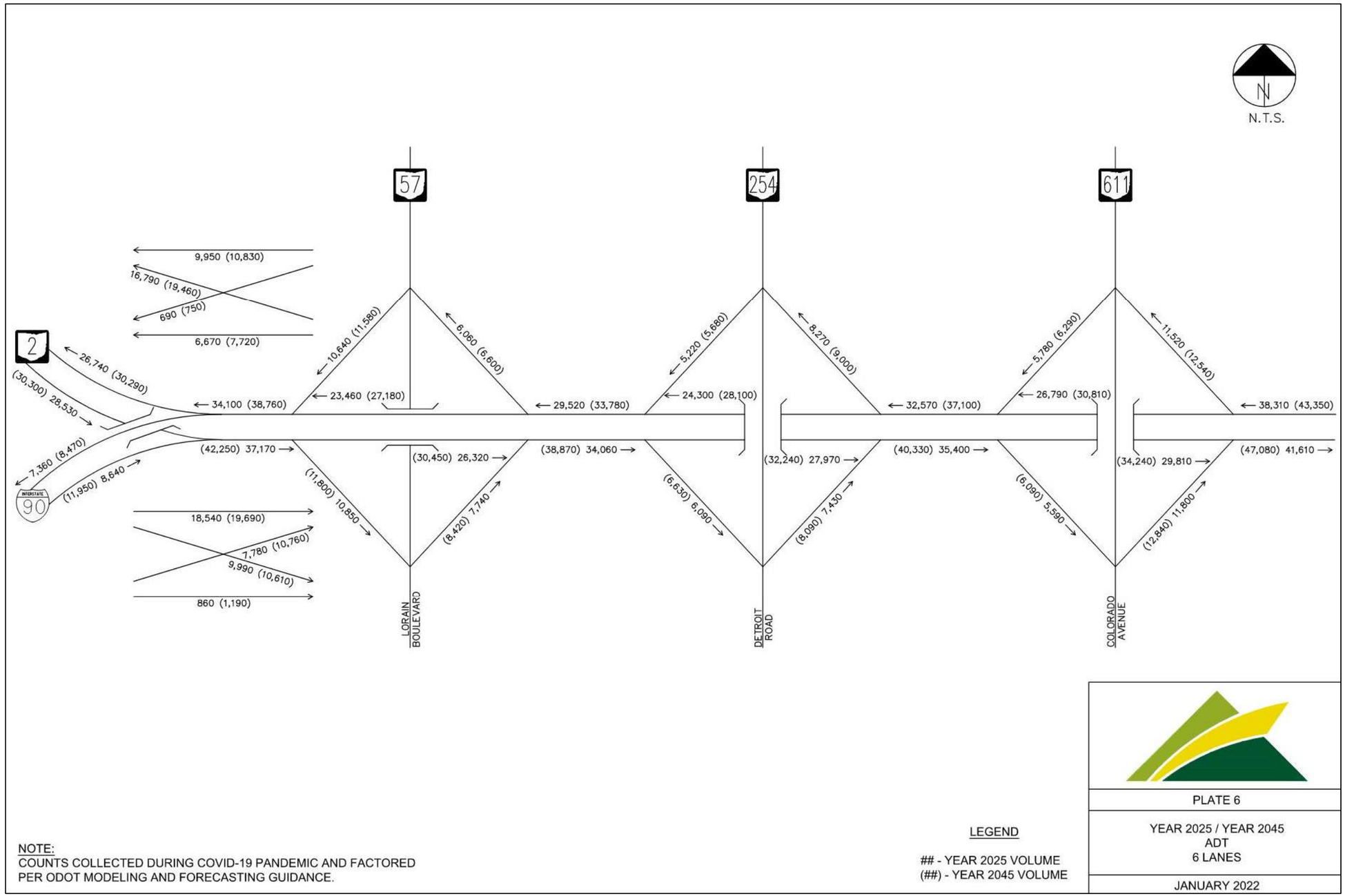
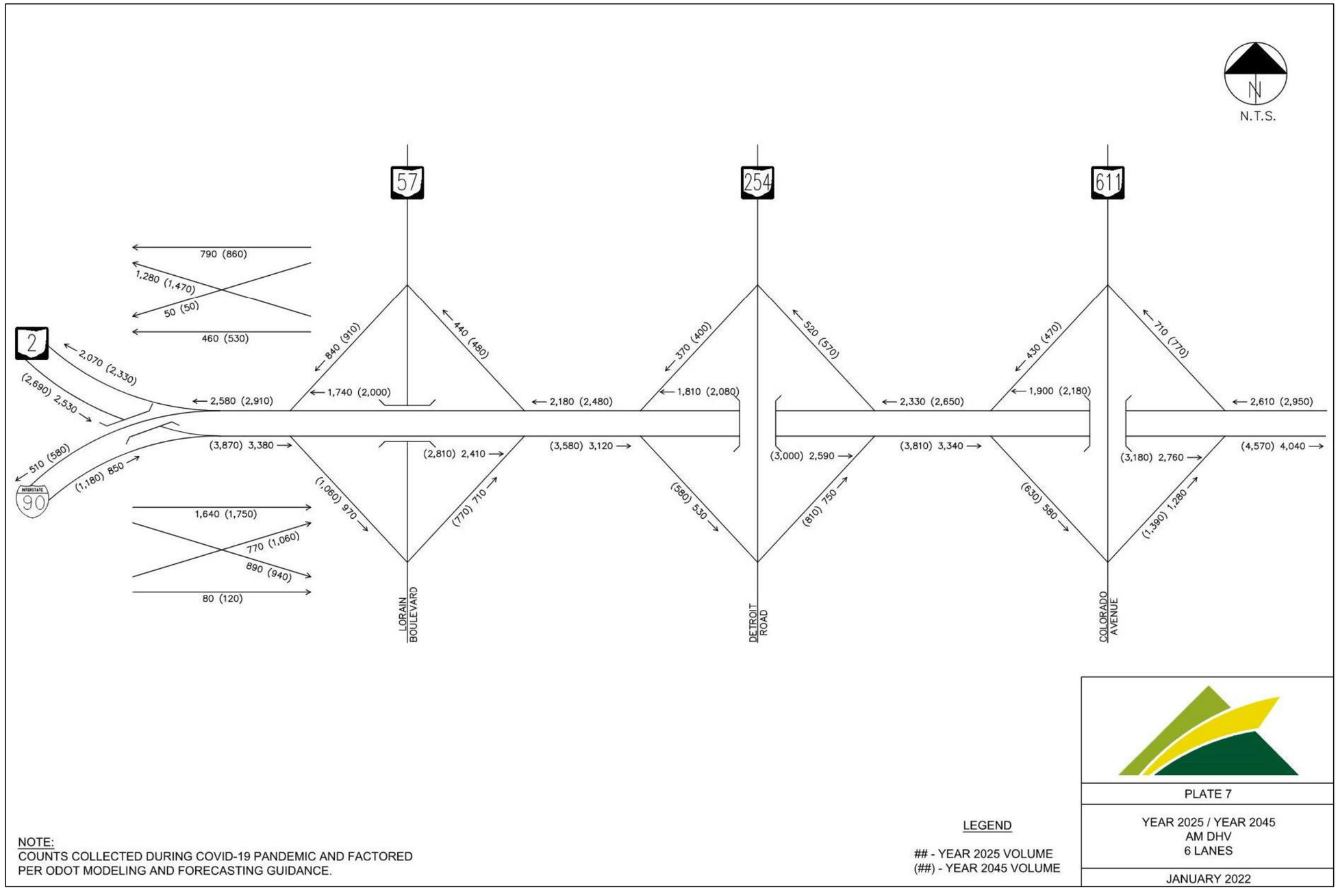


FIGURE 3: 2025 AND 2045 CERTIFIED TRAFFIC AM DESIGN HOURLY VOLUMES



NOTE:
COUNTS COLLECTED DURING COVID-19 PANDEMIC AND FACTORED PER ODOT MODELING AND FORECASTING GUIDANCE.

LEGEND

- YEAR 2025 VOLUME
(##) - YEAR 2045 VOLUME

PLATE 7

YEAR 2025 / YEAR 2045
AM DHV
6 LANES

JANUARY 2022

FIGURE 4: 2025 AND 2045 CERTIFIED TRAFFIC PM DESIGN HOURLY VOLUMES

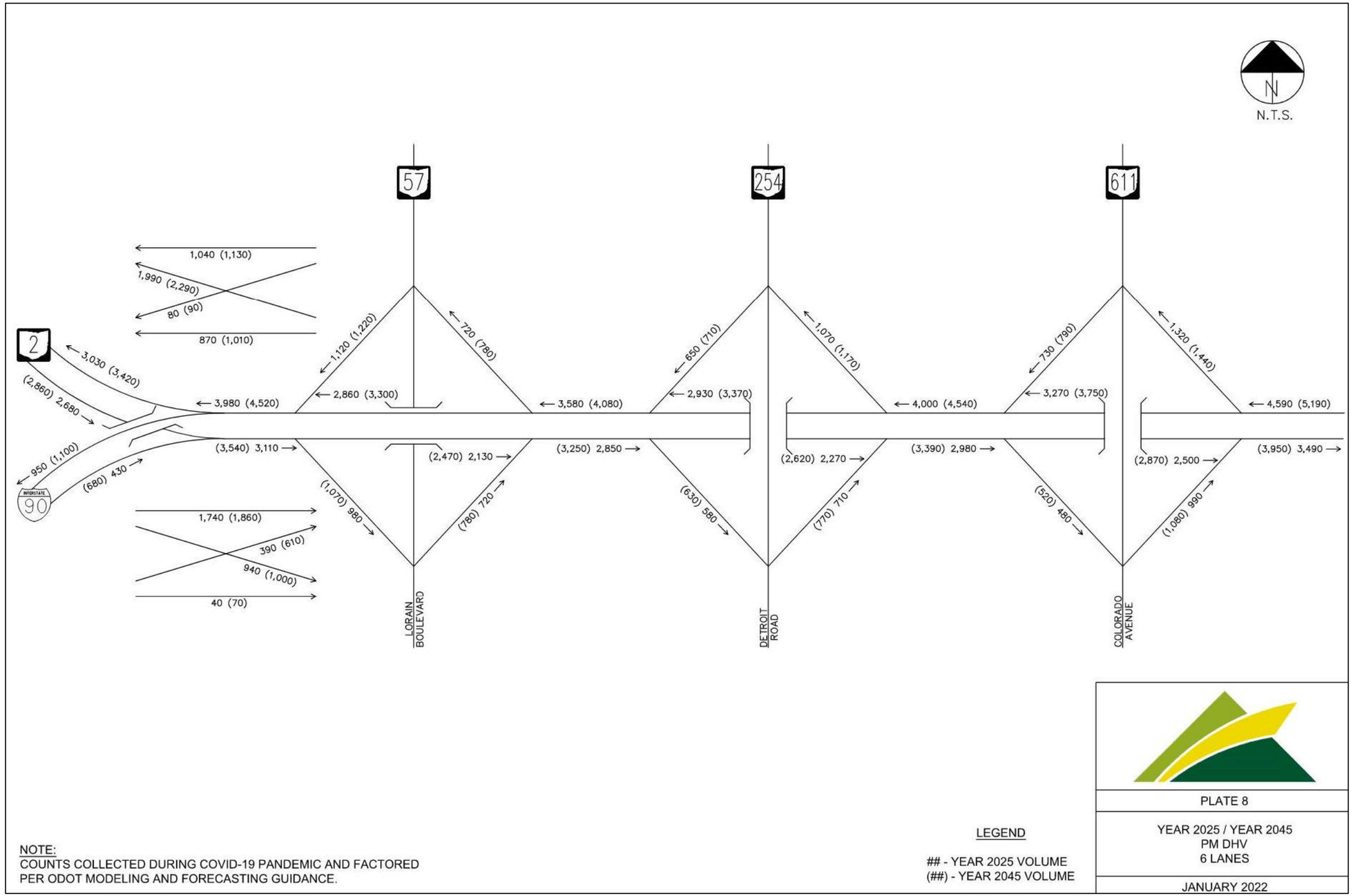
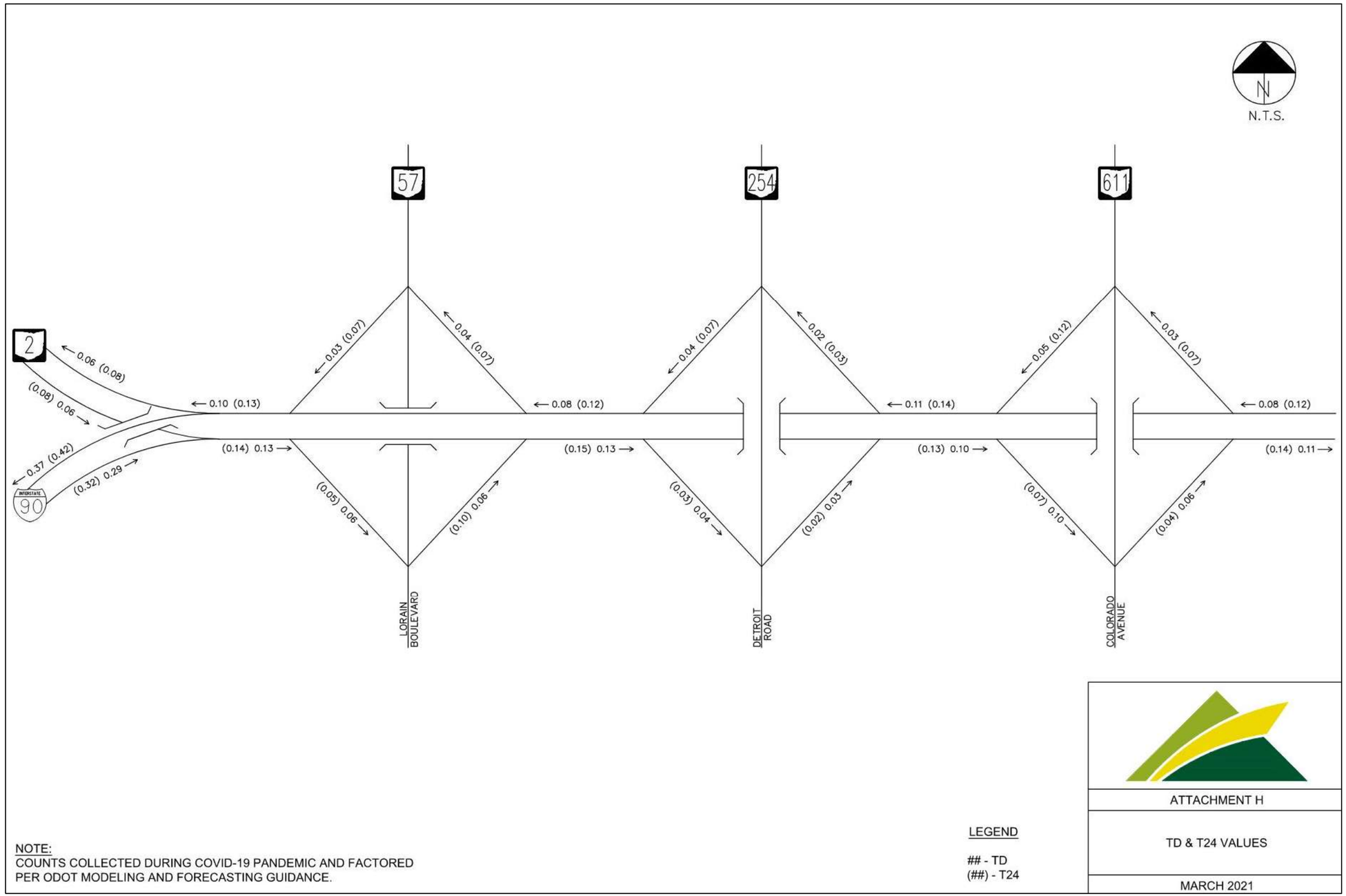


FIGURE 5: CERTIFIED TRAFFIC TD AND T24



According to ODOT's Statewide and Regional Traffic Analysis Dashboard, total traffic volumes in Northeast Ohio during the week of 5/15/2022 to 5/21/2022 is 8% lower when compared to the same week in 2019 (pre-COVID). According to the same source, total traffic volumes in District 3 during the same week is 6% lower than pre-COVID. These COVID factors were compared to the difference between the DHVs from the 2022 traffic counts (increased to 2025/ 2045 without COVID adjustments) and the Certified Traffic DHVs which include COVID adjustments. Calculated DHVs using 2022 traffic count data (and increased to 2025/ 2045 volumes) at the I-90 ramps are on average 5% lower than the Certified Traffic, which is comparable to the 6% and 8% COVID factors posted on ODOT's Statewide and Regional Traffic Analysis Dashboard. Therefore, *COVID Adjustment Factor* of 1.05 (5% increase) was applied to the expanded 2025 and 2045 DHVs.

Section 3: Estimating 2025 and 2045 ADTs

The 2025 and 2045 ADTs at the five intersections were estimated by multiplying the total 8-hour 2022 counts for each movement with *Growth Factor (based on 0.68% per year)*, *P&A Factors* (ODOT P&A Factor Spreadsheet), *Seasonal Adjustment Factors* (ODOT 2021 Seasonal Adjustment Factors Table), and *COVID Adjustment Factor* (equals 1.05). ODOT's Partial Count Form Spreadsheet was used to calculated ADTs, resulting in movement-specific 2025 and 2045 COVID Adjusted ADT estimates.

Section 4: Balancing 2025 and 2045 DHV and ADT

Section 2.6.2 of the Ohio Traffic Forecasting Manual (Volume 2) states that volume balancing is required when a difference in volume is calculated between two data points where there are no intersecting roadways or driveways in between. In addition, Section 5.4.1 of the manual states that volumes should be rounded to the nearest 10.

Driveway accesses exist on SR-254 between the intersections except between the I-90 ramps, and between the I-90 WB ramp and Transportation Dr intersections. Therefore, only upstream-downstream volume pairs at these locations were balanced. Volumes were balanced as applicable toward the average values of the upstream-downstream volume pairs, and then rounded to the nearest 10. The balanced and COVID adjusted 2025 and 2045 DHV and ADT estimates were then used to expand the Certified Traffic Plate as shown in **Figure 6** through **Figure 8**.

Section 5: Peak Hour Factor (PHF) and Truck Percentages

Peak Hour Factors (PHF) and truck percentages for the AM and PM peak hour periods were calculated following the guidance on Section 5 of the ODOT Analysis and Traffic Simulation (OATS) Manual, using the traffic counts collected for the project. These calculated PHF and truck percentages are shown in **Figure 9**.

FIGURE 6: 2025 AND 2045 EXPANDED CERTIFIED TRAFFIC ADT VOLUMES

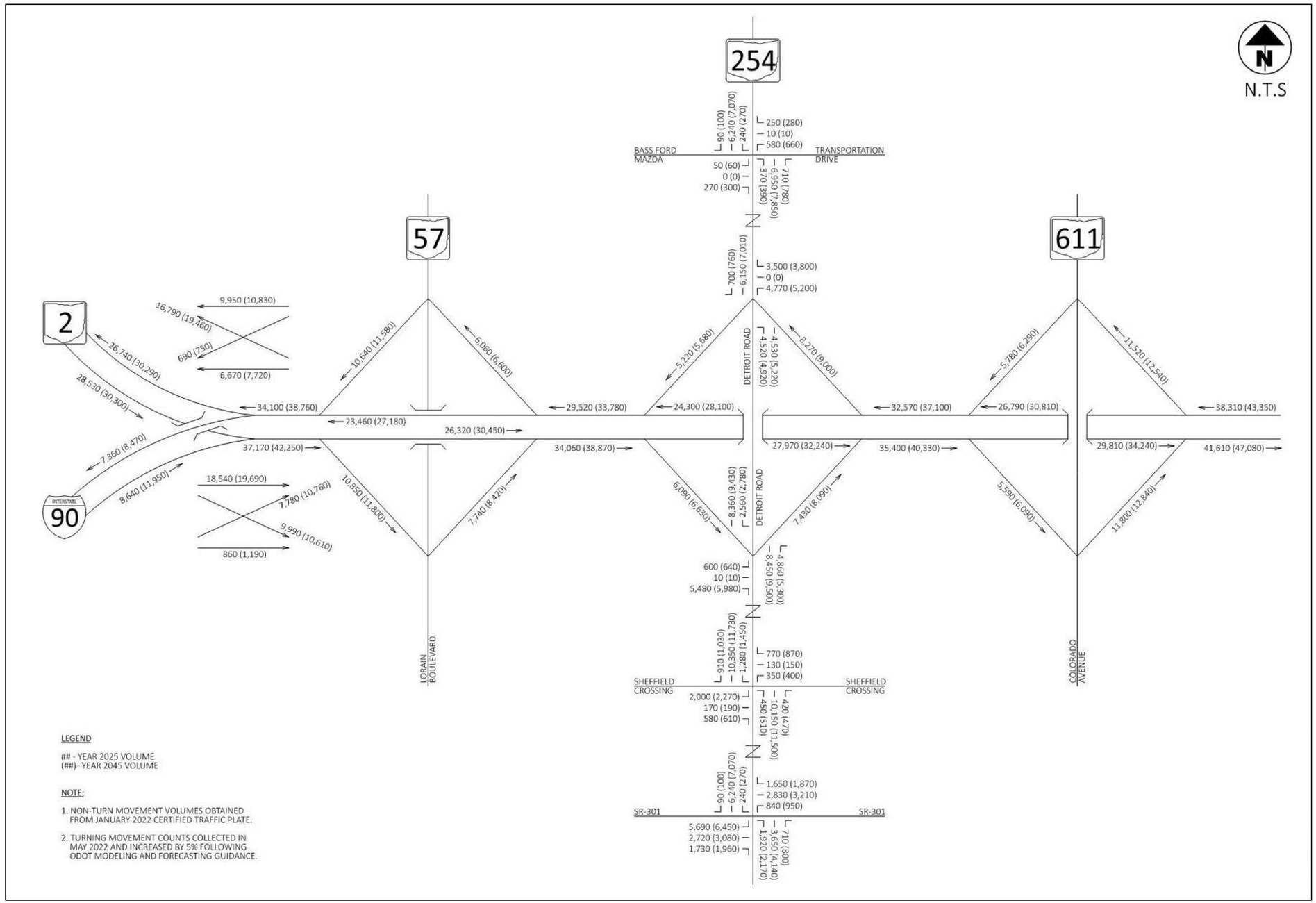
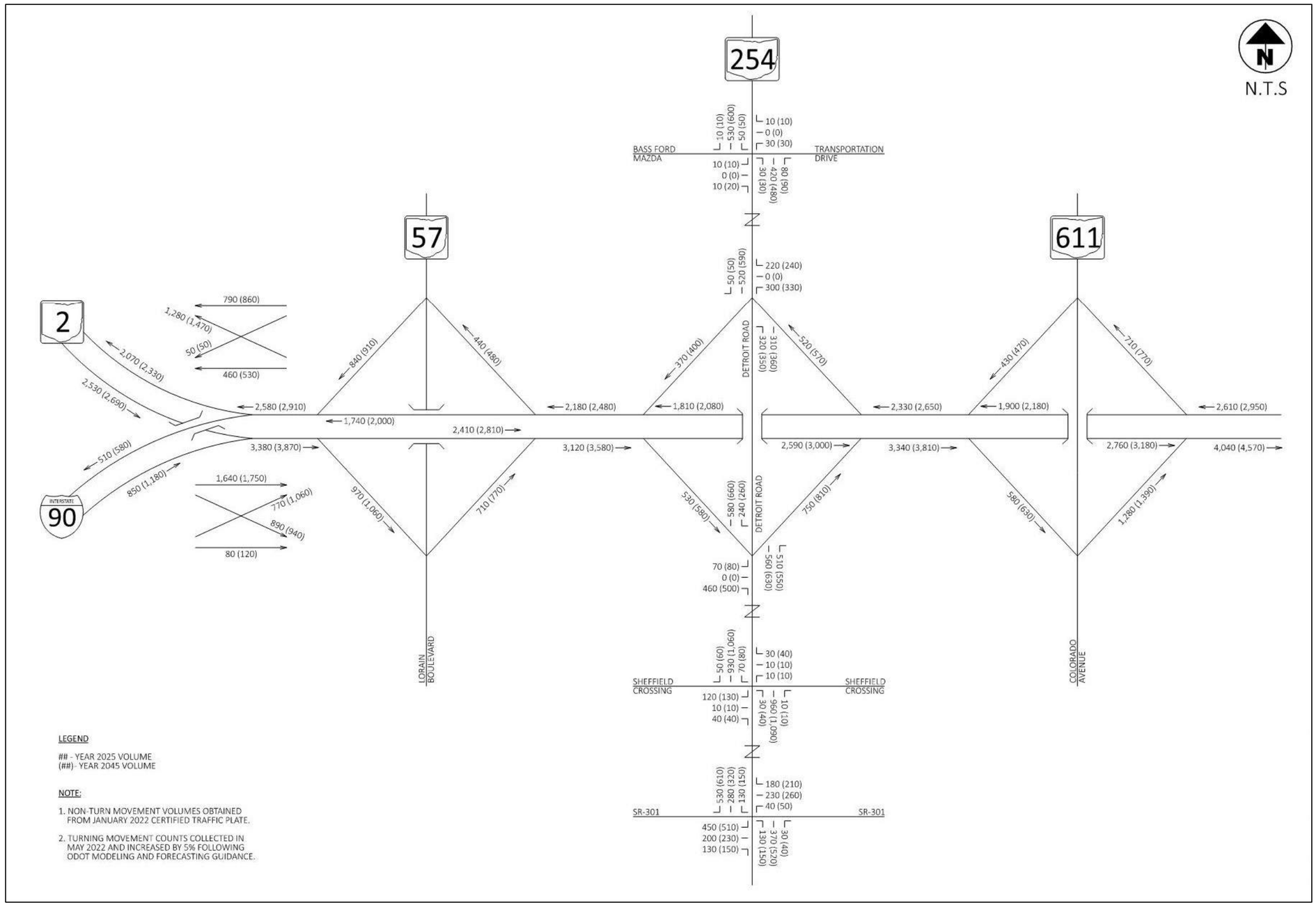


FIGURE 7: 2025 AND 2045 EXPANDED CERTIFIED TRAFFIC AM DESIGN HOURLY VOLUMES



LEGEND

- YEAR 2025 VOLUME
(##)- YEAR 2045 VOLUME

NOTE:

1. NON-TURN MOVEMENT VOLUMES OBTAINED FROM JANUARY 2022 CERTIFIED TRAFFIC PLATE.
2. TURNING MOVEMENT COUNTS COLLECTED IN MAY 2022 AND INCREASED BY 5% FOLLOWING ODOT MODELING AND FORECASTING GUIDANCE.

FIGURE 8: 2025 AND 2045 EXPANDED CERTIFIED TRAFFIC PM DESIGN HOURLY VOLUMES

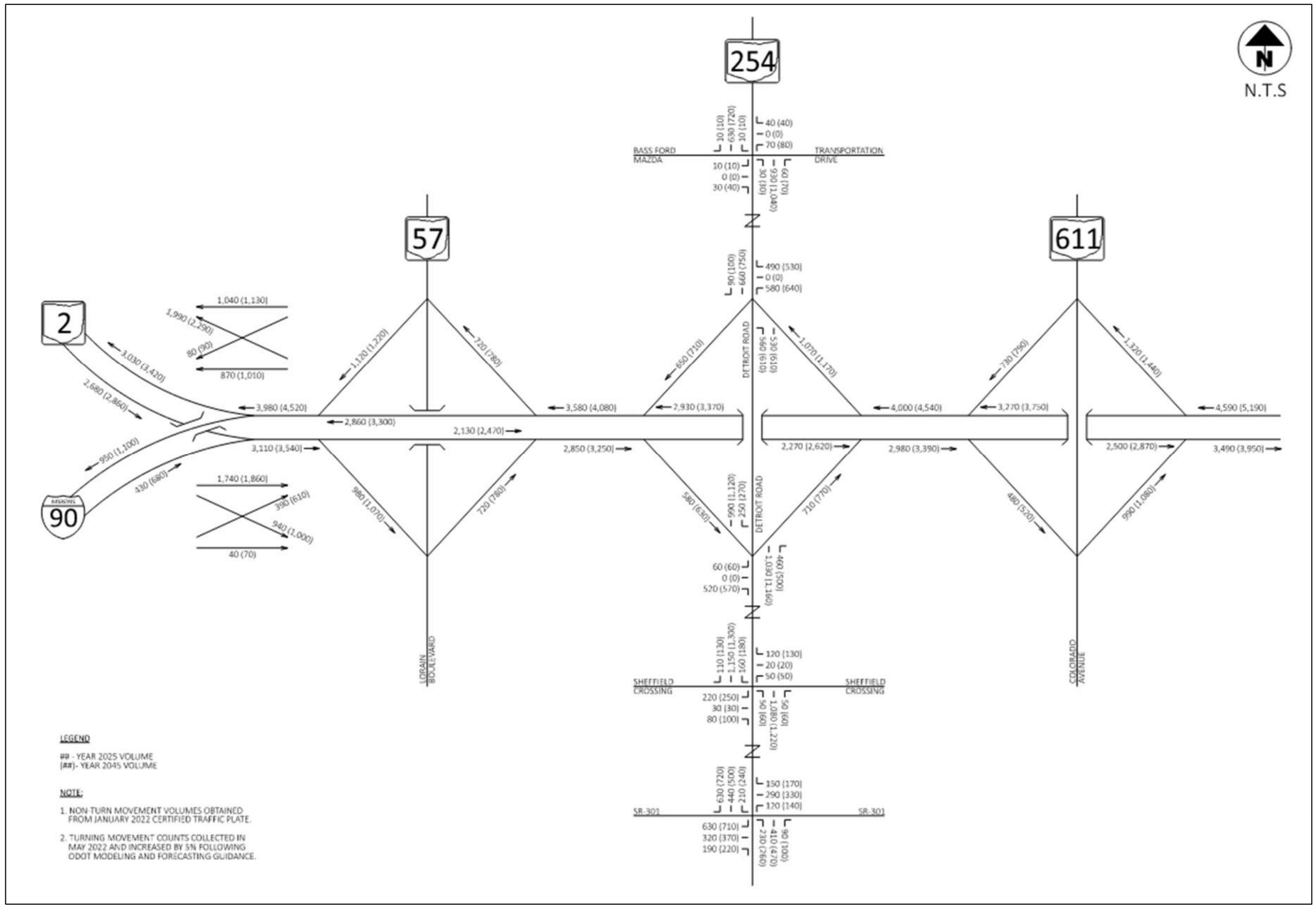
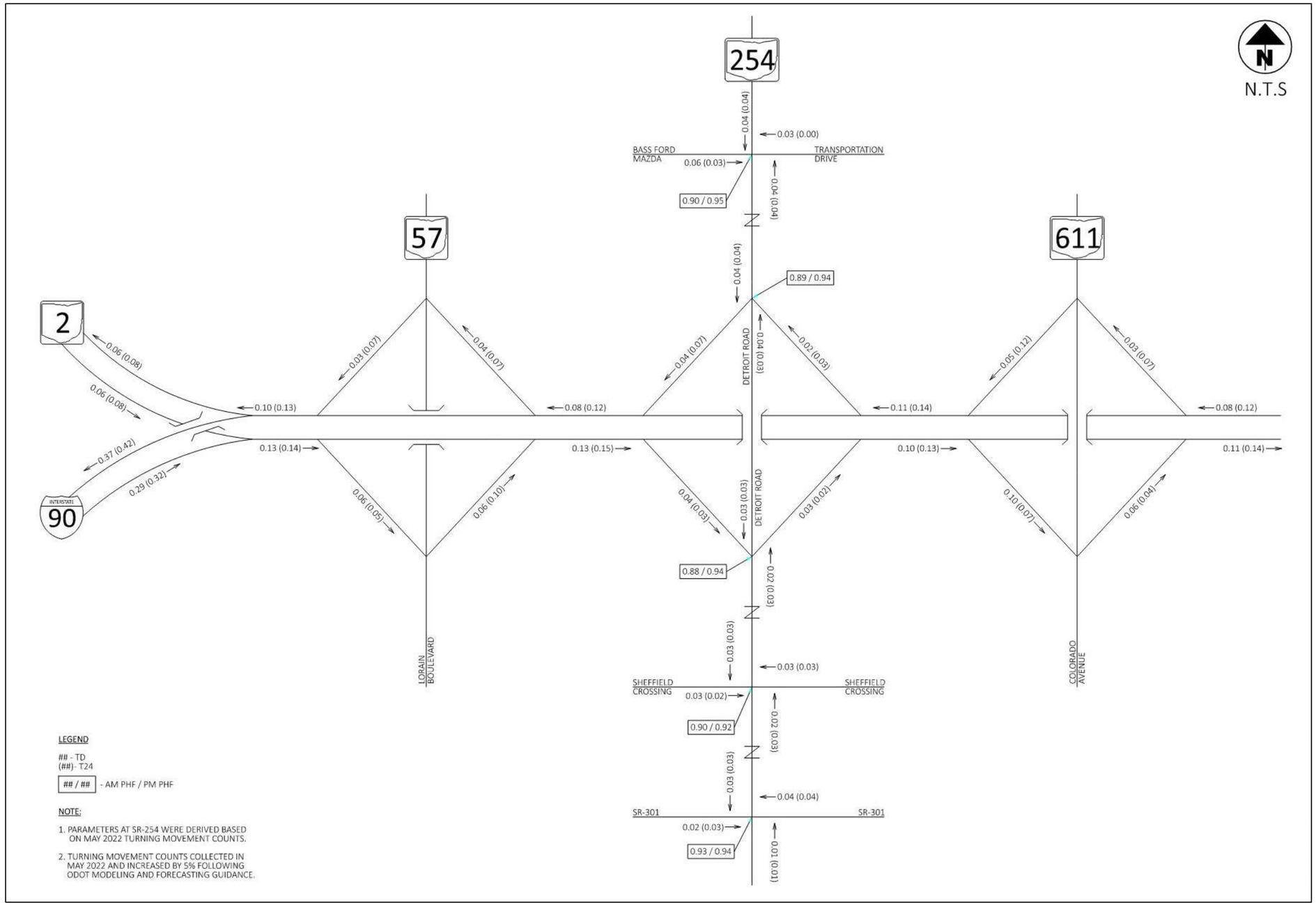


FIGURE 9: PEAK HOUR FACTORS AND EXPANDED CERTIFIED TRAFFIC TD AND T24



INTERCHANGE OPERATIONS STUDY
LOR-90-15.67

APPENDIX C: CAPACITY ANALYSIS

HCS Freeway Facilities Report

Project Information

Analyst	GSH	Date	2/17/23
Agency	CMT	Analysis Year	2045
Jurisdiction	ODOT District 3	Time Analyzed	AM DHV
Facility Name	I-90 EB	Units	U.S. Customary
Project Description	PID 107714 LOR-90-10.76		

Facility Global Input

Jam Density, pc/mi/ln	190.0	Density at Capacity, pc/mi/ln	45.0
Queue Discharge Capacity Drop, %	7	Total Segments	5
Total Analysis Periods	1	Analysis Period Duration, min	15
Facility Length, mi	4.52		

Facility Segment Data

No.	Coded	Analyzed	Name	Length, ft	Lanes
1	Basic	Basic	I-90 b/w SR-57 and SR-254	7240	3
2	Diverge	Diverge	I-90 Exit Ramp to SR-254	1500	3
3	Basic	Basic	I-90 below SR-254	2330	3
4	Merge	Merge	I-90 Entrance Ramp from SR-254	1500	3
5	Basic	Basic	I-90 b/w SR-254 and SR-611	11310	3

Facility Segment Data

Segment 1: Basic

AP	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.94	0.885	4303	7200	0.60	69.4	20.7	C

Segment 2: Diverge

AP	PHF		fHV		Flow Rate (pc/h)		Capacity (pc/h)		d/c Ratio		Speed (mi/h)		Density (pc/mi/ln)		LOS
	F	R	F	R	Freeway	Ramp	Freeway	Ramp	F	R	F	R Infl.	F	R Infl.	
1	0.94	0.94	0.885	0.962	4303	641	7200	2200	0.60	0.29	67.0	63.7	21.4	24.8	C

Segment 3: Basic

AP	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.94	0.885	3606	7200	0.50	69.9	17.2	B

Segment 4: Merge

AP	PHF		fHV		Flow Rate (pc/h)		Capacity (pc/h)		d/c Ratio		Speed (mi/h)		Density (pc/mi/ln)		LOS
	F	R	F	R	Freeway	Ramp	Freeway	Ramp	F	R	F	R Infl.	F	R Infl.	
1	0.94	0.94	0.885	0.971	4493	887	7200	2200	0.62	0.40	62.8	61.2	23.8	23.9	C

Segment 5: Basic

AP	PHF	fHV	Flow Rate	Capacity	d/c	Speed	Density	LOS

			(pc/h)	(pc/h)	Ratio	(mi/h)	(pc/mi/ln)	
1	0.94	0.909	4459	7200	0.62	69.1	21.5	C

Facility Analysis Results

AP	VMT veh-mi/AP	VMT-Demand veh-mi/AP	VHD veh-h/AP	Total Delay Cost $/AP	Speed mi/h	Density pc/mi/ln	Density veh/mi/ln	TT min	LOS
1	4381	4066	1.21	30.26	68.7	21.0	18.8	4.00	C

Facility Overall Results

Space Mean Speed, mi/h	68.7	Average Density, veh/mi/ln	18.8
Average Travel Time, min	4.00	Average Density, pc/mi/ln	21.0
Total VMT, veh-mi	4381	Total VHD, veh-h	1.21
Vehicle Value of Time (VOT), $/h	25.00	Total Delay Cost, $	30.26

LOS					
	Seg 1	Seg 2	Seg 3	Seg 4	Seg 5
AP 1	C	C	B	C	C
Speed (mi/h)					
	Seg 1	Seg 2	Seg 3	Seg 4	Seg 5
AP 1	69.4	67.0	69.9	62.8	69.1
Density (pc/mi/ln)					
	Seg 1	Seg 2	Seg 3	Seg 4	Seg 5
AP 1	20.7	21.4	17.2	23.8	21.5
Demand - Capacity Ratio (D/C)					
	Seg 1	Seg 2	Seg 3	Seg 4	Seg 5
AP 1	0.60	0.60	0.50	0.62	0.62
Density (veh/mi/ln)					
	Seg 1	Seg 2	Seg 3	Seg 4	Seg 5
AP 1	18.3	18.9	15.2	21.1	19.5
Density in Ramp Influence Area (pc/mi/ln)					
	Seg 1	Seg 2	Seg 3	Seg 4	Seg 5
AP 1	-	24.8	-	23.9	-
Density-Based LOS					
	Seg 1	Seg 2	Seg 3	Seg 4	Seg 5
AP 1	C	C	B	C	C
Demand-Based LOS					
	Seg 1	Seg 2	Seg 3	Seg 4	Seg 5
AP 1	-	-	-	-	-
Volume - Capacity Ratio (V/C)					
	Seg 1	Seg 2	Seg 3	Seg 4	Seg 5
AP 1	0.60	0.60	0.50	0.62	0.62

HCS Basic Freeway Report

Project Information

Analyst	GSH	Date	2/17/23
Agency	CMT	Analysis Year	2045
Jurisdiction	ODOT District 3	Time Analyzed	AM DHV
Project Description	PID 107714 LOR-90-10.76	Units	U.S. Customary
Segment Number	1	Segment Name	I-90 b/w SR-57 and SR-254
Analysis Period Number	1	Segment Analysis Period	08:00-08:15

Geometric Data

Number of Lanes (N), ln	3	Terrain Type	Level
Segment Length (L), ft	7240	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	-
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	70.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000
Incident Type	No Incident	Final Capacity Adjustment Factor (CAF)	1.000
Proportion of CAVs in Traffic Stream	0	Capacity Adj. Factor for CAVs, CAF_{CAV}	1.000

Demand and Capacity

Demand Volume (V), veh/h	3580	Heavy Vehicle Adjustment Factor (f_{HV})	0.885
Peak Hour Factor (PHF)	0.94	Flow Rate (v_p), pc/h/ln	1434
Total Trucks, %	13.00	Capacity (c), pc/h/ln	2400
Single-Unit Trucks (SUT), %	-	Initial Adjusted Capacity (c_{adj}), pc/h/ln	2400
Tractor-Trailers (TT), %	-	Final Adjusted Capacity (c_{adj}), pc/h/ln	2400
Passenger Car Equivalent (E_T)	2.00	Volume-to-Capacity Ratio (v/c)	0.60

Speed and Density

Lane Width Adjustment (f_{LW})	-	Average Speed (S), mi/h	69.4
Right-Side Lateral Clearance Adj. (f_{RLC})	-	Density (D), pc/mi/ln	20.7
Total Ramp Density Adjustment	-	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	70.0		

HCS Freeway Diverge Report

Project Information

Segment Number	2	Segment Name	I-90 Exit Ramp to SR-254
Analysis Period Number	1	Segment Analysis Period	08:00-08:15

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	3	1
Free-Flow Speed (FFS), mi/h	70.0	55.0
Segment Length (L) / Deceleration Length (L_D), ft	1500	510
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Type	Freeway	Right-Sided One-Lane

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Proportion of CAVs in Traffic Stream	0	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000
Capacity Adjustment Factor for CAVs, CAF_{CAV}	1.000	-
Final Capacity Adjustment Factor (CAF)	1.000	1.000

Demand and Capacity

Demand Volume (V_i), veh/h	3580	580
Peak Hour Factor (PHF)	0.94	0.94
Total Trucks, %	13.00	4.00
Heavy Vehicle Adjustment Factor (f_{HV})	0.885	0.962
Flow Rate (v_i), pc/h	4303	641
Capacity (c_{md}), pc/h	7200	2200
Initial Adjusted Capacity (c_{mda}), pc/h	7200	-
Final Adjusted Capacity (c_{mda}), pc/h	7200	2200
Volume-to-Capacity Ratio (v/c)	0.60	0.29

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	1381
Downstream Equilibrium Distance (L_{EQ}), ft	-	Off-Ramp Influence Area Speed (S_R), mi/h	63.7
Flow in Lanes 1 and 2 (v_{12}), pc/h	2922	Outer Lanes Freeway Speed (S_O), mi/h	75.3
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	-	Ramp Junction Speed (S), mi/h	67.0
Number of Outer Lanes on Freeway (N_O), ln	1	Average Density (D), pc/mi/ln	21.4
Level of Service (LOS)	C	Density in Ramp Influence Area (D_R), pc/mi/ln	24.8

HCS Basic Freeway Report

Project Information

Segment Number	3	Segment Name	I-90 below SR-254
Analysis Period Number	1	Segment Analysis Period	08:00-08:15

Geometric Data

Number of Lanes (N), ln	3	Terrain Type	Level
Segment Length (L), ft	2330	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	0.83
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	70.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000
Incident Type	No Incident	Final Capacity Adjustment Factor (CAF)	1.000
Proportion of CAVs in Traffic Stream	0	Capacity Adj. Factor for CAVs, CAF_{CAV}	1.000

Demand and Capacity

Demand Volume (V), veh/h	3000	Heavy Vehicle Adjustment Factor (f_{HV})	0.885
Peak Hour Factor (PHF)	0.94	Flow Rate (v_p), pc/h/ln	1202
Total Trucks, %	13.00	Capacity (c), pc/h/ln	2400
Single-Unit Trucks (SUT), %	-	Initial Adjusted Capacity (c_{adj}), pc/h/ln	2400
Tractor-Trailers (TT), %	-	Final Adjusted Capacity (c_{adj}), pc/h/ln	2400
Passenger Car Equivalent (E_T)	2.00	Volume-to-Capacity Ratio (v/c)	0.50

Speed and Density

Lane Width Adjustment (f_{LW})	-	Average Speed (S), mi/h	69.9
Right-Side Lateral Clearance Adj. (f_{RLC})	-	Density (D), pc/mi/ln	17.2
Total Ramp Density Adjustment	-	Level of Service (LOS)	B
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	70.0		

HCS Freeway Merge Report

Project Information

Segment Number	4	Segment Name	I-90 Entrance Ramp from SR-254
Analysis Period Number	1	Segment Analysis Period	08:00-08:15

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	3	1
Free-Flow Speed (FFS), mi/h	70.0	55.0
Segment Length (L) / Acceleration Length (LA), ft	1500	800
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Type	Freeway	Right-Sided One-Lane

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Proportion of CAVs in Traffic Stream	0	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000
Capacity Adjustment Factor for CAVs, CAF_{CAV}	1.000	-
Final Capacity Adjustment Factor (CAF)	1.000	1.000

Demand and Capacity

Demand Volume (V_i), veh/h	3000	810
Peak Hour Factor (PHF)	0.94	0.94
Total Trucks, %	13.00	3.00
Heavy Vehicle Adjustment Factor (f_{HV})	0.885	0.971
Flow Rate (v_i), pc/h	3606	887
Capacity (c_{md}), pc/h	7200	2200
Adjusted Capacity (c_{mda}), pc/h	7200	2200
Volume-to-Capacity Ratio (v/c)	0.62	0.40

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	1791.3	Flow Outer Lanes (v_{OA}), pc/h/ln	1442
Downstream Equilibrium Distance (L_{EQ}), ft	-	On-Ramp Influence Area Speed (S_R), mi/h	61.2
Flow in Lanes 1 and 2 (v_{12}), pc/h	2164	Outer Lanes Freeway Speed (S_O), mi/h	66.6
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	3051	Ramp Junction Speed (S), mi/h	62.8
Number of Outer Lanes on Freeway (N_O), ln	1	Average Density (D), pc/mi/ln	23.8
Level of Service (LOS)	C	Density in Ramp Influence Area (D_R), pc/mi/ln	23.9

HCS Basic Freeway Report

Project Information

Segment Number	5	Segment Name	I-90 b/w SR-254 and SR-611
Analysis Period Number	1	Segment Analysis Period	08:00-08:15

Geometric Data

Number of Lanes (N), ln	3	Terrain Type	Level
Segment Length (L), ft	11310	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	0.83
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	70.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000
Incident Type	No Incident	Final Capacity Adjustment Factor (CAF)	1.000
Proportion of CAVs in Traffic Stream	0	Capacity Adj. Factor for CAVs, CAF_{CAV}	1.000

Demand and Capacity

Demand Volume (V), veh/h	3810	Heavy Vehicle Adjustment Factor (f_{HV})	0.909
Peak Hour Factor (PHF)	0.94	Flow Rate (v_p), pc/h/ln	1486
Total Trucks, %	10.00	Capacity (c), pc/h/ln	2400
Single-Unit Trucks (SUT), %	-	Initial Adjusted Capacity (c_{adj}), pc/h/ln	2400
Tractor-Trailers (TT), %	-	Final Adjusted Capacity (c_{adj}), pc/h/ln	2400
Passenger Car Equivalent (E_T)	2.00	Volume-to-Capacity Ratio (v/c)	0.62

Speed and Density

Lane Width Adjustment (f_{LW})	-	Average Speed (S), mi/h	69.1
Right-Side Lateral Clearance Adj. (f_{RLC})	-	Density (D), pc/mi/ln	21.5
Total Ramp Density Adjustment	-	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	70.0		

HCS Freeway Facilities Report

Project Information

Analyst	GSH	Date	2/17/2023
Agency	CMT	Analysis Year	2045
Jurisdiction	ODOT District 3	Time Analyzed	AM DHV
Facility Name	I-90 WB	Units	U.S. Customary
Project Description	PID 107714 LOR-90-10.76		

Facility Global Input

Jam Density, pc/mi/ln	190.0	Density at Capacity, pc/mi/ln	45.0
Queue Discharge Capacity Drop, %	7	Total Segments	5
Total Analysis Periods	1	Analysis Period Duration, min	15
Facility Length, mi	4.48		

Facility Segment Data

No.	Coded	Analyzed	Name	Length, ft	Lanes
1	Basic	Basic	I-90 b/w SR-611 and SR-254	11410	3
2	Diverge	Diverge	I-90 Exit Ramp to SR-254	1500	3
3	Basic	Basic	I-90 below SR-254	2790	3
4	Merge	Merge	I-90 Entrance Ramp from SR-254	1500	3
5	Basic	Basic	I-90 b/w SR-254 and SR-57	6450	3

Facility Segment Data

Segment 1: Basic

AP	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.94	0.901	3129	7200	0.43	70.0	14.9	B

Segment 2: Diverge

AP	PHF		fHV		Flow Rate (pc/h)		Capacity (pc/h)		d/c Ratio		Speed (mi/h)		Density (pc/mi/ln)		LOS
	F	R	F	R	Freeway	Ramp	Freeway	Ramp	F	R	F	R Infl.	F	R Infl.	
1	0.94	0.94	0.901	0.980	3129	619	7200	2200	0.43	0.28	66.9	63.7	15.6	19.2	B

Segment 3: Basic

AP	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.94	0.901	2456	7200	0.34	69.9	11.7	B

Segment 4: Merge

AP	PHF		fHV		Flow Rate (pc/h)		Capacity (pc/h)		d/c Ratio		Speed (mi/h)		Density (pc/mi/ln)		LOS
	F	R	F	R	Freeway	Ramp	Freeway	Ramp	F	R	F	R Infl.	F	R Infl.	
1	0.94	0.94	0.901	0.962	2898	442	7200	2200	0.40	0.20	64.6	62.8	15.0	15.1	B

Segment 5: Basic

AP	PHF	fHV	Flow Rate	Capacity	d/c	Speed	Density	LOS

			(pc/h)	(pc/h)	Ratio	(mi/h)	(pc/mi/ln)	
1	0.94	0.926	2849	7200	0.40	70.0	13.6	B

Facility Analysis Results

AP	VMT veh-mi/AP	VMT-Demand veh-mi/AP	VHD veh-h/AP	Total Delay Cost $/AP	Speed mi/h	Density pc/mi/ln	Density veh/mi/ln	TT min	LOS
1	3007	2800	0.36	9.03	69.4	14.2	12.9	3.90	B

Facility Overall Results

Space Mean Speed, mi/h	69.4	Average Density, veh/mi/ln	12.9
Average Travel Time, min	3.90	Average Density, pc/mi/ln	14.2
Total VMT, veh-mi	3007	Total VHD, veh-h	0.36
Vehicle Value of Time (VOT), $/h	25.00	Total Delay Cost, $	9.03

LOS					
	Seg 1	Seg 2	Seg 3	Seg 4	Seg 5
AP 1	B	B	B	B	B
Speed (mi/h)					
	Seg 1	Seg 2	Seg 3	Seg 4	Seg 5
AP 1	70.0	66.9	69.9	64.6	70.0
Density (pc/mi/ln)					
	Seg 1	Seg 2	Seg 3	Seg 4	Seg 5
AP 1	14.9	15.6	11.7	15.0	13.6
Demand - Capacity Ratio (D/C)					
	Seg 1	Seg 2	Seg 3	Seg 4	Seg 5
AP 1	0.43	0.43	0.34	0.40	0.40
Density (veh/mi/ln)					
	Seg 1	Seg 2	Seg 3	Seg 4	Seg 5
AP 1	13.4	14.1	10.5	13.5	12.6
Density in Ramp Influence Area (pc/mi/ln)					
	Seg 1	Seg 2	Seg 3	Seg 4	Seg 5
AP 1	-	19.2	-	15.1	-
Density-Based LOS					
	Seg 1	Seg 2	Seg 3	Seg 4	Seg 5
AP 1	B	B	B	B	B
Demand-Based LOS					
	Seg 1	Seg 2	Seg 3	Seg 4	Seg 5
AP 1	-	-	-	-	-
Volume - Capacity Ratio (V/C)					
	Seg 1	Seg 2	Seg 3	Seg 4	Seg 5
AP 1	0.43	0.43	0.34	0.40	0.40

HCS Basic Freeway Report

Project Information

Analyst	GSH	Date	2/17/2023
Agency	CMT	Analysis Year	2045
Jurisdiction	ODOT District 3	Time Analyzed	AM DHV
Project Description	PID 107714 LOR-90-10.76	Units	U.S. Customary
Segment Number	1	Segment Name	I-90 b/w SR-611 and SR-254
Analysis Period Number	1	Segment Analysis Period	08:00-08:15

Geometric Data

Number of Lanes (N), ln	3	Terrain Type	Level
Segment Length (L), ft	11410	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	0.83
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	70.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000
Incident Type	No Incident	Final Capacity Adjustment Factor (CAF)	1.000
Proportion of CAVs in Traffic Stream	0	Capacity Adj. Factor for CAVs, CAF_{CAV}	1.000

Demand and Capacity

Demand Volume (V), veh/h	2650	Heavy Vehicle Adjustment Factor (f_{HV})	0.901
Peak Hour Factor (PHF)	0.94	Flow Rate (v_p), pc/h/ln	1043
Total Trucks, %	11.00	Capacity (c), pc/h/ln	2400
Single-Unit Trucks (SUT), %	-	Initial Adjusted Capacity (c_{adj}), pc/h/ln	2400
Tractor-Trailers (TT), %	-	Final Adjusted Capacity (c_{adj}), pc/h/ln	2400
Passenger Car Equivalent (E_T)	2.00	Volume-to-Capacity Ratio (v/c)	0.43

Speed and Density

Lane Width Adjustment (f_{LW})	-	Average Speed (S), mi/h	70.0
Right-Side Lateral Clearance Adj. (f_{RLC})	-	Density (D), pc/mi/ln	14.9
Total Ramp Density Adjustment	-	Level of Service (LOS)	B
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	70.0		

HCS Freeway Diverge Report

Project Information

Segment Number	2	Segment Name	I-90 Exit Ramp to SR-254
Analysis Period Number	1	Segment Analysis Period	08:00-08:15

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	3	1
Free-Flow Speed (FFS), mi/h	70.0	55.0
Segment Length (L) / Deceleration Length (L_D), ft	1500	500
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Type	Freeway	Right-Sided One-Lane

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Proportion of CAVs in Traffic Stream	0	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000
Capacity Adjustment Factor for CAVs, CAF_{CAV}	1.000	-
Final Capacity Adjustment Factor (CAF)	1.000	1.000

Demand and Capacity

Demand Volume (V_i), veh/h	2650	570
Peak Hour Factor (PHF)	0.94	0.94
Total Trucks, %	11.00	2.00
Heavy Vehicle Adjustment Factor (f_{HV})	0.901	0.980
Flow Rate (v_i), pc/h	3129	619
Capacity (c_{md}), pc/h	7200	2200
Initial Adjusted Capacity (c_{mda}), pc/h	7200	-
Final Adjusted Capacity (c_{mda}), pc/h	7200	2200
Volume-to-Capacity Ratio (v/c)	0.43	0.28

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	871
Downstream Equilibrium Distance (L_{EQ}), ft	-	Off-Ramp Influence Area Speed (S_R), mi/h	63.7
Flow in Lanes 1 and 2 (v_{12}), pc/h	2258	Outer Lanes Freeway Speed (S_O), mi/h	76.8
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	-	Ramp Junction Speed (S), mi/h	66.9
Number of Outer Lanes on Freeway (N_O), ln	1	Average Density (D), pc/mi/ln	15.6
Level of Service (LOS)	B	Density in Ramp Influence Area (D_R), pc/mi/ln	19.2

HCS Basic Freeway Report

Project Information

Segment Number	3	Segment Name	I-90 below SR-254
Analysis Period Number	1	Segment Analysis Period	08:00-08:15

Geometric Data

Number of Lanes (N), ln	3	Terrain Type	Level
Segment Length (L), ft	2790	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	0.83
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	70.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000
Incident Type	No Incident	Final Capacity Adjustment Factor (CAF)	1.000
Proportion of CAVs in Traffic Stream	0	Capacity Adj. Factor for CAVs, CAF_{CAV}	1.000

Demand and Capacity

Demand Volume (V), veh/h	2080	Heavy Vehicle Adjustment Factor (f_{HV})	0.901
Peak Hour Factor (PHF)	0.94	Flow Rate (v_p), pc/h/ln	819
Total Trucks, %	11.00	Capacity (c), pc/h/ln	2400
Single-Unit Trucks (SUT), %	-	Initial Adjusted Capacity (c_{adj}), pc/h/ln	2400
Tractor-Trailers (TT), %	-	Final Adjusted Capacity (c_{adj}), pc/h/ln	2400
Passenger Car Equivalent (E_T)	2.00	Volume-to-Capacity Ratio (v/c)	0.34

Speed and Density

Lane Width Adjustment (f_{LW})	-	Average Speed (S), mi/h	69.9
Right-Side Lateral Clearance Adj. (f_{RLC})	-	Density (D), pc/mi/ln	11.7
Total Ramp Density Adjustment	-	Level of Service (LOS)	B
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	70.0		

HCS Freeway Merge Report

Project Information

Segment Number	4	Segment Name	I-90 Entrance Ramp from SR-254
Analysis Period Number	1	Segment Analysis Period	08:00-08:15

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	3	1
Free-Flow Speed (FFS), mi/h	70.0	55.0
Segment Length (L) / Acceleration Length (L_A), ft	1500	830
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Type	Freeway	Right-Sided One-Lane

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Proportion of CAVs in Traffic Stream	0	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000
Capacity Adjustment Factor for CAVs, CAF_{CAV}	1.000	-
Final Capacity Adjustment Factor (CAF)	1.000	1.000

Demand and Capacity

Demand Volume (V_i), veh/h	2080	400
Peak Hour Factor (PHF)	0.94	0.94
Total Trucks, %	11.00	4.00
Heavy Vehicle Adjustment Factor (f_{HV})	0.901	0.962
Flow Rate (v_i), pc/h	2456	442
Capacity (c_{md}), pc/h	7200	2200
Adjusted Capacity (c_{mda}), pc/h	7200	2200
Volume-to-Capacity Ratio (v/c)	0.40	0.20

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	1463.3	Flow Outer Lanes (v_{OA}), pc/h/ln	980
Downstream Equilibrium Distance (L_{EQ}), ft	-	On-Ramp Influence Area Speed (S_R), mi/h	62.8
Flow in Lanes 1 and 2 (v_{12}), pc/h	1476	Outer Lanes Freeway Speed (S_O), mi/h	68.3
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	1918	Ramp Junction Speed (S), mi/h	64.6
Number of Outer Lanes on Freeway (N_O), ln	1	Average Density (D), pc/mi/ln	15.0
Level of Service (LOS)	B	Density in Ramp Influence Area (D_R), pc/mi/ln	15.1

