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July 31, 2019 Project #: 20717.13

Matt Hermen, AICP, CTP
Clark County Community Planning
1300 Franklin Street
Vancouver, WA 98666-9810

RE: 10th Avenue Capital Facilities Plan Review

Dear Matt,

This letter documents a turn lane capacity needs assessment at the NE 10th Avenue/NE 139th Street intersection. The assessment was prepared to determine whether previously identified mitigations at the intersection should be included in the County's Capital Facilities Plan (CFP) based on long-term projections of regional transportation demand, or if the capacity needs are specifically related to accommodating site-generated traffic associated with properties on the northeast corner of the intersection. The development of these properties is subject to a previously approved Concomitant Rezone Agreement that changed the zoning designations from industrial to commercial.

As described herein, the assessment evaluated three turn lane mitigations previously identified for the NE 10th Avenue/NE 139th Street intersection, including:

- Construction of a westbound right turn lane on NE 139th Street and provision of a right-turn signal overlap phase (allowing protected westbound right turns concurrent with the protected southbound left-turn movement).
- Providing either (1) a second southbound left-turn lane; or (2) a southbound shared through-left center lane (converted from the existing through only lane). If the shared through-left option is selected, the north-south signal phasing will need to be "split" whereas if a second southbound left-turn lane is added, the north-south signal phasing should continue to provide for protected left-turns.
- Modify the northbound NE 10th Avenue approach between NE 139th Street and the commercial site access (NE 141st Street) to include a northbound right-turn lane for the entire street segment.

The assessment revealed that one of the three identified mitigations is needed to support growth in regional travel through the year 2040, irrespective of the zone change. Accordingly, adding the following mitigation to the CFP is both reasonable and appropriate:

- Modify the southbound NE 10th Avenue approach to NE 139th Street to provide either (1) a second southbound left-turn lane; or (2) a southbound shared through-left center lane (converted from the existing through only lane). If the shared through-left option is

selected, the north-south signal phasing will need to be "split" whereas if a second southbound left-turn lane is added, the north-south signal phasing should continue to provide for protected left-turns.

Providing additional southbound left-turn capacity through either of the two options identified would benefit intersection operations. By comparison, the alternative creating a second southbound left-turn lane operates more efficiently than the option to develop a shared through/right lane with north-south split phasing but also requires more pavement widening and associated costs.

This study further found that construction of a westbound right turn lane at the intersection with a right-turn signal overlap phase would benefit corridor and intersection operations but is not essential to ensuring the year 2040 signal operations meet Clark County Code delay standards. However, this mitigation would reduce westbound queuing and delay on NE 139th Street that could otherwise impact long-term weekday PM peak hour Salmon Creek Park & Ride bus driveway operations (the C-Tran bus driveway is located approximately 390 feet east of the NE 139th Street westbound stop bar). Although not required to satisfy County Code delay standards, we believe the turn lane addition to the CFP is reasonable and could be justified from a corridor operations and safety perspective.

The third mitigation option, modifying the northbound NE 10th Avenue approach between NE 139th Street and NE 141st Street to include left-turn lane(s) for the entire street segment does not appear necessary as a CFP project.

Further documentation of our analysis methodology and findings is presented herein.

ANALYSIS METHODOLOGY

This section describes Clark County performance standards, analysis tools used, and the development of projected long-term intersection volumes.

Clark County Signalized Intersection Operations Standards

Clark County Code (CCC) Section 40.350.020.G defines the County's performance standards for roadway segments and signalized intersections.

Roadway Segments

Per CCC Section 40.350.020.G.1.a: *"The maximum volume to capacity ratio for each roadway segment shall not exceed nine-tenths (0.9), when measured independently for each direction of travel."*

Signalized Intersections

Per CCC Section 40.350.020.G.1.b: *"Individual movements at each signalized intersection of regional significance in the unincorporated county shall not exceed an average of two (2) cycle lengths or two hundred forty (240) seconds of delay (whichever is less)."*

The signalized intersection operations analyses described in this report were performed in accordance with the procedures stated in the *2010 Highway Capacity Manual* (HCM 2010) using Vistro software. Peak 15-minute flow rates were used in the evaluation of all intersection levels of service to provide analyses based on a reasonable worst-case scenario. For this reason, the analyses reflect conditions that are only likely to occur for 15 minutes out of each average peak hour.