HCS Basic Freeway Report

Project Information

Segment Number	5	Segment Name	I-90 b/w SR-254 and SR-57
Analysis Period Number	1	Segment Analysis Period	08:00-08:15

Geometric Data

Number of Lanes (N), ln	3	Terrain Type	Level
Segment Length (L), ft	6450	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	0.33
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	70.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000
Incident Type	No Incident	Final Capacity Adjustment Factor (CAF)	1.000
Proportion of CAVs in Traffic Stream	0	Capacity Adj. Factor for CAVs, CAF_{CAV}	1.000

Demand and Capacity

Demand Volume (V), veh/h	2480	Heavy Vehicle Adjustment Factor (f_{HV})	0.926
Peak Hour Factor (PHF)	0.94	Flow Rate (v_p), pc/h/ln	950
Total Trucks, %	8.00	Capacity (c), pc/h/ln	2400
Single-Unit Trucks (SUT), %	-	Initial Adjusted Capacity (c_{adj}), pc/h/ln	2400
Tractor-Trailers (TT), %	-	Final Adjusted Capacity (c_{adj}), pc/h/ln	2400
Passenger Car Equivalent (E_T)	2.00	Volume-to-Capacity Ratio (v/c)	0.40

Speed and Density

Lane Width Adjustment (f_{LW})	-	Average Speed (S), mi/h	70.0
Right-Side Lateral Clearance Adj. (f_{RLC})	-	Density (D), pc/mi/ln	13.6
Total Ramp Density Adjustment	-	Level of Service (LOS)	B
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	70.0		

HCS Freeway Facilities Report

Project Information

Analyst	GSH	Date	2/17/23
Agency	CMT	Analysis Year	2045
Jurisdiction	ODOT District 3	Time Analyzed	PM DHV
Facility Name	I-90 EB	Units	U.S. Customary
Project Description	PID 107714 LOR-90-10.76		

Facility Global Input

Jam Density, pc/mi/ln	190.0	Density at Capacity, pc/mi/ln	45.0
Queue Discharge Capacity Drop, %	7	Total Segments	5
Total Analysis Periods	1	Analysis Period Duration, min	15
Facility Length, mi	4.52		

Facility Segment Data

No.	Coded	Analyzed	Name	Length, ft	Lanes
1	Basic	Basic	I-90 b/w SR-57 and SR-254	7240	3
2	Diverge	Diverge	I-90 Exit Ramp to SR-254	1500	3
3	Basic	Basic	I-90 below SR-254	2330	3
4	Merge	Merge	I-90 Entrance Ramp from SR-254	1500	3
5	Basic	Basic	I-90 b/w SR-254 and SR-611	11310	3

Facility Segment Data

Segment 1: Basic

AP	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.94	0.885	3907	7200	0.54	69.9	18.6	C

Segment 2: Diverge

AP	PHF		fHV		Flow Rate (pc/h)		Capacity (pc/h)		d/c Ratio		Speed (mi/h)		Density (pc/mi/ln)		LOS
	F	R	F	R	Freeway	Ramp	Freeway	Ramp	F	R	F	R Infl.	F	R Infl.	
1	0.94	0.94	0.885	0.962	3907	697	7200	2200	0.54	0.32	66.9	63.5	19.5	23.0	C

Segment 3: Basic

AP	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.94	0.885	3149	7200	0.44	69.9	15.0	B

Segment 4: Merge

AP	PHF		fHV		Flow Rate (pc/h)		Capacity (pc/h)		d/c Ratio		Speed (mi/h)		Density (pc/mi/ln)		LOS
	F	R	F	R	Freeway	Ramp	Freeway	Ramp	F	R	F	R Infl.	F	R Infl.	
1	0.94	0.94	0.885	0.971	3993	844	7200	2200	0.55	0.38	63.4	61.8	21.0	21.5	C

Segment 5: Basic

AP	PHF	fHV	Flow Rate	Capacity	d/c	Speed	Density	LOS

			(pc/h)	(pc/h)	Ratio	(mi/h)	(pc/mi/ln)	
1	0.94	0.909	3967	7200	0.55	69.8	18.9	C

Facility Analysis Results

AP	VMT veh-mi/AP	VMT-Demand veh-mi/AP	VHD veh-h/AP	Total Delay Cost $/AP	Speed mi/h	Density pc/mi/ln	Density veh/mi/ln	TT min	LOS
1	3921	3635	0.65	16.20	69.2	18.6	16.7	3.90	C

Facility Overall Results

Space Mean Speed, mi/h	69.2	Average Density, veh/mi/ln	16.7
Average Travel Time, min	3.90	Average Density, pc/mi/ln	18.6
Total VMT, veh-mi	3921	Total VHD, veh-h	0.65
Vehicle Value of Time (VOT), $/h	25.00	Total Delay Cost, $	16.20

LOS					
	Seg 1	Seg 2	Seg 3	Seg 4	Seg 5
AP 1	C	C	B	C	C
Speed (mi/h)					
	Seg 1	Seg 2	Seg 3	Seg 4	Seg 5
AP 1	69.9	66.9	69.9	63.4	69.8
Density (pc/mi/ln)					
	Seg 1	Seg 2	Seg 3	Seg 4	Seg 5
AP 1	18.6	19.5	15.0	21.0	18.9
Demand - Capacity Ratio (D/C)					
	Seg 1	Seg 2	Seg 3	Seg 4	Seg 5
AP 1	0.54	0.54	0.44	0.55	0.55
Density (veh/mi/ln)					
	Seg 1	Seg 2	Seg 3	Seg 4	Seg 5
AP 1	16.5	17.3	13.3	18.6	17.2
Density in Ramp Influence Area (pc/mi/ln)					
	Seg 1	Seg 2	Seg 3	Seg 4	Seg 5
AP 1	-	23.0	-	21.5	-
Density-Based LOS					
	Seg 1	Seg 2	Seg 3	Seg 4	Seg 5
AP 1	C	C	B	C	C
Demand-Based LOS					
	Seg 1	Seg 2	Seg 3	Seg 4	Seg 5
AP 1	-	-	-	-	-
Volume - Capacity Ratio (V/C)					
	Seg 1	Seg 2	Seg 3	Seg 4	Seg 5
AP 1	0.54	0.54	0.44	0.55	0.55

HCS Basic Freeway Report

Project Information

Analyst	GSH	Date	2/17/23
Agency	CMT	Analysis Year	2045
Jurisdiction	ODOT District 3	Time Analyzed	PM DHV
Project Description	PID 107714 LOR-90-10.76	Units	U.S. Customary
Segment Number	1	Segment Name	I-90 b/w SR-57 and SR-254
Analysis Period Number	1	Segment Analysis Period	16:00-16:15

Geometric Data

Number of Lanes (N), ln	3	Terrain Type	Level
Segment Length (L), ft	7240	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	0.33
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	70.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000
Incident Type	No Incident	Final Capacity Adjustment Factor (CAF)	1.000
Proportion of CAVs in Traffic Stream	0	Capacity Adj. Factor for CAVs, CAF_{CAV}	1.000

Demand and Capacity

Demand Volume (V), veh/h	3250	Heavy Vehicle Adjustment Factor (f_{HV})	0.885
Peak Hour Factor (PHF)	0.94	Flow Rate (v_p), pc/h/ln	1302
Total Trucks, %	13.00	Capacity (c), pc/h/ln	2400
Single-Unit Trucks (SUT), %	-	Initial Adjusted Capacity (c_{adj}), pc/h/ln	2400
Tractor-Trailers (TT), %	-	Final Adjusted Capacity (c_{adj}), pc/h/ln	2400
Passenger Car Equivalent (E_T)	2.00	Volume-to-Capacity Ratio (v/c)	0.54

Speed and Density

Lane Width Adjustment (f_{LW})	-	Average Speed (S), mi/h	69.9
Right-Side Lateral Clearance Adj. (f_{RLC})	-	Density (D), pc/mi/ln	18.6
Total Ramp Density Adjustment	-	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	70.0		

HCS Freeway Diverge Report

Project Information

Segment Number	2	Segment Name	I-90 Exit Ramp to SR-254
Analysis Period Number	1	Segment Analysis Period	16:00-16:15

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	3	1
Free-Flow Speed (FFS), mi/h	70.0	55.0
Segment Length (L) / Deceleration Length (LD), ft	1500	510
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Type	Freeway	Right-Sided One-Lane

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Proportion of CAVs in Traffic Stream	0	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000
Capacity Adjustment Factor for CAVs, CAF_{CAV}	1.000	-
Final Capacity Adjustment Factor (CAF)	1.000	1.000

Demand and Capacity

Demand Volume (V_i), veh/h	3250	630
Peak Hour Factor (PHF)	0.94	0.94
Total Trucks, %	13.00	4.00
Heavy Vehicle Adjustment Factor (f_{HV})	0.885	0.962
Flow Rate (v_i), pc/h	3907	697
Capacity (c_{md}), pc/h	7200	2200
Initial Adjusted Capacity (c_{mda}), pc/h	7200	-
Final Adjusted Capacity (c_{mda}), pc/h	7200	2200
Volume-to-Capacity Ratio (v/c)	0.54	0.32

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	1188
Downstream Equilibrium Distance (L_{EQ}), ft	-	Off-Ramp Influence Area Speed (S_R), mi/h	63.5
Flow in Lanes 1 and 2 (v_{12}), pc/h	2719	Outer Lanes Freeway Speed (S_O), mi/h	76.1
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	-	Ramp Junction Speed (S), mi/h	66.9
Number of Outer Lanes on Freeway (N_O), ln	1	Average Density (D), pc/mi/ln	19.5
Level of Service (LOS)	C	Density in Ramp Influence Area (D_R), pc/mi/ln	23.0

HCS Basic Freeway Report

Project Information

Segment Number	3	Segment Name	I-90 below SR-254
Analysis Period Number	1	Segment Analysis Period	16:00-16:15

Geometric Data

Number of Lanes (N), ln	3	Terrain Type	Level
Segment Length (L), ft	2330	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	0.83
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	70.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000
Incident Type	No Incident	Final Capacity Adjustment Factor (CAF)	1.000
Proportion of CAVs in Traffic Stream	0	Capacity Adj. Factor for CAVs, CAF_{CAV}	1.000

Demand and Capacity

Demand Volume (V), veh/h	2620	Heavy Vehicle Adjustment Factor (f_{HV})	0.885
Peak Hour Factor (PHF)	0.94	Flow Rate (v_p), pc/h/ln	1050
Total Trucks, %	13.00	Capacity (c), pc/h/ln	2400
Single-Unit Trucks (SUT), %	-	Initial Adjusted Capacity (c_{adj}), pc/h/ln	2400
Tractor-Trailers (TT), %	-	Final Adjusted Capacity (c_{adj}), pc/h/ln	2400
Passenger Car Equivalent (E_T)	2.00	Volume-to-Capacity Ratio (v/c)	0.44

Speed and Density

Lane Width Adjustment (f_{LW})	-	Average Speed (S), mi/h	69.9
Right-Side Lateral Clearance Adj. (f_{RLC})	-	Density (D), pc/mi/ln	15.0
Total Ramp Density Adjustment	-	Level of Service (LOS)	B
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	70.0		

HCS Freeway Merge Report

Project Information

Segment Number	4	Segment Name	I-90 Entrance Ramp from SR-254
Analysis Period Number	1	Segment Analysis Period	16:00-16:15

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	3	1
Free-Flow Speed (FFS), mi/h	70.0	55.0
Segment Length (L) / Acceleration Length (LA), ft	1500	800
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Type	Freeway	Right-Sided One-Lane

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Proportion of CAVs in Traffic Stream	0	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000
Capacity Adjustment Factor for CAVs, CAF_{CAV}	1.000	-
Final Capacity Adjustment Factor (CAF)	1.000	1.000

Demand and Capacity

Demand Volume (V_i), veh/h	2620	770
Peak Hour Factor (PHF)	0.94	0.94
Total Trucks, %	13.00	3.00
Heavy Vehicle Adjustment Factor (f_{HV})	0.885	0.971
Flow Rate (v_i), pc/h	3149	844
Capacity (c_{md}), pc/h	7200	2200
Adjusted Capacity (c_{mda}), pc/h	7200	2200
Volume-to-Capacity Ratio (v/c)	0.55	0.38

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	1684.3	Flow Outer Lanes (v_{OA}), pc/h/ln	1260
Downstream Equilibrium Distance (L_{EQ}), ft	-	On-Ramp Influence Area Speed (S_R), mi/h	61.8
Flow in Lanes 1 and 2 (v_{12}), pc/h	1889	Outer Lanes Freeway Speed (S_O), mi/h	67.3
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	2733	Ramp Junction Speed (S), mi/h	63.4
Number of Outer Lanes on Freeway (N_O), ln	1	Average Density (D), pc/mi/ln	21.0
Level of Service (LOS)	C	Density in Ramp Influence Area (D_R), pc/mi/ln	21.5

HCS Basic Freeway Report

Project Information

Segment Number	5	Segment Name	I-90 b/w SR-254 and SR-611
Analysis Period Number	1	Segment Analysis Period	16:00-16:15

Geometric Data

Number of Lanes (N), ln	3	Terrain Type	Level
Segment Length (L), ft	11310	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	0.83
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	70.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000
Incident Type	No Incident	Final Capacity Adjustment Factor (CAF)	1.000
Proportion of CAVs in Traffic Stream	0	Capacity Adj. Factor for CAVs, CAF_{CAV}	1.000

Demand and Capacity

Demand Volume (V), veh/h	3390	Heavy Vehicle Adjustment Factor (f_{HV})	0.909
Peak Hour Factor (PHF)	0.94	Flow Rate (v_p), pc/h/ln	1322
Total Trucks, %	10.00	Capacity (c), pc/h/ln	2400
Single-Unit Trucks (SUT), %	-	Initial Adjusted Capacity (c_{adj}), pc/h/ln	2400
Tractor-Trailers (TT), %	-	Final Adjusted Capacity (c_{adj}), pc/h/ln	2400
Passenger Car Equivalent (E_T)	2.00	Volume-to-Capacity Ratio (v/c)	0.55

Speed and Density

Lane Width Adjustment (f_{LW})	-	Average Speed (S), mi/h	69.8
Right-Side Lateral Clearance Adj. (f_{RLC})	-	Density (D), pc/mi/ln	18.9
Total Ramp Density Adjustment	-	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	70.0		

HCS Freeway Facilities Report

Project Information

Analyst	GSH	Date	2/17/2023
Agency	CMT	Analysis Year	2045
Jurisdiction	ODOT District 3	Time Analyzed	PM DHV
Facility Name	I-90 WB	Units	U.S. Customary
Project Description	PID 107714 LOR-90-10.76		

Facility Global Input

Jam Density, pc/mi/ln	190.0	Density at Capacity, pc/mi/ln	45.0
Queue Discharge Capacity Drop, %	7	Total Segments	5
Total Analysis Periods	1	Analysis Period Duration, min	15
Facility Length, mi	4.48		

Facility Segment Data

No.	Coded	Analyzed	Name	Length, ft	Lanes
1	Basic	Basic	I-90 b/w SR-611 and SR-254	11410	3
2	Diverge	Diverge	I-90 Exit Ramp to SR-254	1500	3
3	Basic	Basic	I-90 below SR-254	2790	3
4	Merge	Merge	I-90 Entrance Ramp from SR-254	1500	3
5	Basic	Basic	I-90 b/w SR-254 and SR-57	6450	3

Facility Segment Data

Segment 1: Basic

AP	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.94	0.901	5360	7200	0.74	66.0	27.1	D

Segment 2: Diverge

AP	PHF		fHV		Flow Rate (pc/h)		Capacity (pc/h)		d/c Ratio		Speed (mi/h)		Density (pc/mi/ln)		LOS
	F	R	F	R	Freeway	Ramp	Freeway	Ramp	F	R	F	R Infl.	F	R Infl.	
1	0.94	0.94	0.901	0.980	5360	1270	7200	2200	0.74	0.58	65.5	62.1	27.3	30.7	D

Segment 3: Basic

AP	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.94	0.901	3979	7200	0.55	69.8	19.0	C

Segment 4: Merge

AP	PHF		fHV		Flow Rate (pc/h)		Capacity (pc/h)		d/c Ratio		Speed (mi/h)		Density (pc/mi/ln)		LOS
	F	R	F	R	Freeway	Ramp	Freeway	Ramp	F	R	F	R Infl.	F	R Infl.	
1	0.94	0.94	0.901	0.962	4764	785	7200	2200	0.66	0.36	62.6	61.0	25.4	24.8	C

Segment 5: Basic

AP	PHF	fHV	Flow Rate	Capacity	d/c	Speed	Density	LOS

			(pc/h)	(pc/h)	Ratio	(mi/h)	(pc/mi/ln)	
1	0.94	0.926	4687	7200	0.65	68.5	22.8	C

Facility Analysis Results

AP	VMT veh-mi/AP	VMT-Demand veh-mi/AP	VHD veh-h/AP	Total Delay Cost $/AP	Speed mi/h	Density pc/mi/ln	Density veh/mi/ln	TT min	LOS
1	5056	4706	3.54	88.60	66.7	24.9	22.6	4.00	C

Facility Overall Results

Space Mean Speed, mi/h	66.7	Average Density, veh/mi/ln	22.6
Average Travel Time, min	4.00	Average Density, pc/mi/ln	24.9
Total VMT, veh-mi	5056	Total VHD, veh-h	3.54
Vehicle Value of Time (VOT), $/h	25.00	Total Delay Cost, $	88.60

LOS					
	Seg 1	Seg 2	Seg 3	Seg 4	Seg 5
AP 1	D	D	C	C	C
Speed (mi/h)					
	Seg 1	Seg 2	Seg 3	Seg 4	Seg 5
AP 1	66.0	65.5	69.8	62.6	68.5
Density (pc/mi/ln)					
	Seg 1	Seg 2	Seg 3	Seg 4	Seg 5
AP 1	27.1	27.3	19.0	25.4	22.8
Demand - Capacity Ratio (D/C)					
	Seg 1	Seg 2	Seg 3	Seg 4	Seg 5
AP 1	0.74	0.74	0.55	0.66	0.65
Density (veh/mi/ln)					
	Seg 1	Seg 2	Seg 3	Seg 4	Seg 5
AP 1	24.4	24.6	17.1	22.9	21.1
Density in Ramp Influence Area (pc/mi/ln)					
	Seg 1	Seg 2	Seg 3	Seg 4	Seg 5
AP 1	-	30.7	-	24.8	-
Density-Based LOS					
	Seg 1	Seg 2	Seg 3	Seg 4	Seg 5
AP 1	D	D	C	C	C
Demand-Based LOS					
	Seg 1	Seg 2	Seg 3	Seg 4	Seg 5
AP 1	-	-	-	-	-
Volume - Capacity Ratio (V/C)					
	Seg 1	Seg 2	Seg 3	Seg 4	Seg 5
AP 1	0.74	0.74	0.55	0.66	0.65

HCS Basic Freeway Report

Project Information

Analyst	GSH	Date	2/17/2023
Agency	CMT	Analysis Year	2045
Jurisdiction	ODOT District 3	Time Analyzed	PM DHV
Project Description	PID 107714 LOR-90-10.76	Units	U.S. Customary
Segment Number	1	Segment Name	I-90 b/w SR-611 and SR-254
Analysis Period Number	1	Segment Analysis Period	16:00-16:15

Geometric Data

Number of Lanes (N), ln	3	Terrain Type	Level
Segment Length (L), ft	11410	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	0.83
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	70.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000
Incident Type	No Incident	Final Capacity Adjustment Factor (CAF)	1.000
Proportion of CAVs in Traffic Stream	0	Capacity Adj. Factor for CAVs, CAF_{CAV}	1.000

Demand and Capacity

Demand Volume (V), veh/h	4540	Heavy Vehicle Adjustment Factor (f_{HV})	0.901
Peak Hour Factor (PHF)	0.94	Flow Rate (v_p), pc/h/ln	1787
Total Trucks, %	11.00	Capacity (c), pc/h/ln	2400
Single-Unit Trucks (SUT), %	-	Initial Adjusted Capacity (c_{adj}), pc/h/ln	2400
Tractor-Trailers (TT), %	-	Final Adjusted Capacity (c_{adj}), pc/h/ln	2400
Passenger Car Equivalent (E_T)	2.00	Volume-to-Capacity Ratio (v/c)	0.74

Speed and Density

Lane Width Adjustment (f_{LW})	-	Average Speed (S), mi/h	66.0
Right-Side Lateral Clearance Adj. (f_{RLC})	-	Density (D), pc/mi/ln	27.1
Total Ramp Density Adjustment	-	Level of Service (LOS)	D
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	70.0		

HCS Freeway Diverge Report

Project Information

Segment Number	2	Segment Name	I-90 Exit Ramp to SR-254
Analysis Period Number	1	Segment Analysis Period	16:00-16:15

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	3	1
Free-Flow Speed (FFS), mi/h	70.0	55.0
Segment Length (L) / Deceleration Length (LD), ft	1500	500
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Type	Freeway	Right-Sided One-Lane

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Proportion of CAVs in Traffic Stream	0	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000
Capacity Adjustment Factor for CAVs, CAF_{CAV}	1.000	-
Final Capacity Adjustment Factor (CAF)	1.000	1.000

Demand and Capacity

Demand Volume (V_i), veh/h	4540	1170
Peak Hour Factor (PHF)	0.94	0.94
Total Trucks, %	11.00	2.00
Heavy Vehicle Adjustment Factor (f_{HV})	0.901	0.980
Flow Rate (v_i), pc/h	5360	1270
Capacity (c_{md}), pc/h	7200	2200
Initial Adjusted Capacity (c_{mda}), pc/h	7200	-
Final Adjusted Capacity (c_{mda}), pc/h	7200	2200
Volume-to-Capacity Ratio (v/c)	0.74	0.58

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	1767
Downstream Equilibrium Distance (L_{EQ}), ft	-	Off-Ramp Influence Area Speed (S_R), mi/h	62.1
Flow in Lanes 1 and 2 (v_{12}), pc/h	3593	Outer Lanes Freeway Speed (S_O), mi/h	73.8
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	-	Ramp Junction Speed (S), mi/h	65.5
Number of Outer Lanes on Freeway (N_O), ln	1	Average Density (D), pc/mi/ln	27.3
Level of Service (LOS)	D	Density in Ramp Influence Area (D_R), pc/mi/ln	30.7

HCS Basic Freeway Report

Project Information

Segment Number	3	Segment Name	I-90 below SR-254
Analysis Period Number	1	Segment Analysis Period	16:00-16:15

Geometric Data

Number of Lanes (N), ln	3	Terrain Type	Level
Segment Length (L), ft	2790	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	0.83
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	70.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000
Incident Type	No Incident	Final Capacity Adjustment Factor (CAF)	1.000
Proportion of CAVs in Traffic Stream	0	Capacity Adj. Factor for CAVs, CAF_{CAV}	1.000

Demand and Capacity

Demand Volume (V), veh/h	3370	Heavy Vehicle Adjustment Factor (f_{HV})	0.901
Peak Hour Factor (PHF)	0.94	Flow Rate (v_p), pc/h/ln	1326
Total Trucks, %	11.00	Capacity (c), pc/h/ln	2400
Single-Unit Trucks (SUT), %	-	Initial Adjusted Capacity (c_{adj}), pc/h/ln	2400
Tractor-Trailers (TT), %	-	Final Adjusted Capacity (c_{adj}), pc/h/ln	2400
Passenger Car Equivalent (E_T)	2.00	Volume-to-Capacity Ratio (v/c)	0.55

Speed and Density

Lane Width Adjustment (f_{LW})	-	Average Speed (S), mi/h	69.8
Right-Side Lateral Clearance Adj. (f_{RLC})	-	Density (D), pc/mi/ln	19.0
Total Ramp Density Adjustment	-	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	70.0		

HCS Freeway Merge Report

Project Information

Segment Number	4	Segment Name	I-90 Entrance Ramp from SR-254
Analysis Period Number	1	Segment Analysis Period	16:00-16:15

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	3	1
Free-Flow Speed (FFS), mi/h	70.0	55.0
Segment Length (L) / Acceleration Length (LA), ft	1500	830
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Type	Freeway	Right-Sided One-Lane

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Proportion of CAVs in Traffic Stream	0	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000
Capacity Adjustment Factor for CAVs, CAF_{CAV}	1.000	-
Final Capacity Adjustment Factor (CAF)	1.000	1.000

Demand and Capacity

Demand Volume (V_i), veh/h	3370	710
Peak Hour Factor (PHF)	0.94	0.94
Total Trucks, %	11.00	4.00
Heavy Vehicle Adjustment Factor (f_{HV})	0.901	0.962
Flow Rate (v_i), pc/h	3979	785
Capacity (c_{md}), pc/h	7200	2200
Adjusted Capacity (c_{mda}), pc/h	7200	2200
Volume-to-Capacity Ratio (v/c)	0.66	0.36

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	1862.6	Flow Outer Lanes (v_{OA}), pc/h/ln	1588
Downstream Equilibrium Distance (L_{EQ}), ft	-	On-Ramp Influence Area Speed (S_R), mi/h	61.0
Flow in Lanes 1 and 2 (v_{12}), pc/h	2391	Outer Lanes Freeway Speed (S_O), mi/h	66.1
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	3176	Ramp Junction Speed (S), mi/h	62.6
Number of Outer Lanes on Freeway (N_O), ln	1	Average Density (D), pc/mi/ln	25.4
Level of Service (LOS)	C	Density in Ramp Influence Area (D_R), pc/mi/ln	24.8

HCS Basic Freeway Report

Project Information

Segment Number	5	Segment Name	I-90 b/w SR-254 and SR-57
Analysis Period Number	1	Segment Analysis Period	16:00-16:15

Geometric Data

Number of Lanes (N), ln	3	Terrain Type	Level
Segment Length (L), ft	6450	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	0.33
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	70.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000
Incident Type	No Incident	Final Capacity Adjustment Factor (CAF)	1.000
Proportion of CAVs in Traffic Stream	0	Capacity Adj. Factor for CAVs, CAF_{CAV}	1.000

Demand and Capacity

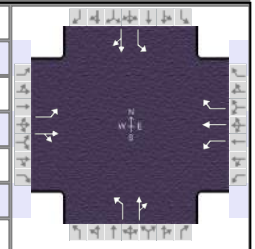
Demand Volume (V), veh/h	4080	Heavy Vehicle Adjustment Factor (f_{HV})	0.926
Peak Hour Factor (PHF)	0.94	Flow Rate (v_p), pc/h/ln	1562
Total Trucks, %	8.00	Capacity (c), pc/h/ln	2400
Single-Unit Trucks (SUT), %	-	Initial Adjusted Capacity (c_{adj}), pc/h/ln	2400
Tractor-Trailers (TT), %	-	Final Adjusted Capacity (c_{adj}), pc/h/ln	2400
Passenger Car Equivalent (E_T)	2.00	Volume-to-Capacity Ratio (v/c)	0.65

Speed and Density

Lane Width Adjustment (f_{LW})	-	Average Speed (S), mi/h	68.5
Right-Side Lateral Clearance Adj. (f_{RLC})	-	Density (D), pc/mi/ln	22.8
Total Ramp Density Adjustment	-	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	70.0		

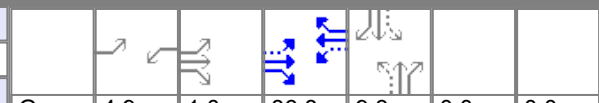
HCS Signalized Intersection Input Data

General Information				Intersection Information	
Agency	CMT			Duration, h	0.250
Analyst	TJH	Analysis Date	2/14/2023	Area Type	Other
Jurisdiction	ODOT District 3	Time Period	AM	PHF	0.90
Urban Street	SR-254 (Detroit Rd)	Analysis Year	2045	Analysis Period	1> 7:00
Intersection	Transportation Dr	File Name	SR-254 Corridor 2045 AM - Existing.xus		
Project Description	2045 AM Existing				

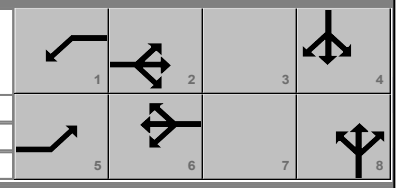


Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	50	600	10	30	480	90	10	0	20	30	0	10

Signal Information			
Cycle, s	120.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	4.9	1.0		86.8	9.3	0.0	0.0					
Yellow	4.0	0.0		4.0	4.0	0.0	0.0					
Red	2.0	0.0		2.0	2.0	0.0	0.0					



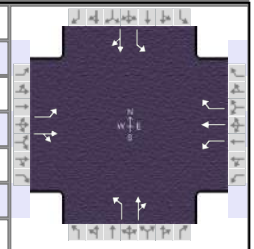
Traffic Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	50	600	10	30	480	90	10	0	20	30	0	10
Initial Queue (Q_b), veh/h	0	0	0	0	0	0	0	0	0	0	0	0
Base Saturation Flow Rate (s_o), veh/h	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Parking (N_m), man/h		None			None			None			None	
Heavy Vehicles (P_{HV}), %	4	4		4	4	4	6	6		3	3	
Ped / Bike / RTOR, /h	0	0	0	0	0	0	0	0	0	0	0	0
Buses (N_b), buses/h	0	0	0	0	0	0	0	0	0	0	0	0
Arrival Type (*AT*)	3	3	3	3	3	3	3	3	3	3	3	3
Upstream Filtering (*I*)	1.00	1.00	1.00	0.95	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Lane Width (*W*), ft	12.0	12.0		12.0	12.0	12.0	12.0	12.0		12.0	12.0	
Turn Bay Length, ft	115	2540		400	500	500	250	250		400	400	
Grade (*Pg*), %		0			0			0			0	
Speed Limit, mi/h	35	35	35	35	35	35	25	25	25	25	25	25

Phase Information	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Maximum Green (G_{max}) or Phase Split, s	13.0	62.0	13.0	62.0		45.0		45.0
Yellow Change Interval (*Y*), s	4.0	4.0	4.0	4.0		4.0		4.0
Red Clearance Interval (R_c), s	2.0	2.0	2.0	2.0		2.0		2.0
Minimum Green (G_{min}), s	7	20	7	20		10		10
Start-Up Lost Time (*l*t), s	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Extension of Effective Green (*e*), s	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Passage (*PT*), s	2.0	2.0	2.0	2.0		2.0		2.0
Recall Mode	Off	Min	Off	Min		Off		Off
Dual Entry	No	Yes	No	Yes		Yes		Yes
Walk (*Walk*), s		0.0		0.0		0.0		0.0
Pedestrian Clearance Time (*PC*), s		0.0		0.0		0.0		0.0

Multimodal Information	EB			WB			NB			SB		
85th % Speed / Rest in Walk / Corner Radius	0.0	No	25.0	0.0	No	25.0	0.0	No	25.0	0.0	No	25.0
Walkway / Crosswalk Width / Length, ft	9.0	12.0	0.0	9.0	12.0	0.0	9.0	12.0	0.0	9.0	12.0	0.0
Street Width / Island / Curb, ft	0.0	0	No	0.0	0	No	0.0	0	No	0.0	0	No
Width Outside / Bike Lane / Shoulder, ft	12.0	5.0	2.0	12.0	5.0	2.0	12.0	5.0	2.0	12.0	5.0	2.0
Pedestrian Signal / Occupied Parking	No	0.50		No	0.50		No	0.50		No	0.50	

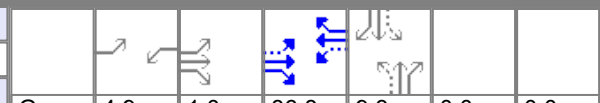
HCS Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	CMT			Duration, h	0.250
Analyst	TJH	Analysis Date	2/14/2023	Area Type	Other
Jurisdiction	ODOT District 3	Time Period	AM	PHF	0.90
Urban Street	SR-254 (Detroit Rd)	Analysis Year	2045	Analysis Period	1> 7:00
Intersection	Transportation Dr	File Name	SR-254 Corridor 2045 AM - Existing.xus		
Project Description	2045 AM Existing				

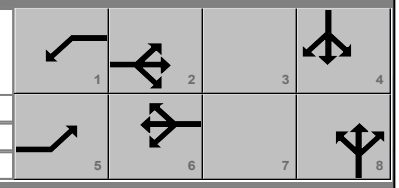


Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	50	600	10	30	480	90	10	0	20	30	0	10

Signal Information			
Cycle, s	120.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	4.9	1.0	86.8	9.3	0.0	0.0						
Yellow	4.0	0.0	4.0	4.0	0.0	0.0						
Red	2.0	0.0	2.0	2.0	0.0	0.0						



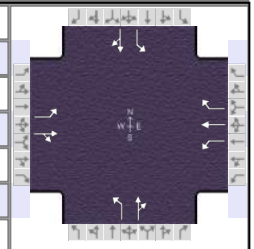
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	5	2	1	6		8		4
Case Number	1.1	4.0	1.1	3.0		6.0		6.0
Phase Duration, s	11.9	93.9	10.9	92.8		15.3		15.3
Change Period, ($Y+R_c$), s	6.0	6.0	6.0	6.0		6.0		6.0
Max Allow Headway (*MAH*), s	3.1	0.0	3.1	0.0		3.4		3.4
Queue Clearance Time (g_s), s	2.9		2.6			3.7		6.4
Green Extension Time (g_e), s	0.1	0.0	0.0	0.0		0.1		0.1
Phase Call Probability	0.84		0.69			0.93		0.93
Max Out Probability	0.00		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	56	678		36	570	107	11	22		33	11	
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1753	1835		1753	1841	1560	1359	1535		1378	1572	
Queue Service Time (g_s), s	0.9	18.8		0.6	6.6	1.5	0.9	1.6		2.8	0.8	
Cycle Queue Clearance Time (g_c), s	0.9	18.8		0.6	6.6	1.5	1.7	1.6		4.4	0.8	
Green Ratio (*g/C*)	0.77	0.73		0.76	0.72	0.72	0.08	0.08		0.08	0.08	
Capacity (*c*), veh/h	700	1344		550	1332	1129	156	118		148	121	
Volume-to-Capacity Ratio (*X*)	0.079	0.504		0.065	0.428	0.095	0.071	0.188		0.226	0.092	
Back of Queue (*Q*), ft/ln (95 th percentile)	11.9	284.3		8.2	89.7	21.7	15.1	30.3		45.5	14.7	
Back of Queue (*Q*), veh/ln (95 th percentile)	0.5	11.0		0.3	3.5	0.8	0.6	1.2		1.8	0.6	
Queue Storage Ratio (*RQ*) (95 th percentile)	0.10	0.11		0.02	0.18	0.04	0.06	0.12		0.11	0.04	
Uniform Delay (d_1), s/veh	3.4	6.8		5.2	2.2	2.9	52.2	51.9		53.9	51.5	
Incremental Delay (d_2), s/veh	0.0	1.4		0.0	1.0	0.2	0.1	0.3		0.3	0.1	
Initial Queue Delay (d_3), s/veh	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Control Delay (*d*), s/veh	3.4	8.2		5.2	3.1	3.1	52.3	52.1		54.2	51.6	
Level of Service (LOS)	A	A		A	A	A	D	D		D	D	
Approach Delay, s/veh / LOS	7.8	A		3.2	A		52.2	D		53.5	D	
Intersection Delay, s/veh / LOS	8.0						A					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	1.86	B	1.86	B	2.15	B	1.96	B
Bicycle LOS Score / LOS	1.70	B	1.59	B	0.54	A	0.56	A

HCS Signalized Intersection Intermediate Values

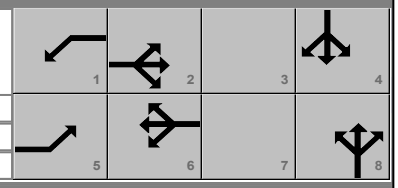
General Information				Intersection Information	
Agency	CMT			Duration, h	0.250
Analyst	TJH	Analysis Date	2/14/2023	Area Type	Other
Jurisdiction	ODOT District 3	Time Period	AM	PHF	0.90
Urban Street	SR-254 (Detroit Rd)	Analysis Year	2045	Analysis Period	1> 7:00
Intersection	Transportation Dr	File Name	SR-254 Corridor 2045 AM - Existing.xus		
Project Description	2045 AM Existing				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	50	600	10	30	480	90	10	0	20	30	0	10

Signal Information			
Cycle, s	120.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	4.9	1.0		86.8	9.3	0.0	0.0					
Yellow	4.0	0.0		4.0	4.0	0.0	0.0					
Red	2.0	0.0		2.0	2.0	0.0	0.0					



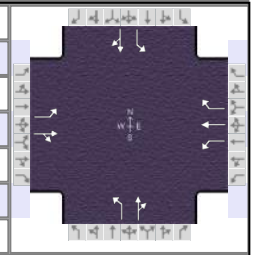
Saturation Flow / Delay	L	T	R	L	T	R	L	T	R	L	T	R
Lane Width Adjustment Factor (f_w)	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Heavy Vehicles and Grade Factor (f_{HVg})	0.969	0.969	1.000	0.969	0.969	0.969	0.953	0.953	1.000	0.977	0.977	1.000
Parking Activity Adjustment Factor (f_p)	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Bus Blockage Adjustment Factor (f_{bb})	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Area Type Adjustment Factor (f_a)	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Lane Utilization Adjustment Factor (f_{LU})	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Left-Turn Adjustment Factor (f_{LT})	0.952	0.000		0.952	0.000		0.715	0.000		0.725	0.000	
Right-Turn Adjustment Factor (f_{RT})		0.997	0.997		0.000	0.847		0.847	0.847		0.847	0.847
Left-Turn Pedestrian Adjustment Factor (f_{Lpb})	1.000			1.000			1.000			1.000		
Right-Turn Ped-Bike Adjustment Factor (f_{Rpb})			1.000			1.000			1.000			1.000
Work Zone Adjustment Factor (f_{wz})	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
DDI Factor (f_{DDI})	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Left-Turn Prot. CAV Adj. Factor ($f_{CAV,prot}$)	1.00			1.00								
Left-Turn Perm. CAV Adj. Factor ($f_{CAV,perm}$)							1.00			1.00		
Movement Saturation Flow Rate (s), veh/h	1753	1805	30	1753	1841	1560	1359	0	1535	1378	0	1572
Proportion of Vehicles Arriving on Green (P)	0.05	0.73	0.73	0.02	0.89	0.83	0.08	0.00	0.08	0.08	0.00	0.08
Incremental Delay Factor (k)	0.04	0.50		0.04	0.50	0.50	0.04	0.04		0.04	0.04	

Signal Timing / Movement Groups	EBL	EBT/R	WBL	WBT/R	NBL	NBT/R	SBL	SBT/R
Lost Time (t_L)	6.0	6.0	6.0	6.0		6.0		6.0
Green Ratio (g/C)	0.77	0.73	0.76	0.72		0.08		0.08
Permitted Saturation Flow Rate (s_p), veh/h/ln	829	0	750	0		1359		1378
Shared Saturation Flow Rate (s_{sh}), veh/h/ln								
Permitted Effective Green Time (g_p), s	86.8	0.0	86.8	0.0		9.3		9.3
Permitted Service Time (g_u), s	80.2	0.0	67.0	0.0		8.5		7.6
Permitted Queue Service Time (g_{ps}), s	0.5		1.0			0.9		2.8
Time to First Blockage (g_f), s	0.0	0.0	0.0	0.0		0.0		0.0
Queue Service Time Before Blockage (g_{fs}), s								
Protected Right Saturation Flow (s_R), veh/h/ln				0				
Protected Right Effective Green Time (g_R), s				0.0				

Multimodal	EB		WB		NB		SB	
Pedestrian F_w / F_v	1.198	0.000	1.198	0.000	1.389	0.000	1.198	0.000
Pedestrian F_s / F_{delay}	0.000	0.058	0.000	0.061	0.000	0.158	0.000	0.158
Pedestrian M_{corner} / M_{cw}	0.00		0.00		0.00		0.00	
Bicycle c_b / d_b	1464.73	4.30	1447.43	4.58	154.21	51.10	154.21	51.10
Bicycle F_w / F_v	-3.64	1.21	-3.64	1.10	-3.64	0.06	-3.64	0.07

HCS Signalized Intersection Results Graphical Summary

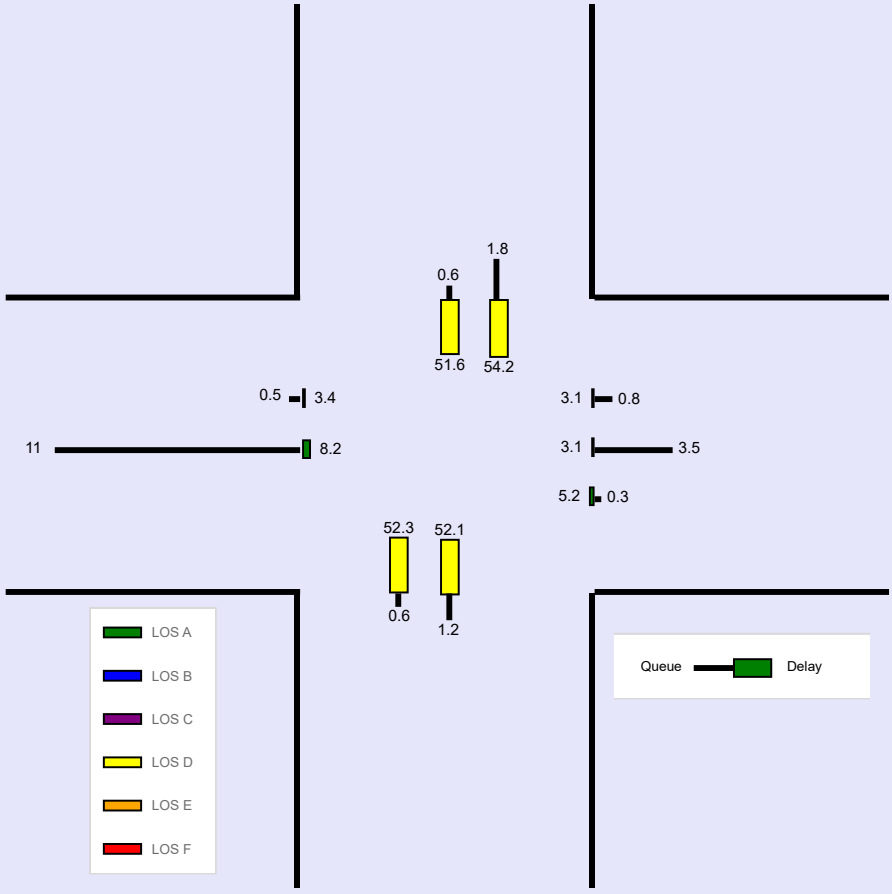
General Information				Intersection Information	
Agency	CMT			Duration, h	0.250
Analyst	TJH	Analysis Date	2/14/2023	Area Type	Other
Jurisdiction	ODOT District 3	Time Period	AM	PHF	0.90
Urban Street	SR-254 (Detroit Rd)	Analysis Year	2045	Analysis Period	1> 7:00
Intersection	Transportation Dr	File Name	SR-254 Corridor 2045 AM - Existing.xus		
Project Description	2045 AM Existing				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	50	600	10	30	480	90	10	0	20	30	0	10

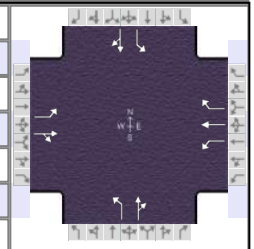
Signal Information													
Cycle, s	120.0	Reference Phase	2										
Offset, s	0	Reference Point	End										
Uncoordinated	No	Simult. Gap E/W	On										
Force Mode	Fixed	Simult. Gap N/S	On										
				Green	4.9	1.0	86.8	9.3	0.0	0.0			
				Yellow	4.0	0.0	4.0	4.0	0.0	0.0			
				Red	2.0	0.0	2.0	2.0	0.0	0.0			

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Back of Queue (*Q*), ft/ln (95 th percentile)	11.9	284.3		8.2	89.7	21.7	15.1	30.3		45.5	14.7	
Back of Queue (*Q*), veh/ln (95 th percentile)	0.5	11.0		0.3	3.5	0.8	0.6	1.2		1.8	0.6	
Queue Storage Ratio (*RQ*) (95 th percentile)	0.10	0.11		0.02	0.18	0.04	0.06	0.12		0.11	0.04	
Control Delay (*d*), s/veh	3.4	8.2		5.2	3.1	3.1	52.3	52.1		54.2	51.6	
Level of Service (LOS)	A	A		A	A	A	D	D		D	D	
Approach Delay, s/veh / LOS	7.8	A		3.2	A		52.2	D		53.5	D	
Intersection Delay, s/veh / LOS	8.0						A					



HCS Signalized Intersection Input Data

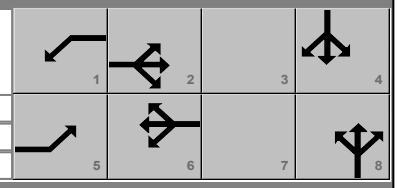
General Information				Intersection Information	
Agency	CMT			Duration, h	0.250
Analyst	TJH	Analysis Date	2/14/2023	Area Type	Other
Jurisdiction	ODOT District 3	Time Period	PM	PHF	0.95
Urban Street	SR-254 (Detroit Rd)	Analysis Year	2045	Analysis Period	1> 17:00
Intersection	Transportation Dr	File Name	SR-254 Corridor 2045 PM - Existing.xus		
Project Description	2045 PM Existing				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	10	720	10	30	1040	70	10	0	40	80	0	40

Signal Information			
Cycle, s	120.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	2.1	2.5	84.9	12.6	0.0	0.0						
Yellow	4.0	0.0	4.0	4.0	0.0	0.0						
Red	2.0	0.0	2.0	2.0	0.0	0.0						



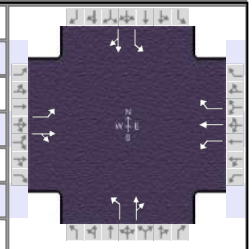
Traffic Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	10	720	10	30	1040	70	10	0	40	80	0	40
Initial Queue (Q_b), veh/h	0	0	0	0	0	0	0	0	0	0	0	0
Base Saturation Flow Rate (s_o), veh/h	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Parking (N_m), man/h		None			None			None			None	
Heavy Vehicles (P_{HV}), %	4	4		4	4	4	6	6		3	3	
Ped / Bike / RTOR, /h	0	0	0	0	0	0	0	0	0	0	0	0
Buses (N_b), buses/h	0	0	0	0	0	0	0	0	0	0	0	0
Arrival Type (*AT*)	3	3	3	3	3	3	3	3	3	3	3	3
Upstream Filtering (*I*)	1.00	1.00	1.00	0.73	0.73	0.73	1.00	1.00	1.00	1.00	1.00	1.00
Lane Width (*W*), ft	12.0	12.0		12.0	12.0	12.0	12.0	12.0		12.0	12.0	
Turn Bay Length, ft	115	2540		400	500	500	250	250		400	400	
Grade (*Pg*), %		0			0			0			0	
Speed Limit, mi/h	35	35	35	35	35	35	25	25	25	25	25	25

Phase Information	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Maximum Green (G_{max}) or Phase Split, s	13.0	77.0	13.0	77.0		30.0		30.0
Yellow Change Interval (*Y*), s	4.0	4.0	4.0	4.0		4.0		4.0
Red Clearance Interval (R_c), s	2.0	2.0	2.0	2.0		2.0		2.0
Minimum Green (G_{min}), s	7	20	7	20		10		10
Start-Up Lost Time (*l*t), s	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Extension of Effective Green (*e*), s	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Passage (*PT*), s	2.0	2.0	2.0	2.0		2.0		2.0
Recall Mode	Off	Min	Off	Min		Off		Off
Dual Entry	No	Yes	No	Yes		Yes		Yes
Walk (*Walk*), s		0.0		0.0		0.0		0.0
Pedestrian Clearance Time (*PC*), s		0.0		0.0		0.0		0.0

Multimodal Information	EB			WB			NB			SB		
85th % Speed / Rest in Walk / Corner Radius	0.0	No	25.0	0.0	No	25.0	0.0	No	25.0	0.0	No	25.0
Walkway / Crosswalk Width / Length, ft	9.0	12.0	0.0	9.0	12.0	0.0	9.0	12.0	0.0	9.0	12.0	0.0
Street Width / Island / Curb, ft	0.0	0	No	0.0	0	No	0.0	0	No	0.0	0	No
Width Outside / Bike Lane / Shoulder, ft	12.0	5.0	2.0	12.0	5.0	2.0	12.0	5.0	2.0	12.0	5.0	2.0
Pedestrian Signal / Occupied Parking	No	0.50		No	0.50		No	0.50		No	0.50	

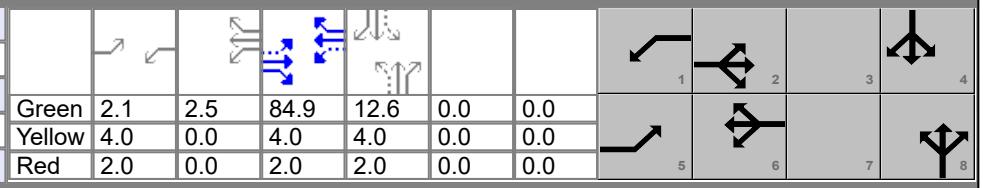
HCS Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	CMT			Duration, h	0.250
Analyst	TJH	Analysis Date	2/14/2023	Area Type	Other
Jurisdiction	ODOT District 3	Time Period	PM	PHF	0.95
Urban Street	SR-254 (Detroit Rd)	Analysis Year	2045	Analysis Period	1> 17:00
Intersection	Transportation Dr	File Name	SR-254 Corridor 2045 PM - Existing.xus		
Project Description	2045 PM Existing				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	10	720	10	30	1040	70	10	0	40	80	0	40

Signal Information			
Cycle, s	120.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	2.1	2.5	84.9	12.6	0.0	0.0
Yellow	4.0	0.0	4.0	4.0	0.0	0.0
Red	2.0	0.0	2.0	2.0	0.0	0.0

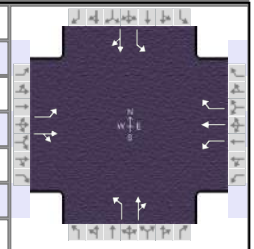
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	5	2	1	6		8		4
Case Number	1.1	4.0	1.1	3.0		6.0		6.0
Phase Duration, s	8.1	90.9	10.6	93.3		18.6		18.6
Change Period, ($Y+R_c$), s	6.0	6.0	6.0	6.0		6.0		6.0
Max Allow Headway (*MAH*), s	3.1	0.0	3.1	0.0		3.4		3.4
Queue Clearance Time (g_s), s	2.2		2.6			5.8		12.3
Green Extension Time (g_e), s	0.0	0.0	0.0	0.0		0.3		0.3
Phase Call Probability	0.30		0.65			1.00		1.00
Max Out Probability	0.00		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	11	768		31	1092	73	11	42		84	42	
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1753	1836		1753	1841	1560	1321	1535		1354	1572	
Queue Service Time (g_s), s	0.2	25.3		0.6	28.7	1.1	0.9	3.0		7.3	3.0	
Cycle Queue Clearance Time (g_c), s	0.2	25.3		0.6	28.7	1.1	3.8	3.0		10.3	3.0	
Green Ratio (*g/C*)	0.72	0.71		0.74	0.73	0.73	0.10	0.10		0.10	0.10	
Capacity (*c*), veh/h	330	1298		467	1339	1135	167	162		169	166	
Volume-to-Capacity Ratio (*X*)	0.032	0.592		0.067	0.815	0.065	0.063	0.261		0.499	0.254	
Back of Queue (*Q*), ft/ln (95 th percentile)	3	375.9		8.2	211.1	15.8	14.1	56.1		117.6	54.7	
Back of Queue (*Q*), veh/ln (95 th percentile)	0.1	14.6		0.3	8.2	0.6	0.5	2.1		4.6	2.1	
Queue Storage Ratio (*RQ*) (95 th percentile)	0.03	0.15		0.02	0.42	0.03	0.06	0.22		0.29	0.14	
Uniform Delay (d_1), s/veh	8.0	8.9		7.0	3.4	3.2	51.1	49.4		54.1	49.4	
Incremental Delay (d_2), s/veh	0.0	2.0		0.0	4.1	0.1	0.1	0.3		0.8	0.3	
Initial Queue Delay (d_3), s/veh	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Control Delay (*d*), s/veh	8.0	10.9		7.0	7.5	3.3	51.1	49.7		55.0	49.7	
Level of Service (LOS)	A	B		A	A	A	D	D		D	D	
Approach Delay, s/veh / LOS	10.8	B		7.3	A		50.0	D		53.2	D	
Intersection Delay, s/veh / LOS	12.3						B					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	1.86	B	1.86	B	2.14	B	1.95	B
Bicycle LOS Score / LOS	1.77	B	2.47	B	0.57	A	0.70	A

HCS Signalized Intersection Intermediate Values

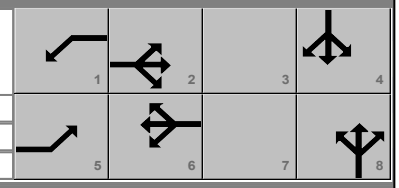
General Information				Intersection Information	
Agency	CMT			Duration, h	0.250
Analyst	TJH	Analysis Date	2/14/2023	Area Type	Other
Jurisdiction	ODOT District 3	Time Period	PM	PHF	0.95
Urban Street	SR-254 (Detroit Rd)	Analysis Year	2045	Analysis Period	1> 17:00
Intersection	Transportation Dr	File Name	SR-254 Corridor 2045 PM - Existing.xus		
Project Description	2045 PM Existing				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	10	720	10	30	1040	70	10	0	40	80	0	40

Signal Information			
Cycle, s	120.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	2.1	2.5	84.9	12.6	0.0	0.0
Yellow	4.0	0.0	4.0	4.0	0.0	0.0
Red	2.0	0.0	2.0	2.0	0.0	0.0



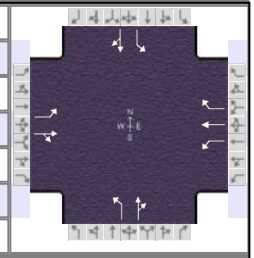
Saturation Flow / Delay	L	T	R	L	T	R	L	T	R	L	T	R
Lane Width Adjustment Factor (f_w)	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Heavy Vehicles and Grade Factor (f_{HVg})	0.969	0.969	1.000	0.969	0.969	0.969	0.953	0.953	1.000	0.977	0.977	1.000
Parking Activity Adjustment Factor (f_p)	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Bus Blockage Adjustment Factor (f_{bb})	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Area Type Adjustment Factor (f_a)	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Lane Utilization Adjustment Factor (f_{LU})	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Left-Turn Adjustment Factor (f_{LT})	0.952	0.000		0.952	0.000		0.695	0.000		0.713	0.000	
Right-Turn Adjustment Factor (f_{RT})		0.998	0.998		0.000	0.847		0.847	0.847		0.847	0.847
Left-Turn Pedestrian Adjustment Factor (f_{Lpb})	1.000			1.000			1.000			1.000		
Right-Turn Ped-Bike Adjustment Factor (f_{Rpb})			1.000			1.000			1.000			1.000
Work Zone Adjustment Factor (f_{wz})	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
DDI Factor (f_{DDI})	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Left-Turn Prot. CAV Adj. Factor ($f_{CAV,prot}$)	1.00			1.00								
Left-Turn Perm. CAV Adj. Factor ($f_{CAV,perm}$)							1.00			1.00		
Movement Saturation Flow Rate (s), veh/h	1753	1811	25	1753	1841	1560	1321	0	1535	1354	0	1572
Proportion of Vehicles Arriving on Green (P)	0.02	0.71	0.71	0.02	0.89	0.81	0.11	0.00	0.11	0.11	0.00	0.11
Incremental Delay Factor (k)	0.04	0.50		0.04	0.50	0.50	0.04	0.04		0.04	0.04	

Signal Timing / Movement Groups	EBL	EBT/R	WBL	WBT/R	NBL	NBT/R	SBL	SBT/R
Lost Time (t_L)	6.0	6.0	6.0	6.0		6.0		6.0
Green Ratio (g/C)	0.72	0.71	0.74	0.73		0.10		0.10
Permitted Saturation Flow Rate (s_p), veh/h/ln	508	0	689	0		1321		1354
Shared Saturation Flow Rate (s_{sh}), veh/h/ln								
Permitted Effective Green Time (g_p), s	84.8	0.0	84.8	0.0		12.6		12.6
Permitted Service Time (g_u), s	56.5	0.0	59.4	0.0		9.7		9.6
Permitted Queue Service Time (g_{ps}), s	0.6		1.2			0.9		7.3
Time to First Blockage (g_f), s	0.0	0.0	0.0	0.0		0.0		0.0
Queue Service Time Before Blockage (g_{fs}), s								
Protected Right Saturation Flow (s_R), veh/h/ln				0				
Protected Right Effective Green Time (g_R), s				0.0				

Multimodal	EB		WB		NB		SB	
Pedestrian F_w / F_v	1.198	0.000	1.198	0.000	1.389	0.000	1.198	0.000
Pedestrian F_s / F_{delay}	0.000	0.066	0.000	0.060	0.000	0.155	0.000	0.155
Pedestrian M_{corner} / M_{cw}	0.00		0.00		0.00		0.00	
Bicycle c_b / d_b	1414.32	5.15	1455.63	4.45	209.84	48.07	209.84	48.07
Bicycle F_w / F_v	-3.64	1.29	-3.64	1.98	-3.64	0.09	-3.64	0.21

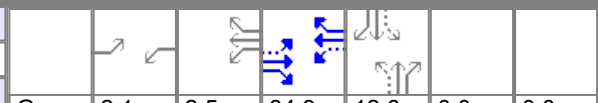
HCS Signalized Intersection Results Graphical Summary

General Information				Intersection Information	
Agency	CMT			Duration, h	0.250
Analyst	TJH	Analysis Date	2/14/2023	Area Type	Other
Jurisdiction	ODOT District 3	Time Period	PM	PHF	0.95
Urban Street	SR-254 (Detroit Rd)	Analysis Year	2045	Analysis Period	1> 17:00
Intersection	Transportation Dr	File Name	SR-254 Corridor 2045 PM - Existing.xus		
Project Description	2045 PM Existing				

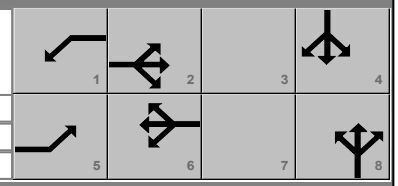


Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	10	720	10	30	1040	70	10	0	40	80	0	40

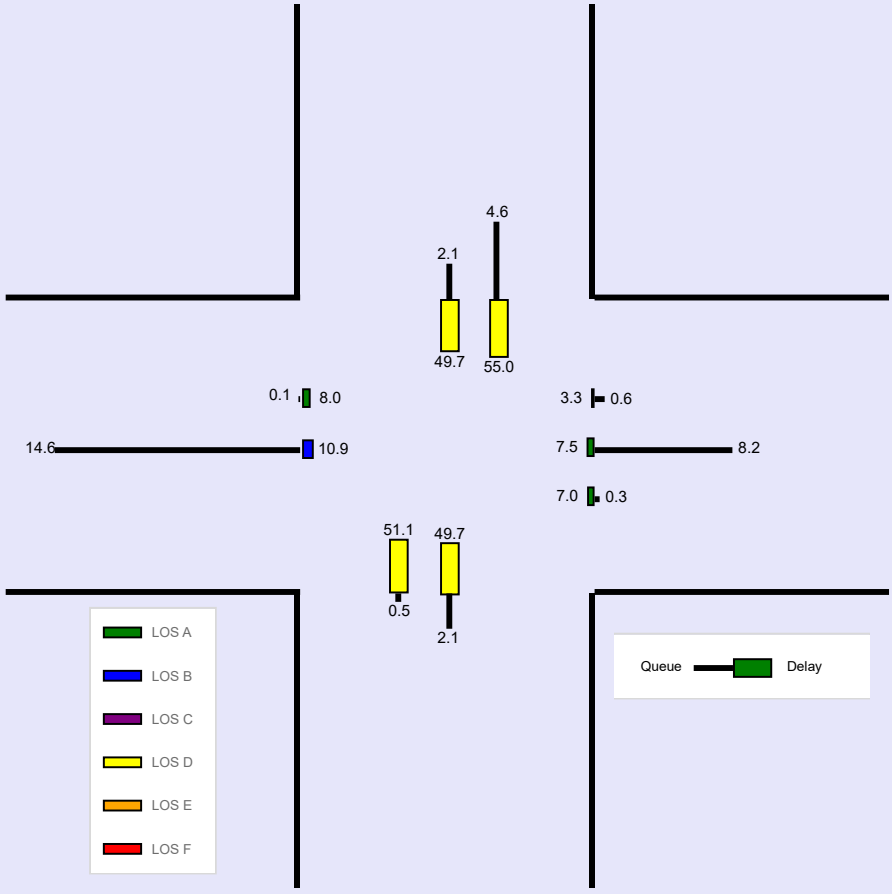
Signal Information			
Cycle, s	120.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	2.1	2.5	84.9	12.6	0.0	0.0						
Yellow	4.0	0.0	4.0	4.0	0.0	0.0						
Red	2.0	0.0	2.0	2.0	0.0	0.0						

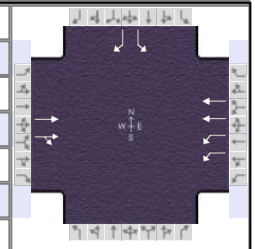


Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Back of Queue (*Q*), ft/ln (95 th percentile)	3	375.9		8.2	211.1	15.8	14.1	56.1		117.6	54.7	
Back of Queue (*Q*), veh/ln (95 th percentile)	0.1	14.6		0.3	8.2	0.6	0.5	2.1		4.6	2.1	
Queue Storage Ratio (*RQ*) (95 th percentile)	0.03	0.15		0.02	0.42	0.03	0.06	0.22		0.29	0.14	
Control Delay (*d*), s/veh	8.0	10.9		7.0	7.5	3.3	51.1	49.7		55.0	49.7	
Level of Service (LOS)	A	B		A	A	A	D	D		D	D	
Approach Delay, s/veh / LOS	10.8	B		7.3	A		50.0	D		53.2	D	
Intersection Delay, s/veh / LOS	12.3						B					



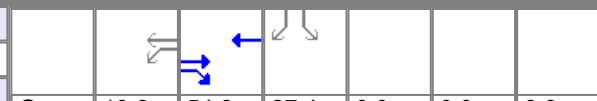
HCS Signalized Intersection Input Data

General Information				Intersection Information	
Agency	CMT			Duration, h	0.250
Analyst	TJH	Analysis Date	2/14/2023	Area Type	Other
Jurisdiction	ODOT District 3	Time Period	AM	PHF	0.89
Urban Street	SR-254 (Detroit Rd)	Analysis Year	2045	Analysis Period	1> 7:00
Intersection	I-90 WB Ramps	File Name	SR-254 Corridor 2045 AM - Existing.xus		
Project Description	2045 AM Existing				

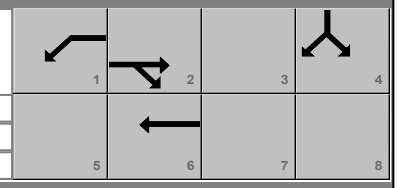


Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h		590	50	350	360					330		240

Signal Information			
Cycle, s	120.0	Reference Phase	2
Offset, s	7	Reference Point	Begin
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	19.8	54.8	27.4	0.0	0.0	0.0						
Yellow	4.0	4.0	4.0	0.0	0.0	0.0						
Red	2.0	2.0	2.0	0.0	0.0	0.0						



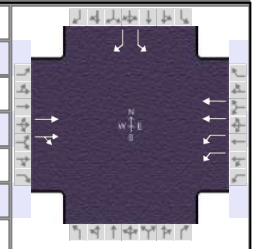
Traffic Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h		590	50	350	360					330		240
Initial Queue (Q_b), veh/h		0	0	0	0					0		0
Base Saturation Flow Rate (s_o), veh/h		1900	1900	1900	1900					1900		1900
Parking (N_m), man/h		None			None						None	
Heavy Vehicles (P_{HV}), %		4		4	4					2		2
Ped / Bike / RTOR, /h	0	0	0	0	0		0	0		0	0	
Buses (N_b), buses/h	0	0	0	0	0	0				0	0	0
Arrival Type (*AT*)		3	3	3	3					3		3
Upstream Filtering (*I*)		0.87	0.87	0.84	0.84					1.00		1.00
Lane Width (*W*), ft		12.0		12.0	12.0					12.0		12.0
Turn Bay Length, ft		430		550	890					700		950
Grade (*Pg*), %		0			0			0			0	
Speed Limit, mi/h		35	35	35	35					35		35

Phase Information	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Maximum Green (G_{max}) or Phase Split, s		38.0	40.0	78.0				42.0
Yellow Change Interval (*Y*), s		4.0	4.0	4.0				4.0
Red Clearance Interval (R_c), s		2.0	2.0	2.0				2.0
Minimum Green (G_{min}), s		20	7	20				10
Start-Up Lost Time (*l1*), s		2.0	2.0	2.0			2.0	
Extension of Effective Green (*e*), s		2.0	2.0	2.0			2.0	
Passage (*PT*), s		2.0	2.0	2.0				2.0
Recall Mode		Min	Off	Min				Off
Dual Entry		Yes	No	Yes				Yes
Walk (*Walk*), s				0.0		0.0		0.0
Pedestrian Clearance Time (*PC*), s				0.0		0.0		0.0

Multimodal Information	EB			WB			NB			SB		
85th % Speed / Rest in Walk / Corner Radius				0.0	No	25.0	0.0	No	25.0	0.0	No	25.0
Walkway / Crosswalk Width / Length, ft				9.0	12.0	0.0	9.0	12.0	0.0	9.0	12.0	0.0
Street Width / Island / Curb, ft	0.0		No	0.0	0	No		0		0.0	0	No
Width Outside / Bike Lane / Shoulder, ft	12.0	5.0	2.0	12.0	5.0	2.0				12.0	5.0	2.0
Pedestrian Signal / Occupied Parking		0.50		No	0.50		No			No	0.50	

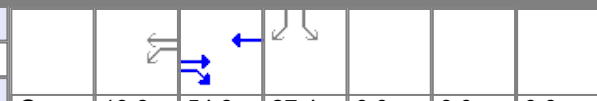
HCS Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	CMT			Duration, h	0.250
Analyst	TJH	Analysis Date	2/14/2023	Area Type	Other
Jurisdiction	ODOT District 3	Time Period	AM	PHF	0.89
Urban Street	SR-254 (Detroit Rd)	Analysis Year	2045	Analysis Period	1> 7:00
Intersection	I-90 WB Ramps	File Name	SR-254 Corridor 2045 AM - Existing.xus		
Project Description	2045 AM Existing				

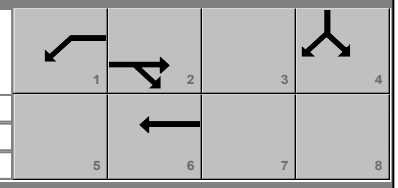


Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h		590	50	350	360					330		240

Signal Information			
Cycle, s	120.0	Reference Phase	2
Offset, s	7	Reference Point	Begin
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	19.8	54.8	27.4	0.0	0.0	0.0
Yellow	4.0	4.0	4.0	0.0	0.0	0.0
Red	2.0	2.0	2.0	0.0	0.0	0.0



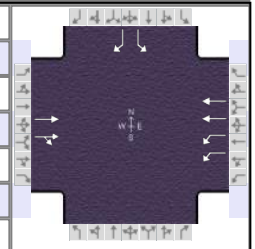
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		2	1	6				4
Case Number		8.3	2.0	4.0				9.0
Phase Duration, s		60.8	25.8	86.6				33.4
Change Period, ($Y+R_c$), s		6.0	6.0	6.0				6.0
Max Allow Headway (*MAH*), s		0.0	3.1	0.0				3.2
Queue Clearance Time (g_s), s			18.8					26.3
Green Extension Time (g_e), s		0.0	1.0	0.0				1.1
Phase Call Probability			1.00					1.00
Max Out Probability			0.00					0.05

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement		2	12	1	6					7		14
Adjusted Flow Rate (*v*), veh/h		345	377	430	442					371		270
Adjusted Saturation Flow Rate (*s*), veh/h/ln		1645	1792	1534	1752					1781		1585
Queue Service Time (g_s), s		21.7	18.3	16.8	8.5					24.3		19.0
Cycle Queue Clearance Time (g_c), s		21.7	18.3	16.8	8.5					24.3		19.0
Green Ratio (*g/C*)		0.46	0.46	0.16	0.67					0.23		0.23
Capacity (*c*), veh/h		751	818	506	2353					407		362
Volume-to-Capacity Ratio (*X*)		0.460	0.461	0.850	0.188					0.911		0.744
Back of Queue (*Q*), ft/ln (95 th percentile)		298.8	313.1	288.8	158.7					455.8		308.9
Back of Queue (*Q*), veh/ln (95 th percentile)		11.6	12.5	11.2	6.2					17.9		12.2
Queue Storage Ratio (*RQ*) (95 th percentile)		0.69	0.75	0.53	0.18					0.65		0.33
Uniform Delay (d_1), s/veh		24.1	24.4	57.3	12.3					45.1		43.0
Incremental Delay (d_2), s/veh		1.8	1.6	1.3	0.1					14.5		2.9
Initial Queue Delay (d_3), s/veh		0.0	0.0	0.0	0.0					0.0		0.0
Control Delay (*d*), s/veh		25.9	26.1	58.6	12.4					59.6		45.9
Level of Service (LOS)		C	C	E	B					E		D
Approach Delay, s/veh / LOS	26.0	C		35.2	D		0.0			53.8	D	
Intersection Delay, s/veh / LOS	37.6						D					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	1.69	B	1.65	B	2.47	B	2.15	B
Bicycle LOS Score / LOS	1.08	A	1.15	A				F

HCS Signalized Intersection Intermediate Values

General Information				Intersection Information	
Agency	CMT			Duration, h	0.250
Analyst	TJH	Analysis Date	2/14/2023	Area Type	Other
Jurisdiction	ODOT District 3	Time Period	AM	PHF	0.89
Urban Street	SR-254 (Detroit Rd)	Analysis Year	2045	Analysis Period	1> 7:00
Intersection	I-90 WB Ramps	File Name	SR-254 Corridor 2045 AM - Existing.xus		
Project Description	2045 AM Existing				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h		590	50	350	360					330		240

Signal Information			
Cycle, s	120.0	Reference Phase	2
Offset, s	7	Reference Point	Begin
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

							1	2	3	4
Green	19.8	54.8	27.4	0.0	0.0	0.0	5	6	7	8
Yellow	4.0	4.0	4.0	0.0	0.0	0.0				
Red	2.0	2.0	2.0	0.0	0.0	0.0				

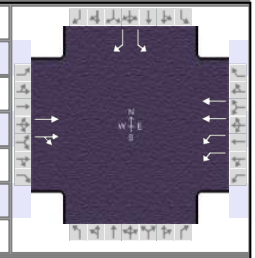
Saturation Flow / Delay	L	T	R	L	T	R	L	T	R	L	T	R
Lane Width Adjustment Factor (f_w)	1.000	1.000	1.000	1.000	1.000	1.000				1.000	1.000	1.000
Heavy Vehicles and Grade Factor (f_{HVg})	1.000	0.969	1.000	0.969	0.969	1.000				0.984	1.000	0.984
Parking Activity Adjustment Factor (f_p)	1.000	1.000	1.000	1.000	1.000	1.000	0.000	0.000	0.000	1.000	1.000	1.000
Bus Blockage Adjustment Factor (f_{bb})	1.000	1.000	1.000	1.000	1.000	1.000	0.000	0.000	0.000	1.000	1.000	1.000
Area Type Adjustment Factor (f_a)	1.000	1.000	1.000	1.000	1.000	1.000				1.000	1.000	1.000
Lane Utilization Adjustment Factor (f_{LU})	1.000	0.894	1.000	0.875	0.952	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Left-Turn Adjustment Factor (f_{LT})	1.000	1.000		0.952	0.000					0.952	0.000	
Right-Turn Adjustment Factor (f_{RT})		0.974	0.974		1.000	1.000					0.000	0.847
Left-Turn Pedestrian Adjustment Factor (f_{Lpb})	1.000			1.000						1.000		
Right-Turn Ped-Bike Adjustment Factor (f_{Rpb})			1.000			1.000						1.000
Work Zone Adjustment Factor (f_{wz})	1.000	1.000	1.000	1.000	1.000	1.000				1.000	1.000	1.000
DDI Factor (f_{DDI})	1.000	1.000	1.000	1.000	1.000	1.000				1.000	1.000	1.000
Left-Turn Prot. CAV Adj. Factor ($f_{CAV,prot}$)				1.00								
Left-Turn Perm. CAV Adj. Factor ($f_{CAV,perm}$)	1.00											
Movement Saturation Flow Rate (s), veh/h	0	3365	268	3068	3593	0				1781	0	1585
Proportion of Vehicles Arriving on Green (P)	0.00	0.42	0.38	0.02	0.49	0.00	0.00	0.00	0.00	0.23	0.00	0.23
Incremental Delay Factor (k)		0.50	0.50	0.04	0.50					0.22		0.10

Signal Timing / Movement Groups	EBL	EBT/R	WBL	WBT/R	NBL	NBT/R	SBL	SBT/R
Lost Time (t_L)		6.0	6.0	6.0				4.0
Green Ratio (g/C)		0.46	0.16	0.67				0.23
Permitted Saturation Flow Rate (s_p), veh/h/ln		962	0	0				1781
Shared Saturation Flow Rate (s_{sh}), veh/h/ln		0						
Permitted Effective Green Time (g_p), s		0.0	0.0	0.0				0.0
Permitted Service Time (g_u), s		0.0	0.0	0.0				0.0
Permitted Queue Service Time (g_{ps}), s								
Time to First Blockage (g_f), s		54.8	0.0	0.0				0.0
Queue Service Time Before Blockage (g_{fs}), s								
Protected Right Saturation Flow (s_R), veh/h/ln								0
Protected Right Effective Green Time (g_R), s								0.0

Multimodal	EB		WB		NB		SB	
Pedestrian F_w / F_v	0.972	0.000	0.972	0.000	1.710	0.000	1.389	0.000
Pedestrian F_s / F_{delay}	0.000	0.115	0.000	0.075	0.000	0.164	0.000	0.164
Pedestrian M_{corner} / M_{cw}	0.00		0.00		0.00		0.00	
Bicycle c_b / d_b	912.97	17.72	1342.81	6.48	-83.33	65.10		67.20
Bicycle F_w / F_v	-3.64	0.59	-3.64	0.66	-3.64		-3.64	Infinity

HCS Signalized Intersection Results Graphical Summary

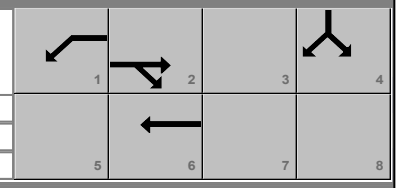
General Information				Intersection Information	
Agency	CMT			Duration, h	0.250
Analyst	TJH	Analysis Date	2/14/2023	Area Type	Other
Jurisdiction	ODOT District 3	Time Period	AM	PHF	0.89
Urban Street	SR-254 (Detroit Rd)	Analysis Year	2045	Analysis Period	1> 7:00
Intersection	I-90 WB Ramps	File Name	SR-254 Corridor 2045 AM - Existing.xus		
Project Description	2045 AM Existing				



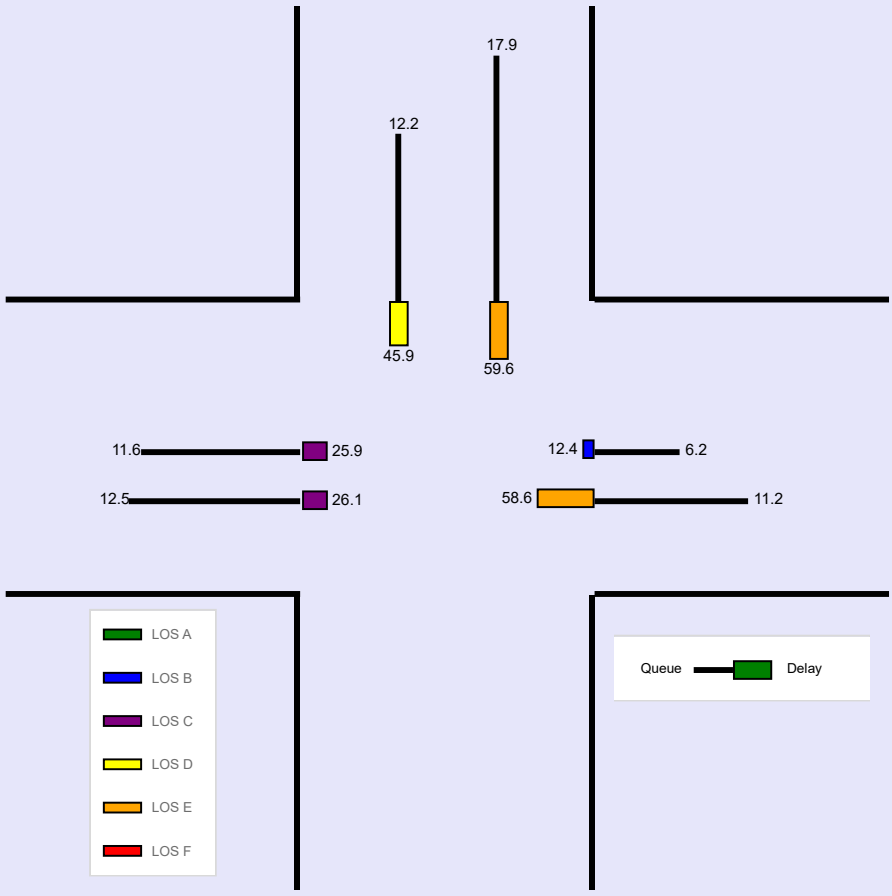
Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h		590	50	350	360					330		240

Signal Information			
Cycle, s	120.0	Reference Phase	2
Offset, s	7	Reference Point	Begin
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	19.8	54.8	27.4	0.0	0.0	0.0						
Yellow	4.0	4.0	4.0	0.0	0.0	0.0						
Red	2.0	2.0	2.0	0.0	0.0	0.0						

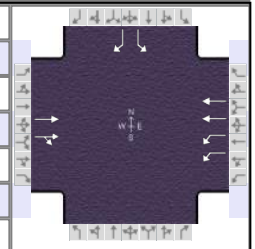


Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Back of Queue (*Q*), ft/ln (95 th percentile)		298.8	313.1	288.8	158.7					455.8		308.9
Back of Queue (*Q*), veh/ln (95 th percentile)		11.6	12.5	11.2	6.2					17.9		12.2
Queue Storage Ratio (*RQ*) (95 th percentile)		0.69	0.75	0.53	0.18					0.65		0.33
Control Delay (*d*), s/veh		25.9	26.1	58.6	12.4					59.6		45.9
Level of Service (LOS)		C	C	E	B					E		D
Approach Delay, s/veh / LOS	26.0	C		35.2	D		0.0			53.8	D	
Intersection Delay, s/veh / LOS	37.6						D					



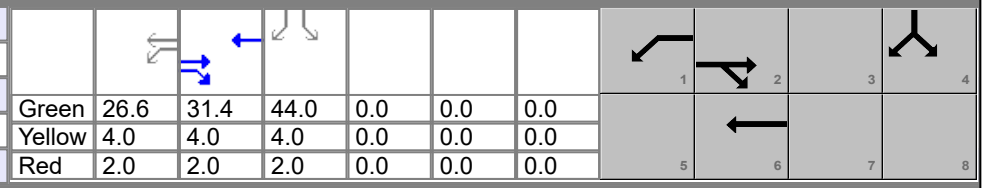
HCS Signalized Intersection Input Data

General Information				Intersection Information	
Agency	CMT			Duration, h	0.250
Analyst	TJH	Analysis Date	2/14/2023	Area Type	Other
Jurisdiction	ODOT District 3	Time Period	PM	PHF	0.94
Urban Street	SR-254 (Detroit Rd)	Analysis Year	2045	Analysis Period	1> 17:00
Intersection	I-90 WB Ramps	File Name	SR-254 Corridor 2045 PM - Existing.xus		
Project Description	2045 PM Existing				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h		750	100	610	610					640		530

Signal Information			
Cycle, s	120.0	Reference Phase	2
Offset, s	0	Reference Point	Begin
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	26.6	31.4	44.0	0.0	0.0	0.0						
Yellow	4.0	4.0	4.0	0.0	0.0	0.0						
Red	2.0	2.0	2.0	0.0	0.0	0.0						

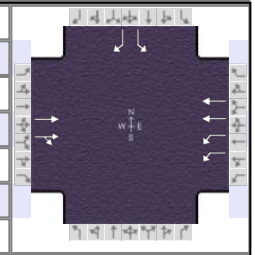
Traffic Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h		750	100	610	610					640		530
Initial Queue (Q_b), veh/h		0	0	0	0					0		0
Base Saturation Flow Rate (s_o), veh/h		1900	1900	1900	1900					1900		1900
Parking (N_m), man/h		None			None						None	
Heavy Vehicles (P_{HV}), %		4		4	4					2		2
Ped / Bike / RTOR, /h	0	0	0	0	0		0	0		0	0	
Buses (N_b), buses/h	0	0	0	0	0	0				0	0	0
Arrival Type (*AT*)		3	3	3	3					3		3
Upstream Filtering (*I*)		0.80	0.80	0.58	0.58					1.00		1.00
Lane Width (*W*), ft		12.0		12.0	12.0					12.0		12.0
Turn Bay Length, ft		430		550	890					700		950
Grade (*Pg*), %		0			0			0			0	
Speed Limit, mi/h		35	35	35	35					35		35

Phase Information	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Maximum Green (G_{max}) or Phase Split, s		36.0	34.0	70.0				50.0
Yellow Change Interval (*Y*), s		4.0	4.0	4.0				4.0
Red Clearance Interval (R_c), s		2.0	2.0	2.0				2.0
Minimum Green (G_{min}), s		20	7	20				10
Start-Up Lost Time (*l1*), s		2.0	2.0	2.0			2.0	
Extension of Effective Green (*e*), s		2.0	2.0	2.0			2.0	
Passage (*PT*), s		2.0	2.0	2.0				2.0
Recall Mode		Min	Off	Min				Off
Dual Entry		Yes	No	Yes				Yes
Walk (*Walk*), s				0.0		0.0		0.0
Pedestrian Clearance Time (*PC*), s				0.0		0.0		0.0

Multimodal Information	EB			WB			NB			SB		
85th % Speed / Rest in Walk / Corner Radius				0.0	No	25.0	0.0	No	25.0	0.0	No	25.0
Walkway / Crosswalk Width / Length, ft				9.0	12.0	0.0	9.0	12.0	0.0	9.0	12.0	0.0
Street Width / Island / Curb, ft	0.0		No	0.0	0	No		0		0.0	0	No
Width Outside / Bike Lane / Shoulder, ft	12.0	5.0	2.0	12.0	5.0	2.0				12.0	5.0	2.0
Pedestrian Signal / Occupied Parking		0.50		No	0.50		No			No	0.50	

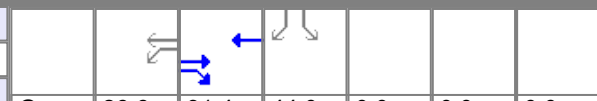
HCS Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	CMT			Duration, h	0.250
Analyst	TJH	Analysis Date	2/14/2023	Area Type	Other
Jurisdiction	ODOT District 3	Time Period	PM	PHF	0.94
Urban Street	SR-254 (Detroit Rd)	Analysis Year	2045	Analysis Period	1> 17:00
Intersection	I-90 WB Ramps	File Name	SR-254 Corridor 2045 PM - Existing.xus		
Project Description	2045 PM Existing				

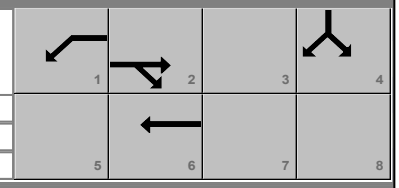


Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h		750	100	610	610					640		530

Signal Information			
Cycle, s	120.0	Reference Phase	2
Offset, s	0	Reference Point	Begin
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	26.6	31.4	44.0	0.0	0.0	0.0
Yellow	4.0	4.0	4.0	0.0	0.0	0.0
Red	2.0	2.0	2.0	0.0	0.0	0.0



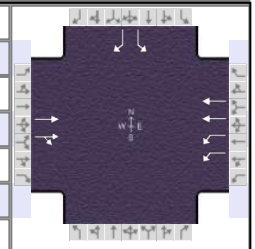
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		2	1	6				4
Case Number		8.3	2.0	4.0				9.0
Phase Duration, s		37.4	32.6	70.0				50.0
Change Period, (*Y+R c*), s		6.0	6.0	6.0				6.0
Max Allow Headway (*MAH*), s		0.0	3.1	0.0				3.2
Queue Clearance Time (*g s*), s			26.1					46.0
Green Extension Time (*g e*), s		0.0	0.4	0.0				0.0
Phase Call Probability			1.00					1.00
Max Out Probability			1.00					1.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement		2	12	1	6					7		14
Adjusted Flow Rate (*v*), veh/h		396	488	633	633					681		564
Adjusted Saturation Flow Rate (*s*), veh/h/ln		1438	1773	1573	1752					1781		1585
Queue Service Time (*g s*), s		30.0	31.4	24.1	15.2					44.0		42.0
Cycle Queue Clearance Time (*g c*), s		30.0	31.4	24.1	15.2					44.0		42.0
Green Ratio (*g/C*)		0.26	0.26	0.22	0.53					0.37		0.37
Capacity (*c*), veh/h		377	465	696	1869					653		581
Volume-to-Capacity Ratio (*X*)		1.051	1.051	0.910	0.339					1.042		0.970
Back of Queue (*Q*), ft/ln (95 th percentile)		590.1	677.4	403.8	254.3					930.6		710.1
Back of Queue (*Q*), veh/ln (95 th percentile)		22.9	27.1	15.7	9.9					36.6		28.0
Queue Storage Ratio (*RQ*) (95 th percentile)		1.37	1.63	0.73	0.29					1.33		0.75
Uniform Delay (*d 1*), s/veh		40.9	41.9	58.4	21.6					38.0		37.4
Incremental Delay (*d 2*), s/veh		55.4	51.4	9.3	0.3					46.7		29.7
Initial Queue Delay (*d 3*), s/veh		0.0	0.0	0.0	0.0					0.0		0.0
Control Delay (*d*), s/veh		96.3	93.3	67.7	21.9					84.7		67.0
Level of Service (LOS)		F	F	E	C					F		E
Approach Delay, s/veh / LOS	94.6	F		44.8	D		0.0			76.7	E	
Intersection Delay, s/veh / LOS	69.5						E					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	1.71	B	1.68	B	2.47	B	2.15	B
Bicycle LOS Score / LOS	1.23	A	1.56	B				F

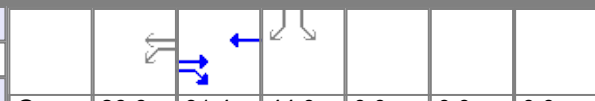
HCS Signalized Intersection Intermediate Values

General Information				Intersection Information	
Agency	CMT			Duration, h	0.250
Analyst	TJH	Analysis Date	2/14/2023	Area Type	Other
Jurisdiction	ODOT District 3	Time Period	PM	PHF	0.94
Urban Street	SR-254 (Detroit Rd)	Analysis Year	2045	Analysis Period	1> 17:00
Intersection	I-90 WB Ramps	File Name	SR-254 Corridor 2045 PM - Existing.xus		
Project Description	2045 PM Existing				

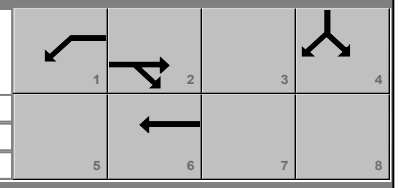


Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h		750	100	610	610					640		530

Signal Information			
Cycle, s	120.0	Reference Phase	2
Offset, s	0	Reference Point	Begin
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	26.6	31.4	44.0	0.0	0.0	0.0						
Yellow	4.0	4.0	4.0	0.0	0.0	0.0						
Red	2.0	2.0	2.0	0.0	0.0	0.0						



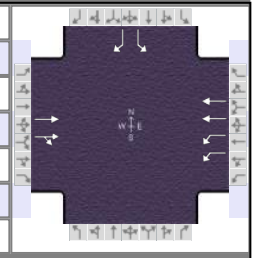
Saturation Flow / Delay	L	T	R	L	T	R	L	T	R	L	T	R
Lane Width Adjustment Factor (f_w)	1.000	1.000	1.000	1.000	1.000	1.000				1.000	1.000	1.000
Heavy Vehicles and Grade Factor (f_{HVg})	1.000	0.969	1.000	0.969	0.969	1.000				0.984	1.000	0.984
Parking Activity Adjustment Factor (f_p)	1.000	1.000	1.000	1.000	1.000	1.000	0.000	0.000	0.000	1.000	1.000	1.000
Bus Blockage Adjustment Factor (f_{bb})	1.000	1.000	1.000	1.000	1.000	1.000	0.000	0.000	0.000	1.000	1.000	1.000
Area Type Adjustment Factor (f_a)	1.000	1.000	1.000	1.000	1.000	1.000				1.000	1.000	1.000
Lane Utilization Adjustment Factor (f_{LU})	1.000	0.781	1.000	0.897	0.952	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Left-Turn Adjustment Factor (f_{LT})	1.000	1.000		0.952	0.000					0.952	0.000	
Right-Turn Adjustment Factor (f_{RT})		0.963	0.963		1.000	1.000					0.000	0.847
Left-Turn Pedestrian Adjustment Factor (f_{Lpb})	1.000			1.000						1.000		
Right-Turn Ped-Bike Adjustment Factor (f_{Rpb})			1.000			1.000						1.000
Work Zone Adjustment Factor (f_{wz})	1.000	1.000	1.000	1.000	1.000	1.000				1.000	1.000	1.000
DDI Factor (f_{DDI})	1.000	1.000	1.000	1.000	1.000	1.000				1.000	1.000	1.000
Left-Turn Prot. CAV Adj. Factor ($f_{CAV,prot}$)				1.00								
Left-Turn Perm. CAV Adj. Factor ($f_{CAV,perm}$)	1.00											
Movement Saturation Flow Rate (s), veh/h	0	3236	378	3145	3593	0				1781	0	1585
Proportion of Vehicles Arriving on Green (P)	0.00	0.32	0.24	0.01	0.39	0.00	0.00	0.00	0.00	0.37	0.00	0.37
Incremental Delay Factor (k)		0.50	0.50	0.37	0.50					0.50		0.47

Signal Timing / Movement Groups	EBL	EBT/R	WBL	WBT/R	NBL	NBT/R	SBL	SBT/R
Lost Time (t_L)		6.0	6.0	6.0				4.0
Green Ratio (g/C)		0.26	0.22	0.53				0.37
Permitted Saturation Flow Rate (s_p), veh/h/ln		807	0	0				1781
Shared Saturation Flow Rate (s_{sh}), veh/h/ln		0						
Permitted Effective Green Time (g_p), s		0.0	0.0	0.0				0.0
Permitted Service Time (g_u), s		0.0	0.0	0.0				0.0
Permitted Queue Service Time (g_{ps}), s								
Time to First Blockage (g_f), s		31.4	0.0	0.0				0.0
Queue Service Time Before Blockage (g_{fs}), s								
Protected Right Saturation Flow (s_R), veh/h/ln								0
Protected Right Effective Green Time (g_R), s								0.0

Multimodal	EB		WB		NB		SB	
Pedestrian F_w / F_v	0.972	0.000	0.972	0.000	1.710	0.000	1.389	0.000
Pedestrian F_s / F_{delay}	0.000	0.140	0.000	0.103	0.000	0.164	0.000	0.164
Pedestrian M_{corner} / M_{cw}	0.00		0.00		0.00		0.00	
Bicycle c_b / d_b	524.15	32.67	1066.67	13.07	-83.33	65.10		67.20
Bicycle F_w / F_v	-3.64	0.75	-3.64	1.07	-3.64		-3.64	Infinity

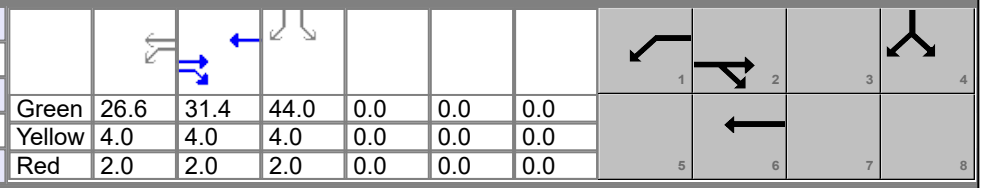
HCS Signalized Intersection Results Graphical Summary

General Information				Intersection Information	
Agency	CMT			Duration, h	0.250
Analyst	TJH	Analysis Date	2/14/2023	Area Type	Other
Jurisdiction	ODOT District 3	Time Period	PM	PHF	0.94
Urban Street	SR-254 (Detroit Rd)	Analysis Year	2045	Analysis Period	1> 17:00
Intersection	I-90 WB Ramps	File Name	SR-254 Corridor 2045 PM - Existing.xus		
Project Description	2045 PM Existing				



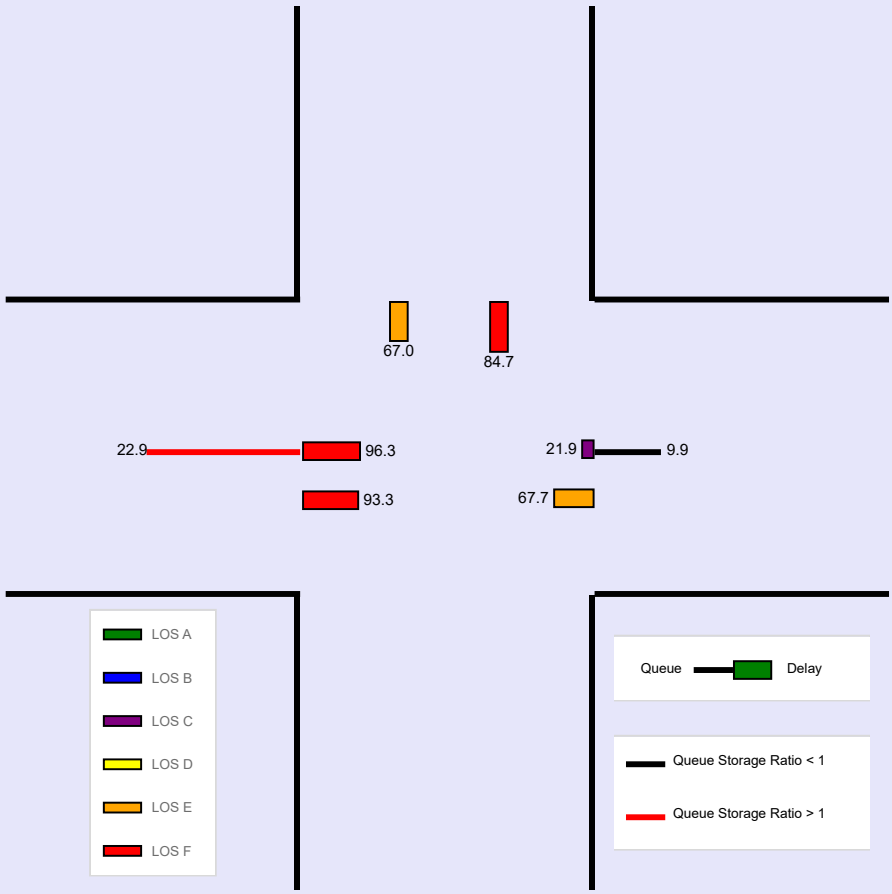
Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h		750	100	610	610					640		530

Signal Information			
Cycle, s	120.0	Reference Phase	2
Offset, s	0	Reference Point	Begin
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	26.6	31.4	44.0	0.0	0.0	0.0						
Yellow	4.0	4.0	4.0	0.0	0.0	0.0						
Red	2.0	2.0	2.0	0.0	0.0	0.0						

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Back of Queue (*Q*), ft/ln (95 th percentile)		590.1	677.4	403.8	254.3					930.6		710.1
Back of Queue (*Q*), veh/ln (95 th percentile)		22.9	27.1	15.7	9.9					36.6		28.0
Queue Storage Ratio (*RQ*) (95 th percentile)		1.37	1.63	0.73	0.29					1.33		0.75
Control Delay (*d*), s/veh		96.3	93.3	67.7	21.9					84.7		67.0
Level of Service (LOS)		F	F	E	C					F		E
Approach Delay, s/veh / LOS	94.6		F	44.8		D	0.0			76.7		E
Intersection Delay, s/veh / LOS	69.5						E					



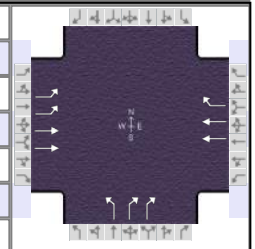
--- Messages ---

WARNING: Since queue spillover from turn lanes and spillback into upstream intersections is not accounted for in the HCM procedures, use of a simulation tool may be advised in situations where the Queue Storage Ratio exceeds 1.0.

--- Comments ---

HCS Signalized Intersection Input Data

General Information				Intersection Information	
Agency	CMT			Duration, h	0.250
Analyst	TJH	Analysis Date	2/14/2023	Area Type	Other
Jurisdiction	ODOT District 3	Time Period	AM	PHF	0.88
Urban Street	SR-254 (Detroit Rd)	Analysis Year	2045	Analysis Period	1> 7:00
Intersection	I-90 EB Ramps	File Name	SR-254 Corridor 2045 AM - Existing.xus		
Project Description	2045 AM Existing				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	260	660			630	550	80		500			

Signal Information					EB			WB			NB			SB		
Cycle, s	120.0	Reference Phase	2													
Offset, s	32	Reference Point	End	Green	12.5	49.8	39.7	0.0	0.0	0.0						
Uncoordinated	No	Simult. Gap E/W	On	Yellow	4.0	4.0	4.0	0.0	0.0	0.0						
Force Mode	Fixed	Simult. Gap N/S	On	Red	2.0	2.0	2.0	0.0	0.0	0.0						

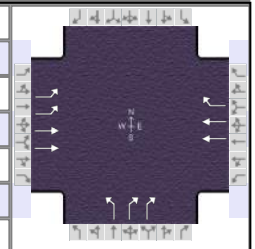
Traffic Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	260	660			630	550	80		500			
Initial Queue (Q_b), veh/h	0	0			0	0	0		0			
Base Saturation Flow Rate (s_o), veh/h	1900	1900			1900	1900	1900		1900			
Parking (N_m), man/h		None			None			None				
Heavy Vehicles (P_{HV}), %	3	3			2	2	4		4			
Ped / Bike / RTOR, /h	0	0		0	0	0	0	0		0	0	
Buses (N_b), buses/h	0	0	0	0	0	0	0	0	0			
Arrival Type (*AT*)	3	3			3	3	3		3			
Upstream Filtering (*I*)	0.75	0.75			0.81	0.81	1.00		1.00			
Lane Width (*W*), ft	12.0	12.0			12.0	12.0	12.0		12.0			
Turn Bay Length, ft	270	890			650	450	460		690			
Grade (*Pg*), %		0			0			0			0	
Speed Limit, mi/h	35	35			35	35	35		35			

Phase Information	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Maximum Green (G_{max}) or Phase Split, s	21.0	71.0		50.0		49.0		
Yellow Change Interval (*Y*), s	4.0	4.0		4.0		4.0		
Red Clearance Interval (R_c), s	2.0	2.0		2.0		2.0		
Minimum Green (G_{min}), s	7	20		20		10		
Start-Up Lost Time (*lt*), s	2.0	2.0		2.0	2.0			
Extension of Effective Green (*e*), s	2.0	2.0		2.0	2.0			
Passage (*PT*), s	2.0	2.0		2.0		2.0		
Recall Mode	Off	Min		Min		Off		
Dual Entry	No	Yes		Yes		Yes		
Walk (*Walk*), s		0.0				0.0		0.0
Pedestrian Clearance Time (*PC*), s		0.0				0.0		0.0

Multimodal Information	EB			WB			NB			SB		
85th % Speed / Rest in Walk / Corner Radius	0.0	No	25.0				0.0	No	25.0	0.0	No	25.0
Walkway / Crosswalk Width / Length, ft	9.0	12.0	0.0				9.0	12.0	0.0	9.0	12.0	0.0
Street Width / Island / Curb, ft	0.0	0	No	0.0		No	0.0	0	No		0	
Width Outside / Bike Lane / Shoulder, ft	12.0	5.0	2.0	12.0	5.0	2.0	12.0	5.0	2.0			
Pedestrian Signal / Occupied Parking	No	0.50			0.50		No	0.50		No		

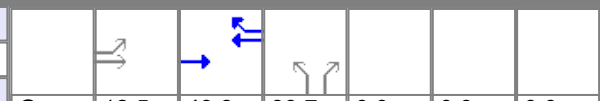
HCS Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	CMT			Duration, h	0.250
Analyst	TJH	Analysis Date	2/14/2023	Area Type	Other
Jurisdiction	ODOT District 3	Time Period	AM	PHF	0.88
Urban Street	SR-254 (Detroit Rd)	Analysis Year	2045	Analysis Period	1> 7:00
Intersection	I-90 EB Ramps	File Name	SR-254 Corridor 2045 AM - Existing.xus		
Project Description	2045 AM Existing				

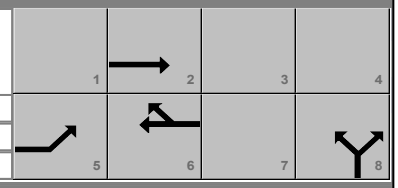


Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	260	660			630	550	80		500			

Signal Information			
Cycle, s	120.0	Reference Phase	2
Offset, s	32	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	12.5	49.8	39.7	0.0	0.0	0.0						
Yellow	4.0	4.0	4.0	0.0	0.0	0.0						
Red	2.0	2.0	2.0	0.0	0.0	0.0						



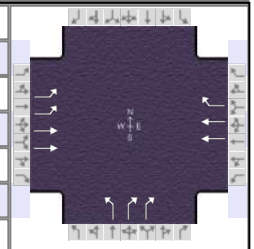
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	5	2		6		8		
Case Number	2.0	4.0		7.3		9.0		
Phase Duration, s	18.5	74.3		55.8		45.7		
Change Period, ($Y+R_c$), s	6.0	6.0		6.0		6.0		
Max Allow Headway (*MAH*), s	3.1	0.0		0.0		3.3		
Queue Clearance Time (g_s), s	12.1					38.8		
Green Extension Time (g_e), s	0.4	0.0		0.0		0.9		
Phase Call Probability	1.00					1.00		
Max Out Probability	0.05					0.65		

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			6	16	3		18			
Adjusted Flow Rate (*v*), veh/h	293	744			781	682	91		568			
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1714	1766			1683	1585	1753		905			
Queue Service Time (g_s), s	10.1	18.9			24.4	49.8	4.4		36.8			
Cycle Queue Clearance Time (g_c), s	10.1	18.9			24.4	49.8	4.4		36.8			
Green Ratio (*g/C*)	0.10	0.57			0.42	0.42	0.33		0.33			
Capacity (*c*), veh/h	357	2012			1398	658	579		598			
Volume-to-Capacity Ratio (*X*)	0.820	0.370			0.559	1.036	0.157		0.950			
Back of Queue (*Q*), ft/ln (95 th percentile)	197.1	325.8			399.1	301.2	85.8		385.4			
Back of Queue (*Q*), veh/ln (95 th percentile)	7.7	12.7			15.7	11.9	3.3		14.9			
Queue Storage Ratio (*RQ*) (95 th percentile)	0.73	0.37			0.61	0.67	0.19		0.56			
Uniform Delay (d_1), s/veh	55.0	23.0			35.9	51.3	28.4		39.2			
Incremental Delay (d_2), s/veh	3.1	0.4			1.3	41.3	0.0		22.2			
Initial Queue Delay (d_3), s/veh	0.0	0.0			0.0	0.0	0.0		0.0			
Control Delay (*d*), s/veh	58.1	23.4			37.2	92.6	28.4		61.5			
Level of Service (LOS)	E	C			D	F	C		E			
Approach Delay, s/veh / LOS	33.2	C		63.0	E		56.9	E		0.0		
Intersection Delay, s/veh / LOS	52.0						D					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	1.89	B	1.69	B	2.32	B	2.47	B
Bicycle LOS Score / LOS	1.35	A	1.59	B		F		

HCS Signalized Intersection Intermediate Values

General Information				Intersection Information	
Agency	CMT			Duration, h	0.250
Analyst	TJH	Analysis Date	2/14/2023	Area Type	Other
Jurisdiction	ODOT District 3	Time Period	AM	PHF	0.88
Urban Street	SR-254 (Detroit Rd)	Analysis Year	2045	Analysis Period	1> 7:00
Intersection	I-90 EB Ramps	File Name	SR-254 Corridor 2045 AM - Existing.xus		
Project Description	2045 AM Existing				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	260	660			630	550	80		500			

Signal Information			
Cycle, s	120.0	Reference Phase	2
Offset, s	32	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

							1	2	3	4		
Green	12.5	49.8	39.7	0.0	0.0	0.0	5	6	7	8		
Yellow	4.0	4.0	4.0	0.0	0.0	0.0						
Red	2.0	2.0	2.0	0.0	0.0	0.0						

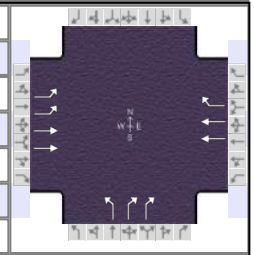
Saturation Flow / Delay	L	T	R	L	T	R	L	T	R	L	T	R
Lane Width Adjustment Factor (f_w)	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000			
Heavy Vehicles and Grade Factor (f_{HVg})	0.977	0.977	1.000	1.000	0.984	0.984	0.969	1.000	0.969			
Parking Activity Adjustment Factor (f_p)	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.000	0.000	0.000
Bus Blockage Adjustment Factor (f_{bb})	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.000	0.000	0.000
Area Type Adjustment Factor (f_a)	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000			
Lane Utilization Adjustment Factor (f_{LU})	0.970	0.952	1.000	1.000	0.900	1.000	1.000	1.000	0.580	1.000	1.000	1.000
Left-Turn Adjustment Factor (f_{LT})	0.952	0.000		1.000	1.000		0.952	0.000				
Right-Turn Adjustment Factor (f_{RT})		1.000	1.000		0.000	0.847		0.000	0.847			
Left-Turn Pedestrian Adjustment Factor (f_{Lpb})	1.000			1.000			1.000					
Right-Turn Ped-Bike Adjustment Factor (f_{Rpb})			1.000			1.000			1.000			
Work Zone Adjustment Factor (f_{wz})	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000			
DDI Factor (f_{DDI})	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000			
Left-Turn Prot. CAV Adj. Factor ($f_{CAV,prot}$)	1.00											
Left-Turn Perm. CAV Adj. Factor ($f_{CAV,perm}$)				1.00								
Movement Saturation Flow Rate (s), veh/h	3429	3622	0	0	3554	1585	1753	0	1810			
Proportion of Vehicles Arriving on Green (P)	0.06	0.35	0.00	0.00	0.24	0.14	0.33	0.00	0.33	0.00	0.00	0.00
Incremental Delay Factor (k)	0.09	0.50			0.50	0.50	0.04		0.39			

Signal Timing / Movement Groups	EBL	EBT/R	WBL	WBT/R	NBL	NBT/R	SBL	SBT/R
Lost Time (t_L)	6.0	6.0		6.0		4.0		
Green Ratio (g/C)	0.10	0.57		0.42		0.33		
Permitted Saturation Flow Rate (s_p), veh/h/ln	0	0		728		1753		
Shared Saturation Flow Rate (s_{sh}), veh/h/ln				0				
Permitted Effective Green Time (g_p), s	0.0	0.0		0.0		0.0		
Permitted Service Time (g_u), s	0.0	0.0		0.0		0.0		
Permitted Queue Service Time (g_{ps}), s								
Time to First Blockage (g_f), s	0.0	0.0		49.8		0.0		
Queue Service Time Before Blockage (g_{fs}), s								
Protected Right Saturation Flow (s_R), veh/h/ln				0		0		
Protected Right Effective Green Time (g_R), s				0.0		0.0		

Multimodal	EB		WB		NB		SB	
Pedestrian F_w / F_v	1.198	0.000	0.972	0.000	1.557	0.000	1.710	0.000
Pedestrian F_s / F_{delay}	0.000	0.097	0.000	0.121	0.000	0.164	0.000	0.164
Pedestrian M_{corner} / M_{cw}	0.00		0.00		0.00		0.00	
Bicycle c_b / d_b	1139.13	11.12	830.67	20.51		67.20	-83.33	65.10
Bicycle F_w / F_v	-3.64	0.86	-3.64	1.11	-3.64	Infinity	-3.64	

HCS Signalized Intersection Results Graphical Summary

General Information				Intersection Information	
Agency	CMT			Duration, h	0.250
Analyst	TJH	Analysis Date	2/14/2023	Area Type	Other
Jurisdiction	ODOT District 3	Time Period	AM	PHF	0.88
Urban Street	SR-254 (Detroit Rd)	Analysis Year	2045	Analysis Period	1> 7:00
Intersection	I-90 EB Ramps	File Name	SR-254 Corridor 2045 AM - Existing.xus		
Project Description	2045 AM Existing				

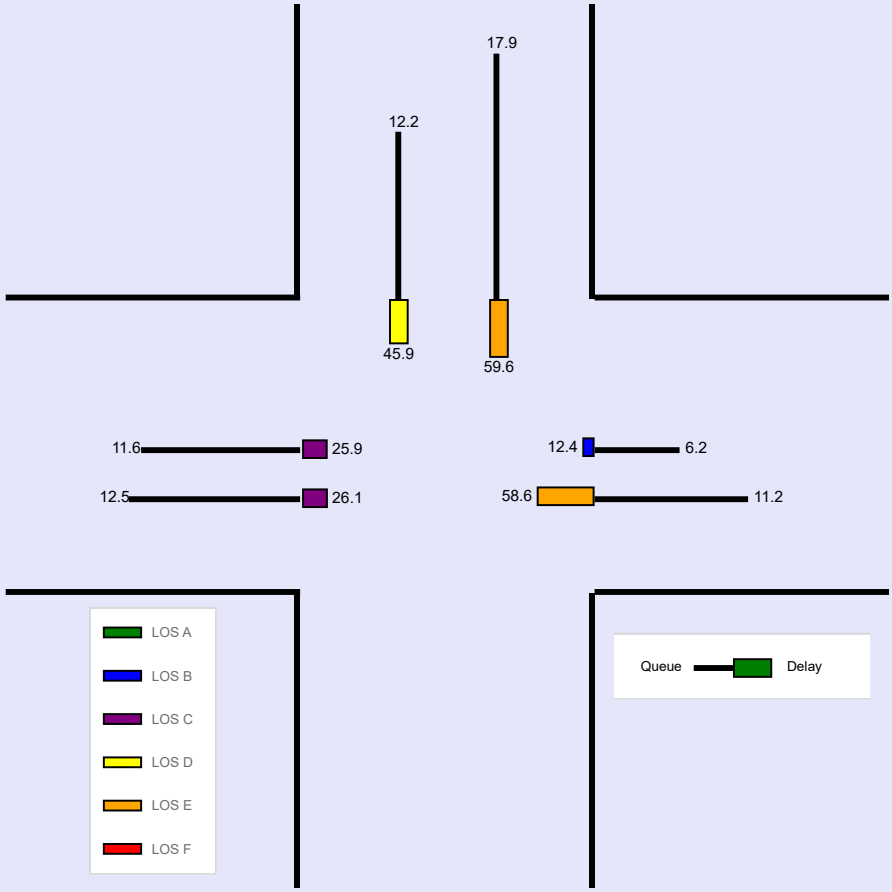


Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	260	660			630	550	80		500			

Signal Information			
Cycle, s	120.0	Reference Phase	2
Offset, s	32	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

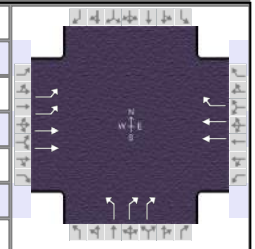
							1	2	3	4		
Green	12.5	49.8	39.7	0.0	0.0	0.0	5	6	7	8		
Yellow	4.0	4.0	4.0	0.0	0.0	0.0						
Red	2.0	2.0	2.0	0.0	0.0	0.0						

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Back of Queue (*Q*), ft/ln (95 th percentile)	197.1	325.8			399.1	301.2	85.8		385.4			
Back of Queue (*Q*), veh/ln (95 th percentile)	7.7	12.7			15.7	11.9	3.3		14.9			
Queue Storage Ratio (*RQ*) (95 th percentile)	0.73	0.37			0.61	0.67	0.19		0.56			
Control Delay (*d*), s/veh	58.1	23.4			37.2	92.6	28.4		61.5			
Level of Service (LOS)	E	C			D	F	C		E			
Approach Delay, s/veh / LOS	33.2	C		63.0	E		56.9	E		0.0		
Intersection Delay, s/veh / LOS	52.0						D					



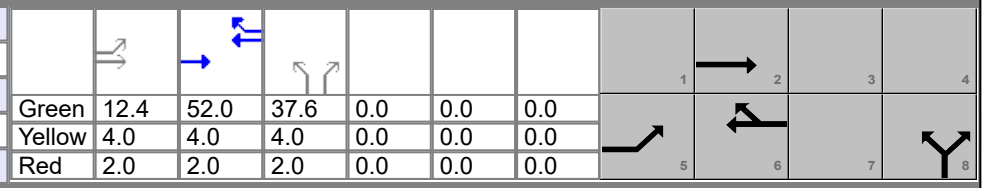
HCS Signalized Intersection Input Data

General Information				Intersection Information	
Agency	CMT			Duration, h	0.250
Analyst	TJH	Analysis Date	2/14/2023	Area Type	Other
Jurisdiction	ODOT District 3	Time Period	PM	PHF	0.94
Urban Street	SR-254 (Detroit Rd)	Analysis Year	2045	Analysis Period	1> 17:00
Intersection	I-90 EB Ramps	File Name	SR-254 Corridor 2045 PM - Existing.xus		
Project Description	2045 PM Existing				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	270	1120			1160	500	60		570			

Signal Information			
Cycle, s	120.0	Reference Phase	2
Offset, s	37	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	12.4	52.0	37.6	0.0	0.0	0.0						
Yellow	4.0	4.0	4.0	0.0	0.0	0.0						
Red	2.0	2.0	2.0	0.0	0.0	0.0						

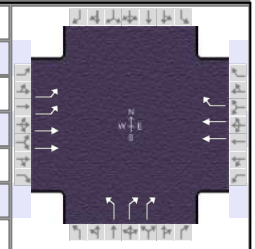
Traffic Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	270	1120			1160	500	60		570			
Initial Queue (Q_b), veh/h	0	0			0	0	0		0			
Base Saturation Flow Rate (s_o), veh/h	1900	1900			1900	1900	1900		1900			
Parking (N_m), man/h		None			None			None				
Heavy Vehicles (P_{HV}), %	3	3			2	2	4		4			
Ped / Bike / RTOR, /h	0	0		0	0	0	0	0		0	0	
Buses (N_b), buses/h	0	0	0	0	0	0	0	0	0			
Arrival Type (*AT*)	3	3			3	3	3		3			
Upstream Filtering (*I*)	0.09	0.09			0.37	0.37	1.00		1.00			
Lane Width (*W*), ft	12.0	12.0			12.0	12.0	12.0		12.0			
Turn Bay Length, ft	270	890			650	450	460		690			
Grade (*Pg*), %		0			0			0			0	
Speed Limit, mi/h	35	35			35	35	35		35			