Year 2040 Traffic Volume Development

Future operations of the study intersection are predicated on turning movement volumes at the intersection. Year 2040 traffic volumes were estimated using a combination of recent intersection turn movement counts conducted at the intersection and year 2040 traffic demand estimates obtained from the Southwest Washington Regional Transportation Council (RTC) travel demand model. Our review revealed that the land use assumptions for the concomitant rezone properties are based on development in accordance with the industrial zoning (as opposed to the potential commercial development possible under the Concomitant Rezone Agreement).

Weekday AM and PM peak hour turn movements counts completed in April 2018 reflect existing conditions at the intersection. RTC provided year base year 2015 and future year 2040 weekday AM and PM peak hour roadway segment volumes surrounding the intersection. The travel demand forecasts and existing traffic counts were used to develop year 2040 turning movement volumes based on the methodology outlined in the National Cooperative Highway Research Program Report 765 *Highway Traffic Data for Urbanized Area Project Planning and Design* (NCHRP 765) methodology (an updated procedure stemming from NCHRP Report 255).

The resultant projected turning and through volumes at the intersection reflect conditions with development of the concomitant rezone property as an industrial use and, as such, intersection capacity needs modeled reflect conditions prior to the potential commercial site development.

Year 2040 Intersection Capacity Analysis

Future year 2040 intersection operations were assessed assuming the existing intersection geometry and lane configurations, followed by incremental addition of the identified mitigation measures associated with the concomitant rezone approval. Table 1 summarizes the operations analysis results and includes a mitigation identification for cross-reference purposes to the technical appendix analysis. Appendix 1 includes the Vistro analysis worksheets.

Table 1. NE 10th Avenue/NE 139th Street Intersection Operations Summary

	AM Peak Hour			PM Peak Hour		
Scenario	Critical Movement Delay (sec/veh)	Intersection Delay (sec)	Exceed Movement Delay Standards (240 seconds)?	Critical Movement Delay (sec/veh)	Intersection Delay (sec)	Exceed Movement Delay Standards (240 seconds)?
Year 2040 (no-build)	61.4 (SBL)	36.8	No	**378.9 (SBL)**	88.4	**Yes**
Year 2040 Mitigated with Addition of a WBR Lane with Overlap Phasing (Mitigation A)	61.4 (SBL)	34.4	No	**378.9 (SBL)**	81.6	**Yes**
Year 2040 Mitigated with Addition of a Second Southbound Left Lane (Mitigation B)	58.0 (NBL)	34.0	No	67.9 (NBL)	40.8	No
Year 2040 Mitigated with Conversion of Southbound Through to a Shared Southbound Through Left Lane with Split Phase (Mitigation C)	66.3 (SBL)	42.0	No	88.9 (SBL)	59.7	No
Year 2040 Mitigation B *and* Addition of a Westbound Right-turn Lane with Overlap Phasing (Mitigation B2)	58.0 (NBL)	32.4	No	67.8 (NBL)	34.2	No
Year 2040 Mitigation C *and* Addition of a Westbound Right-turn Lane with Overlap Phasing (Mitigation C2)	66.3 (SBL)	39.5	No	88.9 (SBL)	44.6	No

As shown in Table 1, year 2040 weekday PM peak hour intersection operations are projected to exceed the County's 240-second movement delay standard assuming the industrial zoning remains and existing intersection configuration remain in-place. To address the projected deficiency, we evaluated a range of geometric options at the signalized intersection that could provide acceptable operations in the future. These are outlined below.

Westbound Right-turn Lane Mitigation Considerations

The first mitigation evaluated was the provision of a westbound right-turn lane and the addition of right-turn overlap phasing at the signal. As shown in Table 1, this improves overall intersection delay slightly but does not address the critical southbound left-turn movement delay projected under year 2040 weekday PM peak hour conditions.