Phase Information	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Maximum Green (G_{max}) or Phase Split, s	27.0	74.0		47.0		46.0		
Yellow Change Interval (*Y*), s	4.0	4.0		4.0		4.0		
Red Clearance Interval (R_c), s	2.0	2.0		2.0		2.0		
Minimum Green (G_{min}), s	7	20		20		10		
Start-Up Lost Time (*lt*), s	2.0	2.0		2.0	2.0			
Extension of Effective Green (*e*), s	2.0	2.0		2.0	2.0			
Passage (*PT*), s	2.0	2.0		2.0		2.0		
Recall Mode	Off	Min		Min		Off		
Dual Entry	No	Yes		Yes		Yes		
Walk (*Walk*), s		0.0				0.0		0.0
Pedestrian Clearance Time (*PC*), s		0.0				0.0		0.0

Multimodal Information	EB			WB			NB			SB		
85th % Speed / Rest in Walk / Corner Radius	0.0	No	25.0				0.0	No	25.0	0.0	No	25.0
Walkway / Crosswalk Width / Length, ft	9.0	12.0	0.0				9.0	12.0	0.0	9.0	12.0	0.0
Street Width / Island / Curb, ft	0.0	0	No	0.0		No	0.0	0	No		0	
Width Outside / Bike Lane / Shoulder, ft	12.0	5.0	2.0	12.0	5.0	2.0	12.0	5.0	2.0			
Pedestrian Signal / Occupied Parking	No	0.50			0.50		No	0.50		No		

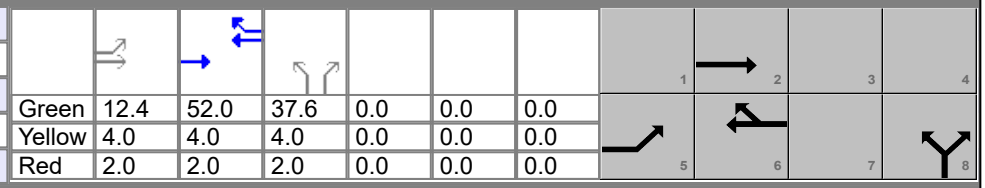
HCS Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	CMT			Duration, h	0.250
Analyst	TJH	Analysis Date	2/14/2023	Area Type	Other
Jurisdiction	ODOT District 3	Time Period	PM	PHF	0.94
Urban Street	SR-254 (Detroit Rd)	Analysis Year	2045	Analysis Period	1> 17:00
Intersection	I-90 EB Ramps	File Name	SR-254 Corridor 2045 PM - Existing.xus		
Project Description	2045 PM Existing				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	270	1120			1160	500	60		570			

Signal Information			
Cycle, s	120.0	Reference Phase	2
Offset, s	37	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	12.4	52.0	37.6	0.0	0.0	0.0						
Yellow	4.0	4.0	4.0	0.0	0.0	0.0						
Red	2.0	2.0	2.0	0.0	0.0	0.0						

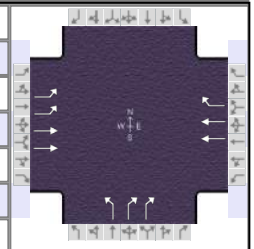
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	5	2		6		8		
Case Number	2.0	4.0		7.3		9.0		
Phase Duration, s	18.4	76.4		58.0		43.6		
Change Period, (*Y+R c*), s	6.0	6.0		6.0		6.0		
Max Allow Headway (*MAH*), s	3.1	0.0		0.0		3.3		
Queue Clearance Time (*g s*), s	11.9					36.9		
Green Extension Time (*g e*), s	0.5	0.0		0.0		0.7		
Phase Call Probability	1.00					1.00		
Max Out Probability	0.00					1.00		

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			6	16	3		18			
Adjusted Flow Rate (*v*), veh/h	271	1125			1202	518	64		606			
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1601	1766			1778	1585	1753		1020			
Queue Service Time (*g s*), s	9.9	30.1			36.3	33.9	3.1		34.9			
Cycle Queue Clearance Time (*g c*), s	9.9	30.1			36.3	33.9	3.1		34.9			
Green Ratio (*g/C*)	0.10	0.59			0.43	0.43	0.31		0.31			
Capacity (*c*), veh/h	332	2073			1540	686	549		639			
Volume-to-Capacity Ratio (*X*)	0.817	0.543			0.781	0.755	0.116		0.949			
Back of Queue (*Q*), ft/ln (95 th percentile)	126.7	390.2			514.2	444.2	61.1		406.7			
Back of Queue (*Q*), veh/ln (95 th percentile)	4.9	15.2			20.2	17.5	2.4		15.8			
Queue Storage Ratio (*RQ*) (95 th percentile)	0.47	0.44			0.79	0.99	0.13		0.59			
Uniform Delay (*d 1*), s/veh	52.6	25.2			34.0	31.0	29.4		40.3			
Incremental Delay (*d 2*), s/veh	0.2	0.1			1.5	2.9	0.0		21.6			
Initial Queue Delay (*d 3*), s/veh	0.0	0.0			0.0	0.0	0.0		0.0			
Control Delay (*d*), s/veh	52.8	25.3			35.6	33.9	29.4		61.9			
Level of Service (LOS)	D	C			D	C	C		E			
Approach Delay, s/veh / LOS	30.6	C		35.1	D		58.8	E		0.0		
Intersection Delay, s/veh / LOS	37.6						D					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	1.89	B	1.69	B	2.32	B	2.47	B
Bicycle LOS Score / LOS	1.71	B	1.94	B		F		

HCS Signalized Intersection Intermediate Values

General Information				Intersection Information	
Agency	CMT			Duration, h	0.250
Analyst	TJH	Analysis Date	2/14/2023	Area Type	Other
Jurisdiction	ODOT District 3	Time Period	PM	PHF	0.94
Urban Street	SR-254 (Detroit Rd)	Analysis Year	2045	Analysis Period	1> 17:00
Intersection	I-90 EB Ramps	File Name	SR-254 Corridor 2045 PM - Existing.xus		
Project Description	2045 PM Existing				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	270	1120			1160	500	60		570			

Signal Information			
Cycle, s	120.0	Reference Phase	2
Offset, s	37	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

							1	2	3	4		
Green	12.4	52.0	37.6	0.0	0.0	0.0	5	6	7	8		
Yellow	4.0	4.0	4.0	0.0	0.0	0.0						
Red	2.0	2.0	2.0	0.0	0.0	0.0						

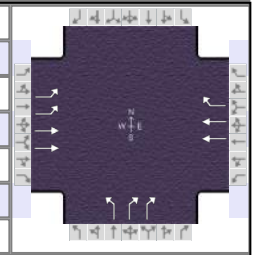
Saturation Flow / Delay	L	T	R	L	T	R	L	T	R	L	T	R
Lane Width Adjustment Factor (f_w)	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000			
Heavy Vehicles and Grade Factor (f_{HVg})	0.977	0.977	1.000	1.000	0.984	0.984	0.969	1.000	0.969			
Parking Activity Adjustment Factor (f_p)	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.000	0.000	0.000
Bus Blockage Adjustment Factor (f_{bb})	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.000	0.000	0.000
Area Type Adjustment Factor (f_a)	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000			
Lane Utilization Adjustment Factor (f_{LU})	0.906	0.952	1.000	1.000	0.951	1.000	1.000	1.000	0.654	1.000	1.000	1.000
Left-Turn Adjustment Factor (f_{LT})	0.952	0.000		1.000	1.000		0.952	0.000				
Right-Turn Adjustment Factor (f_{RT})		1.000	1.000		0.000	0.847		0.000	0.847			
Left-Turn Pedestrian Adjustment Factor (f_{Lpb})	1.000			1.000			1.000					
Right-Turn Ped-Bike Adjustment Factor (f_{Rpb})			1.000			1.000			1.000			
Work Zone Adjustment Factor (f_{wz})	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000			
DDI Factor (f_{DDI})	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000			
Left-Turn Prot. CAV Adj. Factor ($f_{CAV,prot}$)	1.00											
Left-Turn Perm. CAV Adj. Factor ($f_{CAV,perm}$)				1.00								
Movement Saturation Flow Rate (s), veh/h	3202	3622	0	0	3649	1585	1753	0	2039			
Proportion of Vehicles Arriving on Green (P)	0.10	0.37	0.00	0.00	0.35	0.39	0.31	0.00	0.31	0.00	0.00	0.00
Incremental Delay Factor (k)	0.04	0.50			0.50	0.50	0.04		0.40			

Signal Timing / Movement Groups	EBL	EBT/R	WBL	WBT/R	NBL	NBT/R	SBL	SBT/R
Lost Time (t_L)	6.0	6.0		6.0		4.0		
Green Ratio (g/C)	0.10	0.59		0.43		0.31		
Permitted Saturation Flow Rate (s_p), veh/h/ln	0	0		509		1753		
Shared Saturation Flow Rate (s_{sh}), veh/h/ln				0				
Permitted Effective Green Time (g_p), s	0.0	0.0		0.0		0.0		
Permitted Service Time (g_u), s	0.0	0.0		0.0		0.0		
Permitted Queue Service Time (g_{ps}), s								
Time to First Blockage (g_f), s	0.0	0.0		52.0		0.0		
Queue Service Time Before Blockage (g_{fs}), s								
Protected Right Saturation Flow (s_R), veh/h/ln				0		0		
Protected Right Effective Green Time (g_R), s				0.0		0.0		

Multimodal	EB		WB		NB		SB	
Pedestrian F_w / F_v	1.198	0.000	0.972	0.000	1.557	0.000	1.710	0.000
Pedestrian F_s / F_{delay}	0.000	0.093	0.000	0.119	0.000	0.164	0.000	0.164
Pedestrian M_{corner} / M_{cw}	0.00		0.00		0.00		0.00	
Bicycle c_b / d_b	1173.38	10.25	866.18	19.28		67.20	-83.33	65.10
Bicycle F_w / F_v	-3.64	1.22	-3.64	1.46	-3.64	Infinity	-3.64	

HCS Signalized Intersection Results Graphical Summary

General Information				Intersection Information	
Agency	CMT			Duration, h	0.250
Analyst	TJH	Analysis Date	2/14/2023	Area Type	Other
Jurisdiction	ODOT District 3	Time Period	PM	PHF	0.94
Urban Street	SR-254 (Detroit Rd)	Analysis Year	2045	Analysis Period	1> 17:00
Intersection	I-90 EB Ramps	File Name	SR-254 Corridor 2045 PM - Existing.xus		
Project Description	2045 PM Existing				

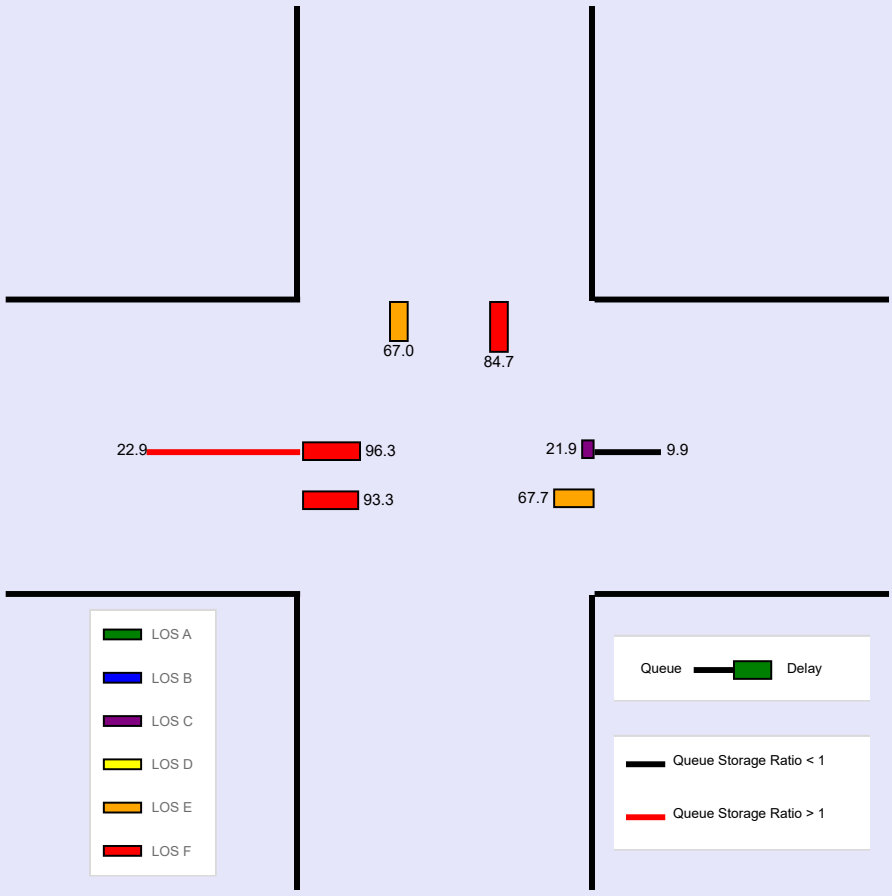


Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	270	1120			1160	500	60		570			

Signal Information			
Cycle, s	120.0	Reference Phase	2
Offset, s	37	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

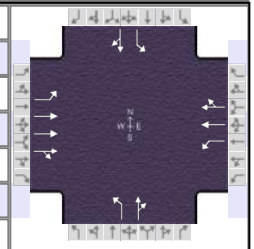
							1	2	3	4		
Green	12.4	52.0	37.6	0.0	0.0	0.0	5	6	7	8		
Yellow	4.0	4.0	4.0	0.0	0.0	0.0						
Red	2.0	2.0	2.0	0.0	0.0	0.0						

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Back of Queue (*Q*), ft/ln (95 th percentile)	126.7	390.2			514.2	444.2	61.1		406.7			
Back of Queue (*Q*), veh/ln (95 th percentile)	4.9	15.2			20.2	17.5	2.4		15.8			
Queue Storage Ratio (*RQ*) (95 th percentile)	0.47	0.44			0.79	0.99	0.13		0.59			
Control Delay (*d*), s/veh	52.8	25.3			35.6	33.9	29.4		61.9			
Level of Service (LOS)	D	C			D	C	C		E			
Approach Delay, s/veh / LOS	30.6	C		35.1	D		58.8	E		0.0		
Intersection Delay, s/veh / LOS	37.6						D					



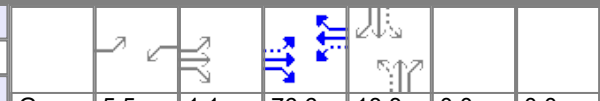
HCS Signalized Intersection Input Data

General Information				Intersection Information	
Agency	CMT			Duration, h	0.250
Analyst	TJH	Analysis Date	2/14/2023	Area Type	Other
Jurisdiction	ODOT District 3	Time Period	AM	PHF	0.90
Urban Street	SR-254 (Detroit Rd)	Analysis Year	2045	Analysis Period	1> 7:00
Intersection	Sheffield Crossing	File Name	SR-254 Corridor 2045 AM - Existing.xus		
Project Description	2045 AM Existing				

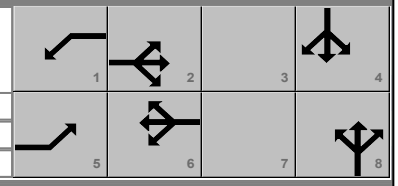


Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	80	1060	60	40	1090	10	130	10	40	10	10	40

Signal Information			
Cycle, s	120.0	Reference Phase	2
Offset, s	92	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	5.5	1.1	76.6	18.8	0.0	0.0
Yellow	4.0	0.0	4.0	4.0	0.0	0.0
Red	2.0	0.0	2.0	2.0	0.0	0.0



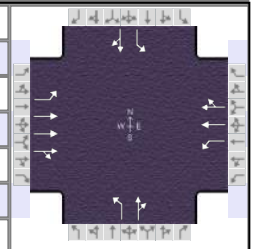
Traffic Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	80	1060	60	40	1090	10	130	10	40	10	10	40
Initial Queue (Q_b), veh/h	0	0	0	0	0	0	0	0	0	0	0	0
Base Saturation Flow Rate (s_o), veh/h	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Parking (N_m), man/h		None			None			None			None	
Heavy Vehicles (P_{HV}), %	3	3		2	2		3	3		3	3	
Ped / Bike / RTOR, /h	0	0	0	0	0	0	0	0	0	0	0	0
Buses (N_b), buses/h	0	0	0	0	0	0	0	0	0	0	0	0
Arrival Type (*AT*)	3	3	3	3	3	3	3	3	3	3	3	3
Upstream Filtering (*I*)	0.78	0.78	0.78	0.72	0.72	0.72	1.00	1.00	1.00	1.00	1.00	1.00
Lane Width (*W*), ft	12.0	12.0		12.0	12.0		12.0	12.0		12.0	12.0	
Turn Bay Length, ft	420	650		140	370		470	470		100	280	
Grade (*Pg*), %		0			0			0			0	
Speed Limit, mi/h	35	35	35	35	35	35	25	25	25	25	25	25

Phase Information	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Maximum Green (G_{max}) or Phase Split, s	13.0	58.0	14.0	59.0		48.0		48.0
Yellow Change Interval (*Y*), s	4.0	4.0	4.0	4.0		4.0		4.0
Red Clearance Interval (R_c), s	2.0	2.0	2.0	2.0		2.0		2.0
Minimum Green (G_{min}), s	7	20	7	20		10		10
Start-Up Lost Time (*l*t), s	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Extension of Effective Green (*e*), s	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Passage (*PT*), s	2.0	2.0	2.0	2.0		2.0		2.0
Recall Mode	Off	Min	Off	Min		Off		Off
Dual Entry	No	Yes	No	Yes		Yes		Yes
Walk (*Walk*), s		0.0		0.0		0.0		0.0
Pedestrian Clearance Time (*PC*), s		0.0		0.0		0.0		0.0

Multimodal Information	EB			WB			NB			SB		
85th % Speed / Rest in Walk / Corner Radius	0.0	No	25.0	0.0	No	25.0	0.0	No	25.0	0.0	No	25.0
Walkway / Crosswalk Width / Length, ft	9.0	12.0	0.0	9.0	12.0	0.0	9.0	12.0	0.0	9.0	12.0	0.0
Street Width / Island / Curb, ft	0.0	0	No	0.0	0	No	0.0	0	No	0.0	0	No
Width Outside / Bike Lane / Shoulder, ft	12.0	5.0	2.0	12.0	5.0	2.0	12.0	5.0	2.0	12.0	5.0	2.0
Pedestrian Signal / Occupied Parking	No	0.50		No	0.50		No	0.50		No	0.50	

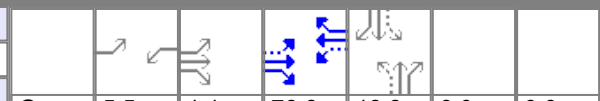
HCS Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	CMT			Duration, h	0.250
Analyst	TJH	Analysis Date	2/14/2023	Area Type	Other
Jurisdiction	ODOT District 3	Time Period	AM	PHF	0.90
Urban Street	SR-254 (Detroit Rd)	Analysis Year	2045	Analysis Period	1> 7:00
Intersection	Sheffield Crossing	File Name	SR-254 Corridor 2045 AM - Existing.xus		
Project Description	2045 AM Existing				

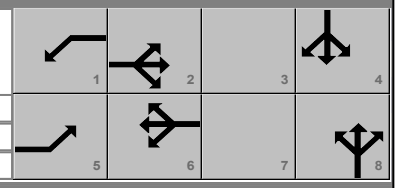


Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	80	1060	60	40	1090	10	130	10	40	10	10	40

Signal Information			
Cycle, s	120.0	Reference Phase	2
Offset, s	92	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	5.5	1.1	76.6	18.8	0.0	0.0
Yellow	4.0	0.0	4.0	4.0	0.0	0.0
Red	2.0	0.0	2.0	2.0	0.0	0.0



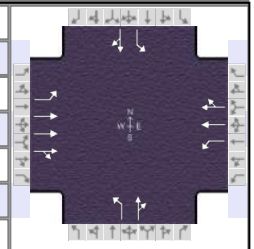
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	5	2	1	6		8		4
Case Number	1.1	4.0	1.1	4.0		6.0		6.0
Phase Duration, s	12.6	83.7	11.5	82.6		24.8		24.8
Change Period, ($Y+R_c$), s	6.0	6.0	6.0	6.0		6.0		6.0
Max Allow Headway (*MAH*), s	3.1	0.0	3.1	0.0		3.4		3.4
Queue Clearance Time (g_s), s	3.9		3.0			18.2		6.4
Green Extension Time (g_e), s	0.1	0.0	0.1	0.0		0.6		0.6
Phase Call Probability	0.95		0.79			1.00		1.00
Max Out Probability	0.00		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	87	824	400	47	613	673	144	56		11	56	
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1767	1856	1802	1781	1699	1865	1337	1622		1337	1622	
Queue Service Time (g_s), s	1.9	15.2	16.3	1.0	24.2	24.4	12.7	3.6		0.9	3.6	
Cycle Queue Clearance Time (g_c), s	1.9	15.2	16.3	1.0	24.2	24.4	16.2	3.6		4.4	3.6	
Green Ratio (*g/C*)	0.69	0.65	0.65	0.68	0.64	0.64	0.16	0.16		0.16	0.16	
Capacity (*c*), veh/h	342	2400	1166	367	1083	1189	231	255		231	255	
Volume-to-Capacity Ratio (*X*)	0.256	0.343	0.344	0.128	0.566	0.566	0.624	0.218		0.048	0.218	
Back of Queue (*Q*), ft/ln (95 th percentile)	31.3	265.4	278.4	16.6	329.1	352.5	198.7	67.9		13.7	67.9	
Back of Queue (*Q*), veh/ln (95 th percentile)	1.2	10.4	11.1	0.7	13.0	14.1	7.8	2.7		0.5	2.7	
Queue Storage Ratio (*RQ*) (95 th percentile)	0.07	0.41	0.44	0.12	0.89	0.97	0.42	0.14		0.14	0.24	
Uniform Delay (d_1), s/veh	9.4	13.4	14.9	7.7	12.0	12.1	51.1	44.1		46.0	44.1	
Incremental Delay (d_2), s/veh	0.1	0.3	0.6	0.0	1.5	1.4	1.0	0.2		0.0	0.2	
Initial Queue Delay (d_3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Control Delay (*d*), s/veh	9.5	13.7	15.5	7.7	13.5	13.5	52.2	44.3		46.0	44.3	
Level of Service (LOS)	A	B	B	A	B	B	D	D		D	D	
Approach Delay, s/veh / LOS	14.0	B		13.3	B		50.0	D		44.6	D	
Intersection Delay, s/veh / LOS	16.9						B					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	1.88	B	1.88	B	2.46	B	2.46	B
Bicycle LOS Score / LOS	1.22	A	1.53	B	0.82	A	0.60	A

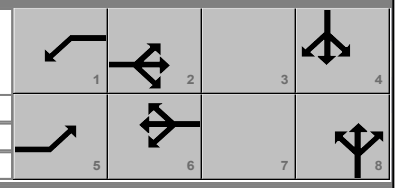
HCS Signalized Intersection Intermediate Values

General Information				Intersection Information	
Agency	CMT			Duration, h	0.250
Analyst	TJH	Analysis Date	2/14/2023	Area Type	Other
Jurisdiction	ODOT District 3	Time Period	AM	PHF	0.90
Urban Street	SR-254 (Detroit Rd)	Analysis Year	2045	Analysis Period	1> 7:00
Intersection	Sheffield Crossing	File Name	SR-254 Corridor 2045 AM - Existing.xus		
Project Description	2045 AM Existing				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	80	1060	60	40	1090	10	130	10	40	10	10	40

Signal Information					EB			WB			NB			SB		
Cycle, s	120.0	Reference Phase	2													
Offset, s	92	Reference Point	End	Green	5.5	1.1		76.6	18.8	0.0	0.0					
Uncoordinated	No	Simult. Gap E/W	On	Yellow	4.0	0.0		4.0	4.0	0.0	0.0					
Force Mode	Fixed	Simult. Gap N/S	On	Red	2.0	0.0		2.0	2.0	0.0	0.0					



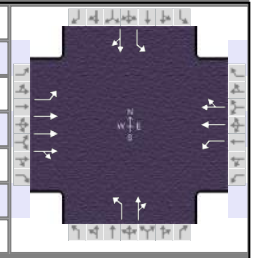
Saturation Flow / Delay	L	T	R	L	T	R	L	T	R	L	T	R
Lane Width Adjustment Factor (f_w)	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Heavy Vehicles and Grade Factor (f_{HVg})	0.977	0.977	1.000	0.984	0.984	1.000	0.977	0.977	1.000	0.977	0.977	1.000
Parking Activity Adjustment Factor (f_p)	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Bus Blockage Adjustment Factor (f_{bb})	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Area Type Adjustment Factor (f_a)	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Lane Utilization Adjustment Factor (f_{LU})	1.000	1.000	1.000	1.000	0.908	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Left-Turn Adjustment Factor (f_{LT})	0.952	0.000		0.952	0.000		0.704	0.000		0.704	0.000	
Right-Turn Adjustment Factor (f_{RT})		0.971	0.971		0.997	0.997		0.874	0.874		0.874	0.874
Left-Turn Pedestrian Adjustment Factor (f_{Lpb})	1.000			1.000			1.000			1.000		
Right-Turn Ped-Bike Adjustment Factor (f_{Rpb})			1.000			1.000			1.000			1.000
Work Zone Adjustment Factor (f_{wz})	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
DDI Factor (f_{DDI})	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Left-Turn Prot. CAV Adj. Factor ($f_{CAV,prot}$)	1.00			1.00								
Left-Turn Perm. CAV Adj. Factor ($f_{CAV,perm}$)							1.00			1.00		
Movement Saturation Flow Rate (s), veh/h	1767	5218	295	1781	3531	32	1337	324	1298	1337	324	1298
Proportion of Vehicles Arriving on Green (P)	0.03	0.53	0.27	0.03	0.65	0.43	0.16	0.16	0.16	0.16	0.16	0.16
Incremental Delay Factor (k)	0.04	0.50	0.50	0.04	0.50	0.50	0.04	0.04		0.04	0.04	

Signal Timing / Movement Groups	EBL	EBT/R	WBL	WBT/R	NBL	NBT/R	SBL	SBT/R
Lost Time (t_L)	6.0	6.0	6.0	6.0		6.0		6.0
Green Ratio (g/C)	0.69	0.65	0.68	0.64		0.16		0.16
Permitted Saturation Flow Rate (s_p), veh/h/ln	426	0	456	0		1337		1337
Shared Saturation Flow Rate (s_{sh}), veh/h/ln								
Permitted Effective Green Time (g_p), s	76.5	0.0	76.5	0.0		18.9		18.9
Permitted Service Time (g_u), s	51.9	0.0	59.1	0.0		15.4		15.4
Permitted Queue Service Time (g_{ps}), s	6.6		2.0			12.7		0.9
Time to First Blockage (g_f), s	0.0	0.0	0.0	0.0		0.0		0.0
Queue Service Time Before Blockage (g_{fs}), s								
Protected Right Saturation Flow (s_R), veh/h/ln								
Protected Right Effective Green Time (g_R), s								

Multimodal	EB		WB		NB		SB	
Pedestrian F_w / F_v	1.198	0.000	1.198	0.000	1.710	0.000	1.710	0.000
Pedestrian F_s / F_{delay}	0.000	0.081	0.000	0.083	0.000	0.151	0.000	0.151
Pedestrian M_{corner} / M_{cw}	0.00		0.00		0.00		0.00	
Bicycle c_b / d_b	1294.56	7.46	1276.36	7.85	313.30	42.67	313.30	42.67
Bicycle F_w / F_v	-3.64	0.73	-3.64	1.05	-3.64	0.33	-3.64	0.11

HCS Signalized Intersection Results Graphical Summary

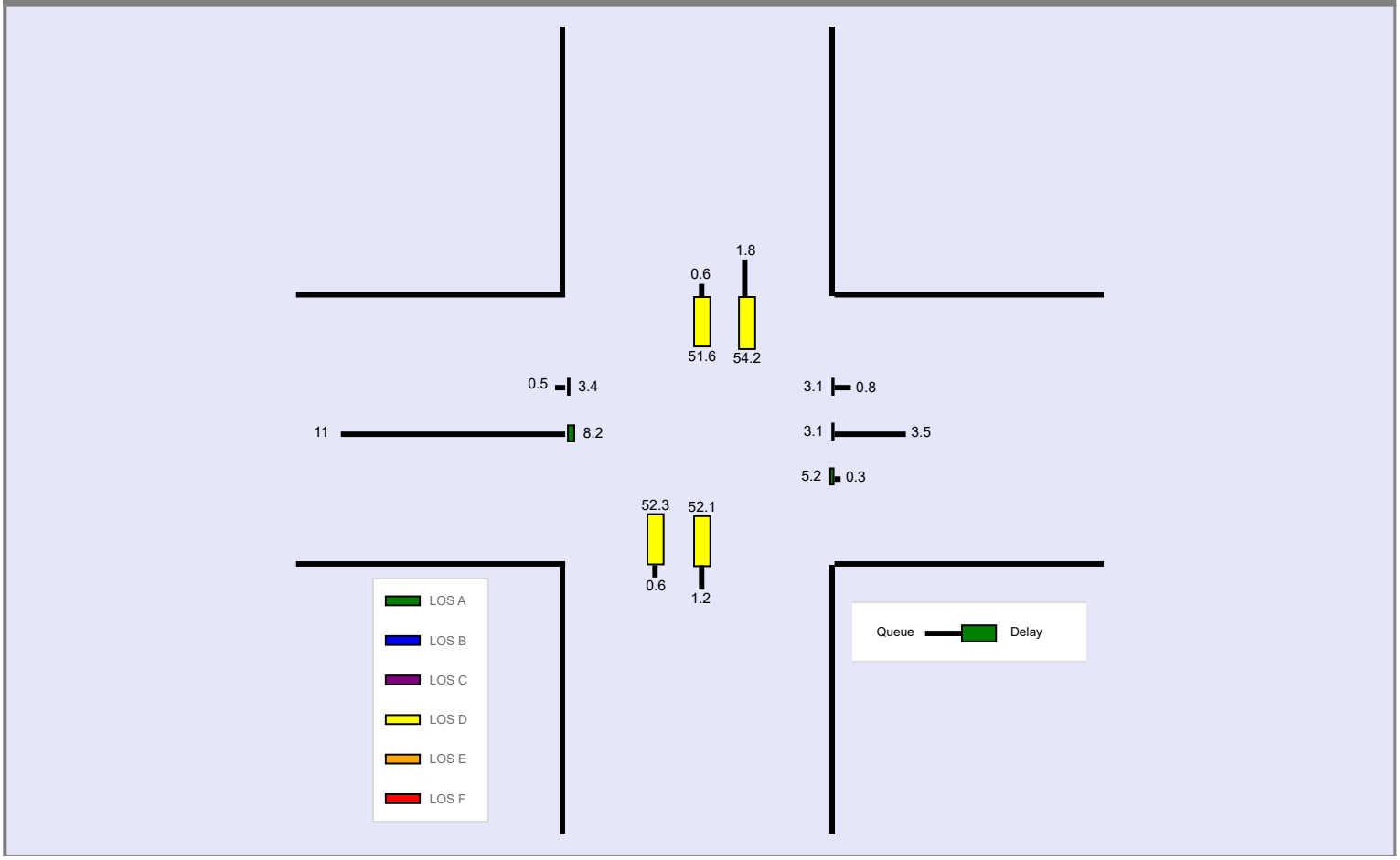
General Information				Intersection Information	
Agency	CMT			Duration, h	0.250
Analyst	TJH	Analysis Date	2/14/2023	Area Type	Other
Jurisdiction	ODOT District 3	Time Period	AM	PHF	0.90
Urban Street	SR-254 (Detroit Rd)	Analysis Year	2045	Analysis Period	1> 7:00
Intersection	Sheffield Crossing	File Name	SR-254 Corridor 2045 AM - Existing.xus		
Project Description	2045 AM Existing				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	80	1060	60	40	1090	10	130	10	40	10	10	40

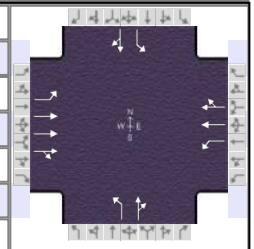
Signal Information					EB			WB				NB				SB		
Cycle, s	120.0	Reference Phase	2															
Offset, s	92	Reference Point	End	Green	5.5	1.1		76.6	18.8	0.0	0.0	1	2	3	4			
Uncoordinated	No	Simult. Gap E/W	On	Yellow	4.0	0.0		4.0	4.0	0.0	0.0	5	6	7	8			
Force Mode	Fixed	Simult. Gap N/S	On	Red	2.0	0.0		2.0	2.0	0.0	0.0							

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Back of Queue (*Q*), ft/ln (95 th percentile)	31.3	265.4	278.4	16.6	329.1	352.5	198.7	67.9		13.7	67.9	
Back of Queue (*Q*), veh/ln (95 th percentile)	1.2	10.4	11.1	0.7	13.0	14.1	7.8	2.7		0.5	2.7	
Queue Storage Ratio (*RQ*) (95 th percentile)	0.07	0.41	0.44	0.12	0.89	0.97	0.42	0.14		0.14	0.24	
Control Delay (*d*), s/veh	9.5	13.7	15.5	7.7	13.5	13.5	52.2	44.3		46.0	44.3	
Level of Service (LOS)	A	B	B	A	B	B	D	D		D	D	
Approach Delay, s/veh / LOS	14.0	B		13.3	B		50.0	D		44.6	D	
Intersection Delay, s/veh / LOS	16.9						B					



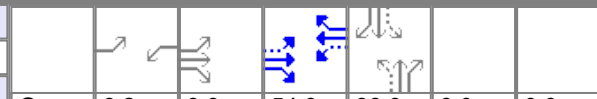
HCS Signalized Intersection Input Data

General Information				Intersection Information	
Agency	CMT			Duration, h	0.250
Analyst	TJH	Analysis Date	2/14/2023	Area Type	Other
Jurisdiction	ODOT District 3	Time Period	PM	PHF	0.92
Urban Street	SR-254 (Detroit Rd)	Analysis Year	2045	Analysis Period	1> 17:00
Intersection	Sheffield Crossing	File Name	SR-254 Corridor 2045 PM - Existing.xus		
Project Description	2045 PM Existing				

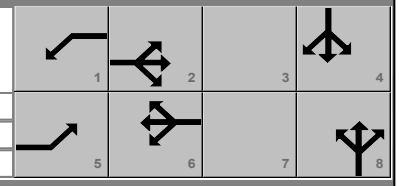


Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	180	1300	130	60	1220	60	250	30	100	50	20	130

Signal Information			
Cycle, s	120.0	Reference Phase	2
Offset, s	52	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	6.2	3.3		54.3	38.3	0.0	0.0					
Yellow	4.0	0.0		4.0	4.0	0.0	0.0					
Red	2.0	0.0		2.0	2.0	0.0	0.0					



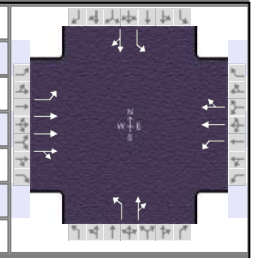
Traffic Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	180	1300	130	60	1220	60	250	30	100	50	20	130
Initial Queue (Q_b), veh/h	0	0	0	0	0	0	0	0	0	0	0	0
Base Saturation Flow Rate (s_o), veh/h	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Parking (N_m), man/h		None			None			None			None	
Heavy Vehicles (P_{HV}), %	3	3		2	2		3	3		3	3	
Ped / Bike / RTOR, /h	0	0	0	0	0	0	0	0	0	0	0	0
Buses (N_b), buses/h	0	0	0	0	0	0	0	0	0	0	0	0
Arrival Type (*AT*)	3	3	3	3	3	3	3	3	3	3	3	3
Upstream Filtering (*I*)	0.70	0.70	0.70	0.61	0.61	0.61	1.00	1.00	1.00	1.00	1.00	1.00
Lane Width (*W*), ft	12.0	12.0		12.0	12.0		12.0	12.0		12.0	12.0	
Turn Bay Length, ft	420	650		140	370		470	470		100	280	
Grade (*Pg*), %		0			0			0			0	
Speed Limit, mi/h	35	35	35	35	35	35	25	25	25	25	25	25

Phase Information	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Maximum Green (G_{max}) or Phase Split, s	13.0	59.0	13.0	59.0		48.0		48.0
Yellow Change Interval (*Y*), s	4.0	4.0	4.0	4.0		4.0		4.0
Red Clearance Interval (R_c), s	2.0	2.0	2.0	2.0		2.0		2.0
Minimum Green (G_{min}), s	7	20	7	20		10		10
Start-Up Lost Time (*l*t), s	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Extension of Effective Green (*e*), s	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Passage (*PT*), s	2.0	2.0	2.0	2.0		2.0		2.0
Recall Mode	Off	Min	Off	Min		Off		Off
Dual Entry	No	Yes	No	Yes		Yes		Yes
Walk (*Walk*), s		0.0		0.0		0.0		0.0
Pedestrian Clearance Time (*PC*), s		0.0		0.0		0.0		0.0

Multimodal Information	EB			WB			NB			SB		
85th % Speed / Rest in Walk / Corner Radius	0.0	No	25.0	0.0	No	25.0	0.0	No	25.0	0.0	No	25.0
Walkway / Crosswalk Width / Length, ft	9.0	12.0	0.0	9.0	12.0	0.0	9.0	12.0	0.0	9.0	12.0	0.0
Street Width / Island / Curb, ft	0.0	0	No	0.0	0	No	0.0	0	No	0.0	0	No
Width Outside / Bike Lane / Shoulder, ft	12.0	5.0	2.0	12.0	5.0	2.0	12.0	5.0	2.0	12.0	5.0	2.0
Pedestrian Signal / Occupied Parking	No	0.50		No	0.50		No	0.50		No	0.50	

HCS Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	CMT			Duration, h	0.250
Analyst	TJH	Analysis Date	2/14/2023	Area Type	Other
Jurisdiction	ODOT District 3	Time Period	PM	PHF	0.92
Urban Street	SR-254 (Detroit Rd)	Analysis Year	2045	Analysis Period	1> 17:00
Intersection	Sheffield Crossing	File Name	SR-254 Corridor 2045 PM - Existing.xus		
Project Description	2045 PM Existing				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	180	1300	130	60	1220	60	250	30	100	50	20	130

Signal Information			
Cycle, s	120.0	Reference Phase	2
Offset, s	52	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

							1	2	3	4
Green	6.2	3.3	54.3	38.3	0.0	0.0	5	6	7	8
Yellow	4.0	0.0	4.0	4.0	0.0	0.0				
Red	2.0	0.0	2.0	2.0	0.0	0.0				

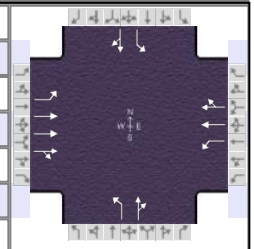
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	5	2	1	6		8		4
Case Number	1.1	4.0	1.1	4.0		6.0		6.0
Phase Duration, s	15.4	63.5	12.2	60.3		44.3		44.3
Change Period, ($Y+R_c$), s	6.0	6.0	6.0	6.0		6.0		6.0
Max Allow Headway (*MAH*), s	3.1	0.0	3.1	0.0		3.5		3.5
Queue Clearance Time (g_s), s	9.4		4.3			37.5		13.8
Green Extension Time (g_e), s	0.0	0.0	0.0	0.0		0.8		1.6
Phase Call Probability	1.00		0.88			1.00		1.00
Max Out Probability	1.00		0.01			0.66		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	194	1042	496	64	577	795	272	141		54	163	
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1767	1856	1766	1781	1342	1844	1213	1630		1237	1605	
Queue Service Time (g_s), s	7.4	25.5	24.0	2.3	48.7	49.0	26.3	7.8		4.1	9.2	
Cycle Queue Clearance Time (g_c), s	7.4	25.5	24.0	2.3	48.7	49.0	35.5	7.8		11.8	9.2	
Green Ratio (*g/C*)	0.53	0.48	0.48	0.50	0.45	0.45	0.32	0.32		0.32	0.32	
Capacity (*c*), veh/h	216	1780	847	236	607	834	354	520		375	512	
Volume-to-Capacity Ratio (*X*)	0.894	0.585	0.585	0.273	0.950	0.953	0.768	0.272		0.145	0.319	
Back of Queue (*Q*), ft/ln (95 th percentile)	165.8	411.3	358.7	42.9	563.4	713.6	343	143.6		58.4	168.4	
Back of Queue (*Q*), veh/ln (95 th percentile)	6.5	16.1	14.3	1.7	22.2	28.5	13.4	5.6		2.3	6.6	
Queue Storage Ratio (*RQ*) (95 th percentile)	0.39	0.63	0.57	0.31	1.52	1.96	0.73	0.31		0.58	0.60	
Uniform Delay (d_1), s/veh	24.7	24.9	21.9	19.2	26.2	26.2	44.4	30.5		34.9	31.0	
Incremental Delay (d_2), s/veh	22.4	1.0	2.1	0.1	18.8	15.4	6.9	0.1		0.1	0.1	
Initial Queue Delay (d_3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Control Delay (*d*), s/veh	47.1	25.9	23.9	19.3	45.0	41.5	51.3	30.6		35.0	31.1	
Level of Service (LOS)	D	C	C	B	D	D	D	C		C	C	
Approach Delay, s/veh / LOS	27.7	C		42.0	D		44.2	D		32.1	C	
Intersection Delay, s/veh / LOS	35.1						D					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	1.91	B	1.91	B	2.44	B	2.44	B
Bicycle LOS Score / LOS	1.45	A	1.69	B	1.17	A	0.85	A

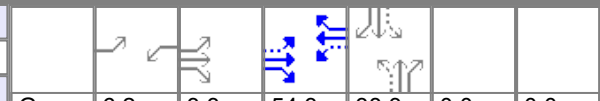
HCS Signalized Intersection Intermediate Values

General Information				Intersection Information	
Agency	CMT			Duration, h	0.250
Analyst	TJH	Analysis Date	2/14/2023	Area Type	Other
Jurisdiction	ODOT District 3	Time Period	PM	PHF	0.92
Urban Street	SR-254 (Detroit Rd)	Analysis Year	2045	Analysis Period	1> 17:00
Intersection	Sheffield Crossing	File Name	SR-254 Corridor 2045 PM - Existing.xus		
Project Description	2045 PM Existing				

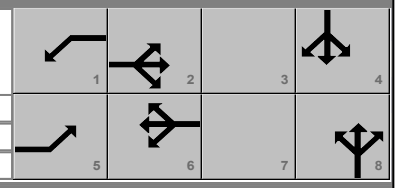


Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	180	1300	130	60	1220	60	250	30	100	50	20	130

Signal Information			
Cycle, s	120.0	Reference Phase	2
Offset, s	52	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	6.2	3.3	54.3	38.3	0.0	0.0
Yellow	4.0	0.0	4.0	4.0	0.0	0.0
Red	2.0	0.0	2.0	2.0	0.0	0.0



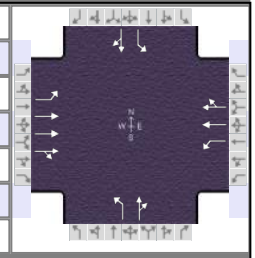
Saturation Flow / Delay	L	T	R	L	T	R	L	T	R	L	T	R
Lane Width Adjustment Factor (f_w)	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Heavy Vehicles and Grade Factor (f_{HVg})	0.977	0.977	1.000	0.984	0.984	1.000	0.977	0.977	1.000	0.977	0.977	1.000
Parking Activity Adjustment Factor (f_p)	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Bus Blockage Adjustment Factor (f_{bb})	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Area Type Adjustment Factor (f_a)	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Lane Utilization Adjustment Factor (f_{LU})	1.000	1.000	1.000	1.000	0.718	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Left-Turn Adjustment Factor (f_{LT})	0.952	0.000		0.952	0.000		0.639	0.000		0.651	0.000	
Right-Turn Adjustment Factor (f_{RT})		0.952	0.952		0.986	0.986		0.878	0.878		0.865	0.865
Left-Turn Pedestrian Adjustment Factor (f_{Lpb})	1.000			1.000			1.000			1.000		
Right-Turn Ped-Bike Adjustment Factor (f_{Rpb})			1.000			1.000			1.000			1.000
Work Zone Adjustment Factor (f_{wz})	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
DDI Factor (f_{DDI})	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Left-Turn Prot. CAV Adj. Factor ($f_{CAV,prot}$)	1.00			1.00								
Left-Turn Perm. CAV Adj. Factor ($f_{CAV,perm}$)							1.00			1.00		
Movement Saturation Flow Rate (s), veh/h	1767	4979	498	1781	3037	149	1213	376	1254	1237	214	1391
Proportion of Vehicles Arriving on Green (P)	0.17	0.43	0.64	0.01	0.54	0.57	0.32	0.32	0.32	0.32	0.32	0.32
Incremental Delay Factor (k)	0.34	0.50	0.50	0.04	0.50	0.50	0.22	0.04		0.04	0.04	

Signal Timing / Movement Groups	EBL	EBT/R	WBL	WBT/R	NBL	NBT/R	SBL	SBT/R
Lost Time (t_L)	6.0	6.0	6.0	6.0		6.0		6.0
Green Ratio (g/C)	0.53	0.48	0.50	0.45		0.32		0.32
Permitted Saturation Flow Rate (s_p), veh/h/ln	393	0	338	0		1213		1237
Shared Saturation Flow Rate (s_{sh}), veh/h/ln								
Permitted Effective Green Time (g_p), s	54.3	0.0	54.3	0.0		38.3		38.3
Permitted Service Time (g_u), s	5.3	0.0	29.9	0.0		29.0		30.5
Permitted Queue Service Time (g_{ps}), s	5.3		6.0			26.3		4.1
Time to First Blockage (g_f), s	0.0	0.0	0.0	0.0		0.0		0.0
Queue Service Time Before Blockage (g_{fs}), s								
Protected Right Saturation Flow (s_R), veh/h/ln								
Protected Right Effective Green Time (g_R), s								

Multimodal	EB		WB		NB		SB	
Pedestrian F_w / F_v	1.198	0.000	1.198	0.000	1.710	0.000	1.710	0.000
Pedestrian F_s / F_{delay}	0.000	0.112	0.000	0.116	0.000	0.133	0.000	0.133
Pedestrian M_{corner} / M_{cw}	0.00		0.00		0.00		0.00	
Bicycle c_b / d_b	959.01	16.26	904.81	17.99	638.01	27.83	638.01	27.83
Bicycle F_w / F_v	-3.64	0.96	-3.64	1.20	-3.64	0.68	-3.64	0.36

HCS Signalized Intersection Results Graphical Summary

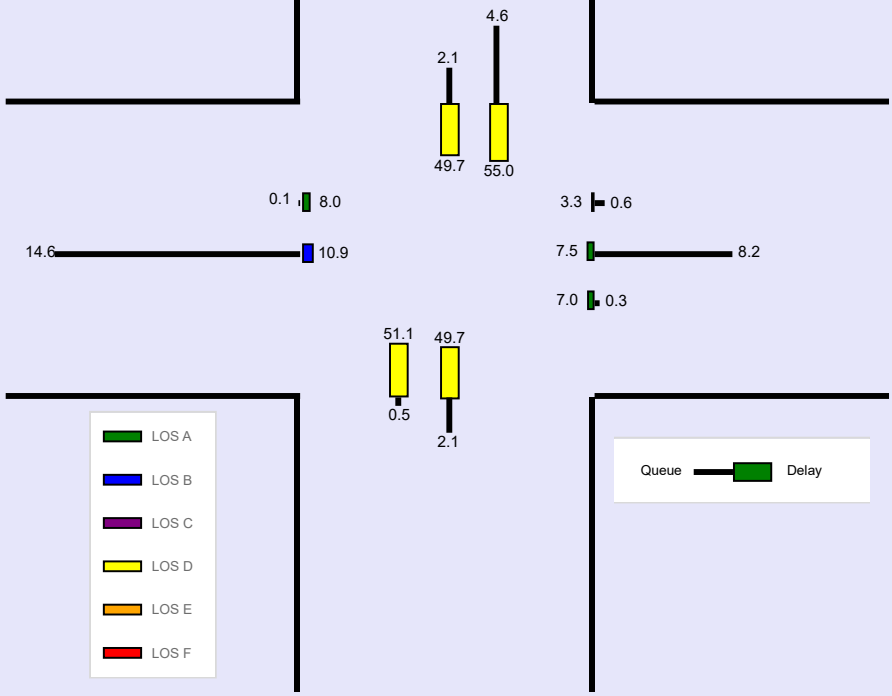
General Information				Intersection Information	
Agency	CMT			Duration, h	0.250
Analyst	TJH	Analysis Date	2/14/2023	Area Type	Other
Jurisdiction	ODOT District 3	Time Period	PM	PHF	0.92
Urban Street	SR-254 (Detroit Rd)	Analysis Year	2045	Analysis Period	1> 17:00
Intersection	Sheffield Crossing	File Name	SR-254 Corridor 2045 PM - Existing.xus		
Project Description	2045 PM Existing				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	180	1300	130	60	1220	60	250	30	100	50	20	130

Signal Information					EB			WB							
Cycle, s	120.0	Reference Phase	2												
Offset, s	52	Reference Point	End	Green	6.2	3.3		54.3	38.3	0.0	0.0	1	2	3	4
Uncoordinated	No	Simult. Gap E/W	On	Yellow	4.0	0.0		4.0	4.0	0.0	0.0	5	6	7	8
Force Mode	Fixed	Simult. Gap N/S	On	Red	2.0	0.0		2.0	2.0	0.0	0.0				

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Back of Queue (*Q*), ft/ln (95 th percentile)	165.8	411.3	358.7	42.9	563.4	713.6	343	143.6		58.4	168.4	
Back of Queue (*Q*), veh/ln (95 th percentile)	6.5	16.1	14.3	1.7	22.2	28.5	13.4	5.6		2.3	6.6	
Queue Storage Ratio (*RQ*) (95 th percentile)	0.39	0.63	0.57	0.31	1.52	1.96	0.73	0.31		0.58	0.60	
Control Delay (*d*), s/veh	47.1	25.9	23.9	19.3	45.0	41.5	51.3	30.6		35.0	31.1	
Level of Service (LOS)	D	C	C	B	D	D	D	C		C	C	
Approach Delay, s/veh / LOS	27.7	C		42.0	D		44.2	D		32.1	C	
Intersection Delay, s/veh / LOS	35.1						D					



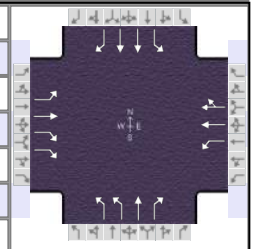
--- Messages ---

WARNING: Since queue spillover from turn lanes and spillback into upstream intersections is not accounted for in the HCM procedures, use of a simulation tool may be advised in situations where the Queue Storage Ratio exceeds 1.0.

--- Comments ---

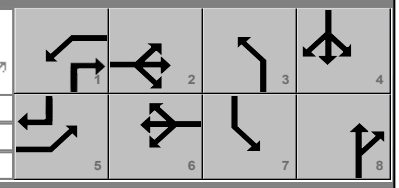
HCS Signalized Intersection Input Data

General Information				Intersection Information	
Agency	CMT			Duration, h	0.250
Analyst	TJH	Analysis Date	2/14/2023	Area Type	Other
Jurisdiction	ODOT District 3	Time Period	AM	PHF	0.93
Urban Street	SR-254 (Detroit Rd)	Analysis Year	2045	Analysis Period	1> 7:00
Intersection	SR-301 (Abbe Rd)	File Name	SR-254 Corridor 2045 AM - Existing.xus		
Project Description	2045 AM Existing				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	150	320	610	150	520	40	510	230	150	50	260	210

Signal Information					EB			WB			NB			SB		
Cycle, s	120.0	Reference Phase	2													
Offset, s	19	Reference Point	End	Green	8.3	0.4		47.6	5.8	9.6	18.3					
Uncoordinated	No	Simult. Gap E/W	On	Yellow	4.0	0.0		4.0	4.0	4.0	4.0					
Force Mode	Fixed	Simult. Gap N/S	On	Red	2.0	0.0		2.0	2.0	2.0	2.0					



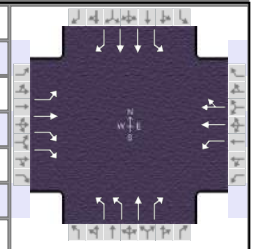
Traffic Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	150	320	610	150	520	40	510	230	150	50	260	210
Initial Queue (Q_b), veh/h	0	0	0	0	0	0	0	0	0	0	0	0
Base Saturation Flow Rate (s_o), veh/h	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Parking (N_m), man/h		None			None			None			None	
Heavy Vehicles (P_{HV}), %	3	3	3	1	1		2	2	2	4	4	4
Ped / Bike / RTOR, /h	0	0	0	0	0	0	0	0	0	0	0	0
Buses (N_b), buses/h	0	0	0	0	0	0	0	0	0	0	0	0
Arrival Type (*AT*)	3	3	3	3	3	3	3	3	3	3	3	3
Upstream Filtering (*I*)	0.95	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lane Width (*W*), ft	12.0	12.0	12.0	12.0	12.0		12.0	12.0	12.0	12.0	12.0	12.0
Turn Bay Length, ft	150	350	350	320	470		940	1440	330	230	460	250
Grade (*Pg*), %		0			0			0			0	
Speed Limit, mi/h	35	35	35	35	35	35	35	35	35	35	35	35

Phase Information	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Maximum Green (G_{max}) or Phase Split, s	15.0	54.0	13.0	52.0	33.0	40.0	13.0	20.0
Yellow Change Interval (*Y*), s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Red Clearance Interval (R_c), s	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Minimum Green (G_{min}), s	7	20	7	20	7	10	7	10
Start-Up Lost Time (*lt*), s	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Extension of Effective Green (*e*), s	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Passage (*PT*), s	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Recall Mode	Off	Min	Off	Min	Off	Off	Off	Off
Dual Entry	No	Yes	No	Yes	No	Yes	No	Yes
Walk (*Walk*), s		0.0		0.0		0.0		0.0
Pedestrian Clearance Time (*PC*), s		0.0		0.0		0.0		0.0

Multimodal Information	EB			WB			NB			SB		
85th % Speed / Rest in Walk / Corner Radius	0.0	No	25.0	0.0	No	25.0	0.0	No	25.0	0.0	No	25.0
Walkway / Crosswalk Width / Length, ft	9.0	12.0	0.0	9.0	12.0	0.0	9.0	12.0	0.0	9.0	12.0	0.0
Street Width / Island / Curb, ft	0.0	0	No	0.0	0	No	0.0	0	No	0.0	0	No
Width Outside / Bike Lane / Shoulder, ft	12.0	5.0	2.0	12.0	5.0	2.0	12.0	5.0	2.0	12.0	5.0	2.0
Pedestrian Signal / Occupied Parking	No	0.50		No	0.50		No	0.50		No	0.50	

HCS Signalized Intersection Results Summary

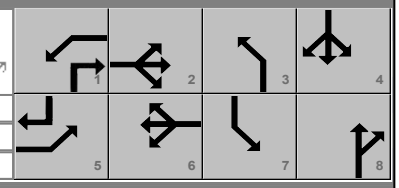
General Information				Intersection Information	
Agency	CMT			Duration, h	0.250
Analyst	TJH	Analysis Date	2/14/2023	Area Type	Other
Jurisdiction	ODOT District 3	Time Period	AM	PHF	0.93
Urban Street	SR-254 (Detroit Rd)	Analysis Year	2045	Analysis Period	1> 7:00
Intersection	SR-301 (Abbe Rd)	File Name	SR-254 Corridor 2045 AM - Existing.xus		
Project Description	2045 AM Existing				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	150	320	610	150	520	40	510	230	150	50	260	210

Signal Information			
Cycle, s	120.0	Reference Phase	2
Offset, s	19	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	8.3	0.4	47.6	5.8	9.6	18.3						
Yellow	4.0	0.0	4.0	4.0	4.0	4.0						
Red	2.0	0.0	2.0	2.0	2.0	2.0						



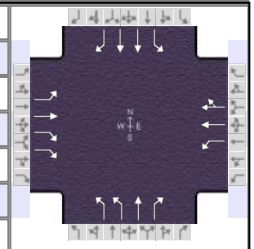
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	5	2	1	6	3	8	7	4
Case Number	1.1	3.0	1.1	4.0	2.0	3.0	1.1	3.0
Phase Duration, s	14.7	54.0	14.3	53.6	27.4	39.9	11.8	24.3
Change Period, (*Y+R c*), s	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Max Allow Headway (*MAH*), s	3.1	0.0	3.1	0.0	3.1	3.2	3.1	3.2
Queue Clearance Time (*g s*), s	8.7		8.3		20.6	15.1	5.0	17.7
Green Extension Time (*g e*), s	0.0	0.0	0.0	0.0	0.9	1.9	0.0	0.5
Phase Call Probability	1.00		1.00		1.00	1.00	0.83	1.00
Max Out Probability	1.00		1.00		0.12	0.00	1.00	1.00

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	169	360	686	161	304	298	548	247	161	54	280	226
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1767	1856	1392	1795	1885	1837	1730	1870	1585	1753	1752	1560
Queue Service Time (*g s*), s	6.7	20.9	28.1	6.3	13.9	14.0	18.6	13.1	8.8	3.0	8.8	15.7
Cycle Queue Clearance Time (*g c*), s	6.7	20.9	28.1	6.3	13.9	14.0	18.6	13.1	8.8	3.0	8.8	15.7
Green Ratio (*g/C*)	0.47	0.40	0.40	0.47	0.40	0.40	0.18	0.28	0.35	0.20	0.15	0.22
Capacity (*c*), veh/h	415	742	1113	400	748	729	618	528	557	315	534	351
Volume-to-Capacity Ratio (*X*)	0.407	0.485	0.616	0.403	0.407	0.409	0.888	0.468	0.290	0.171	0.523	0.644
Back of Queue (*Q*), ft/ln (95 th percentile)	129.4	407	460	119.3	269.9	263.4	342.9	253.4	152.6	60.9	178.5	267.3
Back of Queue (*Q*), veh/ln (95 th percentile)	5.1	15.9	18.0	4.7	10.7	10.5	13.5	10.0	6.0	2.4	6.9	10.4
Queue Storage Ratio (*RQ*) (95 th percentile)	0.86	1.16	1.31	0.37	0.57	0.56	0.36	0.18	0.46	0.26	0.39	1.07
Uniform Delay (*d 1*), s/veh	20.2	38.1	44.2	21.3	26.1	26.1	48.1	35.6	28.1	39.5	46.8	42.2
Incremental Delay (*d 2*), s/veh	0.2	2.2	2.4	0.2	1.6	1.7	8.9	0.2	0.1	0.1	0.3	2.7
Initial Queue Delay (*d 3*), 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
Control Delay (*d*), s/veh	20.4	40.2	46.6	21.5	27.7	27.8	57.0	35.8	28.2	39.6	47.1	44.8
Level of Service (LOS)	C	D	D	C	C	C	E	D	C	D	D	D
Approach Delay, s/veh / LOS	41.1	D		26.4	C		46.7	D		45.5	D	
Intersection Delay, s/veh / LOS	40.1						D					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.43	B	2.28	B	2.13	B	2.46	B
Bicycle LOS Score / LOS	2.40	B	1.12	A	2.07	B	0.95	A

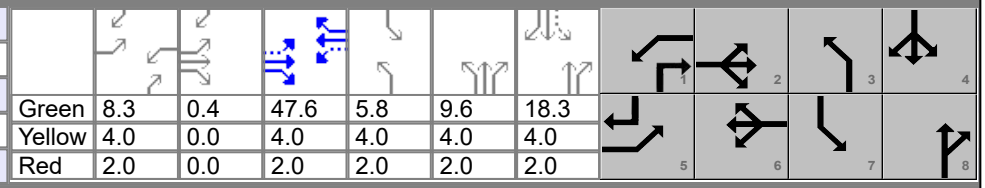
HCS Signalized Intersection Intermediate Values

General Information				Intersection Information	
Agency	CMT			Duration, h	0.250
Analyst	TJH	Analysis Date	2/14/2023	Area Type	Other
Jurisdiction	ODOT District 3	Time Period	AM	PHF	0.93
Urban Street	SR-254 (Detroit Rd)	Analysis Year	2045	Analysis Period	1> 7:00
Intersection	SR-301 (Abbe Rd)	File Name	SR-254 Corridor 2045 AM - Existing.xus		
Project Description	2045 AM Existing				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	150	320	610	150	520	40	510	230	150	50	260	210

Signal Information			
Cycle, s	120.0	Reference Phase	2
Offset, s	19	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	8.3	0.4	47.6	5.8	9.6	18.3						
Yellow	4.0	0.0	4.0	4.0	4.0	4.0						
Red	2.0	0.0	2.0	2.0	2.0	2.0						

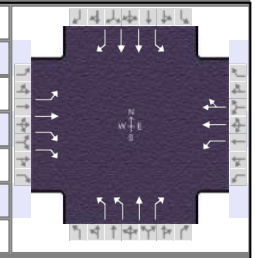
Saturation Flow / Delay	L	T	R	L	T	R	L	T	R	L	T	R
Lane Width Adjustment Factor (f_w)	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Heavy Vehicles and Grade Factor (f_{HVg})	0.977	0.977	0.977	0.992	0.992	1.000	0.984	0.984	0.984	0.969	0.969	0.969
Parking Activity Adjustment Factor (f_p)	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Bus Blockage Adjustment Factor (f_{bb})	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Area Type Adjustment Factor (f_a)	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Lane Utilization Adjustment Factor (f_{LU})	1.000	1.000	0.885	1.000	1.000	1.000	0.971	1.000	1.000	1.000	0.952	1.000
Left-Turn Adjustment Factor (f_{LT})	0.952	0.000		0.952	0.000		0.952	0.000		0.952	0.000	
Right-Turn Adjustment Factor (f_{RT})		0.000	0.847		0.975	0.975		0.000	0.847		0.000	0.847
Left-Turn Pedestrian Adjustment Factor (f_{Lpb})	1.000			1.000			1.000			1.000		
Right-Turn Ped-Bike Adjustment Factor (f_{Rpb})			1.000			1.000			1.000			1.000
Work Zone Adjustment Factor (f_{wz})	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
DDI Factor (f_{DDI})	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Left-Turn Prot. CAV Adj. Factor ($f_{CAV,prot}$)	1.00			1.00			1.00			1.00		
Left-Turn Perm. CAV Adj. Factor ($f_{CAV,perm}$)												
Movement Saturation Flow Rate (s), veh/h	1767	1856	2783	1795	3457	265	3459	1870	1585	1753	3505	1560
Proportion of Vehicles Arriving on Green (P)	0.05	0.18	0.12	0.07	0.40	0.40	0.18	0.28	0.28	0.05	0.15	0.15
Incremental Delay Factor (k)	0.04	0.50	0.50	0.04	0.50	0.50	0.23	0.04	0.04	0.04	0.04	0.15

Signal Timing / Movement Groups	EBL	EBT/R	WBL	WBT/R	NBL	NBT/R	SBL	SBT/R
Lost Time (t_L)	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Green Ratio (g/C)	0.47	0.40	0.47	0.40	0.18	0.28	0.20	0.15
Permitted Saturation Flow Rate (s_p), veh/h/ln	811	0	1030	0	0	0	1115	0
Shared Saturation Flow Rate (s_{sh}), veh/h/ln								
Permitted Effective Green Time (g_p), s	47.6	0.0	47.6	0.0	0.0	0.0	18.3	0.0
Permitted Service Time (g_u), s	33.6	0.0	25.2	0.0	0.0	0.0	18.3	0.0
Permitted Queue Service Time (g_{ps}), s	3.8		4.2				0.0	
Time to First Blockage (g_f), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Queue Service Time Before Blockage (g_{fs}), s								
Protected Right Saturation Flow (s_R), veh/h/ln		0				1585		1560
Protected Right Effective Green Time (g_R), s		0.0				8.3		8.7

Multimodal	EB		WB		NB		SB	
Pedestrian F_w / F_v	1.710	0.000	1.557	0.000	1.389	0.000	1.710	0.000
Pedestrian F_s / F_{delay}	0.000	0.123	0.000	0.124	0.000	0.138	0.000	0.151
Pedestrian M_{corner} / M_{cw}	0.00		0.00		0.00		0.00	
Bicycle c_b / d_b	799.99	21.60	793.16	21.85	564.79	30.90	304.80	43.11
Bicycle F_w / F_v	-3.64	1.92	-3.64	0.63	-3.64	1.58	-3.64	0.46

HCS Signalized Intersection Results Graphical Summary

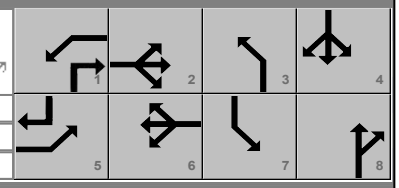
General Information				Intersection Information	
Agency	CMT			Duration, h	0.250
Analyst	TJH	Analysis Date	2/14/2023	Area Type	Other
Jurisdiction	ODOT District 3	Time Period	AM	PHF	0.93
Urban Street	SR-254 (Detroit Rd)	Analysis Year	2045	Analysis Period	1> 7:00
Intersection	SR-301 (Abbe Rd)	File Name	SR-254 Corridor 2045 AM - Existing.xus		
Project Description	2045 AM Existing				



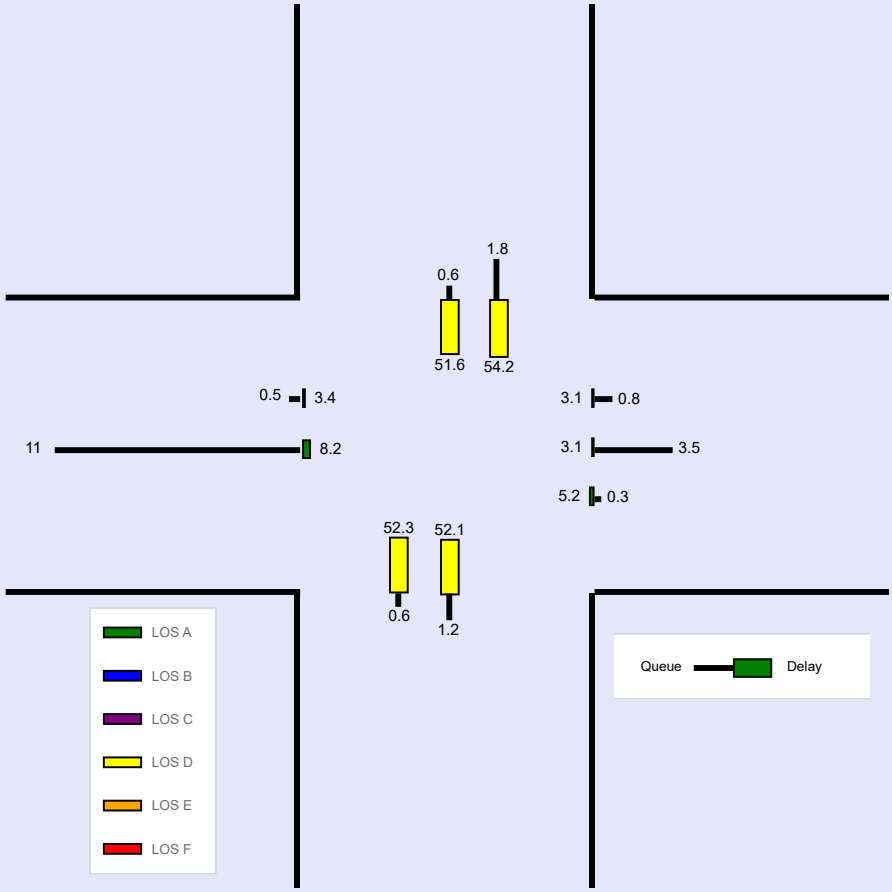
Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	150	320	610	150	520	40	510	230	150	50	260	210

Signal Information			
Cycle, s	120.0	Reference Phase	2
Offset, s	19	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	8.3	0.4	47.6	5.8	9.6	18.3	
Yellow	4.0	0.0	4.0	4.0	4.0	4.0	
Red	2.0	0.0	2.0	2.0	2.0	2.0	



Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Back of Queue (*Q*), ft/ln (95 th percentile)	129.4	407	460	119.3	269.9	263.4	342.9	253.4	152.6	60.9	178.5	267.3
Back of Queue (*Q*), veh/ln (95 th percentile)	5.1	15.9	18.0	4.7	10.7	10.5	13.5	10.0	6.0	2.4	6.9	10.4
Queue Storage Ratio (*RQ*) (95 th percentile)	0.86	1.16	1.31	0.37	0.57	0.56	0.36	0.18	0.46	0.26	0.39	1.07
Control Delay (*d*), s/veh	20.4	40.2	46.6	21.5	27.7	27.8	57.0	35.8	28.2	39.6	47.1	44.8
Level of Service (LOS)	C	D	D	C	C	C	E	D	C	D	D	D
Approach Delay, s/veh / LOS	41.1		D	26.4		C	46.7		D	45.5		D
Intersection Delay, s/veh / LOS	40.1					D						



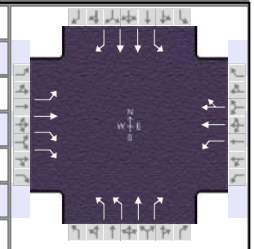
--- Messages ---

WARNING: Since queue spillover from turn lanes and spillback into upstream intersections is not accounted for in the HCM procedures, use of a simulation tool may be advised in situations where the Queue Storage Ratio exceeds 1.0.

--- Comments ---

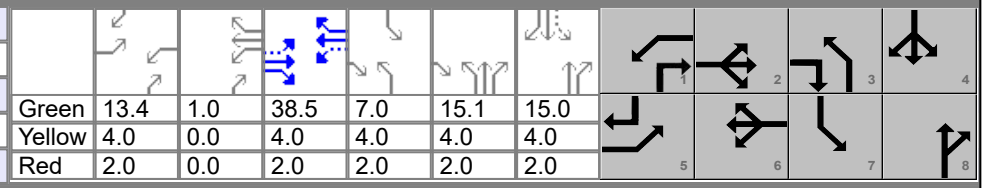
HCS Signalized Intersection Input Data

General Information				Intersection Information	
Agency	CMT			Duration, h	0.250
Analyst	TJH	Analysis Date	2/14/2023	Area Type	Other
Jurisdiction	ODOT District 3	Time Period	PM	PHF	0.94
Urban Street	SR-254 (Detroit Rd)	Analysis Year	2045	Analysis Period	1> 17:00
Intersection	SR-301 (Abbe Rd)	File Name	SR-254 Corridor 2045 PM - Existing.xus		
Project Description	2045 PM Existing				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	240	500	720	260	470	100	710	370	220	140	330	170

Signal Information			
Cycle, s	120.0	Reference Phase	2
Offset, s	15	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	13.4	1.0	38.5	7.0	15.1	15.0						
Yellow	4.0	0.0	4.0	4.0	4.0	4.0						
Red	2.0	0.0	2.0	2.0	2.0	2.0						

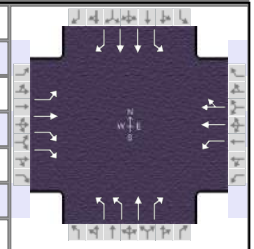
Traffic Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	240	500	720	260	470	100	710	370	220	140	330	170
Initial Queue (Q_b), veh/h	0	0	0	0	0	0	0	0	0	0	0	0
Base Saturation Flow Rate (s_o), veh/h	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Parking (N_m), man/h		None			None			None			None	
Heavy Vehicles (P_{HV}), %	3	3	3	1	1		2	2	2	4	4	4
Ped / Bike / RTOR, /h	0	0	0	0	0	0	0	0	0	0	0	0
Buses (N_b), buses/h	0	0	0	0	0	0	0	0	0	0	0	0
Arrival Type (*AT*)	3	3	3	3	3	3	3	3	3	3	3	3
Upstream Filtering (*I*)	0.82	0.82	0.82	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lane Width (*W*), ft	12.0	12.0	12.0	12.0	12.0		12.0	12.0	12.0	12.0	12.0	12.0
Turn Bay Length, ft	150	350	350	320	470		940	1440	330	230	460	250
Grade (*Pg*), %		0			0			0			0	
Speed Limit, mi/h	35	35	35	35	35	35	35	35	35	35	35	35

Phase Information	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Maximum Green (G_{max}) or Phase Split, s	20.0	41.0	22.0	43.0	35.0	44.0	13.0	22.0
Yellow Change Interval (*Y*), s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Red Clearance Interval (R_c), s	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Minimum Green (G_{min}), s	7	20	7	20	7	10	7	10
Start-Up Lost Time (*lt*), s	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Extension of Effective Green (*e*), s	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Passage (*PT*), s	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Recall Mode	Off	Min	Off	Min	Off	Off	Off	Off
Dual Entry	No	Yes	No	Yes	No	Yes	No	Yes
Walk (*Walk*), s		0.0		0.0		0.0		0.0
Pedestrian Clearance Time (*PC*), s		0.0		0.0		0.0		0.0

Multimodal Information	EB			WB			NB			SB		
85th % Speed / Rest in Walk / Corner Radius	0.0	No	25.0	0.0	No	25.0	0.0	No	25.0	0.0	No	25.0
Walkway / Crosswalk Width / Length, ft	9.0	12.0	0.0	9.0	12.0	0.0	9.0	12.0	0.0	9.0	12.0	0.0
Street Width / Island / Curb, ft	0.0	0	No	0.0	0	No	0.0	0	No	0.0	0	No
Width Outside / Bike Lane / Shoulder, ft	12.0	5.0	2.0	12.0	5.0	2.0	12.0	5.0	2.0	12.0	5.0	2.0
Pedestrian Signal / Occupied Parking	No	0.50		No	0.50		No	0.50		No	0.50	

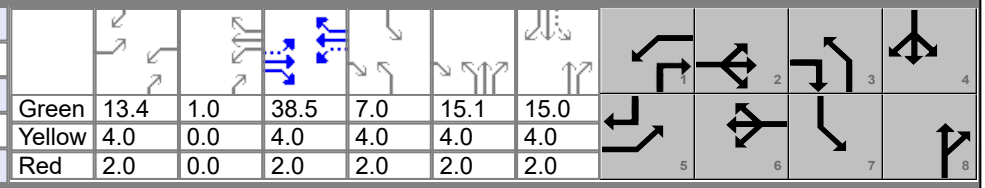
HCS Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	CMT			Duration, h	0.250
Analyst	TJH	Analysis Date	2/14/2023	Area Type	Other
Jurisdiction	ODOT District 3	Time Period	PM	PHF	0.94
Urban Street	SR-254 (Detroit Rd)	Analysis Year	2045	Analysis Period	1> 17:00
Intersection	SR-301 (Abbe Rd)	File Name	SR-254 Corridor 2045 PM - Existing.xus		
Project Description	2045 PM Existing				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	240	500	720	260	470	100	710	370	220	140	330	170

Signal Information			
Cycle, s	120.0	Reference Phase	2
Offset, s	15	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	13.4	1.0	38.5	7.0	15.1	15.0						
Yellow	4.0	0.0	4.0	4.0	4.0	4.0						
Red	2.0	0.0	2.0	2.0	2.0	2.0						

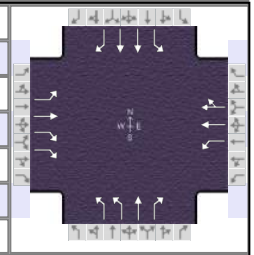
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	5	2	1	6	3	8	7	4
Case Number	1.1	3.0	1.1	4.0	2.0	3.0	1.1	3.0
Phase Duration, s	19.4	44.5	20.4	45.5	34.1	42.1	13.0	21.0
Change Period, (*Y+R c*), s	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Max Allow Headway (*MAH*), s	3.1	0.0	3.1	0.0	3.1	3.1	3.1	3.1
Queue Clearance Time (*g s*), s	13.3		14.2		27.7	24.4	9.0	14.0
Green Extension Time (*g e*), s	0.1	0.0	0.2	0.0	0.4	2.3	0.0	1.0
Phase Call Probability	1.00		1.00		1.00	1.00	0.99	1.00
Max Out Probability	1.00		0.61		1.00	0.04	1.00	1.00

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	257	534	770	277	311	295	755	394	234	149	351	181
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1767	1856	1392	1795	1885	1770	1730	1870	1585	1753	1752	1560
Queue Service Time (*g s*), s	11.3	33.9	21.2	12.2	15.9	16.1	25.7	22.4	12.0	7.0	11.7	12.0
Cycle Queue Clearance Time (*g c*), s	11.3	33.9	21.2	12.2	15.9	16.1	25.7	22.4	12.0	7.0	11.7	12.0
Green Ratio (*g/C*)	0.43	0.32	0.55	0.44	0.33	0.33	0.23	0.30	0.42	0.18	0.13	0.24
Capacity (*c*), veh/h	402	595	1544	309	620	583	809	562	667	257	439	370
Volume-to-Capacity Ratio (*X*)	0.639	0.898	0.499	0.895	0.502	0.506	0.934	0.700	0.351	0.578	0.800	0.489
Back of Queue (*Q*), ft/ln (95 th percentile)	224.3	657.4	319.4	278.1	308.3	294	471	402.3	201.3	40.5	241.5	209.5
Back of Queue (*Q*), veh/ln (95 th percentile)	8.8	25.7	12.5	11.0	12.2	11.8	18.5	15.8	7.9	1.6	9.4	8.1
Queue Storage Ratio (*RQ*) (95 th percentile)	1.50	1.88	0.91	0.87	0.66	0.63	0.50	0.28	0.61	0.18	0.53	0.84
Uniform Delay (*d 1*), s/veh	26.2	48.5	20.4	28.1	32.3	32.4	45.1	37.2	23.6	44.7	51.0	39.5
Incremental Delay (*d 2*), s/veh	1.5	16.1	0.9	19.9	2.9	3.1	16.6	2.8	0.1	2.1	7.1	0.4
Initial Queue Delay (*d 3*), 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
Control Delay (*d*), s/veh	27.8	64.6	21.3	47.9	35.2	35.5	61.7	40.0	23.7	46.8	58.1	39.9
Level of Service (LOS)	C	E	C	D	D	D	E	D	C	D	E	D
Approach Delay, s/veh / LOS	37.2	D		39.3	D		49.1	D		50.8	D	
Intersection Delay, s/veh / LOS	43.3						D					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.44	B	2.29	B	2.12	B	2.46	B
Bicycle LOS Score / LOS	3.05	C	1.22	A	2.77	C	1.05	A

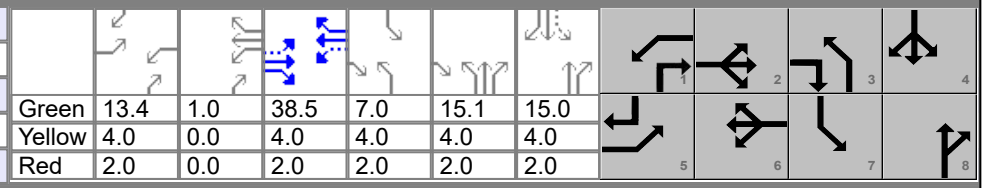
HCS Signalized Intersection Intermediate Values

General Information				Intersection Information	
Agency	CMT			Duration, h	0.250
Analyst	TJH	Analysis Date	2/14/2023	Area Type	Other
Jurisdiction	ODOT District 3	Time Period	PM	PHF	0.94
Urban Street	SR-254 (Detroit Rd)	Analysis Year	2045	Analysis Period	1> 17:00
Intersection	SR-301 (Abbe Rd)	File Name	SR-254 Corridor 2045 PM - Existing.xus		
Project Description	2045 PM Existing				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	240	500	720	260	470	100	710	370	220	140	330	170

Signal Information			
Cycle, s	120.0	Reference Phase	2
Offset, s	15	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	13.4	1.0	38.5	7.0	15.1	15.0
Yellow	4.0	0.0	4.0	4.0	4.0	4.0
Red	2.0	0.0	2.0	2.0	2.0	2.0

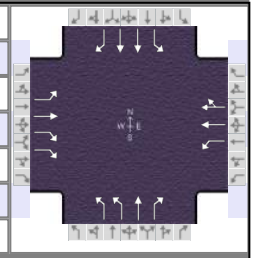
Saturation Flow / Delay	L	T	R	L	T	R	L	T	R	L	T	R
Lane Width Adjustment Factor (f_w)	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Heavy Vehicles and Grade Factor (f_{HVg})	0.977	0.977	0.977	0.992	0.992	1.000	0.984	0.984	0.984	0.969	0.969	0.969
Parking Activity Adjustment Factor (f_p)	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Bus Blockage Adjustment Factor (f_{bb})	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Area Type Adjustment Factor (f_a)	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Lane Utilization Adjustment Factor (f_{LU})	1.000	1.000	0.885	1.000	1.000	1.000	0.971	1.000	1.000	1.000	0.952	1.000
Left-Turn Adjustment Factor (f_{LT})	0.952	0.000		0.952	0.000		0.952	0.000		0.952	0.000	
Right-Turn Adjustment Factor (f_{RT})		0.000	0.847		0.939	0.939		0.000	0.847		0.000	0.847
Left-Turn Pedestrian Adjustment Factor (f_{Lpb})	1.000			1.000			1.000			1.000		
Right-Turn Ped-Bike Adjustment Factor (f_{Rpb})			1.000			1.000			1.000			1.000
Work Zone Adjustment Factor (f_{wz})	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
DDI Factor (f_{DDI})	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Left-Turn Prot. CAV Adj. Factor ($f_{CAV,prot}$)	1.00			1.00			1.00			1.00		
Left-Turn Perm. CAV Adj. Factor ($f_{CAV,perm}$)												
Movement Saturation Flow Rate (s), veh/h	1767	1856	2783	1795	3017	638	3459	1870	1585	1753	3505	1560
Proportion of Vehicles Arriving on Green (P)	0.04	0.16	0.17	0.12	0.33	0.33	0.23	0.30	0.30	0.06	0.13	0.13
Incremental Delay Factor (k)	0.12	0.50	0.50	0.28	0.50	0.50	0.41	0.19	0.04	0.11	0.23	0.04

Signal Timing / Movement Groups	EBL	EBT/R	WBL	WBT/R	NBL	NBT/R	SBL	SBT/R
Lost Time (t_L)	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Green Ratio (g/C)	0.43	0.32	0.44	0.33	0.23	0.30	0.18	0.13
Permitted Saturation Flow Rate (s_p), veh/h/ln	807	0	877	0	0	0	975	0
Shared Saturation Flow Rate (s_{sh}), veh/h/ln								
Permitted Effective Green Time (g_p), s	38.5	0.0	38.5	0.0	0.0	0.0	15.0	0.0
Permitted Service Time (g_u), s	21.4	0.0	4.6	0.0	0.0	0.0	11.7	0.0
Permitted Queue Service Time (g_{ps}), s	8.9		4.6				4.7	
Time to First Blockage (g_f), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Queue Service Time Before Blockage (g_{fs}), s								
Protected Right Saturation Flow (s_R), veh/h/ln		1392				1585		1560
Protected Right Effective Green Time (g_R), s		28.1				14.4		13.4

Multimodal	EB		WB		NB		SB	
Pedestrian F_w / F_v	1.710	0.000	1.557	0.000	1.389	0.000	1.710	0.000
Pedestrian F_s / F_{delay}	0.000	0.133	0.000	0.132	0.000	0.135	0.000	0.153
Pedestrian M_{corner} / M_{cw}	0.00		0.00		0.00		0.00	
Bicycle c_b / d_b	641.56	27.68	658.24	27.00	601.47	29.34	250.51	45.91
Bicycle F_w / F_v	-3.64	2.56	-3.64	0.73	-3.64	2.28	-3.64	0.56

HCS Signalized Intersection Results Graphical Summary

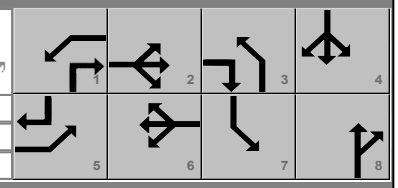
General Information				Intersection Information	
Agency	CMT			Duration, h	0.250
Analyst	TJH	Analysis Date	2/14/2023	Area Type	Other
Jurisdiction	ODOT District 3	Time Period	PM	PHF	0.94
Urban Street	SR-254 (Detroit Rd)	Analysis Year	2045	Analysis Period	1> 17:00
Intersection	SR-301 (Abbe Rd)	File Name	SR-254 Corridor 2045 PM - Existing.xus		
Project Description	2045 PM Existing				



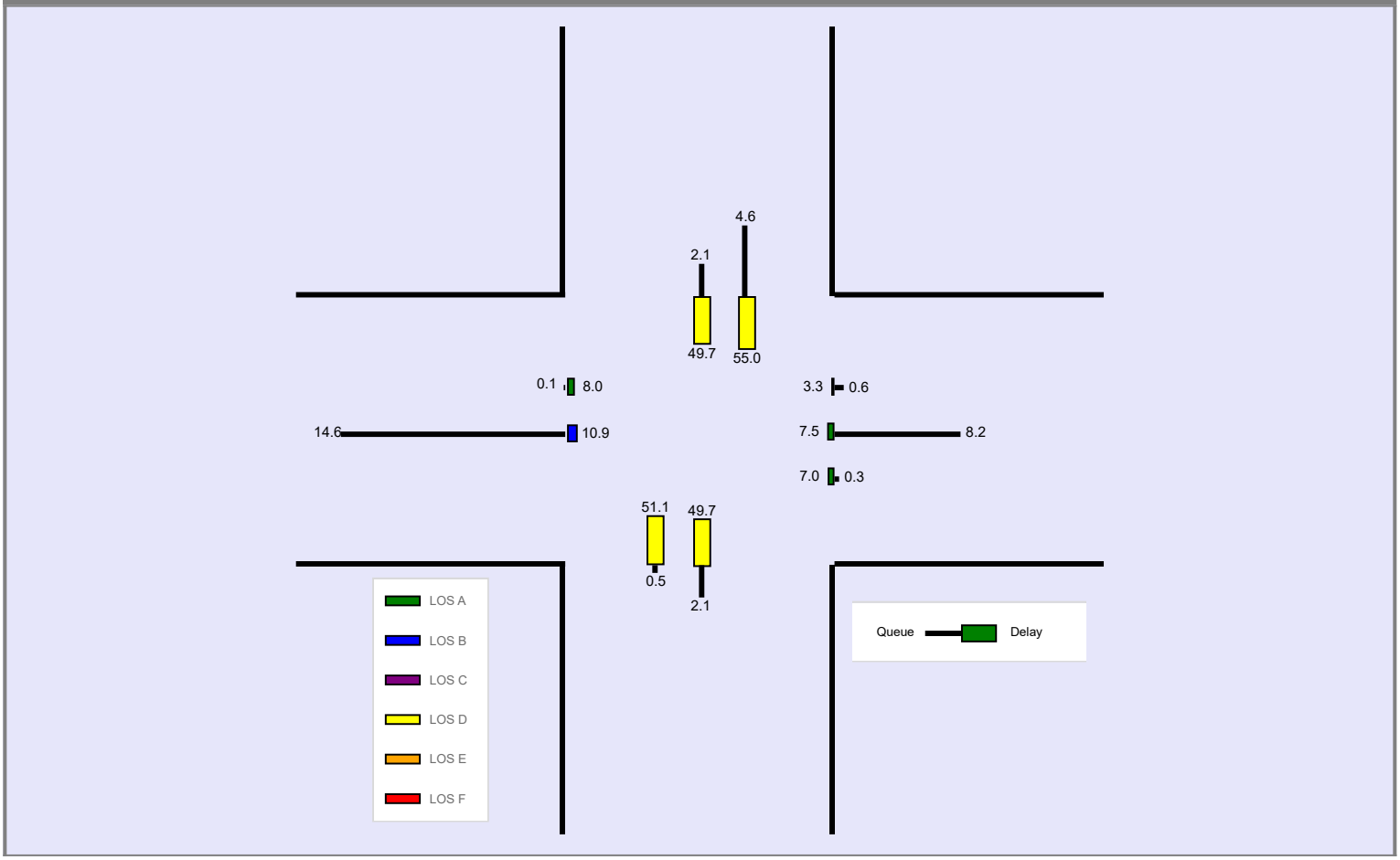
Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	240	500	720	260	470	100	710	370	220	140	330	170

Signal Information			
Cycle, s	120.0	Reference Phase	2
Offset, s	15	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	13.4	1.0	38.5	7.0	15.1	15.0	
Yellow	4.0	0.0	4.0	4.0	4.0	4.0	
Red	2.0	0.0	2.0	2.0	2.0	2.0	



Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Back of Queue (*Q*), ft/ln (95 th percentile)	224.3	657.4	319.4	278.1	308.3	294	471	402.3	201.3	40.5	241.5	209.5
Back of Queue (*Q*), veh/ln (95 th percentile)	8.8	25.7	12.5	11.0	12.2	11.8	18.5	15.8	7.9	1.6	9.4	8.1
Queue Storage Ratio (*RQ*) (95 th percentile)	1.50	1.88	0.91	0.87	0.66	0.63	0.50	0.28	0.61	0.18	0.53	0.84
Control Delay (*d*), s/veh	27.8	64.6	21.3	47.9	35.2	35.5	61.7	40.0	23.7	46.8	58.1	39.9
Level of Service (LOS)	C	E	C	D	D	D	E	D	C	D	E	D
Approach Delay, s/veh / LOS	37.2		D	39.3		D	49.1		D	50.8		D
Intersection Delay, s/veh / LOS	43.3						D					



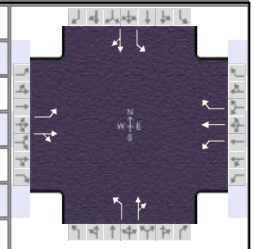
--- Messages ---

WARNING: Since queue spillover from turn lanes and spillback into upstream intersections is not accounted for in the HCM procedures, use of a simulation tool may be advised in situations where the Queue Storage Ratio exceeds 1.0.

--- Comments ---

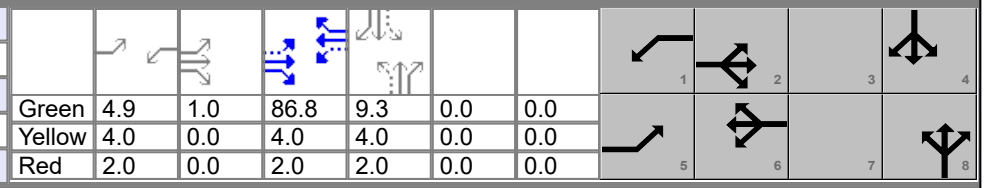
HCS Signalized Intersection Input Data

General Information				Intersection Information	
Agency	CMT			Duration, h	0.250
Analyst	TJH	Analysis Date	2/14/2023	Area Type	Other
Jurisdiction	ODOT District 3	Time Period	AM	PHF	0.90
Urban Street	SR-254 (Detroit Rd)	Analysis Year	2045	Analysis Period	1> 7:00
Intersection	Transportation Dr	File Name	SR-254 Corridor 2045 AM - Prop.xus		
Project Description	2045 AM Proposed				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	50	600	10	30	480	90	10	0	20	30	0	10

Signal Information			
Cycle, s	120.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	4.9	1.0		86.8	9.3	0.0	0.0					
Yellow	4.0	0.0		4.0	4.0	0.0	0.0					
Red	2.0	0.0		2.0	2.0	0.0	0.0					

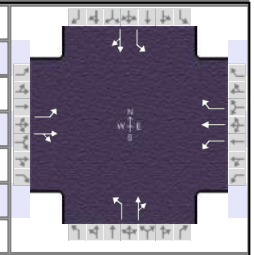
Traffic Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	50	600	10	30	480	90	10	0	20	30	0	10
Initial Queue (Q_b), veh/h	0	0	0	0	0	0	0	0	0	0	0	0
Base Saturation Flow Rate (s_o), veh/h	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Parking (N_m), man/h		None			None			None			None	
Heavy Vehicles (P_{HV}), %	4	4		4	4	4	6	6		3	3	
Ped / Bike / RTOR, /h	0	0	0	0	0	0	0	0	0	0	0	0
Buses (N_b), buses/h	0	0	0	0	0	0	0	0	0	0	0	0
Arrival Type (*AT*)	3	3	3	3	3	3	3	3	3	3	3	3
Upstream Filtering (*I*)	1.00	1.00	1.00	0.99	0.99	0.99	1.00	1.00	1.00	1.00	1.00	1.00
Lane Width (*W*), ft	12.0	12.0		12.0	12.0	12.0	12.0	12.0		12.0	12.0	
Turn Bay Length, ft	115	2540		400	500	500	250	250		400	400	
Grade (*Pg*), %		0			0			0			0	
Speed Limit, mi/h	35	35	35	35	35	35	25	25	25	25	25	25

Phase Information	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Maximum Green (G_{max}) or Phase Split, s	16.0	84.0	16.0	84.0		20.0		20.0
Yellow Change Interval (*Y*), s	4.0	4.0	4.0	4.0		4.0		4.0
Red Clearance Interval (R_c), s	2.0	2.0	2.0	2.0		2.0		2.0
Minimum Green (G_{min}), s	7	20	7	20		10		10
Start-Up Lost Time (*l*t), s	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Extension of Effective Green (*e*), s	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Passage (*PT*), s	2.0	2.0	2.0	2.0		2.0		2.0
Recall Mode	Off	Min	Off	Min		Off		Off
Dual Entry	No	Yes	No	Yes		Yes		Yes
Walk (*Walk*), s		0.0		0.0		0.0		0.0
Pedestrian Clearance Time (*PC*), s		0.0		0.0		0.0		0.0

Multimodal Information	EB			WB			NB			SB		
85th % Speed / Rest in Walk / Corner Radius	0.0	No	25.0	0.0	No	25.0	0.0	No	25.0	0.0	No	25.0
Walkway / Crosswalk Width / Length, ft	9.0	12.0	0.0	9.0	12.0	0.0	9.0	12.0	0.0	9.0	12.0	0.0
Street Width / Island / Curb, ft	0.0	0	No	0.0	0	No	0.0	0	No	0.0	0	No
Width Outside / Bike Lane / Shoulder, ft	12.0	5.0	2.0	12.0	5.0	2.0	12.0	5.0	2.0	12.0	5.0	2.0
Pedestrian Signal / Occupied Parking	No	0.50		No	0.50		No	0.50		No	0.50	

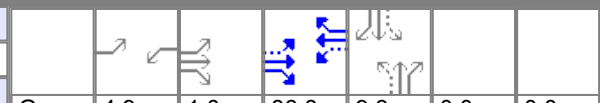
HCS Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	CMT			Duration, h	0.250
Analyst	TJH	Analysis Date	2/14/2023	Area Type	Other
Jurisdiction	ODOT District 3	Time Period	AM	PHF	0.90
Urban Street	SR-254 (Detroit Rd)	Analysis Year	2045	Analysis Period	1> 7:00
Intersection	Transportation Dr	File Name	SR-254 Corridor 2045 AM - Prop.xus		
Project Description	2045 AM Proposed				

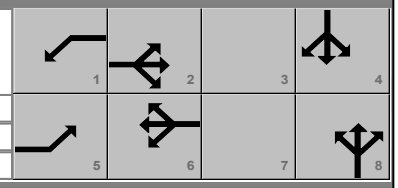


Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	50	600	10	30	480	90	10	0	20	30	0	10

Signal Information			
Cycle, s	120.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	4.9	1.0		86.8	9.3	0.0	0.0					
Yellow	4.0	0.0		4.0	4.0	0.0	0.0					
Red	2.0	0.0		2.0	2.0	0.0	0.0					



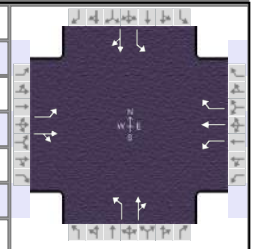
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	5	2	1	6		8		4
Case Number	1.1	4.0	1.1	3.0		6.0		6.0
Phase Duration, s	11.9	93.9	10.9	92.8		15.3		15.3
Change Period, ($Y+R_c$), s	6.0	6.0	6.0	6.0		6.0		6.0
Max Allow Headway (*MAH*), s	3.1	0.0	3.1	0.0		3.4		3.4
Queue Clearance Time (g_s), s	2.9		2.6			3.7		6.4
Green Extension Time (g_e), s	0.0	0.0	0.0	0.0		0.1		0.1
Phase Call Probability	0.84		0.69			0.93		0.93
Max Out Probability	0.00		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	56	678		36	570	107	11	22		33	11	
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1753	1835		1753	1841	1560	1359	1535		1378	1572	
Queue Service Time (g_s), s	0.9	18.8		0.6	11.0	2.6	0.9	1.6		2.8	0.8	
Cycle Queue Clearance Time (g_c), s	0.9	18.8		0.6	11.0	2.6	1.7	1.6		4.4	0.8	
Green Ratio (*g/C*)	0.77	0.73		0.76	0.72	0.72	0.08	0.08		0.08	0.08	
Capacity (*c*), veh/h	670	1344		550	1332	1129	156	118		148	121	
Volume-to-Capacity Ratio (*X*)	0.083	0.504		0.065	0.428	0.095	0.071	0.188		0.226	0.092	
Back of Queue (*Q*), ft/ln (95 th percentile)	11.9	284.3		8.1	162.4	37.9	15.1	30.3		45.5	14.7	
Back of Queue (*Q*), veh/ln (95 th percentile)	0.5	11.0		0.3	6.3	1.5	0.6	1.2		1.8	0.6	
Queue Storage Ratio (*RQ*) (95 th percentile)	0.10	0.11		0.02	0.32	0.08	0.06	0.12		0.11	0.04	
Uniform Delay (d_1), s/veh	3.7	6.8		5.1	4.3	5.4	52.3	51.9		53.9	51.5	
Incremental Delay (d_2), s/veh	0.0	1.4		0.0	1.0	0.2	0.1	0.3		0.3	0.1	
Initial Queue Delay (d_3), s/veh	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Control Delay (*d*), s/veh	3.8	8.2		5.1	5.3	5.6	52.3	52.1		54.2	51.6	
Level of Service (LOS)	A	A		A	A	A	D	D		D	D	
Approach Delay, s/veh / LOS	7.8	A		5.3	A		52.2	D		53.6	D	
Intersection Delay, s/veh / LOS	9.0						A					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	1.86	B	1.86	B	2.15	B	1.96	B
Bicycle LOS Score / LOS	1.70	B	1.59	B	0.54	A	0.56	A

HCS Signalized Intersection Intermediate Values

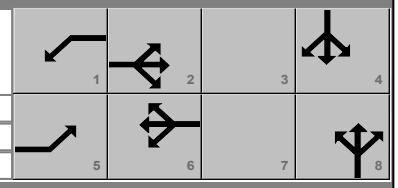
General Information				Intersection Information	
Agency	CMT			Duration, h	0.250
Analyst	TJH	Analysis Date	2/14/2023	Area Type	Other
Jurisdiction	ODOT District 3	Time Period	AM	PHF	0.90
Urban Street	SR-254 (Detroit Rd)	Analysis Year	2045	Analysis Period	1> 7:00
Intersection	Transportation Dr	File Name	SR-254 Corridor 2045 AM - Prop.xus		
Project Description	2045 AM Proposed				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	50	600	10	30	480	90	10	0	20	30	0	10

Signal Information			
Cycle, s	120.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	4.9	1.0	86.8	9.3	0.0	0.0						
Yellow	4.0	0.0	4.0	4.0	0.0	0.0						
Red	2.0	0.0	2.0	2.0	0.0	0.0						



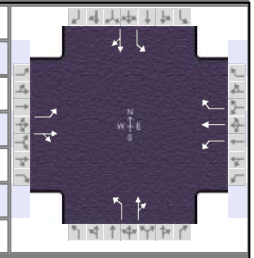
Saturation Flow / Delay	L	T	R	L	T	R	L	T	R	L	T	R
Lane Width Adjustment Factor (f_w)	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Heavy Vehicles and Grade Factor (f_{HVg})	0.969	0.969	1.000	0.969	0.969	0.969	0.953	0.953	1.000	0.977	0.977	1.000
Parking Activity Adjustment Factor (f_p)	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Bus Blockage Adjustment Factor (f_{bb})	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Area Type Adjustment Factor (f_a)	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Lane Utilization Adjustment Factor (f_{LU})	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Left-Turn Adjustment Factor (f_{LT})	0.952	0.000		0.952	0.000		0.715	0.000		0.725	0.000	
Right-Turn Adjustment Factor (f_{RT})		0.997	0.997		0.000	0.847		0.847	0.847		0.847	0.847
Left-Turn Pedestrian Adjustment Factor (f_{Lpb})	1.000			1.000			1.000			1.000		
Right-Turn Ped-Bike Adjustment Factor (f_{Rpb})			1.000			1.000			1.000			1.000
Work Zone Adjustment Factor (f_{wz})	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
DDI Factor (f_{DDI})	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Left-Turn Prot. CAV Adj. Factor ($f_{CAV,prot}$)	1.00			1.00								
Left-Turn Perm. CAV Adj. Factor ($f_{CAV,perm}$)							1.00			1.00		
Movement Saturation Flow Rate (s), veh/h	1753	1805	30	1753	1841	1560	1359	0	1535	1378	0	1572
Proportion of Vehicles Arriving on Green (P)	0.05	0.73	0.73	0.04	0.81	0.70	0.08	0.00	0.08	0.08	0.00	0.08
Incremental Delay Factor (k)	0.04	0.50		0.04	0.50	0.50	0.04	0.04		0.04	0.04	

Signal Timing / Movement Groups	EBL	EBT/R	WBL	WBT/R	NBL	NBT/R	SBL	SBT/R
Lost Time (t_L)	6.0	6.0	6.0	6.0		6.0		6.0
Green Ratio (g/C)	0.77	0.73	0.76	0.72		0.08		0.08
Permitted Saturation Flow Rate (s_p), veh/h/ln	829	0	750	0		1359		1378
Shared Saturation Flow Rate (s_{sh}), veh/h/ln								
Permitted Effective Green Time (g_p), s	86.8	0.0	86.8	0.0		9.3		9.3
Permitted Service Time (g_u), s	75.8	0.0	67.1	0.0		8.5		7.6
Permitted Queue Service Time (g_{ps}), s	0.8		1.0			0.9		2.8
Time to First Blockage (g_f), s	0.0	0.0	0.0	0.0		0.0		0.0
Queue Service Time Before Blockage (g_{fs}), s								
Protected Right Saturation Flow (s_R), veh/h/ln				0				
Protected Right Effective Green Time (g_R), s				0.0				

Multimodal	EB		WB		NB		SB	
Pedestrian F_w / F_v	1.198	0.000	1.198	0.000	1.389	0.000	1.198	0.000
Pedestrian F_s / F_{delay}	0.000	0.058	0.000	0.061	0.000	0.158	0.000	0.158
Pedestrian M_{corner} / M_{cw}	0.00		0.00		0.00		0.00	
Bicycle c_b / d_b	1464.74	4.30	1447.44	4.58	154.20	51.10	154.20	51.10
Bicycle F_w / F_v	-3.64	1.21	-3.64	1.10	-3.64	0.06	-3.64	0.07

HCS Signalized Intersection Results Graphical Summary

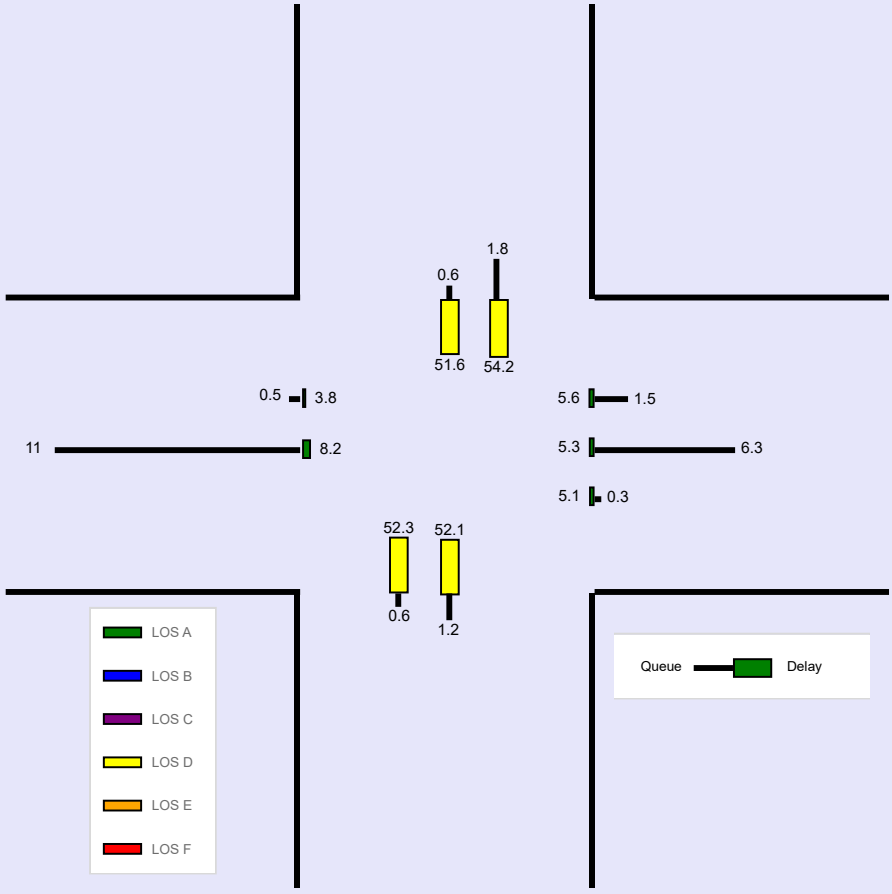
General Information				Intersection Information	
Agency	CMT			Duration, h	0.250
Analyst	TJH	Analysis Date	2/14/2023	Area Type	Other
Jurisdiction	ODOT District 3	Time Period	AM	PHF	0.90
Urban Street	SR-254 (Detroit Rd)	Analysis Year	2045	Analysis Period	1> 7:00
Intersection	Transportation Dr	File Name	SR-254 Corridor 2045 AM - Prop.xus		
Project Description	2045 AM Proposed				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	50	600	10	30	480	90	10	0	20	30	0	10

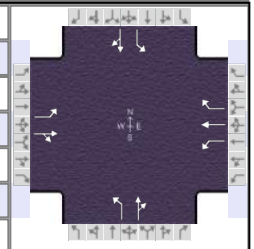
Signal Information					EB			WB			NB			SB		
Cycle, s	120.0	Reference Phase	2													
Offset, s	0	Reference Point	End	Green	4.9	1.0		86.8	9.3	0.0	0.0					
Uncoordinated	No	Simult. Gap E/W	On	Yellow	4.0	0.0		4.0	4.0	0.0	0.0					
Force Mode	Fixed	Simult. Gap N/S	On	Red	2.0	0.0		2.0	2.0	0.0	0.0					

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Back of Queue (*Q*), ft/ln (95 th percentile)	11.9	284.3		8.1	162.4	37.9	15.1	30.3		45.5	14.7	
Back of Queue (*Q*), veh/ln (95 th percentile)	0.5	11.0		0.3	6.3	1.5	0.6	1.2		1.8	0.6	
Queue Storage Ratio (*RQ*) (95 th percentile)	0.10	0.11		0.02	0.32	0.08	0.06	0.12		0.11	0.04	
Control Delay (*d*), s/veh	3.8	8.2		5.1	5.3	5.6	52.3	52.1		54.2	51.6	
Level of Service (LOS)	A	A		A	A	A	D	D		D	D	
Approach Delay, s/veh / LOS	7.8	A		5.3	A		52.2	D		53.6	D	
Intersection Delay, s/veh / LOS	9.0						A					



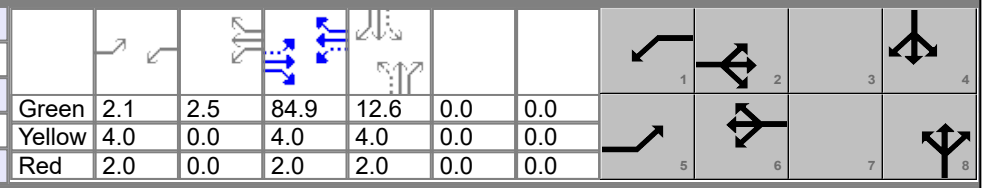
HCS Signalized Intersection Input Data

General Information				Intersection Information	
Agency	CMT			Duration, h	0.250
Analyst	TJH	Analysis Date	2/14/2023	Area Type	Other
Jurisdiction	ODOT District 3	Time Period	PM	PHF	0.95
Urban Street	SR-254 (Detroit Rd)	Analysis Year	2045	Analysis Period	1> 17:00
Intersection	Transportation Dr	File Name	SR-254 Corridor 2045 PM - Prop.xus		
Project Description	2045 PM Proposed				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	10	720	10	30	1040	70	10	0	40	80	0	40

Signal Information			
Cycle, s	120.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	2.1	2.5	84.9	12.6	0.0	0.0						
Yellow	4.0	0.0	4.0	4.0	0.0	0.0						
Red	2.0	0.0	2.0	2.0	0.0	0.0						

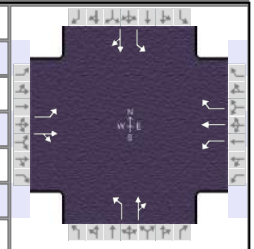
Traffic Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	10	720	10	30	1040	70	10	0	40	80	0	40
Initial Queue (Q_b), veh/h	0	0	0	0	0	0	0	0	0	0	0	0
Base Saturation Flow Rate (s_o), veh/h	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Parking (N_m), man/h		None			None			None			None	
Heavy Vehicles (P_{HV}), %	4	4		4	4	4	6	6		3	3	
Ped / Bike / RTOR, /h	0	0	0	0	0	0	0	0	0	0	0	0
Buses (N_b), buses/h	0	0	0	0	0	0	0	0	0	0	0	0
Arrival Type (*AT*)	3	3	3	3	3	3	3	3	3	3	3	3
Upstream Filtering (*I*)	1.00	1.00	1.00	0.87	0.87	0.87	1.00	1.00	1.00	1.00	1.00	1.00
Lane Width (*W*), ft	12.0	12.0		12.0	12.0	12.0	12.0	12.0		12.0	12.0	
Turn Bay Length, ft	115	2540		400	500	500	250	250		400	400	
Grade (*Pg*), %		0			0			0			0	
Speed Limit, mi/h	35	35	35	35	35	35	25	25	25	25	25	25

Phase Information	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Maximum Green (G_{max}) or Phase Split, s	13.0	77.0	13.0	77.0		30.0		30.0
Yellow Change Interval (*Y*), s	4.0	4.0	4.0	4.0		4.0		4.0
Red Clearance Interval (R_c), s	2.0	2.0	2.0	2.0		2.0		2.0
Minimum Green (G_{min}), s	7	20	7	20		10		10
Start-Up Lost Time (*l*t), s	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Extension of Effective Green (*e*), s	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Passage (*PT*), s	2.0	2.0	2.0	2.0		2.0		2.0
Recall Mode	Off	Min	Off	Min		Off		Off
Dual Entry	No	Yes	No	Yes		Yes		Yes
Walk (*Walk*), s		0.0		0.0		0.0		0.0
Pedestrian Clearance Time (*PC*), s		0.0		0.0		0.0		0.0

Multimodal Information	EB			WB			NB			SB		
85th % Speed / Rest in Walk / Corner Radius	0.0	No	25.0	0.0	No	25.0	0.0	No	25.0	0.0	No	25.0
Walkway / Crosswalk Width / Length, ft	9.0	12.0	0.0	9.0	12.0	0.0	9.0	12.0	0.0	9.0	12.0	0.0
Street Width / Island / Curb, ft	0.0	0	No	0.0	0	No	0.0	0	No	0.0	0	No
Width Outside / Bike Lane / Shoulder, ft	12.0	5.0	2.0	12.0	5.0	2.0	12.0	5.0	2.0	12.0	5.0	2.0
Pedestrian Signal / Occupied Parking	No	0.50		No	0.50		No	0.50		No	0.50	

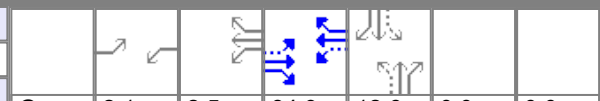
HCS Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	CMT			Duration, h	0.250
Analyst	TJH	Analysis Date	2/14/2023	Area Type	Other
Jurisdiction	ODOT District 3	Time Period	PM	PHF	0.95
Urban Street	SR-254 (Detroit Rd)	Analysis Year	2045	Analysis Period	1> 17:00
Intersection	Transportation Dr	File Name	SR-254 Corridor 2045 PM - Prop.xus		
Project Description	2045 PM Proposed				

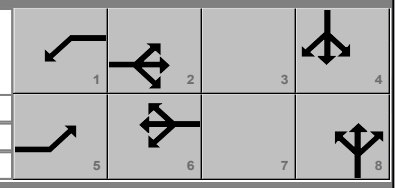


Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	10	720	10	30	1040	70	10	0	40	80	0	40

Signal Information			
Cycle, s	120.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	2.1	2.5	84.9	12.6	0.0	0.0
Yellow	4.0	0.0	4.0	4.0	0.0	0.0
Red	2.0	0.0	2.0	2.0	0.0	0.0



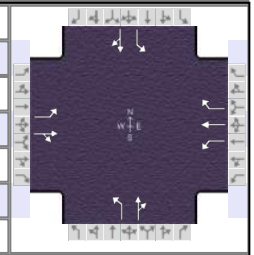
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	5	2	1	6		8		4
Case Number	1.1	4.0	1.1	3.0		6.0		6.0
Phase Duration, s	8.1	90.9	10.6	93.3		18.6		18.6
Change Period, ($Y+R_c$), s	6.0	6.0	6.0	6.0		6.0		6.0
Max Allow Headway (*MAH*), s	3.1	0.0	3.1	0.0		3.4		3.4
Queue Clearance Time (g_s), s	2.2		2.6			5.8		12.3
Green Extension Time (g_e), s	0.0	0.0	0.0	0.0		0.3		0.3
Phase Call Probability	0.30		0.65			1.00		1.00
Max Out Probability	0.00		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	11	768		31	1092	73	11	42		84	42	
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1753	1836		1753	1841	1560	1321	1535		1354	1572	
Queue Service Time (g_s), s	0.2	25.3		0.6	30.2	1.2	0.9	3.0		7.3	3.0	
Cycle Queue Clearance Time (g_c), s	0.2	25.3		0.6	30.2	1.2	3.8	3.0		10.3	3.0	
Green Ratio (*g/C*)	0.72	0.71		0.74	0.73	0.73	0.10	0.10		0.10	0.10	
Capacity (*c*), veh/h	323	1298		467	1339	1135	167	162		169	166	
Volume-to-Capacity Ratio (*X*)	0.033	0.592		0.067	0.815	0.065	0.063	0.261		0.499	0.254	
Back of Queue (*Q*), ft/ln (95 th percentile)	3	375.9		8.2	241.3	17.1	14.1	56.1		117.6	54.7	
Back of Queue (*Q*), veh/ln (95 th percentile)	0.1	14.6		0.3	9.4	0.7	0.5	2.1		4.6	2.1	
Queue Storage Ratio (*RQ*) (95 th percentile)	0.03	0.15		0.02	0.48	0.03	0.06	0.22		0.29	0.14	
Uniform Delay (d_1), s/veh	8.4	8.9		6.9	3.8	3.4	51.1	49.4		54.1	49.4	
Incremental Delay (d_2), s/veh	0.0	2.0		0.0	4.9	0.1	0.1	0.3		0.8	0.3	
Initial Queue Delay (d_3), s/veh	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Control Delay (*d*), s/veh	8.4	10.9		7.0	8.7	3.5	51.1	49.7		55.0	49.7	
Level of Service (LOS)	A	B		A	A	A	D	D		D	D	
Approach Delay, s/veh / LOS	10.8	B		8.3	A		50.0	D		53.2	D	
Intersection Delay, s/veh / LOS	12.9						B					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	1.86	B	1.86	B	2.14	B	1.95	B
Bicycle LOS Score / LOS	1.77	B	2.47	B	0.57	A	0.70	A

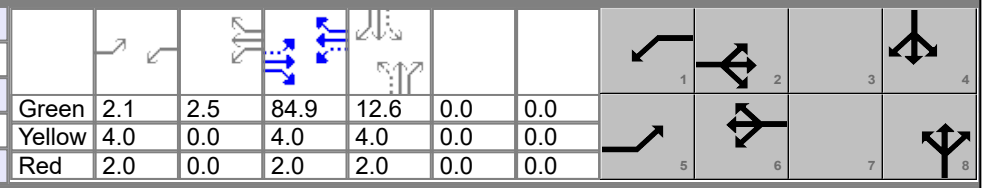
HCS Signalized Intersection Intermediate Values

General Information				Intersection Information	
Agency	CMT			Duration, h	0.250
Analyst	TJH	Analysis Date	2/14/2023	Area Type	Other
Jurisdiction	ODOT District 3	Time Period	PM	PHF	0.95
Urban Street	SR-254 (Detroit Rd)	Analysis Year	2045	Analysis Period	1> 17:00
Intersection	Transportation Dr	File Name	SR-254 Corridor 2045 PM - Prop.xus		
Project Description	2045 PM Proposed				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	10	720	10	30	1040	70	10	0	40	80	0	40

Signal Information			
Cycle, s	120.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	2.1	2.5	84.9	12.6	0.0	0.0						
Yellow	4.0	0.0	4.0	4.0	0.0	0.0						
Red	2.0	0.0	2.0	2.0	0.0	0.0						

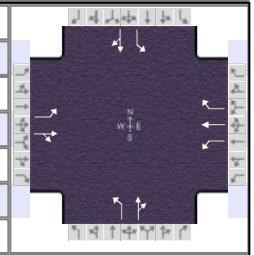
Saturation Flow / Delay	L	T	R	L	T	R	L	T	R	L	T	R
Lane Width Adjustment Factor (f_w)	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Heavy Vehicles and Grade Factor (f_{HVg})	0.969	0.969	1.000	0.969	0.969	0.969	0.953	0.953	1.000	0.977	0.977	1.000
Parking Activity Adjustment Factor (f_p)	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Bus Blockage Adjustment Factor (f_{bb})	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Area Type Adjustment Factor (f_a)	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Lane Utilization Adjustment Factor (f_{LU})	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Left-Turn Adjustment Factor (f_{LT})	0.952	0.000		0.952	0.000		0.695	0.000		0.713	0.000	
Right-Turn Adjustment Factor (f_{RT})		0.998	0.998		0.000	0.847		0.847	0.847		0.847	0.847
Left-Turn Pedestrian Adjustment Factor (f_{Lpb})	1.000			1.000			1.000			1.000		
Right-Turn Ped-Bike Adjustment Factor (f_{Rpb})			1.000			1.000			1.000			1.000
Work Zone Adjustment Factor (f_{wz})	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
DDI Factor (f_{DDI})	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Left-Turn Prot. CAV Adj. Factor ($f_{CAV,prot}$)	1.00			1.00								
Left-Turn Perm. CAV Adj. Factor ($f_{CAV,perm}$)							1.00			1.00		
Movement Saturation Flow Rate (s), veh/h	1753	1811	25	1753	1841	1560	1321	0	1535	1354	0	1572
Proportion of Vehicles Arriving on Green (P)	0.02	0.71	0.71	0.02	0.88	0.80	0.11	0.00	0.11	0.11	0.00	0.11
Incremental Delay Factor (k)	0.04	0.50		0.04	0.50	0.50	0.04	0.04		0.04	0.04	

Signal Timing / Movement Groups	EBL	EBT/R	WBL	WBT/R	NBL	NBT/R	SBL	SBT/R
Lost Time (t_L)	6.0	6.0	6.0	6.0		6.0		6.0
Green Ratio (g/C)	0.72	0.71	0.74	0.73		0.10		0.10
Permitted Saturation Flow Rate (s_p), veh/h/ln	508	0	689	0		1321		1354
Shared Saturation Flow Rate (s_{sh}), veh/h/ln								
Permitted Effective Green Time (g_p), s	84.8	0.0	84.8	0.0		12.6		12.6
Permitted Service Time (g_u), s	55.0	0.0	59.4	0.0		9.7		9.6
Permitted Queue Service Time (g_{ps}), s	0.6		1.2			0.9		7.3
Time to First Blockage (g_f), s	0.0	0.0	0.0	0.0		0.0		0.0
Queue Service Time Before Blockage (g_{fs}), s								
Protected Right Saturation Flow (s_R), veh/h/ln				0				
Protected Right Effective Green Time (g_R), s				0.0				

Multimodal	EB		WB		NB		SB	
Pedestrian F_w / F_v	1.198	0.000	1.198	0.000	1.389	0.000	1.198	0.000
Pedestrian F_s / F_{delay}	0.000	0.066	0.000	0.060	0.000	0.155	0.000	0.155
Pedestrian M_{corner} / M_{cw}	0.00		0.00		0.00		0.00	
Bicycle c_b / d_b	1414.32	5.15	1455.63	4.45	209.84	48.07	209.84	48.07
Bicycle F_w / F_v	-3.64	1.29	-3.64	1.98	-3.64	0.09	-3.64	0.21

HCS Signalized Intersection Results Graphical Summary

General Information				Intersection Information	
Agency	CMT			Duration, h	0.250
Analyst	TJH	Analysis Date	2/14/2023	Area Type	Other
Jurisdiction	ODOT District 3	Time Period	PM	PHF	0.95
Urban Street	SR-254 (Detroit Rd)	Analysis Year	2045	Analysis Period	1> 17:00
Intersection	Transportation Dr	File Name	SR-254 Corridor 2045 PM - Prop.xus		
Project Description	2045 PM Proposed				

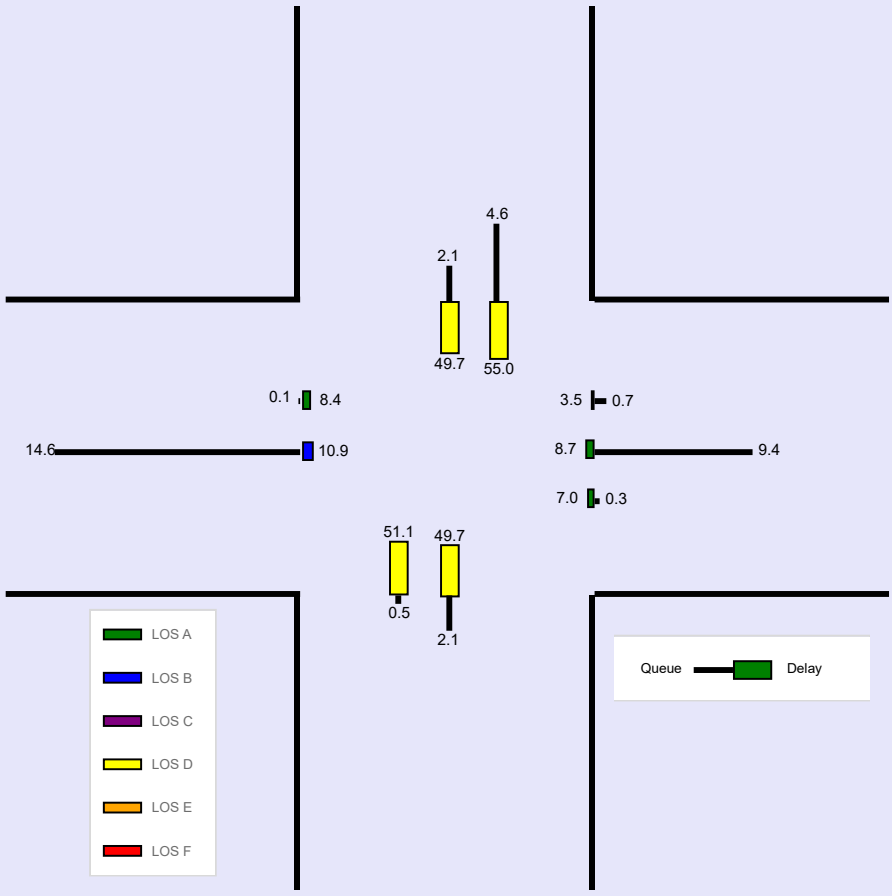


Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	10	720	10	30	1040	70	10	0	40	80	0	40

Signal Information			
Cycle, s	120.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

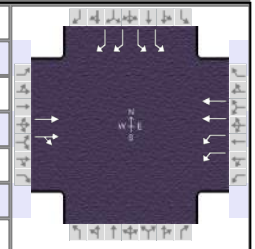
Green	2.1	2.5	84.9	12.6	0.0	0.0	1	2	3	4		
Yellow	4.0	0.0	4.0	4.0	0.0	0.0						
Red	2.0	0.0	2.0	2.0	0.0	0.0	5	6	7	8		

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Back of Queue (*Q*), ft/ln (95 th percentile)	3	375.9		8.2	241.3	17.1	14.1	56.1		117.6	54.7	
Back of Queue (*Q*), veh/ln (95 th percentile)	0.1	14.6		0.3	9.4	0.7	0.5	2.1		4.6	2.1	
Queue Storage Ratio (*RQ*) (95 th percentile)	0.03	0.15		0.02	0.48	0.03	0.06	0.22		0.29	0.14	
Control Delay (*d*), s/veh	8.4	10.9		7.0	8.7	3.5	51.1	49.7		55.0	49.7	
Level of Service (LOS)	A	B		A	A	A	D	D		D	D	
Approach Delay, s/veh / LOS	10.8	B		8.3	A		50.0	D		53.2	D	
Intersection Delay, s/veh / LOS	12.9						B					



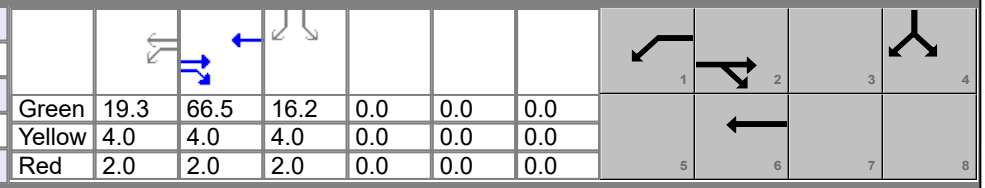
HCS Signalized Intersection Input Data

General Information				Intersection Information	
Agency	CMT			Duration, h	0.250
Analyst	TJH	Analysis Date	2/14/2023	Area Type	Other
Jurisdiction	ODOT District 3	Time Period	AM	PHF	0.89
Urban Street	SR-254 (Detroit Rd)	Analysis Year	2045	Analysis Period	1> 7:00
Intersection	I-90 WB Ramps	File Name	SR-254 Corridor 2045 AM - Prop.xus		
Project Description	2045 AM Proposed				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h		590	50	350	360					330		240

Signal Information			
Cycle, s	120.0	Reference Phase	2
Offset, s	7	Reference Point	Begin
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	19.3	66.5	16.2	0.0	0.0	0.0						
Yellow	4.0	4.0	4.0	0.0	0.0	0.0						
Red	2.0	2.0	2.0	0.0	0.0	0.0						

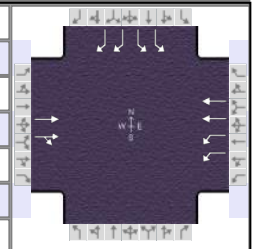
Traffic Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h		590	50	350	360					330		240
Initial Queue (Q_b), veh/h		0	0	0	0					0		0
Base Saturation Flow Rate (s_o), veh/h		1900	1900	1900	1900					1900		1900
Parking (N_m), man/h		None			None						None	
Heavy Vehicles (P_{HV}), %		4		4	4					2		2
Ped / Bike / RTOR, /h	0	0	0	0	0		0	0		0	0	
Buses (N_b), buses/h	0	0	0	0	0	0				0	0	0
Arrival Type (*AT*)		3	3	3	3					3		3
Upstream Filtering (*I*)		0.87	0.87	0.93	0.93					1.00		1.00
Lane Width (*W*), ft		12.0		12.0	12.0					12.0		12.0
Turn Bay Length, ft		430		550	890					540		850
Grade (*Pg*), %		0			0			0			0	
Speed Limit, mi/h		35	35	35	35					35		35

Phase Information	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Maximum Green (G_{max}) or Phase Split, s		35.0	22.0	57.0				63.0
Yellow Change Interval (*Y*), s		4.0	4.0	4.0				4.0
Red Clearance Interval (R_c), s		2.0	2.0	2.0				2.0
Minimum Green (G_{min}), s		20	7	20				10
Start-Up Lost Time (*l1*), s		2.0	2.0	2.0			2.0	
Extension of Effective Green (*e*), s		2.0	2.0	2.0			2.0	
Passage (*PT*), s		2.0	2.0	2.0				2.0
Recall Mode		Min	Off	Min				Off
Dual Entry		Yes	No	Yes				Yes
Walk (*Walk*), s				0.0		0.0		0.0
Pedestrian Clearance Time (*PC*), s				0.0		0.0		0.0

Multimodal Information	EB			WB			NB			SB		
85th % Speed / Rest in Walk / Corner Radius				0.0	No	25.0	0.0	No	25.0	0.0	No	25.0
Walkway / Crosswalk Width / Length, ft				9.0	12.0	0.0	9.0	12.0	0.0	9.0	12.0	0.0
Street Width / Island / Curb, ft	0.0		No	0.0	0	No		0		0.0	0	No
Width Outside / Bike Lane / Shoulder, ft	12.0	5.0	2.0	12.0	5.0	2.0				12.0	5.0	2.0
Pedestrian Signal / Occupied Parking		0.50		No	0.50		No			No	0.50	

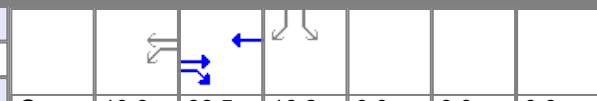
HCS Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	CMT			Duration, h	0.250
Analyst	TJH	Analysis Date	2/14/2023	Area Type	Other
Jurisdiction	ODOT District 3	Time Period	AM	PHF	0.89
Urban Street	SR-254 (Detroit Rd)	Analysis Year	2045	Analysis Period	1> 7:00
Intersection	I-90 WB Ramps	File Name	SR-254 Corridor 2045 AM - Prop.xus		
Project Description	2045 AM Proposed				

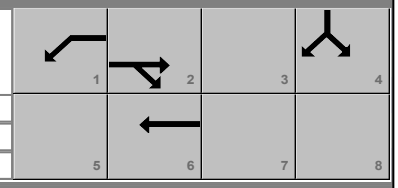


Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h		590	50	350	360					330		240

Signal Information			
Cycle, s	120.0	Reference Phase	2
Offset, s	7	Reference Point	Begin
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	19.3	66.5		16.2	0.0	0.0	0.0					
Yellow	4.0	4.0		4.0	0.0	0.0	0.0					
Red	2.0	2.0		2.0	0.0	0.0	0.0					



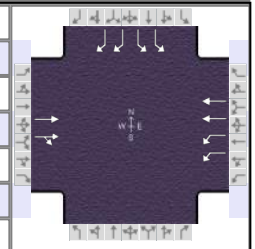
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		2	1	6				4
Case Number		8.3	2.0	4.0				9.0
Phase Duration, s		72.5	25.3	97.8				22.2
Change Period, ($Y+R_c$), s		6.0	6.0	6.0				6.0
Max Allow Headway (*MAH*), s		0.0	3.1	0.0				3.2
Queue Clearance Time (g_s), s			18.3					14.5
Green Extension Time (g_e), s		0.0	1.1	0.0				1.7
Phase Call Probability			1.00					1.00
Max Out Probability			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		2	12	1	6					7		14
Adjusted Flow Rate (*v*), veh/h		345	377	430	442					371		270
Adjusted Saturation Flow Rate (*s*), veh/h/ln		1645	1792	1534	1752					1730		1403
Queue Service Time (g_s), s		22.4	13.9	16.3	0.4					12.5		11.0
Cycle Queue Clearance Time (g_c), s		22.4	13.9	16.3	0.4					12.5		11.0
Green Ratio (*g/C*)		0.55	0.55	0.16	0.77					0.13		0.13
Capacity (*c*), veh/h		913	994	493	2683					466		378
Volume-to-Capacity Ratio (*X*)		0.378	0.379	0.872	0.165					0.796		0.714
Back of Queue (*Q*), ft/ln (95 th percentile)		221.4	231.6	252.9	7					234.7		177.8
Back of Queue (*Q*), veh/ln (95 th percentile)		8.6	9.3	9.8	0.3					9.2		7.0
Queue Storage Ratio (*RQ*) (95 th percentile)		0.51	0.56	0.46	0.01					0.43		0.21
Uniform Delay (d_1), s/veh		14.3	14.5	45.9	0.3					50.3		49.7
Incremental Delay (d_2), s/veh		1.0	1.0	1.8	0.1					1.2		0.9
Initial Queue Delay (d_3), s/veh		0.0	0.0	0.0	0.0					0.0		0.0
Control Delay (*d*), s/veh		15.3	15.5	47.7	0.5					51.5		50.7
Level of Service (LOS)		B	B	D	A					D		D
Approach Delay, s/veh / LOS	15.4	B		23.8	C		0.0			51.2	D	
Intersection Delay, s/veh / LOS	28.9						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	1.67	B	2.04	B	2.47	B	2.15	B
Bicycle LOS Score / LOS	1.08	A	1.15	A				F

HCS Signalized Intersection Intermediate Values

General Information				Intersection Information	
Agency	CMT			Duration, h	0.250
Analyst	TJH	Analysis Date	2/14/2023	Area Type	Other
Jurisdiction	ODOT District 3	Time Period	AM	PHF	0.89
Urban Street	SR-254 (Detroit Rd)	Analysis Year	2045	Analysis Period	1> 7:00
Intersection	I-90 WB Ramps	File Name	SR-254 Corridor 2045 AM - Prop.xus		
Project Description	2045 AM Proposed				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h		590	50	350	360					330		240

Signal Information			
Cycle, s	120.0	Reference Phase	2
Offset, s	7	Reference Point	Begin
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

							1	2	3	4
Green	19.3	66.5	16.2	0.0	0.0	0.0	5	6	7	8
Yellow	4.0	4.0	4.0	0.0	0.0	0.0				
Red	2.0	2.0	2.0	0.0	0.0	0.0				

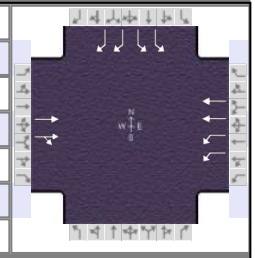
Saturation Flow / Delay	L	T	R	L	T	R	L	T	R	L	T	R
Lane Width Adjustment Factor (f_w)	1.000	1.000	1.000	1.000	1.000	1.000				1.000	1.000	1.000
Heavy Vehicles and Grade Factor (f_{HVg})	1.000	0.969	1.000	0.969	0.969	1.000				0.984	1.000	0.984
Parking Activity Adjustment Factor (f_p)	1.000	1.000	1.000	1.000	1.000	1.000	0.000	0.000	0.000	1.000	1.000	1.000
Bus Blockage Adjustment Factor (f_{bb})	1.000	1.000	1.000	1.000	1.000	1.000	0.000	0.000	0.000	1.000	1.000	1.000
Area Type Adjustment Factor (f_a)	1.000	1.000	1.000	1.000	1.000	1.000				1.000	1.000	1.000
Lane Utilization Adjustment Factor (f_{LU})	1.000	0.894	1.000	0.875	0.952	1.000	1.000	1.000	1.000	0.971	1.000	0.885
Left-Turn Adjustment Factor (f_{LT})	1.000	1.000		0.952	0.000					0.952	0.000	
Right-Turn Adjustment Factor (f_{RT})		0.974	0.974		1.000	1.000					0.000	0.847
Left-Turn Pedestrian Adjustment Factor (f_{Lpb})	1.000			1.000						1.000		
Right-Turn Ped-Bike Adjustment Factor (f_{Rpb})			1.000			1.000						1.000
Work Zone Adjustment Factor (f_{wz})	1.000	1.000	1.000	1.000	1.000	1.000				1.000	1.000	1.000
DDI Factor (f_{DDI})	1.000	1.000	1.000	1.000	1.000	1.000				1.000	1.000	1.000
Left-Turn Prot. CAV Adj. Factor ($f_{CAV,prot}$)				1.00								
Left-Turn Perm. CAV Adj. Factor ($f_{CAV,perm}$)	1.00											
Movement Saturation Flow Rate (s), veh/h	0	3365	268	3068	3593	0				3563	0	2806
Proportion of Vehicles Arriving on Green (P)	0.00	0.57	0.54	0.21	0.98	0.00	0.00	0.00	0.00	0.13	0.00	0.13
Incremental Delay Factor (k)		0.50	0.50	0.04	0.50					0.04		0.04

Signal Timing / Movement Groups	EBL	EBT/R	WBL	WBT/R	NBL	NBT/R	SBL	SBT/R
Lost Time (t_L)		6.0	6.0	6.0				4.0
Green Ratio (g/C)		0.55	0.16	0.77				0.13
Permitted Saturation Flow Rate (s_p), veh/h/ln		962	0	0				1781
Shared Saturation Flow Rate (s_{sh}), veh/h/ln		0						
Permitted Effective Green Time (g_p), s		0.0	0.0	0.0				0.0
Permitted Service Time (g_u), s		0.0	0.0	0.0				0.0
Permitted Queue Service Time (g_{ps}), s								
Time to First Blockage (g_f), s		66.5	0.0	0.0				0.0
Queue Service Time Before Blockage (g_{fs}), s								
Protected Right Saturation Flow (s_R), veh/h/ln								0
Protected Right Effective Green Time (g_R), s								0.0

Multimodal	EB		WB		NB		SB	
Pedestrian F_w / F_v	0.972	0.000	1.389	0.000	1.710	0.000	1.389	0.000
Pedestrian F_s / F_{delay}	0.000	0.099	0.000	0.048	0.000	0.164	0.000	0.164
Pedestrian M_{corner} / M_{cw}	0.00		0.00		0.00		0.00	
Bicycle c_b / d_b	1109.12	11.90	1530.82	3.30	-83.33	65.10		67.20
Bicycle F_w / F_v	-3.64	0.59	-3.64	0.66	-3.64		-3.64	Infinity

HCS Signalized Intersection Results Graphical Summary

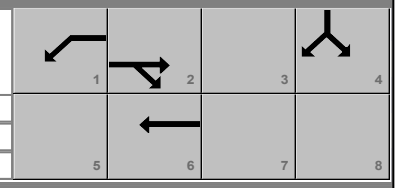
General Information				Intersection Information	
Agency	CMT			Duration, h	0.250
Analyst	TJH	Analysis Date	2/14/2023	Area Type	Other
Jurisdiction	ODOT District 3	Time Period	AM	PHF	0.89
Urban Street	SR-254 (Detroit Rd)	Analysis Year	2045	Analysis Period	1> 7:00
Intersection	I-90 WB Ramps	File Name	SR-254 Corridor 2045 AM - Prop.xus		
Project Description	2045 AM Proposed				



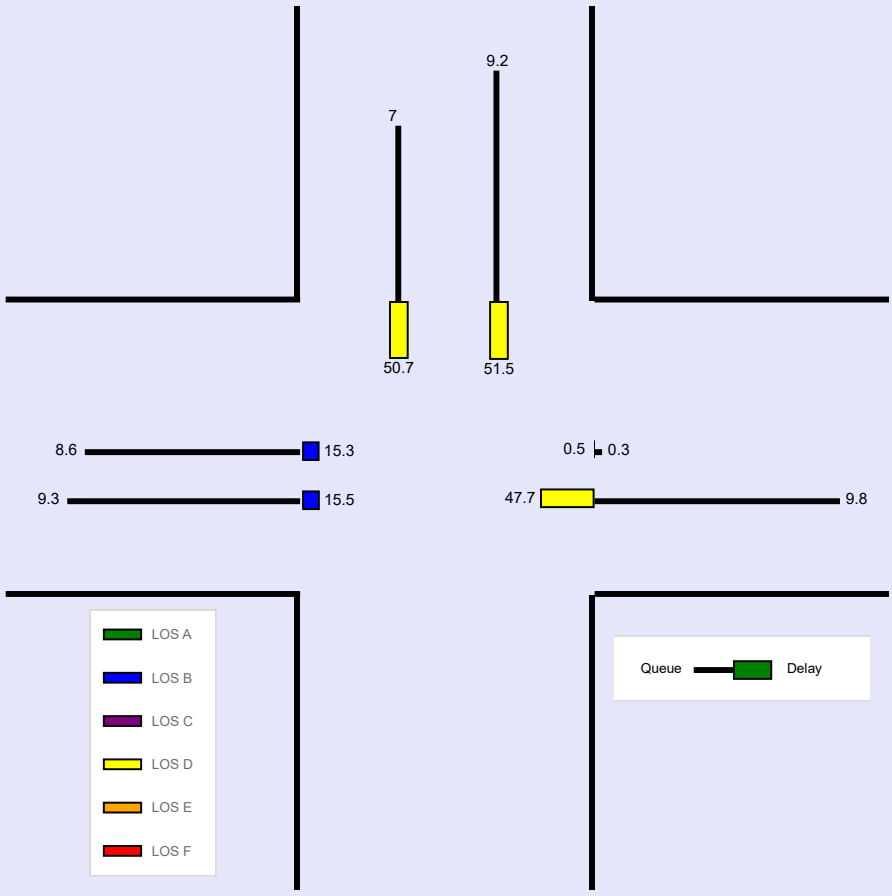
Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h		590	50	350	360					330		240

Signal Information			
Cycle, s	120.0	Reference Phase	2
Offset, s	7	Reference Point	Begin
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	19.3	66.5	16.2	0.0	0.0	0.0						
Yellow	4.0	4.0	4.0	0.0	0.0	0.0						
Red	2.0	2.0	2.0	0.0	0.0	0.0						

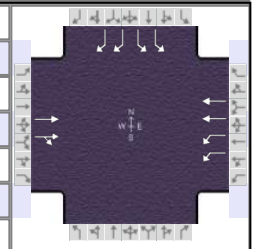


Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Back of Queue (*Q*), ft/ln (95 th percentile)		221.4	231.6	252.9	7					234.7		177.8
Back of Queue (*Q*), veh/ln (95 th percentile)		8.6	9.3	9.8	0.3					9.2		7.0
Queue Storage Ratio (*RQ*) (95 th percentile)		0.51	0.56	0.46	0.01					0.43		0.21
Control Delay (*d*), s/veh		15.3	15.5	47.7	0.5					51.5		50.7
Level of Service (LOS)		B	B	D	A					D		D
Approach Delay, s/veh / LOS	15.4	B		23.8	C		0.0			51.2	D	
Intersection Delay, s/veh / LOS	28.9	C										



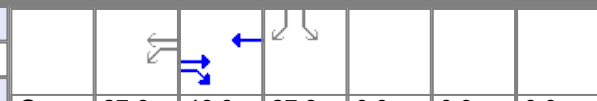
HCS Signalized Intersection Input Data

General Information				Intersection Information	
Agency	CMT			Duration, h	0.250
Analyst	TJH	Analysis Date	2/14/2023	Area Type	Other
Jurisdiction	ODOT District 3	Time Period	PM	PHF	0.94
Urban Street	SR-254 (Detroit Rd)	Analysis Year	2045	Analysis Period	1> 17:00
Intersection	I-90 WB Ramps	File Name	SR-254 Corridor 2045 PM - Prop.xus		
Project Description	2045 PM Proposed				

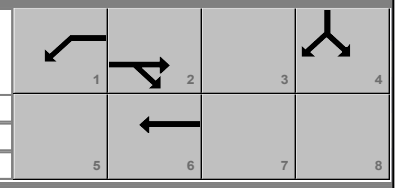


Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h		750	100	610	610					640		530

Signal Information			
Cycle, s	120.0	Reference Phase	2
Offset, s	0	Reference Point	Begin
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	27.6	46.6	27.8	0.0	0.0	0.0						
Yellow	4.0	4.0	4.0	0.0	0.0	0.0						
Red	2.0	2.0	2.0	0.0	0.0	0.0						



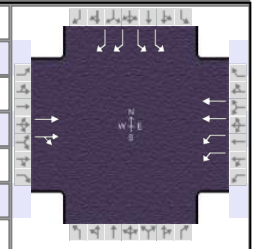
Traffic Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h		750	100	610	610					640		530
Initial Queue (Q_b), veh/h		0	0	0	0					0		0
Base Saturation Flow Rate (s_o), veh/h		1900	1900	1900	1900					1900		1900
Parking (N_m), man/h		None			None						None	
Heavy Vehicles (P_{HV}), %		4		4	4					2		2
Ped / Bike / RTOR, /h	0	0	0	0	0		0	0		0	0	
Buses (N_b), buses/h	0	0	0	0	0	0				0	0	0
Arrival Type (*AT*)		3	3	3	3					3		3
Upstream Filtering (*I*)		0.80	0.80	0.82	0.82					1.00		1.00
Lane Width (*W*), ft		12.0		12.0	12.0					12.0		12.0
Turn Bay Length, ft		430		550	890					540		850
Grade (*Pg*), %		0			0			0			0	
Speed Limit, mi/h		35	35	35	35					35		35

Phase Information	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Maximum Green (G_{max}) or Phase Split, s		40.0	40.0	80.0				40.0
Yellow Change Interval (*Y*), s		4.0	4.0	4.0				4.0
Red Clearance Interval (R_c), s		2.0	2.0	2.0				2.0
Minimum Green (G_{min}), s		20	7	20				10
Start-Up Lost Time (*l1*), s		2.0	2.0	2.0			2.0	
Extension of Effective Green (*e*), s		2.0	2.0	2.0			2.0	
Passage (*PT*), s		2.0	2.0	2.0				2.0
Recall Mode		Min	Off	Min				Off
Dual Entry		Yes	No	Yes				Yes
Walk (*Walk*), s				0.0		0.0		0.0
Pedestrian Clearance Time (*PC*), s				0.0		0.0		0.0

Multimodal Information	EB			WB			NB			SB		
85th % Speed / Rest in Walk / Corner Radius				0.0	No	25.0	0.0	No	25.0	0.0	No	25.0
Walkway / Crosswalk Width / Length, ft				9.0	12.0	0.0	9.0	12.0	0.0	9.0	12.0	0.0
Street Width / Island / Curb, ft	0.0		No	0.0	0	No		0		0.0	0	No
Width Outside / Bike Lane / Shoulder, ft	12.0	5.0	2.0	12.0	5.0	2.0				12.0	5.0	2.0
Pedestrian Signal / Occupied Parking		0.50		No	0.50		No			No	0.50	

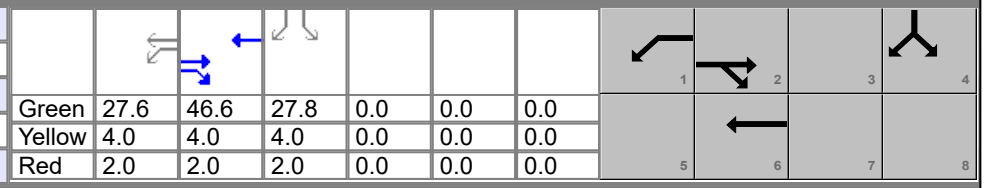
HCS Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	CMT			Duration, h	0.250
Analyst	TJH	Analysis Date	2/14/2023	Area Type	Other
Jurisdiction	ODOT District 3	Time Period	PM	PHF	0.94
Urban Street	SR-254 (Detroit Rd)	Analysis Year	2045	Analysis Period	1> 17:00
Intersection	I-90 WB Ramps	File Name	SR-254 Corridor 2045 PM - Prop.xus		
Project Description	2045 PM Proposed				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h		750	100	610	610					640		530

Signal Information			
Cycle, s	120.0	Reference Phase	2
Offset, s	0	Reference Point	Begin
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	27.6	46.6	27.8	0.0	0.0	0.0
Yellow	4.0	4.0	4.0	0.0	0.0	0.0
Red	2.0	2.0	2.0	0.0	0.0	0.0

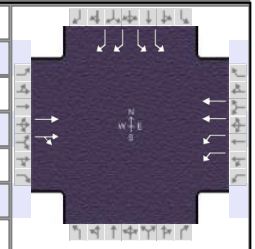
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		2	1	6				4
Case Number		8.3	2.0	4.0				9.0
Phase Duration, s		52.6	33.6	86.2				33.8
Change Period, ($Y+R_c$), s		6.0	6.0	6.0				6.0
Max Allow Headway (*MAH*), s		0.0	3.1	0.0				3.2
Queue Clearance Time (g_s), s			26.1					25.2
Green Extension Time (g_e), s		0.0	1.4	0.0				2.7
Phase Call Probability			1.00					1.00
Max Out Probability			0.00					0.21

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement		2	12	1	6					7		14
Adjusted Flow Rate (*v*), veh/h		396	488	633	633					681		564
Adjusted Saturation Flow Rate (*s*), veh/h/ln		1438	1773	1573	1752					1730		1403
Queue Service Time (g_s), s		28.7	26.9	24.1	10.7					22.6		23.2
Cycle Queue Clearance Time (g_c), s		28.7	26.9	24.1	10.7					22.6		23.2
Green Ratio (*g/C*)		0.39	0.39	0.23	0.67					0.23		0.23
Capacity (*c*), veh/h		558	688	723	2341					802		651
Volume-to-Capacity Ratio (*X*)		0.709	0.710	0.876	0.270					0.848		0.866
Back of Queue (*Q*), ft/ln (95 th percentile)		357.8	416.6	408.3	186.1					389		340.7
Back of Queue (*Q*), veh/ln (95 th percentile)		13.9	16.7	15.8	7.2					15.3		13.4
Queue Storage Ratio (*RQ*) (95 th percentile)		0.83	1.00	0.74	0.21					0.72		0.40
Uniform Delay (d_1), s/veh		27.1	28.0	58.1	10.5					44.1		44.3
Incremental Delay (d_2), s/veh		6.0	4.9	3.6	0.2					5.1		7.4
Initial Queue Delay (d_3), s/veh		0.0	0.0	0.0	0.0					0.0		0.0
Control Delay (*d*), s/veh		33.1	32.9	61.7	10.8					49.2		51.7
Level of Service (LOS)		C	C	E	B					D		D
Approach Delay, s/veh / LOS	33.0	C		36.3	D		0.0			50.3	D	
Intersection Delay, s/veh / LOS	40.6						D					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	1.70	B	2.06	B	2.47	B	2.15	B
Bicycle LOS Score / LOS	1.23	A	1.56	B				F

HCS Signalized Intersection Intermediate Values

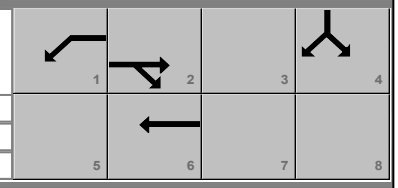
General Information				Intersection Information	
Agency	CMT			Duration, h	0.250
Analyst	TJH	Analysis Date	2/14/2023	Area Type	Other
Jurisdiction	ODOT District 3	Time Period	PM	PHF	0.94
Urban Street	SR-254 (Detroit Rd)	Analysis Year	2045	Analysis Period	1> 17:00
Intersection	I-90 WB Ramps	File Name	SR-254 Corridor 2045 PM - Prop.xus		
Project Description	2045 PM Proposed				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h		750	100	610	610					640		530

Signal Information			
Cycle, s	120.0	Reference Phase	2
Offset, s	0	Reference Point	Begin
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	27.6	46.6	27.8	0.0	0.0	0.0
Yellow	4.0	4.0	4.0	0.0	0.0	0.0
Red	2.0	2.0	2.0	0.0	0.0	0.0



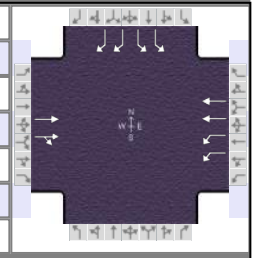
Saturation Flow / Delay	L	T	R	L	T	R	L	T	R	L	T	R
Lane Width Adjustment Factor (f_w)	1.000	1.000	1.000	1.000	1.000	1.000				1.000	1.000	1.000
Heavy Vehicles and Grade Factor (f_{HVg})	1.000	0.969	1.000	0.969	0.969	1.000				0.984	1.000	0.984
Parking Activity Adjustment Factor (f_p)	1.000	1.000	1.000	1.000	1.000	1.000	0.000	0.000	0.000	1.000	1.000	1.000
Bus Blockage Adjustment Factor (f_{bb})	1.000	1.000	1.000	1.000	1.000	1.000	0.000	0.000	0.000	1.000	1.000	1.000
Area Type Adjustment Factor (f_a)	1.000	1.000	1.000	1.000	1.000	1.000				1.000	1.000	1.000
Lane Utilization Adjustment Factor (f_{LU})	1.000	0.781	1.000	0.897	0.952	1.000	1.000	1.000	1.000	0.971	1.000	0.885
Left-Turn Adjustment Factor (f_{LT})	1.000	1.000		0.952	0.000					0.952	0.000	
Right-Turn Adjustment Factor (f_{RT})		0.963	0.963		1.000	1.000					0.000	0.847
Left-Turn Pedestrian Adjustment Factor (f_{Lpb})	1.000			1.000						1.000		
Right-Turn Ped-Bike Adjustment Factor (f_{Rpb})			1.000			1.000						1.000
Work Zone Adjustment Factor (f_{wz})	1.000	1.000	1.000	1.000	1.000	1.000				1.000	1.000	1.000
DDI Factor (f_{DDI})	1.000	1.000	1.000	1.000	1.000	1.000				1.000	1.000	1.000
Left-Turn Prot. CAV Adj. Factor ($f_{CAV,prot}$)				1.00								
Left-Turn Perm. CAV Adj. Factor ($f_{CAV,perm}$)	1.00											
Movement Saturation Flow Rate (s), veh/h	0	3236	378	3145	3593	0				3563	0	2806
Proportion of Vehicles Arriving on Green (P)	0.00	0.46	0.38	0.00	0.58	0.00	0.00	0.00	0.00	0.23	0.00	0.23
Incremental Delay Factor (k)		0.50	0.50	0.13	0.50					0.22		0.23

Signal Timing / Movement Groups	EBL	EBT/R	WBL	WBT/R	NBL	NBT/R	SBL	SBT/R
Lost Time (t_L)		6.0	6.0	6.0				4.0
Green Ratio (g/C)		0.39	0.23	0.67				0.23
Permitted Saturation Flow Rate (s_p), veh/h/ln		807	0	0				1781
Shared Saturation Flow Rate (s_{sh}), veh/h/ln		0						
Permitted Effective Green Time (g_p), s		0.0	0.0	0.0				0.0
Permitted Service Time (g_u), s		0.0	0.0	0.0				0.0
Permitted Queue Service Time (g_{ps}), s								
Time to First Blockage (g_f), s		46.6	0.0	0.0				0.0
Queue Service Time Before Blockage (g_{fs}), s								
Protected Right Saturation Flow (s_R), veh/h/ln								0
Protected Right Effective Green Time (g_R), s								0.0

Multimodal	EB		WB		NB		SB	
Pedestrian F_w / F_v	0.972	0.000	1.389	0.000	1.710	0.000	1.389	0.000
Pedestrian F_s / F_{delay}	0.000	0.125	0.000	0.076	0.000	0.164	0.000	0.164
Pedestrian M_{corner} / M_{cw}	0.00		0.00		0.00		0.00	
Bicycle c_b / d_b	776.27	22.46	1336.05	6.61	-83.33	65.10		67.20
Bicycle F_w / F_v	-3.64	0.75	-3.64	1.07	-3.64		-3.64	Infinity

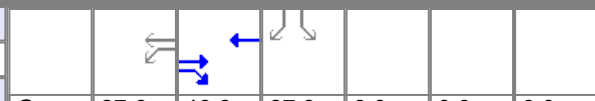
HCS Signalized Intersection Results Graphical Summary

General Information				Intersection Information	
Agency	CMT			Duration, h	0.250
Analyst	TJH	Analysis Date	2/14/2023	Area Type	Other
Jurisdiction	ODOT District 3	Time Period	PM	PHF	0.94
Urban Street	SR-254 (Detroit Rd)	Analysis Year	2045	Analysis Period	1> 17:00
Intersection	I-90 WB Ramps	File Name	SR-254 Corridor 2045 PM - Prop.xus		
Project Description	2045 PM Proposed				

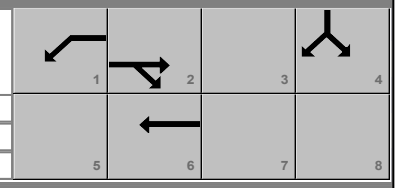


Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h		750	100	610	610					640		530

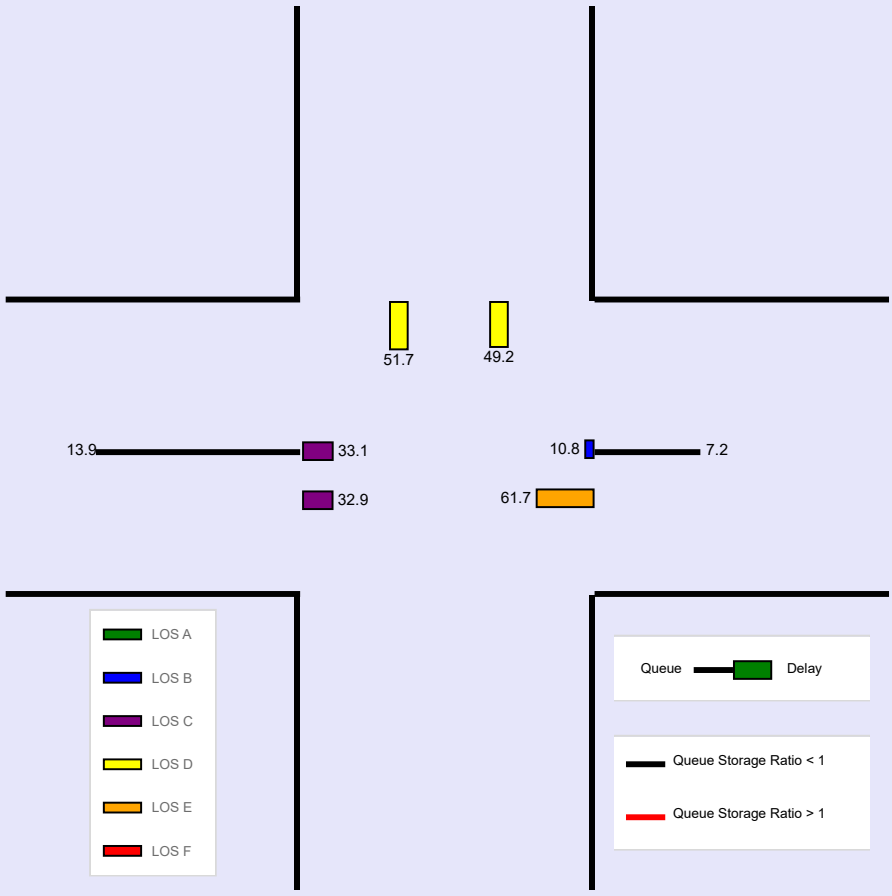
Signal Information			
Cycle, s	120.0	Reference Phase	2
Offset, s	0	Reference Point	Begin
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	27.6	46.6	27.8	0.0	0.0	0.0						
Yellow	4.0	4.0	4.0	0.0	0.0	0.0						
Red	2.0	2.0	2.0	0.0	0.0	0.0						

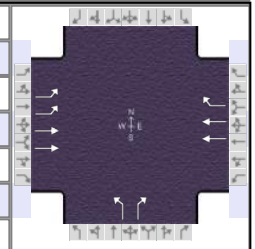


Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Back of Queue (*Q*), ft/ln (95 th percentile)		357.8	416.6	408.3	186.1					389		340.7
Back of Queue (*Q*), veh/ln (95 th percentile)		13.9	16.7	15.8	7.2					15.3		13.4
Queue Storage Ratio (*RQ*) (95 th percentile)		0.83	1.00	0.74	0.21					0.72		0.40
Control Delay (*d*), s/veh		33.1	32.9	61.7	10.8					49.2		51.7
Level of Service (LOS)		C	C	E	B					D		D
Approach Delay, s/veh / LOS	33.0	C		36.3	D		0.0			50.3	D	
Intersection Delay, s/veh / LOS	40.6						D					



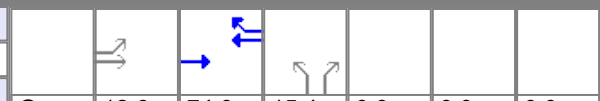
HCS Signalized Intersection Input Data

General Information				Intersection Information	
Agency	CMT			Duration, h	0.250
Analyst	TJH	Analysis Date	2/14/2023	Area Type	Other
Jurisdiction	ODOT District 3	Time Period	AM	PHF	0.88
Urban Street	SR-254 (Detroit Rd)	Analysis Year	2045	Analysis Period	1> 7:00
Intersection	I-90 EB Ramps	File Name	SR-254 Corridor 2045 AM - Prop.xus		
Project Description	2045 AM Proposed				

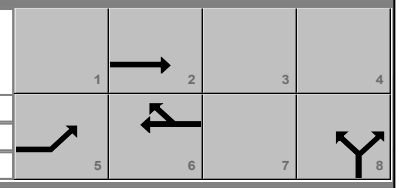


Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	260	660			630	550	80		150			

Signal Information			
Cycle, s	120.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	12.6	74.0	15.4	0.0	0.0	0.0						
Yellow	4.0	4.0	4.0	0.0	0.0	0.0						
Red	2.0	2.0	2.0	0.0	0.0	0.0						



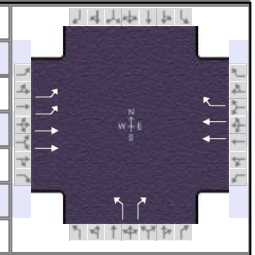
Traffic Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	260	660			630	550	80		150			
Initial Queue (Q_b), veh/h	0	0			0	0	0		0			
Base Saturation Flow Rate (s_o), veh/h	1900	1900			1900	1900	1900		1900			
Parking (N_m), man/h		None			None			None				
Heavy Vehicles (P_{HV}), %	3	3			2	2	4		4			
Ped / Bike / RTOR, /h	0	0		0	0	0	0	0		0	0	
Buses (N_b), buses/h	0	0	0	0	0	0	0	0	0			
Arrival Type (*AT*)	3	3			3	3	3		3			
Upstream Filtering (*I*)	0.84	0.84			0.81	0.81	1.00		1.00			
Lane Width (*W*), ft	12.0	12.0			12.0	12.0	12.0		12.0			
Turn Bay Length, ft	270	890			650	450	460		930			
Grade (*Pg*), %		0			0			0			0	
Speed Limit, mi/h	35	35			35	35	35		35			

Phase Information	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Maximum Green (G_{max}) or Phase Split, s	28.0	54.0		26.0		66.0		
Yellow Change Interval (*Y*), s	4.0	4.0		4.0		4.0		
Red Clearance Interval (R_c), s	2.0	2.0		2.0		2.0		
Minimum Green (G_{min}), s	7	20		20		10		
Start-Up Lost Time (*lt*), s	2.0	2.0		2.0	2.0			
Extension of Effective Green (*e*), s	2.0	2.0		2.0	2.0			
Passage (*PT*), s	2.0	2.0		2.0		2.0		
Recall Mode	Off	Min		Min		Off		
Dual Entry	No	Yes		Yes		Yes		
Walk (*Walk*), s		0.0				0.0		0.0
Pedestrian Clearance Time (*PC*), s		0.0				0.0		0.0

Multimodal Information	EB			WB			NB			SB		
85th % Speed / Rest in Walk / Corner Radius	0.0	No	25.0				0.0	No	25.0	0.0	No	25.0
Walkway / Crosswalk Width / Length, ft	9.0	12.0	0.0				9.0	12.0	0.0	9.0	12.0	0.0
Street Width / Island / Curb, ft	0.0	0	No	0.0		No	0.0	0	No		0	
Width Outside / Bike Lane / Shoulder, ft	12.0	5.0	2.0	12.0	5.0	2.0	12.0	5.0	2.0			
Pedestrian Signal / Occupied Parking	No	0.50			0.50		No	0.50		No		

HCS Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	CMT			Duration, h	0.250
Analyst	TJH	Analysis Date	2/14/2023	Area Type	Other
Jurisdiction	ODOT District 3	Time Period	AM	PHF	0.88
Urban Street	SR-254 (Detroit Rd)	Analysis Year	2045	Analysis Period	1> 7:00
Intersection	I-90 EB Ramps	File Name	SR-254 Corridor 2045 AM - Prop.xus		
Project Description	2045 AM Proposed				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	260	660			630	550	80		150			

Signal Information			
Cycle, s	120.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

							1	2	3	4
Green	12.6	74.0	15.4	0.0	0.0	0.0	5	6	7	8
Yellow	4.0	4.0	4.0	0.0	0.0	0.0				
Red	2.0	2.0	2.0	0.0	0.0	0.0				

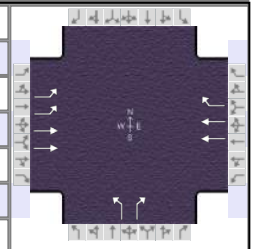
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	5	2		6		8		
Case Number	2.0	4.0		7.3		9.0		
Phase Duration, s	18.6	98.6		80.0		21.4		
Change Period, ($Y+R_c$), s	6.0	6.0		6.0		6.0		
Max Allow Headway (*MAH*), s	3.1	0.0		0.0		3.3		
Queue Clearance Time (g_s), s	11.9					14.8		
Green Extension Time (g_e), s	0.7	0.0		0.0		0.5		
Phase Call Probability	1.00					1.00		
Max Out Probability	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			6	16	3		18			
Adjusted Flow Rate (*v*), veh/h	293	744			781	682	91		170			
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1714	1766			1683	1585	1753		1560			
Queue Service Time (g_s), s	9.9	5.5			9.0	16.8	5.7		12.8			
Cycle Queue Clearance Time (g_c), s	9.9	5.5			9.0	16.8	5.7		12.8			
Green Ratio (*g/C*)	0.11	0.77			0.62	0.62	0.13		0.13			
Capacity (*c*), veh/h	360	2727			2077	978	225		200			
Volume-to-Capacity Ratio (*X*)	0.813	0.273			0.376	0.698	0.405		0.853			
Back of Queue (*Q*), ft/ln (95 th percentile)	182.1	70.1			124.8	157.4	116.9		230.2			
Back of Queue (*Q*), veh/ln (95 th percentile)	7.1	2.7			4.9	6.2	4.5		8.9			
Queue Storage Ratio (*RQ*) (95 th percentile)	0.67	0.08			0.19	0.35	0.25		0.25			
Uniform Delay (d_1), s/veh	49.5	2.7			6.3	4.0	48.1		51.2			
Incremental Delay (d_2), s/veh	1.4	0.2			0.4	3.4	0.4		4.0			
Initial Queue Delay (d_3), s/veh	0.0	0.0			0.0	0.0	0.0		0.0			
Control Delay (*d*), s/veh	50.9	2.9			6.7	7.3	48.5		55.2			
Level of Service (LOS)	D	A			A	A	D		E			
Approach Delay, s/veh / LOS	16.5	B		7.0	A		52.9	D		0.0		
Intersection Delay, s/veh / LOS	14.9						B					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	1.62	B	1.66	B	2.32	B	2.47	B
Bicycle LOS Score / LOS	1.35	A	1.59	B		F		

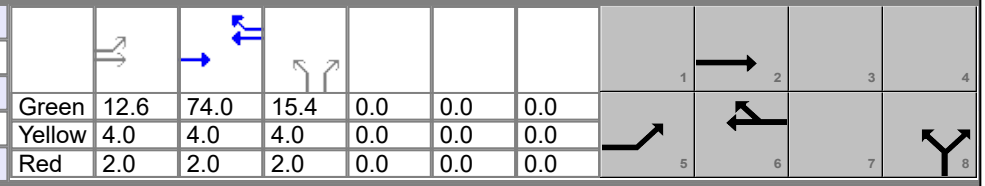
HCS Signalized Intersection Intermediate Values

General Information				Intersection Information	
Agency	CMT			Duration, h	0.250
Analyst	TJH	Analysis Date	2/14/2023	Area Type	Other
Jurisdiction	ODOT District 3	Time Period	AM	PHF	0.88
Urban Street	SR-254 (Detroit Rd)	Analysis Year	2045	Analysis Period	1> 7:00
Intersection	I-90 EB Ramps	File Name	SR-254 Corridor 2045 AM - Prop.xus		
Project Description	2045 AM Proposed				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	260	660			630	550	80		150			

Signal Information			
Cycle, s	120.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	12.6	74.0	15.4	0.0	0.0	0.0						
Yellow	4.0	4.0	4.0	0.0	0.0	0.0						
Red	2.0	2.0	2.0	0.0	0.0	0.0						

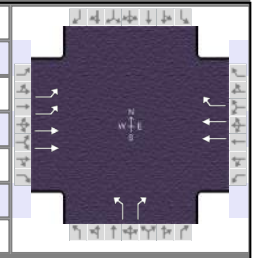
Saturation Flow / Delay	L	T	R	L	T	R	L	T	R	L	T	R
Lane Width Adjustment Factor (f_w)	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000			
Heavy Vehicles and Grade Factor (f_{HVg})	0.977	0.977	1.000	1.000	0.984	0.984	0.969	1.000	0.969			
Parking Activity Adjustment Factor (f_p)	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.000	0.000	0.000
Bus Blockage Adjustment Factor (f_{bb})	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.000	0.000	0.000
Area Type Adjustment Factor (f_a)	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000			
Lane Utilization Adjustment Factor (f_{LU})	0.970	0.952	1.000	1.000	0.900	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Left-Turn Adjustment Factor (f_{LT})	0.952	0.000		1.000	1.000		0.952	0.000				
Right-Turn Adjustment Factor (f_{RT})		1.000	1.000		0.000	0.847		0.000	0.847			
Left-Turn Pedestrian Adjustment Factor (f_{Lpb})	1.000			1.000			1.000					
Right-Turn Ped-Bike Adjustment Factor (f_{Rpb})			1.000			1.000			1.000			
Work Zone Adjustment Factor (f_{wz})	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000			
DDI Factor (f_{DDI})	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000			
Left-Turn Prot. CAV Adj. Factor ($f_{CAV,prot}$)	1.00											
Left-Turn Perm. CAV Adj. Factor ($f_{CAV,perm}$)				1.00								
Movement Saturation Flow Rate (s), veh/h	3429	3622	0	0	3554	1585	1753	0	1560			
Proportion of Vehicles Arriving on Green (P)	0.16	0.83	0.00	0.00	0.77	0.87	0.13	0.00	0.13	0.00	0.00	0.00
Incremental Delay Factor (k)	0.04	0.50			0.50	0.50	0.04		0.04			

Signal Timing / Movement Groups	EBL	EBT/R	WBL	WBT/R	NBL	NBT/R	SBL	SBT/R
Lost Time (t_L)	6.0	6.0		6.0		4.0		
Green Ratio (g/C)	0.11	0.77		0.62		0.13		
Permitted Saturation Flow Rate (s_p), veh/h/ln	0	0		728		1753		
Shared Saturation Flow Rate (s_{sh}), veh/h/ln				0				
Permitted Effective Green Time (g_p), s	0.0	0.0		0.0		0.0		
Permitted Service Time (g_u), s	0.0	0.0		0.0		0.0		
Permitted Queue Service Time (g_{ps}), s								
Time to First Blockage (g_f), s	0.0	0.0		74.0		0.0		
Queue Service Time Before Blockage (g_{fs}), s								
Protected Right Saturation Flow (s_R), veh/h/ln				0		0		
Protected Right Effective Green Time (g_R), s				0.0		0.0		

Multimodal	EB		WB		NB		SB	
Pedestrian F_w / F_v	0.972	0.000	0.972	0.000	1.557	0.000	1.710	0.000
Pedestrian F_s / F_{delay}	0.000	0.046	0.000	0.087	0.000	0.164	0.000	0.164
Pedestrian M_{corner} / M_{cw}	0.00		0.00		0.00		0.00	
Bicycle c_b / d_b	1543.77	3.12	1233.63	8.81		67.20	-83.33	65.10
Bicycle F_w / F_v	-3.64	0.86	-3.64	1.11	-3.64	Infinity	-3.64	

HCS Signalized Intersection Results Graphical Summary

General Information				Intersection Information	
Agency	CMT			Duration, h	0.250
Analyst	TJH	Analysis Date	2/14/2023	Area Type	Other
Jurisdiction	ODOT District 3	Time Period	AM	PHF	0.88
Urban Street	SR-254 (Detroit Rd)	Analysis Year	2045	Analysis Period	1> 7:00
Intersection	I-90 EB Ramps	File Name	SR-254 Corridor 2045 AM - Prop.xus		
Project Description	2045 AM Proposed				

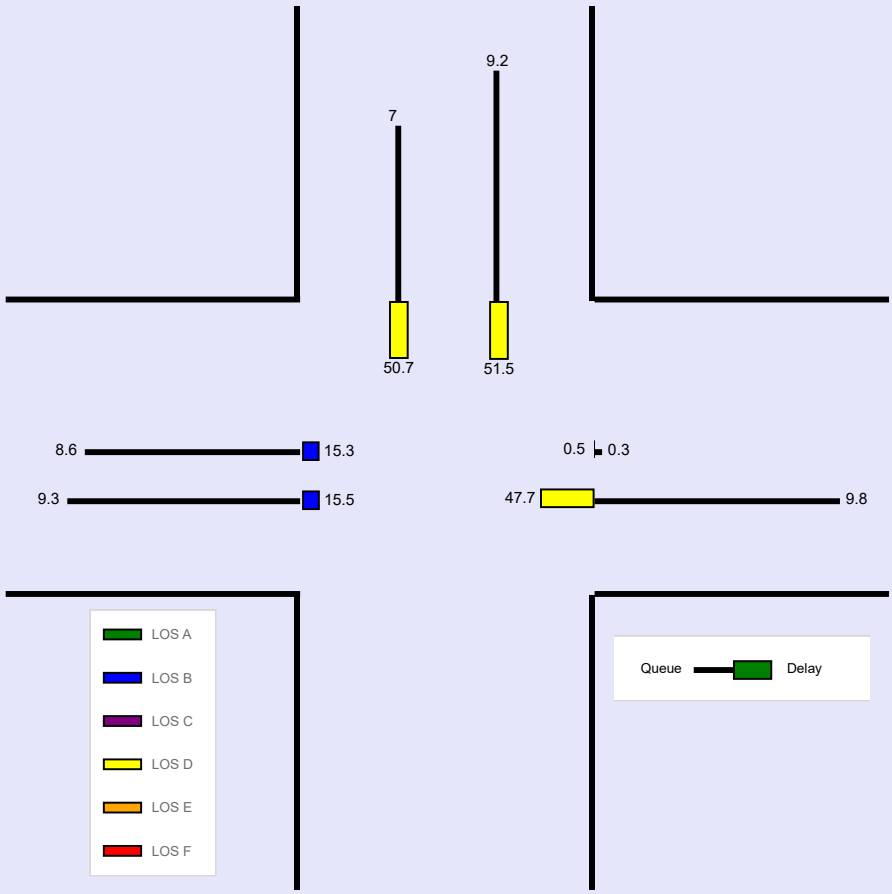


Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	260	660			630	550	80		150			

Signal Information			
Cycle, s	120.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

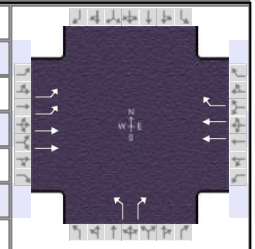
							1	2	3	4		
Green	12.6	74.0	15.4	0.0	0.0	0.0	5	6	7	8		
Yellow	4.0	4.0	4.0	0.0	0.0	0.0						
Red	2.0	2.0	2.0	0.0	0.0	0.0						

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Back of Queue (*Q*), ft/ln (95 th percentile)	182.1	70.1			124.8	157.4	116.9		230.2			
Back of Queue (*Q*), veh/ln (95 th percentile)	7.1	2.7			4.9	6.2	4.5		8.9			
Queue Storage Ratio (*RQ*) (95 th percentile)	0.67	0.08			0.19	0.35	0.25		0.25			
Control Delay (*d*), s/veh	50.9	2.9			6.7	7.3	48.5		55.2			
Level of Service (LOS)	D	A			A	A	D		E			
Approach Delay, s/veh / LOS	16.5	B		7.0	A		52.9	D		0.0		
Intersection Delay, s/veh / LOS	14.9						B					



HCS Signalized Intersection Input Data

General Information				Intersection Information	
Agency	CMT			Duration, h	0.250
Analyst	TJH	Analysis Date	2/14/2023	Area Type	Other
Jurisdiction	ODOT District 3	Time Period	PM	PHF	0.94
Urban Street	SR-254 (Detroit Rd)	Analysis Year	2045	Analysis Period	1> 17:00
Intersection	I-90 EB Ramps	File Name	SR-254 Corridor 2045 PM - Prop.xus		
Project Description	2045 PM Proposed				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	270	1120			1160	500	60		171			

Signal Information			
Cycle, s	120.0	Reference Phase	2
Offset, s	37	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

							1	2	3	4		
Green	12.9	72.9	16.2	0.0	0.0	0.0	5	6	7	8		
Yellow	4.0	4.0	4.0	0.0	0.0	0.0						
Red	2.0	2.0	2.0	0.0	0.0	0.0						

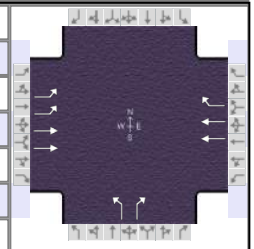
Traffic Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	270	1120			1160	500	60		171			
Initial Queue (Q_b), veh/h	0	0			0	0	0		0			
Base Saturation Flow Rate (s_o), veh/h	1900	1900			1900	1900	1900		1900			
Parking (N_m), man/h		None			None			None				
Heavy Vehicles (P_{HV}), %	3	3			2	2	4		4			
Ped / Bike / RTOR, /h	0	0		0	0	0	0	0		0	0	
Buses (N_b), buses/h	0	0	0	0	0	0	0	0	0			
Arrival Type (*AT*)	3	3			3	3	3		3			
Upstream Filtering (*I*)	0.54	0.54			0.42	0.42	1.00		1.00			
Lane Width (*W*), ft	12.0	12.0			12.0	12.0	12.0		12.0			
Turn Bay Length, ft	270	890			650	450	460		930			
Grade (*Pg*), %		0			0			0			0	
Speed Limit, mi/h	35	35			35	35	35		35			

Phase Information	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Maximum Green (G_{max}) or Phase Split, s	27.0	74.0		47.0		46.0		
Yellow Change Interval (*Y*), s	4.0	4.0		4.0		4.0		
Red Clearance Interval (R_c), s	2.0	2.0		2.0		2.0		
Minimum Green (G_{min}), s	7	20		20		10		
Start-Up Lost Time (*l1*), s	2.0	2.0		2.0	2.0			
Extension of Effective Green (*e*), s	2.0	2.0		2.0	2.0			
Passage (*PT*), s	2.0	2.0		2.0		2.0		
Recall Mode	Off	Min		Min		Off		
Dual Entry	No	Yes		Yes		Yes		
Walk (*Walk*), s		0.0				0.0		0.0
Pedestrian Clearance Time (*PC*), s		0.0				0.0		0.0

Multimodal Information	EB			WB			NB			SB		
85th % Speed / Rest in Walk / Corner Radius	0.0	No	25.0				0.0	No	25.0	0.0	No	25.0
Walkway / Crosswalk Width / Length, ft	9.0	12.0	0.0				9.0	12.0	0.0	9.0	12.0	0.0
Street Width / Island / Curb, ft	0.0	0	No	0.0		No	0.0	0	No		0	
Width Outside / Bike Lane / Shoulder, ft	12.0	5.0	2.0	12.0	5.0	2.0	12.0	5.0	2.0			
Pedestrian Signal / Occupied Parking	No	0.50			0.50		No	0.50		No		

HCS Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	CMT			Duration, h	0.250
Analyst	TJH	Analysis Date	2/14/2023	Area Type	Other
Jurisdiction	ODOT District 3	Time Period	PM	PHF	0.94
Urban Street	SR-254 (Detroit Rd)	Analysis Year	2045	Analysis Period	1> 17:00
Intersection	I-90 EB Ramps	File Name	SR-254 Corridor 2045 PM - Prop.xus		
Project Description	2045 PM Proposed				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	270	1120			1160	500	60		171			

Signal Information			
Cycle, s	120.0	Reference Phase	2
Offset, s	37	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

							1	2	3	4
Green	12.9	72.9	16.2	0.0	0.0	0.0	5	6	7	8
Yellow	4.0	4.0	4.0	0.0	0.0	0.0				
Red	2.0	2.0	2.0	0.0	0.0	0.0				

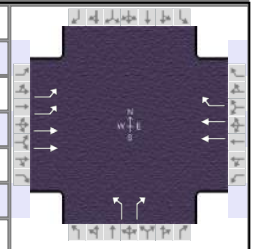
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	5	2		6		8		
Case Number	2.0	4.0		7.3		9.0		
Phase Duration, s	18.9	97.8		78.9		22.2		
Change Period, ($Y+R_c$), s	6.0	6.0		6.0		6.0		
Max Allow Headway (*MAH*), s	3.1	0.0		0.0		3.3		
Queue Clearance Time (g_s), s	12.3					15.7		
Green Extension Time (g_e), s	0.7	0.0		0.0		0.5		
Phase Call Probability	1.00					1.00		
Max Out Probability	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			6	16	3		18			
Adjusted Flow Rate (*v*), veh/h	284	1177			1202	518	64		182			
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1601	1766			1778	1585	1753		1560			
Queue Service Time (g_s), s	10.3	14.1			26.6	26.7	3.9		13.7			
Cycle Queue Clearance Time (g_c), s	10.3	14.1			26.6	26.7	3.9		13.7			
Green Ratio (*g/C*)	0.11	0.77			0.61	0.61	0.13		0.13			
Capacity (*c*), veh/h	345	2703			2160	962	237		210			
Volume-to-Capacity Ratio (*X*)	0.822	0.436			0.557	0.538	0.270		0.864			
Back of Queue (*Q*), ft/ln (95 th percentile)	161.2	173.8			366.7	356.1	79.9		242.5			
Back of Queue (*Q*), veh/ln (95 th percentile)	6.3	6.8			14.4	14.0	3.1		9.4			
Queue Storage Ratio (*RQ*) (95 th percentile)	0.60	0.20			0.56	0.79	0.17		0.26			
Uniform Delay (d_1), s/veh	49.0	5.0			16.9	18.2	46.6		50.8			
Incremental Delay (d_2), s/veh	1.0	0.3			0.4	0.9	0.2		4.1			
Initial Queue Delay (d_3), s/veh	0.0	0.0			0.0	0.0	0.0		0.0			
Control Delay (*d*), s/veh	50.1	5.3			17.4	19.2	46.8		54.9			
Level of Service (LOS)	D	A			B	B	D		D			
Approach Delay, s/veh / LOS	14.0	B		17.9	B		52.8	D		0.0		
Intersection Delay, s/veh / LOS	18.7						B					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	1.62	B	1.66	B	2.32	B	2.47	B
Bicycle LOS Score / LOS	1.71	B	1.94	B		F		

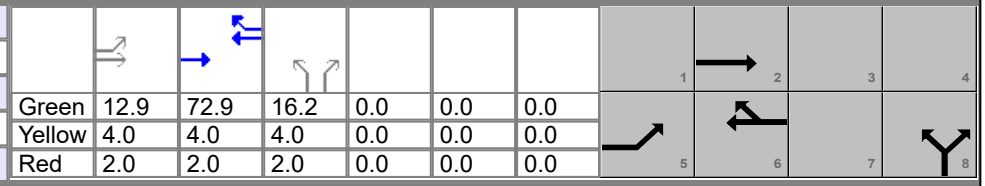
HCS Signalized Intersection Intermediate Values

General Information				Intersection Information	
Agency	CMT			Duration, h	0.250
Analyst	TJH	Analysis Date	2/14/2023	Area Type	Other
Jurisdiction	ODOT District 3	Time Period	PM	PHF	0.94
Urban Street	SR-254 (Detroit Rd)	Analysis Year	2045	Analysis Period	1> 17:00
Intersection	I-90 EB Ramps	File Name	SR-254 Corridor 2045 PM - Prop.xus		
Project Description	2045 PM Proposed				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	270	1120			1160	500	60		171			

Signal Information			
Cycle, s	120.0	Reference Phase	2
Offset, s	37	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	12.9	72.9	16.2	0.0	0.0	0.0						
Yellow	4.0	4.0	4.0	0.0	0.0	0.0						
Red	2.0	2.0	2.0	0.0	0.0	0.0						

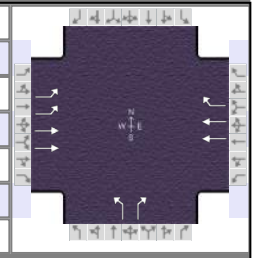
Saturation Flow / Delay	L	T	R	L	T	R	L	T	R	L	T	R
Lane Width Adjustment Factor (f_w)	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000			
Heavy Vehicles and Grade Factor (f_{HVg})	0.977	0.977	1.000	1.000	0.984	0.984	0.969	1.000	0.969			
Parking Activity Adjustment Factor (f_p)	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.000	0.000	0.000
Bus Blockage Adjustment Factor (f_{bb})	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.000	0.000	0.000
Area Type Adjustment Factor (f_a)	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000			
Lane Utilization Adjustment Factor (f_{LU})	0.906	0.952	1.000	1.000	0.951	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Left-Turn Adjustment Factor (f_{LT})	0.952	0.000		1.000	1.000		0.952	0.000				
Right-Turn Adjustment Factor (f_{RT})		1.000	1.000		0.000	0.847		0.000	0.847			
Left-Turn Pedestrian Adjustment Factor (f_{Lpb})	1.000			1.000			1.000					
Right-Turn Ped-Bike Adjustment Factor (f_{Rpb})			1.000			1.000			1.000			
Work Zone Adjustment Factor (f_{wz})	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000			
DDI Factor (f_{DDI})	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000			
Left-Turn Prot. CAV Adj. Factor ($f_{CAV,prot}$)	1.00											
Left-Turn Perm. CAV Adj. Factor ($f_{CAV,perm}$)				1.00								
Movement Saturation Flow Rate (s), veh/h	3202	3622	0	0	3649	1585	1753	0	1560			
Proportion of Vehicles Arriving on Green (P)	0.16	0.76	0.00	0.00	0.54	0.51	0.13	0.00	0.13	0.00	0.00	0.00
Incremental Delay Factor (k)	0.04	0.50			0.50	0.50	0.04		0.04			

Signal Timing / Movement Groups	EBL	EBT/R	WBL	WBT/R	NBL	NBT/R	SBL	SBT/R
Lost Time (t_L)	6.0	6.0		6.0		4.0		
Green Ratio (g/C)	0.11	0.77		0.61		0.13		
Permitted Saturation Flow Rate (s_p), veh/h/ln	0	0		484		1753		
Shared Saturation Flow Rate (s_{sh}), veh/h/ln				0				
Permitted Effective Green Time (g_p), s	0.0	0.0		0.0		0.0		
Permitted Service Time (g_u), s	0.0	0.0		0.0		0.0		
Permitted Queue Service Time (g_{ps}), s								
Time to First Blockage (g_f), s	0.0	0.0		72.9		0.0		
Queue Service Time Before Blockage (g_{fs}), s								
Protected Right Saturation Flow (s_R), veh/h/ln				0		0		
Protected Right Effective Green Time (g_R), s				0.0		0.0		

Multimodal	EB		WB		NB		SB	
Pedestrian F_w / F_v	0.972	0.000	0.972	0.000	1.557	0.000	1.710	0.000
Pedestrian F_s / F_{delay}	0.000	0.048	0.000	0.089	0.000	0.164	0.000	0.164
Pedestrian M_{corner} / M_{cw}	0.00		0.00		0.00		0.00	
Bicycle c_b / d_b	1530.14	3.31	1214.46	9.26		67.20	-83.33	65.10
Bicycle F_w / F_v	-3.64	1.22	-3.64	1.46	-3.64	Infinity	-3.64	

HCS Signalized Intersection Results Graphical Summary

General Information				Intersection Information	
Agency	CMT			Duration, h	0.250
Analyst	TJH	Analysis Date	2/14/2023	Area Type	Other
Jurisdiction	ODOT District 3	Time Period	PM	PHF	0.94
Urban Street	SR-254 (Detroit Rd)	Analysis Year	2045	Analysis Period	1> 17:00
Intersection	I-90 EB Ramps	File Name	SR-254 Corridor 2045 PM - Prop.xus		
Project Description	2045 PM Proposed				

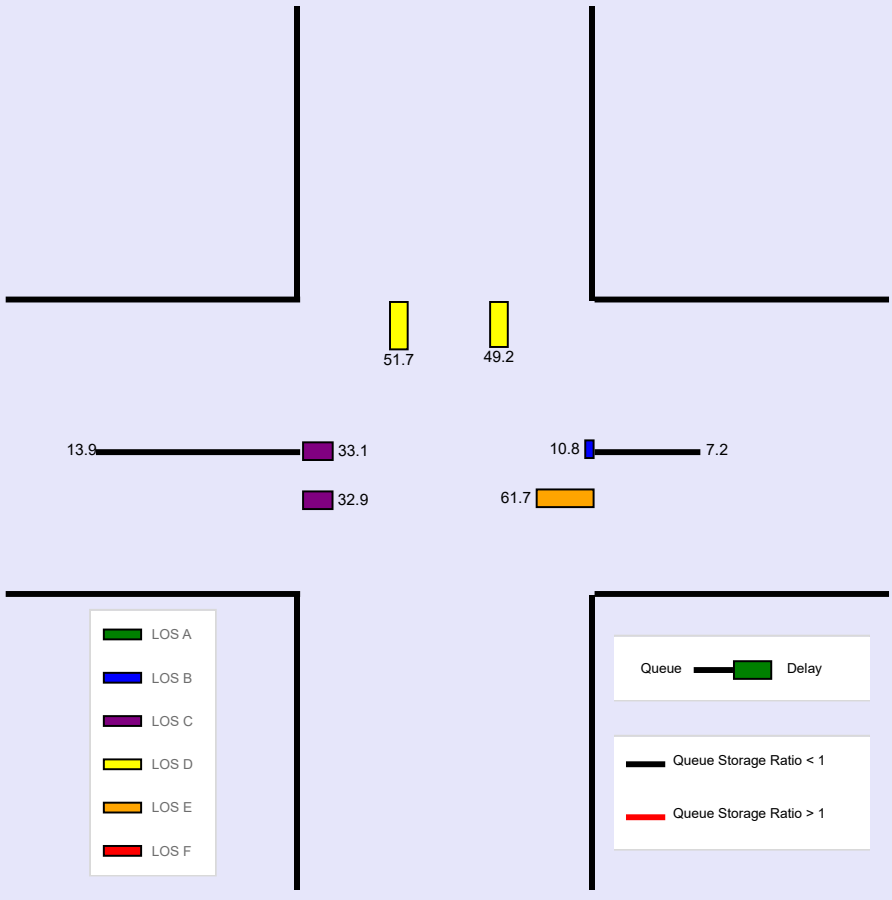


Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	270	1120			1160	500	60		171			

Signal Information			
Cycle, s	120.0	Reference Phase	2
Offset, s	37	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

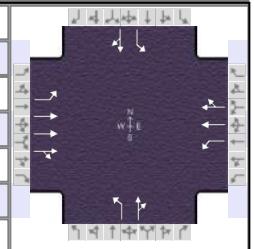
							1	2	3	4		
Green	12.9	72.9	16.2	0.0	0.0	0.0	5	6	7	8		
Yellow	4.0	4.0	4.0	0.0	0.0	0.0						
Red	2.0	2.0	2.0	0.0	0.0	0.0						

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Back of Queue (*Q*), ft/ln (95 th percentile)	161.2	173.8			366.7	356.1	79.9		242.5			
Back of Queue (*Q*), veh/ln (95 th percentile)	6.3	6.8			14.4	14.0	3.1		9.4			
Queue Storage Ratio (*RQ*) (95 th percentile)	0.60	0.20			0.56	0.79	0.17		0.26			
Control Delay (*d*), s/veh	50.1	5.3			17.4	19.2	46.8		54.9			
Level of Service (LOS)	D	A			B	B	D		D			
Approach Delay, s/veh / LOS	14.0	B		17.9	B		52.8	D		0.0		
Intersection Delay, s/veh / LOS	18.7						B					



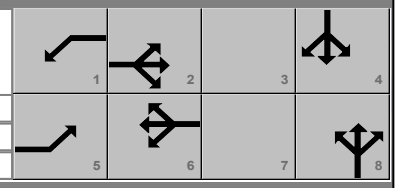
HCS Signalized Intersection Input Data

General Information				Intersection Information	
Agency	CMT			Duration, h	0.250
Analyst	TJH	Analysis Date	2/14/2023	Area Type	Other
Jurisdiction	ODOT District 3	Time Period	AM	PHF	0.90
Urban Street	SR-254 (Detroit Rd)	Analysis Year	2045	Analysis Period	1> 7:00
Intersection	Sheffield Crossing	File Name	SR-254 Corridor 2045 AM - Prop.xus		
Project Description	2045 AM Proposed				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	80	1060	60	40	1090	10	130	10	40	10	10	40

Signal Information					EB			WB			NB			SB		
Cycle, s	120.0	Reference Phase	2													
Offset, s	105	Reference Point	End	Green	5.5	0.6		77.3	18.6	0.0	0.0					
Uncoordinated	No	Simult. Gap E/W	On	Yellow	4.0	0.0		4.0	4.0	0.0	0.0					
Force Mode	Fixed	Simult. Gap N/S	On	Red	2.0	0.0		2.0	2.0	0.0	0.0					



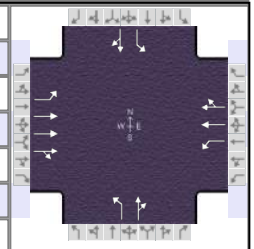
Traffic Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	80	1060	60	40	1090	10	130	10	40	10	10	40
Initial Queue (Q_b), veh/h	0	0	0	0	0	0	0	0	0	0	0	0
Base Saturation Flow Rate (s_o), veh/h	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Parking (N_m), man/h		None			None			None			None	
Heavy Vehicles (P_{HV}), %	3	3		2	2		3	3		3	3	
Ped / Bike / RTOR, /h	0	0	0	0	0	0	0	0	0	0	0	0
Buses (N_b), buses/h	0	0	0	0	0	0	0	0	0	0	0	0
Arrival Type (*AT*)	3	3	3	3	3	3	3	3	3	3	3	3
Upstream Filtering (*I*)	0.97	0.97	0.97	0.72	0.72	0.72	1.00	1.00	1.00	1.00	1.00	1.00
Lane Width (*W*), ft	12.0	12.0		12.0	12.0		12.0	12.0		12.0	12.0	
Turn Bay Length, ft	420	650		140	370		470	470		100	280	
Grade (*Pg*), %		0			0			0			0	
Speed Limit, mi/h	35	35	35	35	35	35	25	25	25	25	25	25

Phase Information	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Maximum Green (G_{max}) or Phase Split, s	14.0	71.0	18.0	75.0		31.0		31.0
Yellow Change Interval (*Y*), s	4.0	4.0	4.0	4.0		4.0		4.0
Red Clearance Interval (R_c), s	2.0	2.0	2.0	2.0		2.0		2.0
Minimum Green (G_{min}), s	7	20	7	20		10		10
Start-Up Lost Time (*l*t), s	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Extension of Effective Green (*e*), s	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Passage (*PT*), s	2.0	2.0	2.0	2.0		2.0		2.0
Recall Mode	Off	Min	Off	Min		Off		Off
Dual Entry	No	Yes	No	Yes		Yes		Yes
Walk (*Walk*), s		0.0		0.0		0.0		0.0
Pedestrian Clearance Time (*PC*), s		0.0		0.0		0.0		0.0

Multimodal Information	EB			WB			NB			SB		
85th % Speed / Rest in Walk / Corner Radius	0.0	No	25.0	0.0	No	25.0	0.0	No	25.0	0.0	No	25.0
Walkway / Crosswalk Width / Length, ft	9.0	12.0	0.0	9.0	12.0	0.0	9.0	12.0	0.0	9.0	12.0	0.0
Street Width / Island / Curb, ft	0.0	0	No	0.0	0	No	0.0	0	No	0.0	0	No
Width Outside / Bike Lane / Shoulder, ft	12.0	5.0	2.0	12.0	5.0	2.0	12.0	5.0	2.0	12.0	5.0	2.0
Pedestrian Signal / Occupied Parking	No	0.50		No	0.50		No	0.50		No	0.50	

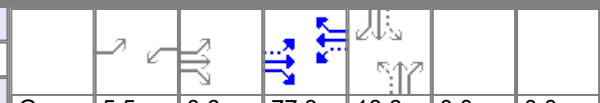
HCS Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	CMT			Duration, h	0.250
Analyst	TJH	Analysis Date	2/14/2023	Area Type	Other
Jurisdiction	ODOT District 3	Time Period	AM	PHF	0.90
Urban Street	SR-254 (Detroit Rd)	Analysis Year	2045	Analysis Period	1> 7:00
Intersection	Sheffield Crossing	File Name	SR-254 Corridor 2045 AM - Prop.xus		
Project Description	2045 AM Proposed				

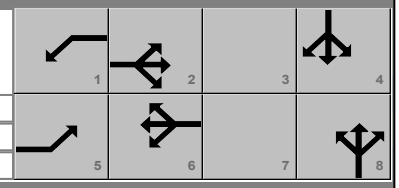


Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	80	1060	60	40	1090	10	130	10	40	10	10	40

Signal Information			
Cycle, s	120.0	Reference Phase	2
Offset, s	105	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	5.5	0.6	77.3	18.6	0.0	0.0
Yellow	4.0	0.0	4.0	4.0	0.0	0.0
Red	2.0	0.0	2.0	2.0	0.0	0.0



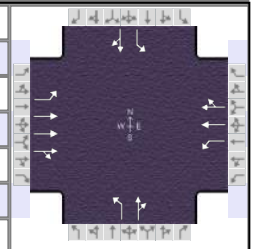
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	5	2	1	6		8		4
Case Number	1.1	4.0	1.1	4.0		6.0		6.0
Phase Duration, s	12.1	83.9	11.5	83.3		24.6		24.6
Change Period, ($Y+R_c$), s	6.0	6.0	6.0	6.0		6.0		6.0
Max Allow Headway (*MAH*), s	3.1	0.0	3.1	0.0		3.4		3.4
Queue Clearance Time (g_s), s	3.3		3.0			18.3		6.4
Green Extension Time (g_e), s	0.0	0.0	0.0	0.0		0.3		0.5
Phase Call Probability	0.87		0.79			1.00		1.00
Max Out Probability	0.00		0.00			0.07		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	61	573	280	47	613	673	144	56		11	56	
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1767	1856	1803	1781	1699	1865	1337	1622		1337	1622	
Queue Service Time (g_s), s	1.3	6.5	6.5	1.0	14.7	14.5	12.7	3.6		0.9	3.6	
Cycle Queue Clearance Time (g_c), s	1.3	6.5	6.5	1.0	14.7	14.5	16.3	3.6		4.4	3.6	
Green Ratio (*g/C*)	0.69	0.65	0.65	0.69	0.64	0.64	0.16	0.16		0.16	0.16	
Capacity (*c*), veh/h	372	2407	1169	516	1094	1201	228	252		228	252	
Volume-to-Capacity Ratio (*X*)	0.164	0.238	0.239	0.091	0.560	0.561	0.634	0.221		0.049	0.221	
Back of Queue (*Q*), ft/ln (95 th percentile)	21.6	111.7	109.4	16.6	168.1	174.9	199.2	68.1		13.8	68.1	
Back of Queue (*Q*), veh/ln (95 th percentile)	0.8	4.4	4.4	0.7	6.6	7.0	7.8	2.7		0.5	2.7	
Queue Storage Ratio (*RQ*) (95 th percentile)	0.05	0.17	0.17	0.12	0.45	0.48	0.42	0.14		0.14	0.24	
Uniform Delay (d_1), s/veh	7.1	7.1	7.1	6.5	5.3	5.2	51.4	44.3		46.3	44.3	
Incremental Delay (d_2), s/veh	0.1	0.2	0.5	0.0	1.5	1.4	1.1	0.2		0.0	0.2	
Initial Queue Delay (d_3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Control Delay (*d*), s/veh	7.2	7.3	7.5	6.5	6.8	6.6	52.5	44.5		46.3	44.5	
Level of Service (LOS)	A	A	A	A	A	A	D	D		D	D	
Approach Delay, s/veh / LOS	7.4	A		6.7	A		50.3	D		44.8	D	
Intersection Delay, s/veh / LOS	11.4						B					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	1.88	B	1.88	B	2.46	B	2.46	B
Bicycle LOS Score / LOS	1.22	A	1.53	B	0.82	A	0.60	A

HCS Signalized Intersection Intermediate Values

General Information				Intersection Information	
Agency	CMT			Duration, h	0.250
Analyst	TJH	Analysis Date	2/14/2023	Area Type	Other
Jurisdiction	ODOT District 3	Time Period	AM	PHF	0.90
Urban Street	SR-254 (Detroit Rd)	Analysis Year	2045	Analysis Period	1> 7:00
Intersection	Sheffield Crossing	File Name	SR-254 Corridor 2045 AM - Prop.xus		
Project Description	2045 AM Proposed				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	80	1060	60	40	1090	10	130	10	40	10	10	40

Signal Information			
Cycle, s	120.0	Reference Phase	2
Offset, s	105	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

							1	2	3	4
Green	5.5	0.6	77.3	18.6	0.0	0.0	5	6	7	8
Yellow	4.0	0.0	4.0	4.0	0.0	0.0				
Red	2.0	0.0	2.0	2.0	0.0	0.0				

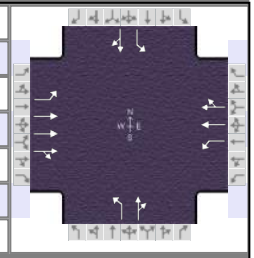
Saturation Flow / Delay	L	T	R	L	T	R	L	T	R	L	T	R
Lane Width Adjustment Factor (f_w)	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Heavy Vehicles and Grade Factor (f_{HVg})	0.977	0.977	1.000	0.984	0.984	1.000	0.977	0.977	1.000	0.977	0.977	1.000
Parking Activity Adjustment Factor (f_p)	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Bus Blockage Adjustment Factor (f_{bb})	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Area Type Adjustment Factor (f_a)	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Lane Utilization Adjustment Factor (f_{LU})	1.000	1.000	1.000	1.000	0.908	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Left-Turn Adjustment Factor (f_{LT})	0.952	0.000		0.952	0.000		0.704	0.000		0.704	0.000	
Right-Turn Adjustment Factor (f_{RT})		0.971	0.971		0.997	0.997		0.874	0.874		0.874	0.874
Left-Turn Pedestrian Adjustment Factor (f_{Lpb})	1.000			1.000			1.000			1.000		
Right-Turn Ped-Bike Adjustment Factor (f_{Rpb})			1.000			1.000			1.000			1.000
Work Zone Adjustment Factor (f_{wz})	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
DDI Factor (f_{DDI})	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Left-Turn Prot. CAV Adj. Factor ($f_{CAV,prot}$)	1.00			1.00								
Left-Turn Perm. CAV Adj. Factor ($f_{CAV,perm}$)							1.00			1.00		
Movement Saturation Flow Rate (s), veh/h	1767	5219	294	1781	3531	32	1337	324	1298	1337	324	1298
Proportion of Vehicles Arriving on Green (P)	0.01	0.71	0.72	0.00	0.82	0.94	0.16	0.16	0.16	0.16	0.16	0.16
Incremental Delay Factor (k)	0.04	0.50	0.50	0.04	0.50	0.50	0.04	0.04		0.04	0.04	

Signal Timing / Movement Groups	EBL	EBT/R	WBL	WBT/R	NBL	NBT/R	SBL	SBT/R
Lost Time (t_L)	6.0	6.0	6.0	6.0		6.0		6.0
Green Ratio (g/C)	0.69	0.65	0.69	0.64		0.16		0.16
Permitted Saturation Flow Rate (s_p), veh/h/ln	426	0	647	0		1337		1337
Shared Saturation Flow Rate (s_{sh}), veh/h/ln								
Permitted Effective Green Time (g_p), s	77.3	0.0	77.3	0.0		18.6		18.6
Permitted Service Time (g_u), s	62.6	0.0	69.3	0.0		15.1		15.1
Permitted Queue Service Time (g_{ps}), s	2.6		0.7			12.7		0.9
Time to First Blockage (g_f), s	0.0	0.0	0.0	0.0		0.0		0.0
Queue Service Time Before Blockage (g_{fs}), s								
Protected Right Saturation Flow (s_R), veh/h/ln								
Protected Right Effective Green Time (g_R), s								

Multimodal	EB		WB		NB		SB	
Pedestrian F_w / F_v	1.198	0.000	1.198	0.000	1.710	0.000	1.710	0.000
Pedestrian F_s / F_{delay}	0.000	0.080	0.000	0.081	0.000	0.151	0.000	0.151
Pedestrian M_{corner} / M_{cw}	0.00		0.00		0.00		0.00	
Bicycle c_b / d_b	1297.71	7.40	1288.49	7.59	310.15	42.83	310.15	42.83
Bicycle F_w / F_v	-3.64	0.73	-3.64	1.05	-3.64	0.33	-3.64	0.11

HCS Signalized Intersection Results Graphical Summary

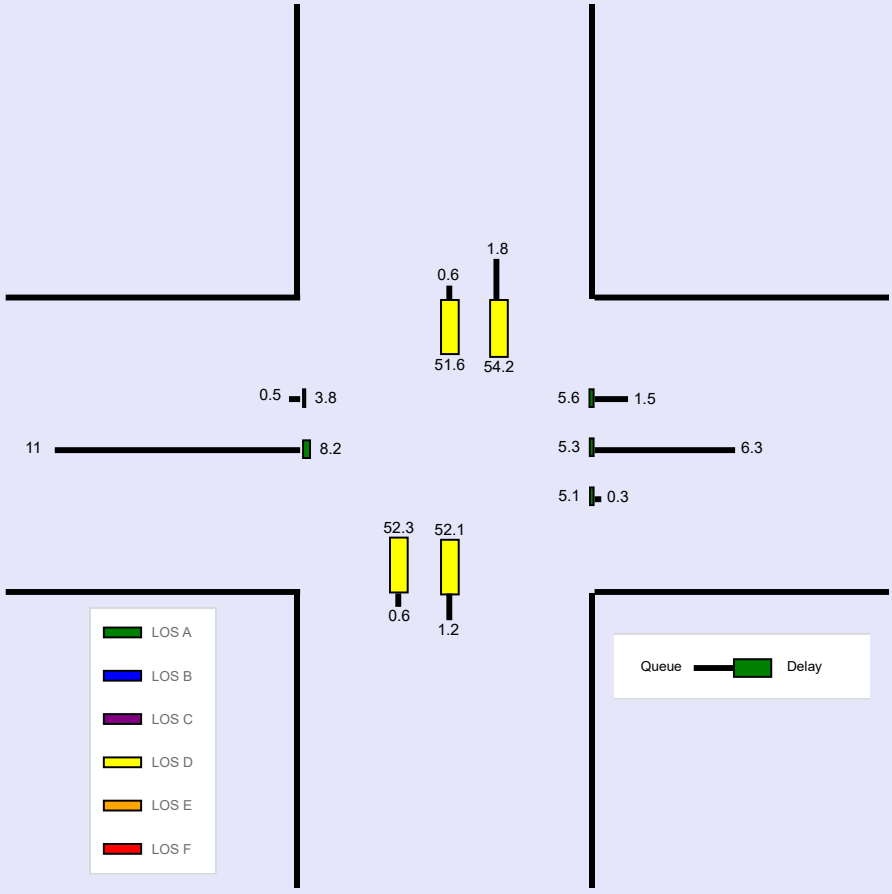
General Information				Intersection Information	
Agency	CMT			Duration, h	0.250
Analyst	TJH	Analysis Date	2/14/2023	Area Type	Other
Jurisdiction	ODOT District 3	Time Period	AM	PHF	0.90
Urban Street	SR-254 (Detroit Rd)	Analysis Year	2045	Analysis Period	1> 7:00
Intersection	Sheffield Crossing	File Name	SR-254 Corridor 2045 AM - Prop.xus		
Project Description	2045 AM Proposed				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	80	1060	60	40	1090	10	130	10	40	10	10	40

Signal Information													
Cycle, s	120.0	Reference Phase	2										
Offset, s	105	Reference Point	End										
Uncoordinated	No	Simult. Gap E/W	On										
Force Mode	Fixed	Simult. Gap N/S	On										
				Green	5.5	0.6	77.3	18.6	0.0	0.0			
				Yellow	4.0	0.0	4.0	4.0	0.0	0.0			
				Red	2.0	0.0	2.0	2.0	0.0	0.0			

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Back of Queue (*Q*), ft/ln (95 th percentile)	21.6	111.7	109.4	16.6	168.1	174.9	199.2	68.1		13.8	68.1	
Back of Queue (*Q*), veh/ln (95 th percentile)	0.8	4.4	4.4	0.7	6.6	7.0	7.8	2.7		0.5	2.7	
Queue Storage Ratio (*RQ*) (95 th percentile)	0.05	0.17	0.17	0.12	0.45	0.48	0.42	0.14		0.14	0.24	
Control Delay (*d*), s/veh	7.2	7.3	7.5	6.5	6.8	6.6	52.5	44.5		46.3	44.5	
Level of Service (LOS)	A	A	A	A	A	A	D	D		D	D	
Approach Delay, s/veh / LOS	7.4	A		6.7	A		50.3	D		44.8	D	
Intersection Delay, s/veh / LOS	11.4						B					



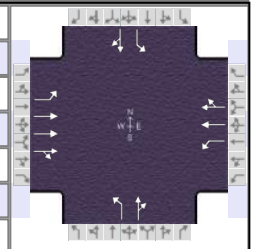
--- Messages ---

WARNING: According to input data, upstream feeding volume is equal to 69% of downstream exit volume during time period #1, for thru movement #2.

--- Comments ---

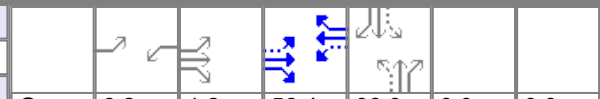
HCS Signalized Intersection Input Data

General Information				Intersection Information	
Agency	CMT			Duration, h	0.250
Analyst	TJH	Analysis Date	2/14/2023	Area Type	Other
Jurisdiction	ODOT District 3	Time Period	PM	PHF	0.92
Urban Street	SR-254 (Detroit Rd)	Analysis Year	2045	Analysis Period	1> 17:00
Intersection	Sheffield Crossing	File Name	SR-254 Corridor 2045 PM - Prop.xus		
Project Description	2045 PM Proposed				

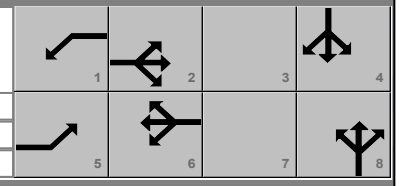


Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	180	1300	130	60	1220	60	250	30	100	50	20	130

Signal Information			
Cycle, s	120.0	Reference Phase	2
Offset, s	52	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	6.2	1.2	56.4	38.3	0.0	0.0						
Yellow	4.0	0.0	4.0	4.0	0.0	0.0						
Red	2.0	0.0	2.0	2.0	0.0	0.0						



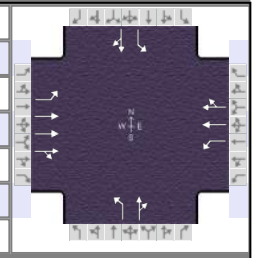
Traffic Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	180	1300	130	60	1220	60	250	30	100	50	20	130
Initial Queue (Q_b), veh/h	0	0	0	0	0	0	0	0	0	0	0	0
Base Saturation Flow Rate (s_o), veh/h	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Parking (N_m), man/h		None			None			None			None	
Heavy Vehicles (P_{HV}), %	3	3		2	2		3	3		3	3	
Ped / Bike / RTOR, /h	0	0	0	0	0	0	0	0	0	0	0	0
Buses (N_b), buses/h	0	0	0	0	0	0	0	0	0	0	0	0
Arrival Type (*AT*)	3	3	3	3	3	3	3	3	3	3	3	3
Upstream Filtering (*I*)	0.91	0.91	0.91	0.62	0.62	0.62	1.00	1.00	1.00	1.00	1.00	1.00
Lane Width (*W*), ft	12.0	12.0		12.0	12.0		12.0	12.0		12.0	12.0	
Turn Bay Length, ft	420	650		140	370		470	470		100	280	
Grade (*Pg*), %		0			0			0			0	
Speed Limit, mi/h	35	35	35	35	35	35	25	25	25	25	25	25

Phase Information	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Maximum Green (G_{max}) or Phase Split, s	13.0	59.0	13.0	59.0		48.0		48.0
Yellow Change Interval (*Y*), s	4.0	4.0	4.0	4.0		4.0		4.0
Red Clearance Interval (R_c), s	2.0	2.0	2.0	2.0		2.0		2.0
Minimum Green (G_{min}), s	7	20	7	20		10		10
Start-Up Lost Time (*l*t), s	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Extension of Effective Green (*e*), s	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Passage (*PT*), s	2.0	2.0	2.0	2.0		2.0		2.0
Recall Mode	Off	Min	Off	Min		Off		Off
Dual Entry	No	Yes	No	Yes		Yes		Yes
Walk (*Walk*), s		0.0		0.0		0.0		0.0
Pedestrian Clearance Time (*PC*), s		0.0		0.0		0.0		0.0

Multimodal Information	EB			WB			NB			SB		
85th % Speed / Rest in Walk / Corner Radius	0.0	No	25.0	0.0	No	25.0	0.0	No	25.0	0.0	No	25.0
Walkway / Crosswalk Width / Length, ft	9.0	12.0	0.0	9.0	12.0	0.0	9.0	12.0	0.0	9.0	12.0	0.0
Street Width / Island / Curb, ft	0.0	0	No	0.0	0	No	0.0	0	No	0.0	0	No
Width Outside / Bike Lane / Shoulder, ft	12.0	5.0	2.0	12.0	5.0	2.0	12.0	5.0	2.0	12.0	5.0	2.0
Pedestrian Signal / Occupied Parking	No	0.50		No	0.50		No	0.50		No	0.50	

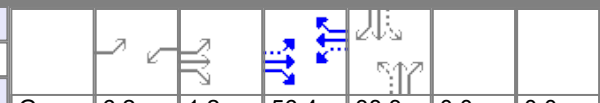
HCS Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	CMT			Duration, h	0.250
Analyst	TJH	Analysis Date	2/14/2023	Area Type	Other
Jurisdiction	ODOT District 3	Time Period	PM	PHF	0.92
Urban Street	SR-254 (Detroit Rd)	Analysis Year	2045	Analysis Period	1> 17:00
Intersection	Sheffield Crossing	File Name	SR-254 Corridor 2045 PM - Prop.xus		
Project Description	2045 PM Proposed				

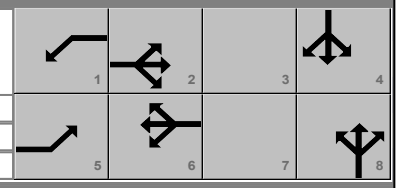


Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	180	1300	130	60	1220	60	250	30	100	50	20	130

Signal Information			
Cycle, s	120.0	Reference Phase	2
Offset, s	52	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	6.2	1.2	56.4	38.3	0.0	0.0
Yellow	4.0	0.0	4.0	4.0	0.0	0.0
Red	2.0	0.0	2.0	2.0	0.0	0.0



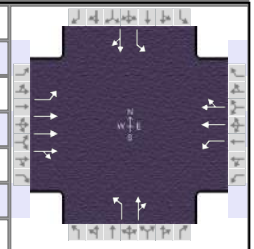
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	5	2	1	6		8		4
Case Number	1.1	4.0	1.1	4.0		6.0		6.0
Phase Duration, s	13.3	63.5	12.2	62.4		44.3		44.3
Change Period, ($Y+R_c$), s	6.0	6.0	6.0	6.0		6.0		6.0
Max Allow Headway (*MAH*), s	3.1	0.0	3.1	0.0		3.5		3.5
Queue Clearance Time (g_s), s	7.3		4.1			37.5		13.8
Green Extension Time (g_e), s	0.1	0.0	0.0	0.0		0.8		1.6
Phase Call Probability	0.99		0.88			1.00		1.00
Max Out Probability	0.70		0.00			0.66		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	152	818	390	64	577	795	272	141		54	163	
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1767	1856	1766	1781	1342	1844	1213	1630		1237	1605	
Queue Service Time (g_s), s	5.3	19.4	19.0	2.1	46.8	47.0	26.3	7.8		4.1	9.2	
Cycle Queue Clearance Time (g_c), s	5.3	19.4	19.0	2.1	46.8	47.0	35.5	7.8		11.8	9.2	
Green Ratio (*g/C*)	0.53	0.48	0.48	0.52	0.47	0.47	0.32	0.32		0.32	0.32	
Capacity (*c*), veh/h	199	1780	847	291	631	866	354	520		375	512	
Volume-to-Capacity Ratio (*X*)	0.765	0.459	0.460	0.221	0.915	0.917	0.768	0.272		0.145	0.319	
Back of Queue (*Q*), ft/ln (95 th percentile)	113.5	346.1	323.6	39.2	529	670.3	343	143.6		58.4	168.4	
Back of Queue (*Q*), veh/ln (95 th percentile)	4.4	13.5	12.9	1.5	20.8	26.8	13.4	5.6		2.3	6.6	
Queue Storage Ratio (*RQ*) (95 th percentile)	0.27	0.53	0.51	0.28	1.43	1.84	0.73	0.31		0.58	0.60	
Uniform Delay (d_1), s/veh	26.7	24.4	23.6	16.2	25.1	25.0	44.4	30.5		34.9	31.0	
Incremental Delay (d_2), s/veh	7.2	0.8	1.6	0.1	13.9	11.0	6.9	0.1		0.1	0.1	
Initial Queue Delay (d_3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Control Delay (*d*), s/veh	33.8	25.2	25.3	16.3	39.0	36.0	51.3	30.6		35.0	31.1	
Level of Service (LOS)	C	C	C	B	D	D	D	C		C	C	
Approach Delay, s/veh / LOS	26.2	C		36.3	D		44.2	D		32.1	C	
Intersection Delay, s/veh / LOS	33.0						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	1.91	B	1.91	B	2.44	B	2.44	B
Bicycle LOS Score / LOS	1.45	A	1.69	B	1.17	A	0.85	A

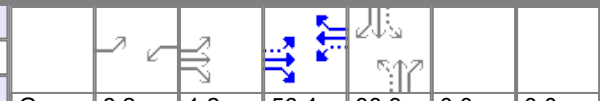
HCS Signalized Intersection Intermediate Values

General Information				Intersection Information	
Agency	CMT			Duration, h	0.250
Analyst	TJH	Analysis Date	2/14/2023	Area Type	Other
Jurisdiction	ODOT District 3	Time Period	PM	PHF	0.92
Urban Street	SR-254 (Detroit Rd)	Analysis Year	2045	Analysis Period	1> 17:00
Intersection	Sheffield Crossing	File Name	SR-254 Corridor 2045 PM - Prop.xus		
Project Description	2045 PM Proposed				

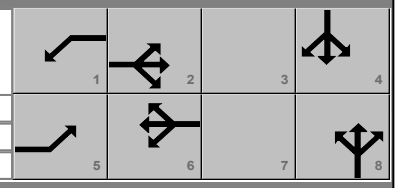


Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	180	1300	130	60	1220	60	250	30	100	50	20	130

Signal Information			
Cycle, s	120.0	Reference Phase	2
Offset, s	52	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	6.2	1.2	56.4	38.3	0.0	0.0
Yellow	4.0	0.0	4.0	4.0	0.0	0.0
Red	2.0	0.0	2.0	2.0	0.0	0.0



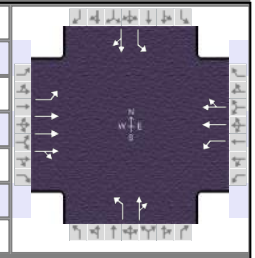
Saturation Flow / Delay	L	T	R	L	T	R	L	T	R	L	T	R
Lane Width Adjustment Factor (f_w)	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Heavy Vehicles and Grade Factor (f_{HVg})	0.977	0.977	1.000	0.984	0.984	1.000	0.977	0.977	1.000	0.977	0.977	1.000
Parking Activity Adjustment Factor (f_p)	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Bus Blockage Adjustment Factor (f_{bb})	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Area Type Adjustment Factor (f_a)	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Lane Utilization Adjustment Factor (f_{LU})	1.000	1.000	1.000	1.000	0.718	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Left-Turn Adjustment Factor (f_{LT})	0.952	0.000		0.952	0.000		0.639	0.000		0.651	0.000	
Right-Turn Adjustment Factor (f_{RT})		0.952	0.952		0.986	0.986		0.878	0.878		0.865	0.865
Left-Turn Pedestrian Adjustment Factor (f_{Lpb})	1.000			1.000			1.000			1.000		
Right-Turn Ped-Bike Adjustment Factor (f_{Rpb})			1.000			1.000			1.000			1.000
Work Zone Adjustment Factor (f_{wz})	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
DDI Factor (f_{DDI})	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Left-Turn Prot. CAV Adj. Factor ($f_{CAV,prot}$)	1.00			1.00								
Left-Turn Perm. CAV Adj. Factor ($f_{CAV,perm}$)							1.00			1.00		
Movement Saturation Flow Rate (s), veh/h	1767	4980	497	1781	3037	149	1213	376	1254	1237	214	1391
Proportion of Vehicles Arriving on Green (P)	0.06	0.40	0.46	0.05	0.55	0.58	0.32	0.32	0.32	0.32	0.32	0.32
Incremental Delay Factor (k)	0.14	0.50	0.50	0.04	0.50	0.50	0.22	0.04		0.04	0.04	

Signal Timing / Movement Groups	EBL	EBT/R	WBL	WBT/R	NBL	NBT/R	SBL	SBT/R
Lost Time (t_L)	6.0	6.0	6.0	6.0		6.0		6.0
Green Ratio (g/C)	0.53	0.48	0.52	0.47		0.32		0.32
Permitted Saturation Flow Rate (s_p), veh/h/ln	393	0	463	0		1213		1237
Shared Saturation Flow Rate (s_{sh}), veh/h/ln								
Permitted Effective Green Time (g_p), s	56.4	0.0	56.4	0.0		38.3		38.3
Permitted Service Time (g_u), s	9.3	0.0	36.1	0.0		29.0		30.5
Permitted Queue Service Time (g_{ps}), s	9.3		3.3			26.3		4.1
Time to First Blockage (g_f), s	0.0	0.0	0.0	0.0		0.0		0.0
Queue Service Time Before Blockage (g_{fs}), s								
Protected Right Saturation Flow (s_R), veh/h/ln								
Protected Right Effective Green Time (g_R), s								

Multimodal	EB		WB		NB		SB	
Pedestrian F_w / F_v	1.198	0.000	1.198	0.000	1.710	0.000	1.710	0.000
Pedestrian F_s / F_{delay}	0.000	0.112	0.000	0.113	0.000	0.133	0.000	0.133
Pedestrian M_{corner} / M_{cw}	0.00		0.00		0.00		0.00	
Bicycle c_b / d_b	959.01	16.26	939.80	16.86	638.01	27.83	638.01	27.83
Bicycle F_w / F_v	-3.64	0.96	-3.64	1.20	-3.64	0.68	-3.64	0.36

HCS Signalized Intersection Results Graphical Summary

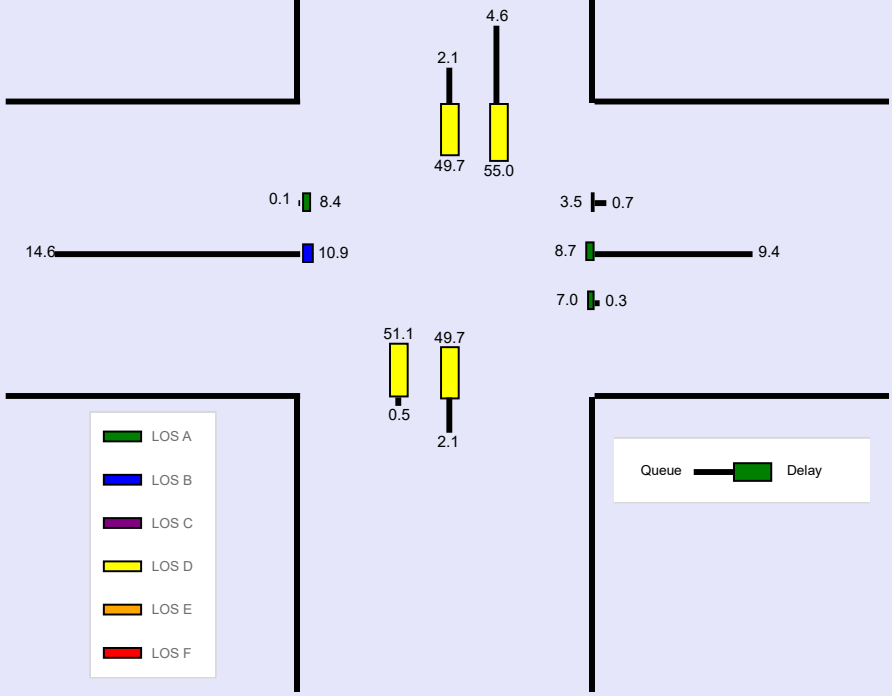
General Information				Intersection Information	
Agency	CMT			Duration, h	0.250
Analyst	TJH	Analysis Date	2/14/2023	Area Type	Other
Jurisdiction	ODOT District 3	Time Period	PM	PHF	0.92
Urban Street	SR-254 (Detroit Rd)	Analysis Year	2045	Analysis Period	1> 17:00
Intersection	Sheffield Crossing	File Name	SR-254 Corridor 2045 PM - Prop.xus		
Project Description	2045 PM Proposed				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	180	1300	130	60	1220	60	250	30	100	50	20	130

Signal Information					EB			WB			NB			SB		
Cycle, s	120.0	Reference Phase	2													
Offset, s	52	Reference Point	End	Green	6.2	1.2		56.4	38.3	0.0	0.0					
Uncoordinated	No	Simult. Gap E/W	On	Yellow	4.0	0.0		4.0	4.0	0.0	0.0					
Force Mode	Fixed	Simult. Gap N/S	On	Red	2.0	0.0		2.0	2.0	0.0	0.0					

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Back of Queue (*Q*), ft/ln (95 th percentile)	113.5	346.1	323.6	39.2	529	670.3	343	143.6		58.4	168.4	
Back of Queue (*Q*), veh/ln (95 th percentile)	4.4	13.5	12.9	1.5	20.8	26.8	13.4	5.6		2.3	6.6	
Queue Storage Ratio (*RQ*) (95 th percentile)	0.27	0.53	0.51	0.28	1.43	1.84	0.73	0.31		0.58	0.60	
Control Delay (*d*), s/veh	33.8	25.2	25.3	16.3	39.0	36.0	51.3	30.6		35.0	31.1	
Level of Service (LOS)	C	C	C	B	D	D	D	C		C	C	
Approach Delay, s/veh / LOS	26.2	C		36.3	D		44.2	D		32.1	C	
Intersection Delay, s/veh / LOS	33.0						C					



--- Messages ---

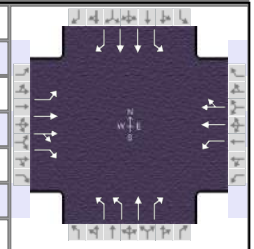
WARNING: Since queue spillover from turn lanes and spillback into upstream intersections is not accounted for in the HCM procedures, use of a simulation tool may be advised in situations where the Queue Storage Ratio exceeds 1.0.

WARNING: According to input data, upstream feeding volume is equal to 78% of downstream exit volume during time period #1, for thru movement #2.

--- Comments ---

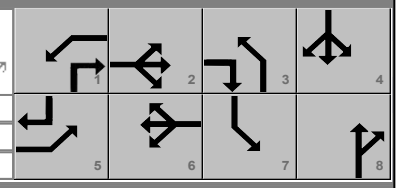
HCS Signalized Intersection Input Data

General Information				Intersection Information	
Agency	CMT			Duration, h	0.250
Analyst	TJH	Analysis Date	2/14/2023	Area Type	Other
Jurisdiction	ODOT District 3	Time Period	AM	PHF	0.93
Urban Street	SR-254 (Detroit Rd)	Analysis Year	2045	Analysis Period	1> 7:00
Intersection	SR-301 (Abbe Rd)	File Name	SR-254 Corridor 2045 AM - Prop.xus		
Project Description	2045 AM Proposed				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	150	320	610	150	520	40	510	230	150	50	260	210

Signal Information												
Cycle, s	120.0	Reference Phase	2									
Offset, s	65	Reference Point	End									
Uncoordinated	No	Simult. Gap E/W	On									
Force Mode	Fixed	Simult. Gap N/S	On									
				Green	6.9	1.8	46.0	5.8	10.0	19.6		
				Yellow	4.0	0.0	4.0	4.0	4.0	4.0		
				Red	2.0	0.0	2.0	2.0	2.0	2.0		



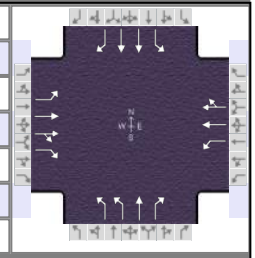
Traffic Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	150	320	610	150	520	40	510	230	150	50	260	210
Initial Queue (Q_b), veh/h	0	0	0	0	0	0	0	0	0	0	0	0
Base Saturation Flow Rate (s_o), veh/h	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Parking (N_m), man/h		None			None			None			None	
Heavy Vehicles (P_{HV}), %	3	3	3	1	1		2	2	2	4	4	4
Ped / Bike / RTOR, /h	0	0	0	0	0	0	0	0	0	0	0	0
Buses (N_b), buses/h	0	0	0	0	0	0	0	0	0	0	0	0
Arrival Type (*AT*)	3	3	3	3	3	3	3	3	3	3	3	3
Upstream Filtering (*I*)	0.98	0.98	0.98	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lane Width (*W*), ft	12.0	12.0	12.0	12.0	12.0		12.0	12.0	12.0	12.0	12.0	12.0
Turn Bay Length, ft	150	350	350	320	470		940	1440	330	230	460	250
Grade (*Pg*), %		0			0			0			0	
Speed Limit, mi/h	35	35	35	35	35	35	35	35	35	35	35	35

Phase Information	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Maximum Green (G_{max}) or Phase Split, s	15.0	38.0	18.0	41.0	45.0	50.0	14.0	19.0
Yellow Change Interval (*Y*), s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Red Clearance Interval (R_c), s	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Minimum Green (G_{min}), s	7	20	7	20	7	10	7	10
Start-Up Lost Time (*lt*), s	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Extension of Effective Green (*e*), s	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Passage (*PT*), s	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Recall Mode	Off	Min	Off	Min	Off	Off	Off	Off
Dual Entry	No	Yes	No	Yes	No	Yes	No	Yes
Walk (*Walk*), s		0.0		0.0		0.0		0.0
Pedestrian Clearance Time (*PC*), s		0.0		0.0		0.0		0.0

Multimodal Information	EB			WB			NB			SB		
85th % Speed / Rest in Walk / Corner Radius	0.0	No	25.0	0.0	No	25.0	0.0	No	25.0	0.0	No	25.0
Walkway / Crosswalk Width / Length, ft	9.0	12.0	0.0	9.0	12.0	0.0	9.0	12.0	0.0	9.0	12.0	0.0
Street Width / Island / Curb, ft	0.0	0	No	0.0	0	No	0.0	0	No	0.0	0	No
Width Outside / Bike Lane / Shoulder, ft	12.0	5.0	2.0	12.0	5.0	2.0	12.0	5.0	2.0	12.0	5.0	2.0
Pedestrian Signal / Occupied Parking	No	0.50		No	0.50		No	0.50		No	0.50	

HCS Signalized Intersection Results Summary

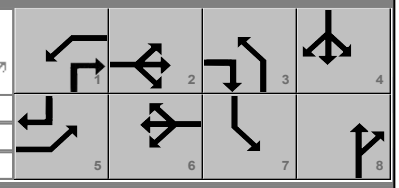
General Information				Intersection Information	
Agency	CMT			Duration, h	0.250
Analyst	TJH	Analysis Date	2/14/2023	Area Type	Other
Jurisdiction	ODOT District 3	Time Period	AM	PHF	0.93
Urban Street	SR-254 (Detroit Rd)	Analysis Year	2045	Analysis Period	1> 7:00
Intersection	SR-301 (Abbe Rd)	File Name	SR-254 Corridor 2045 AM - Prop.xus		
Project Description	2045 AM Proposed				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	150	320	610	150	520	40	510	230	150	50	260	210

Signal Information			
Cycle, s	120.0	Reference Phase	2
Offset, s	65	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	6.9	1.8	46.0	5.8	10.0	19.6						
Yellow	4.0	0.0	4.0	4.0	4.0	4.0						
Red	2.0	0.0	2.0	2.0	2.0	2.0						



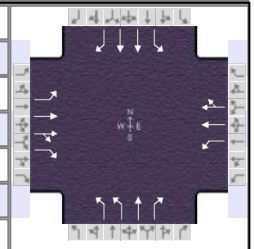
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	5	2	1	6	3	8	7	4
Case Number	1.1	3.0	1.1	4.0	2.0	3.0	1.1	3.0
Phase Duration, s	12.9	52.0	14.6	53.7	27.8	41.6	11.8	25.6
Change Period, (*Y+R c*), s	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Max Allow Headway (*MAH*), s	3.1	0.0	3.1	0.0	3.1	3.2	3.1	3.2
Queue Clearance Time (*g s*), s	6.9		8.5		20.5	14.9	5.0	17.8
Green Extension Time (*g e*), s	0.1	0.0	0.2	0.0	1.3	2.0	0.0	1.8
Phase Call Probability	0.98		1.00		1.00	1.00	0.83	1.00
Max Out Probability	0.00		0.00		0.00	0.00	1.00	0.03

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	120	256	487	161	304	298	548	247	161	54	280	226
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1767	1856	1572	1795	1885	1837	1730	1870	1585	1753	1752	1560
Queue Service Time (*g s*), s	4.9	4.8	21.8	6.5	13.9	14.0	18.5	12.9	8.6	3.0	8.7	15.8
Cycle Queue Clearance Time (*g c*), s	4.9	4.8	21.8	6.5	13.9	14.0	18.5	12.9	8.6	3.0	8.7	15.8
Green Ratio (*g/C*)	0.44	0.38	0.56	0.46	0.40	0.40	0.18	0.30	0.37	0.21	0.16	0.22
Capacity (*c*), veh/h	376	1422	888	578	750	731	628	554	584	327	572	344
Volume-to-Capacity Ratio (*X*)	0.319	0.180	0.549	0.279	0.406	0.407	0.873	0.446	0.276	0.164	0.489	0.656
Back of Queue (*Q*), ft/ln (95 th percentile)	94.9	96.8	160.7	121.4	269	262.8	321.6	248.7	148	59.9	175.8	262.3
Back of Queue (*Q*), veh/ln (95 th percentile)	3.7	3.8	6.3	4.8	10.7	10.5	12.7	9.8	5.8	2.3	6.8	10.2
Queue Storage Ratio (*RQ*) (95 th percentile)	0.63	0.28	0.46	0.38	0.57	0.56	0.34	0.17	0.45	0.26	0.38	1.05
Uniform Delay (*d 1*), s/veh	21.6	21.0	12.6	19.7	26.0	26.0	47.8	34.2	26.7	38.4	45.6	42.6
Incremental Delay (*d 2*), s/veh	0.2	0.3	2.4	0.1	1.6	1.7	1.5	0.2	0.1	0.1	0.2	0.8
Initial Queue Delay (*d 3*), 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
Control Delay (*d*), s/veh	21.8	21.2	15.0	19.8	27.6	27.7	49.3	34.4	26.8	38.5	45.9	43.4
Level of Service (LOS)	C	C	B	B	C	C	D	C	C	D	D	D
Approach Delay, s/veh / LOS	17.8	B		26.0	C		41.7	D		44.2	D	
Intersection Delay, s/veh / LOS	31.7						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.44	B	2.28	B	2.29	B	2.46	B
Bicycle LOS Score / LOS	1.45	A	1.12	A	2.07	B	0.95	A

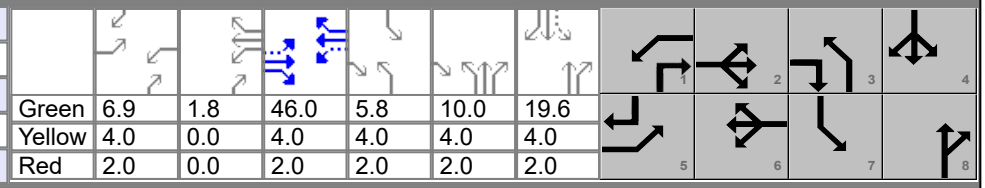
HCS Signalized Intersection Intermediate Values

General Information				Intersection Information	
Agency	CMT			Duration, h	0.250
Analyst	TJH	Analysis Date	2/14/2023	Area Type	Other
Jurisdiction	ODOT District 3	Time Period	AM	PHF	0.93
Urban Street	SR-254 (Detroit Rd)	Analysis Year	2045	Analysis Period	1> 7:00
Intersection	SR-301 (Abbe Rd)	File Name	SR-254 Corridor 2045 AM - Prop.xus		
Project Description	2045 AM Proposed				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	150	320	610	150	520	40	510	230	150	50	260	210

Signal Information			
Cycle, s	120.0	Reference Phase	2
Offset, s	65	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	6.9	1.8	46.0	5.8	10.0	19.6						
Yellow	4.0	0.0	4.0	4.0	4.0	4.0						
Red	2.0	0.0	2.0	2.0	2.0	2.0						

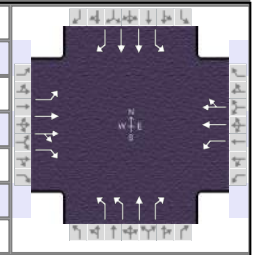
Saturation Flow / Delay	L	T	R	L	T	R	L	T	R	L	T	R
Lane Width Adjustment Factor (f_w)	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Heavy Vehicles and Grade Factor (f_{HVg})	0.977	0.977	0.977	0.992	0.992	1.000	0.984	0.984	0.984	0.969	0.969	0.969
Parking Activity Adjustment Factor (f_p)	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Bus Blockage Adjustment Factor (f_{bb})	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Area Type Adjustment Factor (f_a)	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Lane Utilization Adjustment Factor (f_{LU})	1.000	1.000	1.000	1.000	1.000	1.000	0.971	1.000	1.000	1.000	0.952	1.000
Left-Turn Adjustment Factor (f_{LT})	0.952	0.000		0.952	0.000		0.952	0.000		0.952	0.000	
Right-Turn Adjustment Factor (f_{RT})		0.000	0.847		0.975	0.975		0.000	0.847		0.000	0.847
Left-Turn Pedestrian Adjustment Factor (f_{Lpb})	1.000			1.000			1.000			1.000		
Right-Turn Ped-Bike Adjustment Factor (f_{Rpb})			1.000			1.000			1.000			1.000
Work Zone Adjustment Factor (f_{wz})	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
DDI Factor (f_{DDI})	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Left-Turn Prot. CAV Adj. Factor ($f_{CAV,prot}$)	1.00			1.00			1.00			1.00		
Left-Turn Perm. CAV Adj. Factor ($f_{CAV,perm}$)												
Movement Saturation Flow Rate (s), veh/h	1767	3711	1572	1795	3457	265	3459	1870	1585	1753	3505	1560
Proportion of Vehicles Arriving on Green (P)	0.04	0.47	0.52	0.07	0.40	0.40	0.18	0.30	0.30	0.05	0.16	0.16
Incremental Delay Factor (k)	0.04	0.50	0.50	0.04	0.50	0.50	0.04	0.04	0.04	0.04	0.04	0.04

Signal Timing / Movement Groups	EBL	EBT/R	WBL	WBT/R	NBL	NBT/R	SBL	SBT/R
Lost Time (t_L)	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Green Ratio (g/C)	0.44	0.38	0.46	0.40	0.18	0.30	0.21	0.16
Permitted Saturation Flow Rate (s_p), veh/h/ln	811	0	1133	0	0	0	1115	0
Shared Saturation Flow Rate (s_{sh}), veh/h/ln								
Permitted Effective Green Time (g_p), s	46.0	0.0	46.0	0.0	0.0	0.0	19.6	0.0
Permitted Service Time (g_u), s	31.8	0.0	41.2	0.0	0.0	0.0	19.6	0.0
Permitted Queue Service Time (g_{ps}), s	2.5		0.8				0.0	
Time to First Blockage (g_f), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Queue Service Time Before Blockage (g_{fs}), s								
Protected Right Saturation Flow (s_R), veh/h/ln		1572				1585		1560
Protected Right Effective Green Time (g_R), s		21.8				8.6		6.9

Multimodal	EB		WB		NB		SB	
Pedestrian F_w / F_v	1.710	0.000	1.557	0.000	1.557	0.000	1.710	0.000
Pedestrian F_s / F_{delay}	0.000	0.125	0.000	0.124	0.000	0.136	0.000	0.150
Pedestrian M_{corner} / M_{cw}	0.00		0.00		0.00		0.00	
Bicycle c_b / d_b	766.22	22.83	795.52	21.76	592.60	29.71	326.53	42.01
Bicycle F_w / F_v	-3.64	0.96	-3.64	0.63	-3.64	1.58	-3.64	0.46

HCS Signalized Intersection Results Graphical Summary

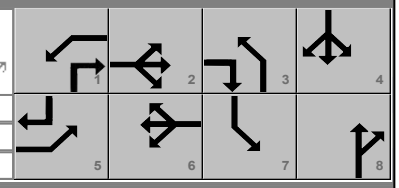
General Information				Intersection Information	
Agency	CMT			Duration, h	0.250
Analyst	TJH	Analysis Date	2/14/2023	Area Type	Other
Jurisdiction	ODOT District 3	Time Period	AM	PHF	0.93
Urban Street	SR-254 (Detroit Rd)	Analysis Year	2045	Analysis Period	1> 7:00
Intersection	SR-301 (Abbe Rd)	File Name	SR-254 Corridor 2045 AM - Prop.xus		
Project Description	2045 AM Proposed				



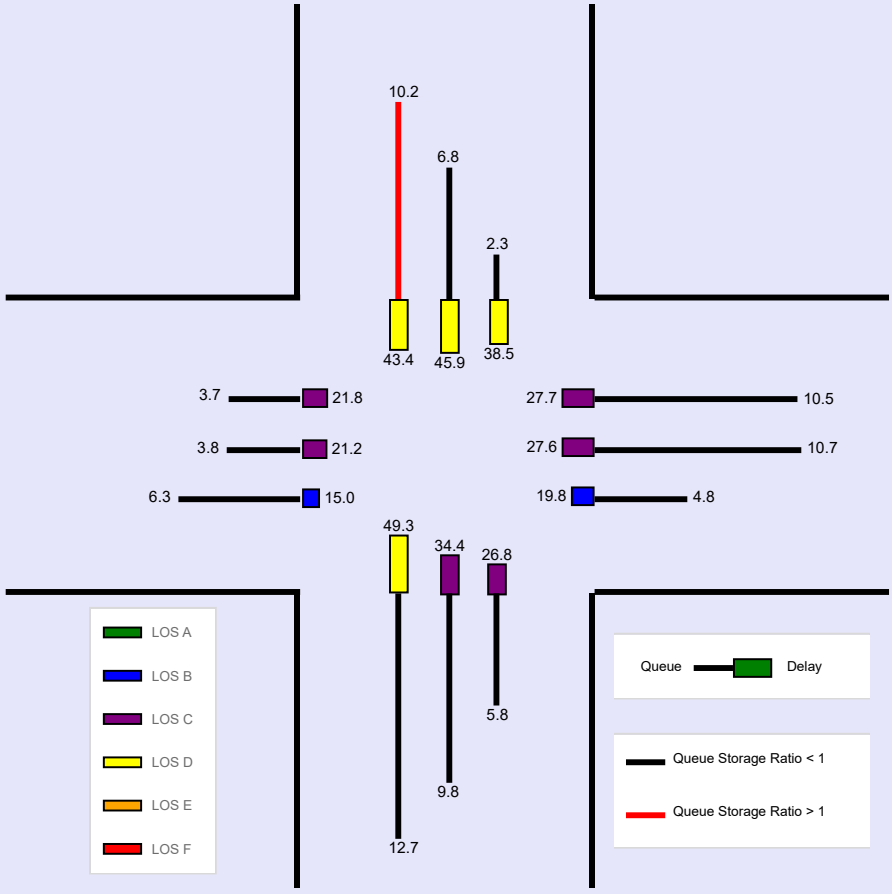
Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	150	320	610	150	520	40	510	230	150	50	260	210

Signal Information			
Cycle, s	120.0	Reference Phase	2
Offset, s	65	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	6.9	1.8	46.0	5.8	10.0	19.6						
Yellow	4.0	0.0	4.0	4.0	4.0	4.0						
Red	2.0	0.0	2.0	2.0	2.0	2.0						



Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Back of Queue (*Q*), ft/ln (95 th percentile)	94.9	96.8	160.7	121.4	269	262.8	321.6	248.7	148	59.9	175.8	262.3
Back of Queue (*Q*), veh/ln (95 th percentile)	3.7	3.8	6.3	4.8	10.7	10.5	12.7	9.8	5.8	2.3	6.8	10.2
Queue Storage Ratio (*RQ*) (95 th percentile)	0.63	0.28	0.46	0.38	0.57	0.56	0.34	0.17	0.45	0.26	0.38	1.05
Control Delay (*d*), s/veh	21.8	21.2	15.0	19.8	27.6	27.7	49.3	34.4	26.8	38.5	45.9	43.4
Level of Service (LOS)	C	C	B	B	C	C	D	C	C	D	D	D
Approach Delay, s/veh / LOS	17.8		B	26.0		C	41.7		D	44.2		D
Intersection Delay, s/veh / LOS	31.7						C					



--- Messages ---

WARNING: Since queue spillover from turn lanes and spillback into upstream intersections is not accounted for in the HCM procedures, use of a simulation tool may be advised in situations where the Queue Storage Ratio exceeds 1.0.

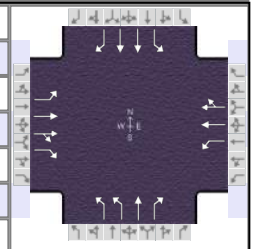
WARNING: According to input data, upstream feeding volume is equal to 74% of downstream exit volume during time period #1, for thru movement #2.

WARNING: The shared-plus-exclusive turn lane solution is an approximation of the HCM method, because more than three lane groups cannot be accommodated. Input data for Percent Turns in Shared Lane are used to specify proportion of turning vehicles in the shared lane.

--- Comments ---

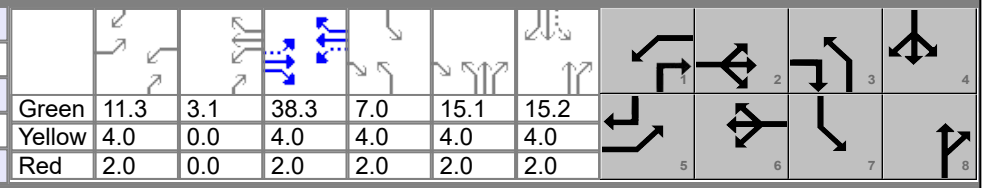
HCS Signalized Intersection Input Data

General Information				Intersection Information	
Agency	CMT			Duration, h	0.250
Analyst	TJH	Analysis Date	2/14/2023	Area Type	Other
Jurisdiction	ODOT District 3	Time Period	PM	PHF	0.94
Urban Street	SR-254 (Detroit Rd)	Analysis Year	2045	Analysis Period	1> 17:00
Intersection	SR-301 (Abbe Rd)	File Name	SR-254 Corridor 2045 PM - Prop.xus		
Project Description	2045 PM Proposed				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	240	500	720	260	470	100	710	370	220	140	330	170

Signal Information			
Cycle, s	120.0	Reference Phase	2
Offset, s	15	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	11.3	3.1		38.3	7.0		15.1	15.2				
Yellow	4.0	0.0		4.0	4.0		4.0	4.0				
Red	2.0	0.0		2.0	2.0		2.0	2.0				

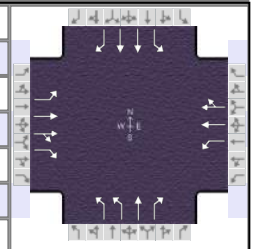
Traffic Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	240	500	720	260	470	100	710	370	220	140	330	170
Initial Queue (Q_b), veh/h	0	0	0	0	0	0	0	0	0	0	0	0
Base Saturation Flow Rate (s_o), veh/h	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Parking (N_m), man/h		None			None			None			None	
Heavy Vehicles (P_{HV}), %	3	3	3	1	1		2	2	2	4	4	4
Ped / Bike / RTOR, /h	0	0	0	0	0	0	0	0	0	0	0	0
Buses (N_b), buses/h	0	0	0	0	0	0	0	0	0	0	0	0
Arrival Type (*AT*)	3	3	3	3	3	3	3	3	3	3	3	3
Upstream Filtering (*I*)	0.91	0.91	0.91	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lane Width (*W*), ft	12.0	12.0	12.0	12.0	12.0		12.0	12.0	12.0	12.0	12.0	12.0
Turn Bay Length, ft	150	350	350	320	470		940	1440	330	230	460	250
Grade (*Pg*), %		0			0			0			0	
Speed Limit, mi/h	35	35	35	35	35	35	35	35	35	35	35	35

Phase Information	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Maximum Green (G_{max}) or Phase Split, s	20.0	41.0	22.0	43.0	35.0	44.0	13.0	22.0
Yellow Change Interval (*Y*), s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Red Clearance Interval (R_c), s	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Minimum Green (G_{min}), s	7	20	7	20	7	10	7	10
Start-Up Lost Time (*lt*), s	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Extension of Effective Green (*e*), s	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Passage (*PT*), s	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Recall Mode	Off	Min	Off	Min	Off	Off	Off	Off
Dual Entry	No	Yes	No	Yes	No	Yes	No	Yes
Walk (*Walk*), s		0.0		0.0		0.0		0.0
Pedestrian Clearance Time (*PC*), s		0.0		0.0		0.0		0.0

Multimodal Information	EB			WB			NB			SB		
85th % Speed / Rest in Walk / Corner Radius	0.0	No	25.0	0.0	No	25.0	0.0	No	25.0	0.0	No	25.0
Walkway / Crosswalk Width / Length, ft	9.0	12.0	0.0	9.0	12.0	0.0	9.0	12.0	0.0	9.0	12.0	0.0
Street Width / Island / Curb, ft	0.0	0	No	0.0	0	No	0.0	0	No	0.0	0	No
Width Outside / Bike Lane / Shoulder, ft	12.0	5.0	2.0	12.0	5.0	2.0	12.0	5.0	2.0	12.0	5.0	2.0
Pedestrian Signal / Occupied Parking	No	0.50		No	0.50		No	0.50		No	0.50	

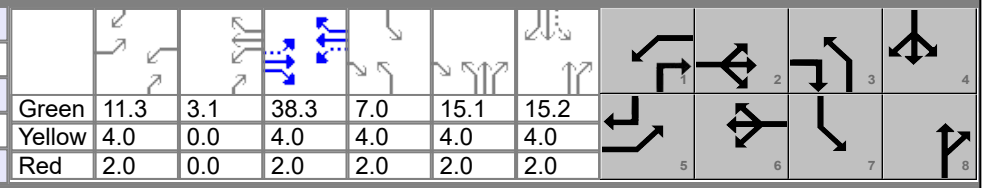
HCS Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	CMT			Duration, h	0.250
Analyst	TJH	Analysis Date	2/14/2023	Area Type	Other
Jurisdiction	ODOT District 3	Time Period	PM	PHF	0.94
Urban Street	SR-254 (Detroit Rd)	Analysis Year	2045	Analysis Period	1> 17:00
Intersection	SR-301 (Abbe Rd)	File Name	SR-254 Corridor 2045 PM - Prop.xus		
Project Description	2045 PM Proposed				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	240	500	720	260	470	100	710	370	220	140	330	170

Signal Information			
Cycle, s	120.0	Reference Phase	2
Offset, s	15	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	11.3	3.1		38.3	7.0		15.1	15.2				
Yellow	4.0	0.0		4.0	4.0		4.0	4.0				
Red	2.0	0.0		2.0	2.0		2.0	2.0				

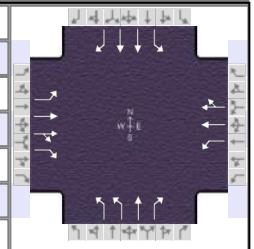
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	5	2	1	6	3	8	7	4
Case Number	1.1	3.0	1.1	4.0	2.0	3.0	1.1	3.0
Phase Duration, s	17.3	44.3	20.4	47.4	34.1	42.3	13.0	21.2
Change Period, ($Y+R_c$), s	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Max Allow Headway (*MAH*), s	3.1	0.0	3.1	0.0	3.1	3.1	3.1	3.1
Queue Clearance Time (g_s), s	11.2		14.3		27.7	24.3	9.0	14.3
Green Extension Time (g_e), s	0.2	0.0	0.2	0.0	0.4	2.3	0.0	1.0
Phase Call Probability	1.00		1.00		1.00	1.00	0.99	1.00
Max Out Probability	0.25		0.74		1.00	0.04	1.00	1.00

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	207	432	622	277	311	295	755	394	234	149	351	181
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1767	1856	1572	1795	1885	1770	1730	1870	1585	1753	1752	1560
Queue Service Time (g_s), s	9.2	11.5	34.3	12.3	15.6	15.7	25.7	22.3	12.0	7.0	11.7	12.3
Cycle Queue Clearance Time (g_c), s	9.2	11.5	34.3	12.3	15.6	15.7	25.7	22.3	12.0	7.0	11.7	12.3
Green Ratio (*g/C*)	0.41	0.32	0.55	0.44	0.34	0.34	0.23	0.30	0.42	0.19	0.13	0.22
Capacity (*c*), veh/h	386	1184	869	491	650	611	809	565	670	259	444	345
Volume-to-Capacity Ratio (*X*)	0.536	0.365	0.715	0.564	0.479	0.483	0.934	0.696	0.349	0.574	0.790	0.524
Back of Queue (*Q*), ft/ln (95 th percentile)	187.9	233.9	510.8	223.4	300.4	286.4	471	401	200.8	39.6	240.5	213.5
Back of Queue (*Q*), veh/ln (95 th percentile)	7.3	9.1	20.0	8.9	11.9	11.5	18.5	15.8	7.9	1.5	9.3	8.3
Queue Storage Ratio (*RQ*) (95 th percentile)	1.25	0.67	1.46	0.70	0.64	0.61	0.50	0.28	0.61	0.17	0.52	0.85
Uniform Delay (d_1), s/veh	26.0	35.0	20.8	23.1	30.8	30.9	45.1	37.0	23.5	44.5	50.8	41.2
Incremental Delay (d_2), s/veh	0.4	0.8	4.5	0.5	2.5	2.7	16.6	2.7	0.1	2.0	6.6	0.5
Initial Queue Delay (d_3), 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
Control Delay (*d*), s/veh	26.4	35.8	25.4	23.6	33.4	33.6	61.7	39.7	23.6	46.5	57.5	41.6
Level of Service (LOS)	C	D	C	C	C	C	E	D	C	D	E	D
Approach Delay, s/veh / LOS	29.1	C		30.4	C		49.0	D		50.9	D	
Intersection Delay, s/veh / LOS	39.4						D					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.44	B	2.29	B	2.29	B	2.46	B
Bicycle LOS Score / LOS	1.77	B	1.22	A	2.77	C	1.05	A

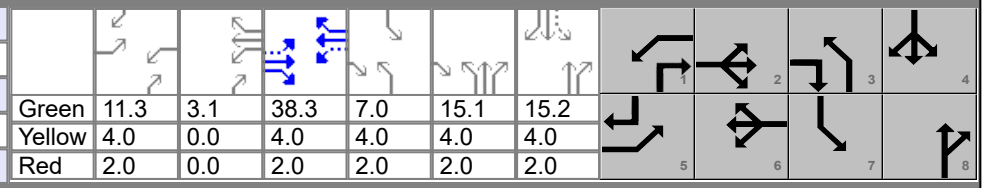
HCS Signalized Intersection Intermediate Values

General Information				Intersection Information	
Agency	CMT			Duration, h	0.250
Analyst	TJH	Analysis Date	2/14/2023	Area Type	Other
Jurisdiction	ODOT District 3	Time Period	PM	PHF	0.94
Urban Street	SR-254 (Detroit Rd)	Analysis Year	2045	Analysis Period	1> 17:00
Intersection	SR-301 (Abbe Rd)	File Name	SR-254 Corridor 2045 PM - Prop.xus		
Project Description	2045 PM Proposed				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	240	500	720	260	470	100	710	370	220	140	330	170

Signal Information			
Cycle, s	120.0	Reference Phase	2
Offset, s	15	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	11.3	3.1	38.3	7.0	15.1	15.2						
Yellow	4.0	0.0	4.0	4.0	4.0	4.0						
Red	2.0	0.0	2.0	2.0	2.0	2.0						

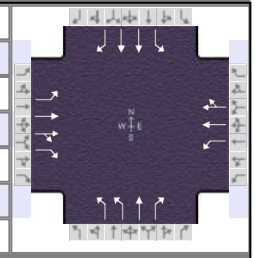
Saturation Flow / Delay	L	T	R	L	T	R	L	T	R	L	T	R
Lane Width Adjustment Factor (f_w)	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Heavy Vehicles and Grade Factor (f_{HVg})	0.977	0.977	0.977	0.992	0.992	1.000	0.984	0.984	0.984	0.969	0.969	0.969
Parking Activity Adjustment Factor (f_p)	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Bus Blockage Adjustment Factor (f_{bb})	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Area Type Adjustment Factor (f_a)	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Lane Utilization Adjustment Factor (f_{LU})	1.000	1.000	1.000	1.000	1.000	1.000	0.971	1.000	1.000	1.000	0.952	1.000
Left-Turn Adjustment Factor (f_{LT})	0.952	0.000		0.952	0.000		0.952	0.000		0.952	0.000	
Right-Turn Adjustment Factor (f_{RT})		0.000	0.847		0.939	0.939		0.000	0.847		0.000	0.847
Left-Turn Pedestrian Adjustment Factor (f_{Lpb})	1.000			1.000			1.000			1.000		
Right-Turn Ped-Bike Adjustment Factor (f_{Rpb})			1.000			1.000			1.000			1.000
Work Zone Adjustment Factor (f_{wz})	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
DDI Factor (f_{DDI})	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Left-Turn Prot. CAV Adj. Factor ($f_{CAV,prot}$)	1.00			1.00			1.00			1.00		
Left-Turn Perm. CAV Adj. Factor ($f_{CAV,perm}$)												
Movement Saturation Flow Rate (s), veh/h	1767	3711	1572	1795	3017	638	3459	1870	1585	1753	3505	1560
Proportion of Vehicles Arriving on Green (P)	0.04	0.25	0.28	0.12	0.34	0.34	0.23	0.30	0.30	0.06	0.13	0.13
Incremental Delay Factor (k)	0.04	0.50	0.50	0.05	0.50	0.50	0.41	0.19	0.04	0.11	0.23	0.04

Signal Timing / Movement Groups	EBL	EBT/R	WBL	WBT/R	NBL	NBT/R	SBL	SBT/R
Lost Time (t_L)	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Green Ratio (g/C)	0.41	0.32	0.44	0.34	0.23	0.30	0.19	0.13
Permitted Saturation Flow Rate (s_p), veh/h/ln	807	0	964	0	0	0	975	0
Shared Saturation Flow Rate (s_{sh}), veh/h/ln								
Permitted Effective Green Time (g_p), s	38.3	0.0	38.3	0.0	0.0	0.0	15.2	0.0
Permitted Service Time (g_u), s	23.7	0.0	26.7	0.0	0.0	0.0	11.9	0.0
Permitted Queue Service Time (g_{ps}), s	5.5		4.7				4.6	
Time to First Blockage (g_f), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Queue Service Time Before Blockage (g_{fs}), s								
Protected Right Saturation Flow (s_R), veh/h/ln		1572				1585		1560
Protected Right Effective Green Time (g_R), s		28.1				14.4		11.3

Multimodal	EB		WB		NB		SB	
Pedestrian F_w / F_v	1.710	0.000	1.557	0.000	1.557	0.000	1.710	0.000
Pedestrian F_s / F_{delay}	0.000	0.133	0.000	0.130	0.000	0.135	0.000	0.153
Pedestrian M_{corner} / M_{cw}	0.00		0.00		0.00		0.00	
Bicycle c_b / d_b	638.17	27.82	689.75	25.75	604.47	29.21	253.51	45.75
Bicycle F_w / F_v	-3.64	1.28	-3.64	0.73	-3.64	2.28	-3.64	0.56

HCS Signalized Intersection Results Graphical Summary

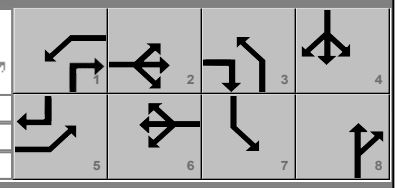
General Information				Intersection Information	
Agency	CMT			Duration, h	0.250
Analyst	TJH	Analysis Date	2/14/2023	Area Type	Other
Jurisdiction	ODOT District 3	Time Period	PM	PHF	0.94
Urban Street	SR-254 (Detroit Rd)	Analysis Year	2045	Analysis Period	1> 17:00
Intersection	SR-301 (Abbe Rd)	File Name	SR-254 Corridor 2045 PM - Prop.xus		
Project Description	2045 PM Proposed				



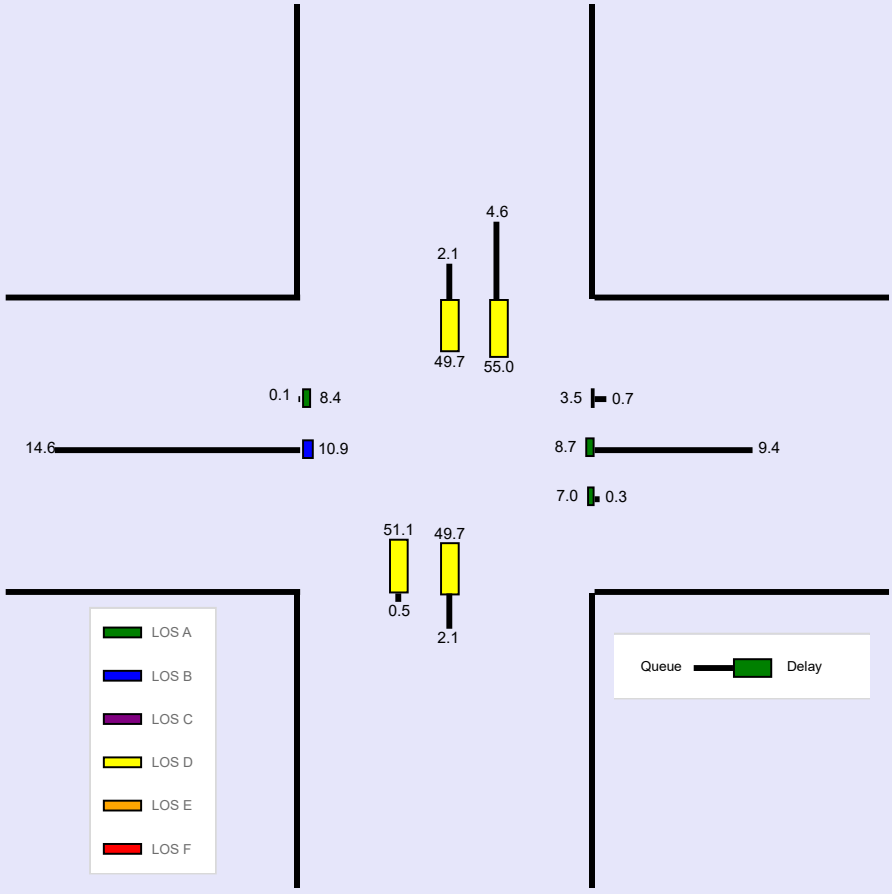
Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	240	500	720	260	470	100	710	370	220	140	330	170

Signal Information			
Cycle, s	120.0	Reference Phase	2
Offset, s	15	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	11.3	3.1	38.3	7.0	15.1	15.2	
Yellow	4.0	0.0	4.0	4.0	4.0	4.0	
Red	2.0	0.0	2.0	2.0	2.0	2.0	



Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Back of Queue (*Q*), ft/ln (95 th percentile)	187.9	233.9	510.8	223.4	300.4	286.4	471	401	200.8	39.6	240.5	213.5
Back of Queue (*Q*), veh/ln (95 th percentile)	7.3	9.1	20.0	8.9	11.9	11.5	18.5	15.8	7.9	1.5	9.3	8.3
Queue Storage Ratio (*RQ*) (95 th percentile)	1.25	0.67	1.46	0.70	0.64	0.61	0.50	0.28	0.61	0.17	0.52	0.85
Control Delay (*d*), s/veh	26.4	35.8	25.4	23.6	33.4	33.6	61.7	39.7	23.6	46.5	57.5	41.6
Level of Service (LOS)	C	D	C	C	C	C	E	D	C	D	E	D
Approach Delay, s/veh / LOS	29.1		C	30.4		C	49.0		D	50.9		D
Intersection Delay, s/veh / LOS	39.4						D					



--- Messages ---

WARNING: Since queue spillover from turn lanes and spillback into upstream intersections is not accounted for in the HCM procedures, use of a simulation tool may be advised in situations where the Queue Storage Ratio exceeds 1.0.

WARNING: According to input data, upstream feeding volume is equal to 81% of downstream exit volume during time period #1, for thru movement #2.

WARNING: The shared-plus-exclusive turn lane solution is an approximation of the HCM method, because more than three lane groups cannot be accommodated. Input data for Percent Turns in Shared Lane are used to specify proportion of turning vehicles in the shared lane.

--- Comments ---

HCS Freeway Weaving Report

Project Information

Analyst	GSH	Date	2/28/2023
Agency	CMT	Analysis Year	2045
Jurisdiction	ODOT District 3	Time Analyzed	AM Peak
Project Description	SR-254 EB Weave Section	Units	U.S. Customary

Geometric Data

Number of Lanes (N), ln	3	Segment Type	Freeway
Segment Length (L_S), ft	500	Number of Maneuver Lanes (N_{WL}), ln	0
Weaving Configuration	Two-Sided	Ramp-to-Freeway Lane Changes (LC_{RF}), lc	1
Terrain Type	Level	Freeway-to-Ramp Lane Changes (LC_{FR}), lc	1
Percent Grade, %	-	Ramp-to-Ramp Lane Changes (LC_{RR}), lc	2
Interchange Density (ID), int/mi	0.80	Cross Weaving Managed Lane	No

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000
Incident Type	No Incident	Capacity Adjustment Factor for CAVs, CAF_{CAV}	1.000
Proportion of CAVs in Traffic Stream	0	Final Capacity Adjustment Factor (CAF)	1.000

Demand and Capacity

	FF	RF	RR	FR
Demand Volume (V_i), veh/h	930	0	500	130
Peak Hour Factor (PHF)	0.92	0.92	0.92	0.92
Total Trucks, %	3.00	4.00	4.00	3.00
Heavy Vehicle Adjustment Factor (f_{HV})	0.971	0.962	0.962	0.971
Flow Rate (v_i), pc/h	1041	0	565	146
Weaving Flow Rate (v_w), pc/h	565	Ideal Conditions Capacity (c_{IFL}), pc/h/ln		2200
Non-Weaving Flow Rate (v_{NW}), pc/h	1187	Density-Based Capacity ($c_{IWL} \times N \times f_{HV}$), veh/h		4510
Total Flow Rate (v), pc/h	1752	Demand Flow-Based Capacity ($c_{IW} \times f_{HV}$), veh/h		-
Volume Ratio (VR)	0.322	Weaving Area Capacity (c_W), veh/h		4510
Minimum Lane Change Rate (LC_{MIN}), lc/h	1130	Adjusted Weaving Area Capacity (c_{WA}), veh/h		4510
Maximum Weaving Length (L_{MAX}), ft	8953	Demand-to-Capacity Ratio (v/c)		0.38

Speed and Density

Non-Weaving Vehicle Index (I_{NW})	47	Average Weaving Speed (S_W), mi/h	35.6
Non-Weaving Lane Change Rate (LC_{NW}), lc/h	0	Average Non-Weaving Speed (S_{NW}), mi/h	34.1
Weaving Lane Change Rate (LC_W), lc/h	1209	Average Speed (S), mi/h	34.6
Weaving Lane Change Rate (LC_{All}), lc/h	1209	Density (D), pc/mi/ln	16.9
Weaving Intensity Factor (W)	0.454	Level of Service (LOS)	B

HCS Freeway Weaving Report

Project Information

Analyst	GSH	Date	2/28/2023
Agency	CMT	Analysis Year	2045
Jurisdiction	ODOT District 3	Time Analyzed	PM Peak
Project Description	SR-254 EB Weave Section	Units	U.S. Customary

Geometric Data

Number of Lanes (N), ln	3	Segment Type	Freeway
Segment Length (L_S), ft	500	Number of Maneuver Lanes (N_{WL}), ln	0
Weaving Configuration	Two-Sided	Ramp-to-Freeway Lane Changes (LC_{RF}), lc	1
Terrain Type	Level	Freeway-to-Ramp Lane Changes (LC_{FR}), lc	1
Percent Grade, %	-	Ramp-to-Ramp Lane Changes (LC_{RR}), lc	2
Interchange Density (ID), int/mi	0.80	Cross Weaving Managed Lane	No

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000
Incident Type	No Incident	Capacity Adjustment Factor for CAVs, CAF_{CAV}	1.000
Proportion of CAVs in Traffic Stream	0	Final Capacity Adjustment Factor (CAF)	1.000

Demand and Capacity

	FF	RF	RR	FR
Demand Volume (V_i), veh/h	1220	0	570	210
Peak Hour Factor (PHF)	0.92	0.92	0.92	0.92
Total Trucks, %	3.00	4.00	4.00	3.00
Heavy Vehicle Adjustment Factor (f_{HV})	0.971	0.962	0.962	0.971
Flow Rate (v_i), pc/h	1366	0	644	235
Weaving Flow Rate (v_w), pc/h	644	Ideal Conditions Capacity (c_{IFL}), pc/h/ln		2200
Non-Weaving Flow Rate (v_{NW}), pc/h	1601	Density-Based Capacity ($c_{IWL} \times N \times f_{HV}$), veh/h		4596
Total Flow Rate (v), pc/h	2245	Demand Flow-Based Capacity ($c_{IW} \times f_{HV}$), veh/h		-
Volume Ratio (VR)	0.287	Weaving Area Capacity (c_W), veh/h		4596
Minimum Lane Change Rate (LC_{MIN}), lc/h	1288	Adjusted Weaving Area Capacity (c_{WA}), veh/h		4596
Maximum Weaving Length (L_{MAX}), ft	8577	Demand-to-Capacity Ratio (v/c)		0.47

Speed and Density

Non-Weaving Vehicle Index (I_{NW})	64	Average Weaving Speed (S_W), mi/h	34.9
Non-Weaving Lane Change Rate (LC_{NW}), lc/h	23	Average Non-Weaving Speed (S_{NW}), mi/h	32.1
Weaving Lane Change Rate (LC_W), lc/h	1367	Average Speed (S), mi/h	32.9
Weaving Lane Change Rate (LC_{All}), lc/h	1390	Density (D), pc/mi/ln	22.7
Weaving Intensity Factor (W)	0.506	Level of Service (LOS)	C

INTERCHANGE OPERATIONS STUDY
LOR-90-15.67

APPENDIX D: STORAGE LENGTH CALCULATIONS

CMT

SR254 and Transportation Dr WB LT		
Design Hour	2045 AM	2045 PM
Design Speed (mph)	35	35
Cycle Length (s)	120	120
Control Type	Signal	Signal
Through Volume (veh/hr)	570	1110
Number of Through Lanes	2	2
Turning Volume (veh/hr)	30	30
Number of Turning Lanes	1	1
Design Condition	A	A
Turn Vehicles / Cycle / Lane	1.00	1.00
Storage Length (feet)	50	50
Deceleration/Taper (feet)	50	50
Calculated Lane Length (feet)	100	100
Through Vehicles / Cycle / Lane	9.50	18.50
No Block Distance (feet)	363	638
No Block Turn Length (feet)	413	388

SR254 and Transportation Dr EB LT		
Design Hour	2045 AM	2045 PM
Design Speed (mph)	35	35
Cycle Length (s)	120	120
Control Type	Signal	Signal
Through Volume (veh/hr)	610	730
Number of Through Lanes	1	1
Turning Volume (veh/hr)	50	10
Number of Turning Lanes	1	1
Design Condition	A	A
Turn Vehicles / Cycle / Lane	1.67	0.33
Storage Length (feet)	83	17
Deceleration/Taper (feet)	50	50
Calculated Lane Length (feet)	133	67
Through Vehicles / Cycle / Lane	20.33	24.33
No Block Distance (feet)	692	808
No Block Turn Length (feet)	742	858

SR254 and I-90 WB Ramps SB LT		
Design Hour	2045 AM	2045 PM
Design Speed (mph)	50	50
Cycle Length (s)	120	120
Control Type	Signal	Signal
RT Volume (veh/hr)	240	530
Number of RT Lanes	2	2
LT Volume (veh/hr)	330	640
Number of LT Lanes	2	2
Design Condition	A	A
Turn Vehicles / Cycle / Lane	5.50	10.67
Storage Length (feet)	225	392
Deceleration/Taper (feet)	50	50
Calculated Lane Length (feet)	275	442
Through Vehicles / Cycle / Lane	4.00	8.83
No Block Distance (feet)	175	346
No Block Turn Length (feet)	225	396

SR254 and I-90 WB Ramps WB LT		
Design Hour	2045 AM	2045 PM
Design Speed (mph)	35	35
Cycle Length (s)	120	120
Control Type	Signal	Signal
Through Volume (veh/hr)	350	610
Number of Through Lanes	2	2
Turning Volume (veh/hr)	360	610
Number of Turning Lanes	2	2
Design Condition	A	A
Turn Vehicles / Cycle / Lane	6.00	10.17
Storage Length (feet)	250	379
Deceleration/Taper (feet)	50	50
Calculated Lane Length (feet)	300	429
Through Vehicles / Cycle / Lane	5.83	10.17
No Block Distance (feet)	242	379
No Block Turn Length (feet)	292	429

SR254 and I-90 WB Ramps SB RT		
Design Hour	2045 AM	2045 PM
Design Speed (mph)	50	50
Cycle Length (s)	120	120
Control Type	Signal	Signal
LT Volume (veh/hr)	330	640
Number of RT Lanes	2	2
RT Volume (veh/hr)	240	530
Number of LT Lanes	2	2
Design Condition	A	A
Turn Vehicles / Cycle / Lane	4.00	8.83
Storage Length (feet)	175	346
Deceleration/Taper (feet)	50	50
Calculated Lane Length (feet)	225	396
Through Vehicles / Cycle / Lane	5.50	10.67
No Block Distance (feet)	225	392
No Block Turn Length (feet)	275	442

SR254 and I-90 EB Ramps WB RT		
Design Hour	2045 AM	2045 PM
Design Speed (mph)	35	35
Cycle Length (s)	120	120
Control Type	Signal	Signal
Through Volume (veh/hr)	630	1160
Number of Through Lanes	2	2
Turning Volume (veh/hr)	550	500
Number of Turning Lanes	1	1
Design Condition	A	A
Turn Vehicles / Cycle / Lane	18.33	16.67
Storage Length (feet)	633	583
Deceleration/Taper (feet)	50	50
Calculated Lane Length (feet)	683	633
Through Vehicles / Cycle / Lane	10.50	19.33
No Block Distance (feet)	388	658
No Block Turn Length (feet)	438	708

SR254 and I-90 EB Ramps NB LT		
Design Hour	2045 AM	2045 PM
Design Speed (mph)	50	50
Cycle Length (s)	120	120
Control Type	Signal	Signal
TH-RT Volume (veh/hr)*	69	137
Number of TH-RT Lanes	1	1
Turning Volume (veh/hr)	80	60
Number of Turning Lanes	1	1
Design Condition	A	A
Turn Vehicles / Cycle / Lane	2.67	2.00
Storage Length (feet)	133	100
Deceleration/Taper (feet)	50	50
Calculated Lane Length (feet)	183	150
Through Vehicles / Cycle / Lane	2.30	4.57
No Block Distance (feet)	115	189
No Block Turn Length (feet)	165	239

** Adjusted with lane utilization from TMC*

SR254 and I-90 EB Ramps NB RT		
Design Hour	2045 AM	2045 PM
Design Speed (mph)	50	50
Cycle Length (s)	120	120
Control Type	Signal	Signal
TH-RT Volume (veh/hr)*	69	137
Number of TH-RT Lanes	1	1
Turning Volume (veh/hr)*	431	433
Number of Turning Lanes	1	1
Design Condition	A	A
Turn Vehicles / Cycle / Lane	14.37	14.43
Storage Length (feet)	509	511
Deceleration/Taper (feet)	50	50
Calculated Lane Length (feet)	559	561
Through Vehicles / Cycle / Lane	2.30	4.57
No Block Distance (feet)	115	189
No Block Turn Length (feet)	165	239

** Adjusted with lane utilization from TMC*

SR254 and I-90 EB Ramps EB LT		
Design Hour	2045 AM	2045 PM
Design Speed (mph)	35	35
Cycle Length (s)	120	120
Control Type	Signal	Signal
Through Volume (veh/hr)	660	1120
Number of Through Lanes	2	2
Turning Volume (veh/hr)	260	270
Number of Turning Lanes	2	2
Design Condition	A	A
Turn Vehicles / Cycle / Lane	4.33	4.50
Storage Length (feet)	183	188
Deceleration/Taper (feet)	50	50
Calculated Lane Length (feet)	233	238
Through Vehicles / Cycle / Lane	11.00	18.67
No Block Distance (feet)	400	642
No Block Turn Length (feet)	450	692

SR254 and Sheffield Crossing SB LT		
Design Hour	2045 AM	2045 PM
Design Speed (mph)	25	25
Cycle Length (s)	120	120
Control Type	Signal	Signal
Through Volume (veh/hr)	50	150
Number of Through Lanes	1	1
Turning Volume (veh/hr)	10	50
Number of Turning Lanes	1	1
Design Condition	A	A
Turn Vehicles / Cycle / Lane	0.33	1.67
Storage Length (feet)	17	83
Deceleration/Taper (feet)	50	50
Calculated Lane Length (feet)	67	133
Through Vehicles / Cycle / Lane	1.67	5.00
No Block Distance (feet)	83	200
No Block Turn Length (feet)	133	250

SR254 and Sheffield Crossing WB LT		
Design Hour	2045 AM	2045 PM
Design Speed (mph)	35	35
Cycle Length (s)	120	120
Control Type	Signal	Signal
Through Volume (veh/hr)	1100	1280
Number of Through Lanes	2	2
Turning Volume (veh/hr)	40	60
Number of Turning Lanes	1	1
Design Condition	A	A
Turn Vehicles / Cycle / Lane	1.33	2.00
Storage Length (feet)	67	100
Deceleration/Taper (feet)	50	50
Calculated Lane Length (feet)	117	150
Through Vehicles / Cycle / Lane	18.33	21.33
No Block Distance (feet)	633	733
No Block Turn Length (feet)	683	783

SR254 and Sheffield Crossing EB LT		
Design Hour	2045 AM	2045 PM
Design Speed (mph)	35	35
Cycle Length (s)	120	120
Control Type	Signal	Signal
Through Volume (veh/hr)	1120	1430
Number of Through Lanes	3	3
Turning Volume (veh/hr)	80	180
Number of Turning Lanes	1	1
Design Condition	A	A
Turn Vehicles / Cycle / Lane	2.67	6.00
Storage Length (feet)	133	250
Deceleration/Taper (feet)	50	50
Calculated Lane Length (feet)	183	300
Through Vehicles / Cycle / Lane	12.44	15.89
No Block Distance (feet)	461	547
No Block Turn Length (feet)	511	597

SR254 and SR301 (Abbe Rd) SB LT		
Design Hour	2045 AM	2045 PM
Design Speed (mph)	35	35
Cycle Length (s)	120	120
Control Type	Signal	Signal
Through Volume (veh/hr)	260	330
Number of Through Lanes	2	2
Turning Volume (veh/hr)	50	140
Number of Turning Lanes	1	1
Design Condition	A	A
Turn Vehicles / Cycle / Lane	1.67	4.67
Storage Length (feet)	83	192
Deceleration/Taper (feet)	50	50
Calculated Lane Length (feet)	133	242
Through Vehicles / Cycle / Lane	4.33	5.50
No Block Distance (feet)	183	225
No Block Turn Length (feet)	233	275

SR254 and SR301 (Abbe Rd) SB RT		
Design Hour	2045 AM	2045 PM
Design Speed (mph)	35	35
Cycle Length (s)	120	120
Control Type	Signal	Signal
Through Volume (veh/hr)	260	330
Number of Through Lanes	2	2
Turning Volume (veh/hr)	210	170
Number of Turning Lanes	1	1
Design Condition	A	A
Turn Vehicles / Cycle / Lane	7.00	5.67
Storage Length (feet)	275	233
Deceleration/Taper (feet)	50	50
Calculated Lane Length (feet)	325	283
Through Vehicles / Cycle / Lane	4.33	5.50
No Block Distance (feet)	183	225
No Block Turn Length (feet)	233	275

SR254 and SR301 (Abbe Rd) WB LT		
Design Hour	2045 AM	2045 PM
Design Speed (mph)	35	35
Cycle Length (s)	120	120
Control Type	Signal	Signal
Through Volume (veh/hr)	560	570
Number of Through Lanes	2	2
Turning Volume (veh/hr)	150	260
Number of Turning Lanes	1	1
Design Condition	A	A
Turn Vehicles / Cycle / Lane	5.00	8.67
Storage Length (feet)	200	342
Deceleration/Taper (feet)	50	50
Calculated Lane Length (feet)	250	392
Through Vehicles / Cycle / Lane	9.33	9.50
No Block Distance (feet)	358	363
No Block Turn Length (feet)	408	413

SR254 and SR301 (Abbe Rd) NB LT		
Design Hour	2045 AM	2045 PM
Design Speed (mph)	35	35
Cycle Length (s)	120	120
Control Type	Signal	Signal
Through Volume (veh/hr)	230	370
Number of Through Lanes	1	1
Turning Volume (veh/hr)	510	710
Number of Turning Lanes	2	2
Design Condition	A	A
Turn Vehicles / Cycle / Lane	8.50	11.83
Storage Length (feet)	338	442
Deceleration/Taper (feet)	50	50
Calculated Lane Length (feet)	388	492
Through Vehicles / Cycle / Lane	7.67	12.33
No Block Distance (feet)	308	458
No Block Turn Length (feet)	358	508

SR254 and SR301 (Abbe Rd) NB RT		
Design Hour	2045 AM	2045 PM
Design Speed (mph)	35	35
Cycle Length (s)	120	120
Control Type	Signal	Signal
Through Volume (veh/hr)	230	370
Number of Through Lanes	1	1
Turning Volume (veh/hr)	150	220
Number of Turning Lanes	1	1
Design Condition	A	A
Turn Vehicles / Cycle / Lane	5.00	7.33
Storage Length (feet)	200	292
Deceleration/Taper (feet)	50	50
Calculated Lane Length (feet)	250	342
Through Vehicles / Cycle / Lane	7.67	12.33
No Block Distance (feet)	308	458
No Block Turn Length (feet)	358	508

SR254 and SR301 (Abbe Rd) EB LT		
Design Hour	2045 AM	2045 PM
Design Speed (mph)	35	35
Cycle Length (s)	120	120
Control Type	Signal	Signal
Through Volume (veh/hr)	320	500
Number of Through Lanes	1	1
Turning Volume (veh/hr)	150	240
Number of Turning Lanes	1	1
Design Condition	A	A
Turn Vehicles / Cycle / Lane	5.00	8.00
Storage Length (feet)	200	325
Deceleration/Taper (feet)	50	50
Calculated Lane Length (feet)	250	375
Through Vehicles / Cycle / Lane	10.67	16.67
No Block Distance (feet)	392	583
No Block Turn Length (feet)	442	633

SR254 and SR301 (Abbe Rd) EB RT		
Design Hour	2045 AM	2045 PM
Design Speed (mph)	35	35
Cycle Length (s)	120	120
Control Type	Signal	Signal
Through Volume (veh/hr)	320	500
Number of Through Lanes	1	1
Turning Volume (veh/hr)	610	720
Number of Turning Lanes	2	2
Design Condition	A	A
Turn Vehicles / Cycle / Lane	10.17	12.00
Storage Length (feet)	379	450
Deceleration/Taper (feet)	50	50
Calculated Lane Length (feet)	429	500
Through Vehicles / Cycle / Lane	10.67	16.67
No Block Distance (feet)	392	583
No Block Turn Length (feet)	442	633

INTERCHANGE OPERATIONS STUDY
LOR-90-15.67

APPENDIX E: COST ESTIMATE

CMT
Crawford, Murphy & Tilly

ENGINEER'S OPINION OF PROBABLE CONSTRUCTION COST

LOR-90-15.67 (I-90 and SR 254 Interchange)

Project number: Study PID 107714 **Date:** 08/30/23

Client name: ODOT District 3

(Based upon 2022 Construction Costs)

Ref. No.	Item No.	Description	Total Estimated Quantity	Unit	Estimated Unit Cost	Total Estimated Cost
		ROADWAY				
1	201	CLEARING AND GRUBBING	1	LUMP	$ 7,500	$ 7,500
2	202	PAVEMENT REMOVED	850	SQ YD	$ 18	$ 15,300
3	202	GUARDRAIL REMOVED	25	FT	$ 5	$ 125
4	203	EXCAVATION	5300	CU YD	$ 20	$ 106,000
5	203	EMBANKMENT	2600	CU YD	$ 18	$ 46,800
6	204	SUBGRADE COMPACTION	3050	SQ YD	$ 4	$ 12,200
7	204	PROOF ROLLING	14	HOUR	$ 250	$ 3,500
8	204	EXCAVATION OF SUBGRADE	550	CU YD	$ 25	$ 13,750
9	204	GRANULAR MATERIAL, TYPE B	550	CU YD	$ 65	$ 35,750
10	204	GEOGRID	1550	SQ YD	$ 4	$ 6,200
11	204	GEOTEXTILE FABRIC	1550	SQ YD	$ 2	$ 3,100
12	609	6" CONCRETE TRAFFIC ISLAND	100	SQ YD	$ 125	$ 12,500
		EROSION CONTROL				
13	659	SEEDING AND MULCHING	7875	SQ YD	$ 5	$ 39,375
14	832	EROSION CONTROL	50000	EACH	$ 1	$ 50,000
15	833	SWPPP	1	LUMP	$ 25,000	$ 25,000
		DRAINAGE				
16	605	6" BASE PIPE UNDERDRAIN	1625	FT	$ 15	$ 24,375
17	611	CATCH BASIN REPLACEMENT (INCL. PIPE)	1	LUMP	$ 7,500	$ 7,500
		PAVEMENT				
18	254	PAVEMENT PLANING	4750	SQ YD	$ 5	$ 23,750
19	302	ASPHALT CONCRETE BASE, PG64-22	50	CU YD	$ 180	$ 9,000
20	304	AGGREGATE BASE	550	CU YD	$ 100	$ 55,000
21	407	TACK COAT	450	GAL	$ 4	$ 1,800
22	411	STABILIZED CRUSHED AGGREGATE	275	CU YD	$ 100	$ 27,500
23	441	AC INTERMEDIATE COURSE, TYPE 2, PG64-28 (448)	25	CU YD	$ 250	$ 6,250
24	441	AC INTERMEDIATE COURSE, TYPE 2, PG64-28 (446), VBL DEPTH	25	CU YD	$ 350	$ 8,750
25	442	AC SURFACE COURSE, 12.5MM, TYPE A (446)	300	CU YD	$ 250	$ 75,000
26	452	10.5" NON-REINFORCED CONCRETE PAVEMENT, CLASS QC1	2825	SQ YD	$ 115	$ 324,875
		TRAFFIC CONTROL AND SIGNALS				
26	630	SIGNAGE (INCLUDING OVERHEAD SIGNS)	1	LUMP	$ 70,000	$ 70,000
27	632	SIGNAL	1	LUMP	$ 100,000	$ 100,000
28	644	PAVEMENT MARKINGS	1	LUMP	$ 12,000	$ 12,000
		MAINTENANCE OF TRAFFIC				
29	614	WORK ZONE PAVEMENT MARKINGS	3.0	MILE	$ 7,500	$ 22,500
30	614	PCMS	18	SNMT	$ 1,100	$ 19,800
31	614	LEO	48	HOUR	$ 80	$ 3,840
32	622	PORTABLE BARRIER, UNANCHORED	2350	FT	$ 30	$ 70,500
						$ 1,239,540
33	614	MAINTAINING TRAFFIC	1	LUMP	$ 105,000	$ 105,000
34	619	FIELD OFFICE	6	MONTH	$ 2,500	$ 15,000
35	623	CONSTRUCTION LAYOUT STAKES	1	LUMP	$ 13,000	$ 13,000
36	624	MOBILIZATION	1	LUMP	$ 40,000	$ 40,000
					SUBTOTAL ESTIMATED CONSTRUCTION COST	$ 1,413,000
					SUBTOTAL ESTIMATED RIGHT OF WAY COST	$ -
						$ 1,413,000
					CONSTRUCTION CONTINGENCY 30%	$ 423,900
					ENGINEERING, DESIGN & CONSTRUCTION ADMINISTRATION 30%	$ 423,900
						$ 2,260,800
					INFLATION CONTINGENCY (2026 CONSTRUCTION MIDPOINT) 18.8%	$ 425,031
					TOTAL ESTIMATED PROJECT COST	$ 2,685,831