Southbound Dual Left-turn Lane Mitigation Considerations

To address the critical southbound left-turn movement, we evaluated two potential solutions: (1) providing a second southbound left-turn lane; or (2) providing a southbound shared through-left center lane (converted from the existing through only lane). If the shared through-left option is selected, the north-south signal phasing will need to be "split" whereas if a second southbound left-turn lane is added, the north-south signal phasing should continue to provide for protected left-turns. As shown in Table 1, either left-turn mitigation option would enable County standards to be met under year 2040

conditions. Further, creating a second southbound left-turn lane operates more efficiently (with 67.9 seconds of southbound left-turn delay) than the option to develop a shared through/right lane with north-south split phasing (with 88.9 seconds of southbound left-turn delay) but also requires more pavement widening and intersection reconstruction than the restriping/split phase option. As such, the minimum level of improvement needed in the CFP per the analysis summarized herein is the provision of additional southbound left-turn capacity through one of the two options evaluated.

Table 1 also shows that the addition of a westbound right-turn lane in combination with either of the two southbound left-turn capacity mitigations would provide additional operational benefits but is not needed to satisfy minimum County delay standards.

Additional Mitigation Considerations

In addition to overall intersection and by movement delay, it is also helpful to understand potential queuing at the intersection and how it may affect adjacent access points and/or intersections. In particular, we reviewed the potential for impacts to the Salmon Creek Park & Ride access located approximated 390 feet east of the intersection on NE 139th Street given no access to this facility is provided along NE 10th Avenue (additional access is provided 3 blocks to the south via NE 136th Street). As such, Table 2 summarizes projected 95th percentile queues (rounded to the nearest 5 feet) in the westbound shared through/right-turn lane along NE 139th Street under the various mitigation options considered.

Table 2. NE 10th Avenue/NE 139th Street Intersection Weekday PM Peak Hour 95th Percentile Queues

Scenario	95th Percentile Queue (feet)	
	Westbound Shared Through/Right-Turn Lane	Mitigated Separate Right-Turn Lane
Year 2020 (no-build)	450	
Year 2040 (no-build)	655	
Year 2040 Mitigated with Addition of a WBR Lane with Overlap Phasing (Mitigation A)		380
Year 2040 Mitigated with Addition of a Second Southbound Left Lane (Mitigation B)	645	
Year 2040 Mitigated with Conversion of Southbound Through to a Shared Southbound Through Left Lane with Split Phase (Mitigation C)	875	
Year 2040 Mitigation B *and* Addition of a Westbound Right-turn Lane with Overlap Phasing (Mitigation B2)		380
Year 2040 Mitigation C *and* Addition of a Westbound Right-turn Lane with Overlap Phasing (Mitigation C2)		385

As shown in Table 2, the addition of a westbound right-turn lane with or without southbound left-turn lane capacity mitigations would benefit corridor operations by reducing westbound queuing that could otherwise affect access to the Salmon Creek Park & Ride bus driveway 390 feet east of the intersection. Note that weekday AM peak hour queues are not projected to impact the Salmon Creek Park & Ride bus driveway.

While not required to satisfy County Code delay standards, the westbound right-turn capacity mitigation would substantially reduce queuing and delay on the westbound approach to the intersection. As shown in Table 2, without a separate right-turn lane, the 95th percentile westbound right-turn queue on NE 139th Street is projected to extend between 645 feet and 875 feet depending on the southbound dual left-turn mitigation implemented, reaching through and past the C-Tran Park & Ride bus driveway and approximately halfway to the NE 139th Street/I-5 interchange southbound ramp terminal. Providing a separate westbound right-turn lane with an overlap phase is projected to reduce the 95th percentile westbound right-turn queue to 385 feet or less (again dependent on the southbound left-turn mitigation selected). As such, we believe the turn lane addition to the CFP is reasonable and could be justified from a corridor operations and safety perspective.

NE 10th Avenue Northbound Turn Lane Mitigation Considerations

Modifying the northbound NE 10th Avenue approach between NE 139th Street and NE 141st Street to include a northbound right turn lane for the entire street segment as required of the concomitant rezone approval was not identified as being necessary from a CFP project perspective given the southbound left-turn and westbound right-turn mitigations identified above.

Year 2040 Roadway Segment Capacity Analysis

Clark County Code requires that roadway segments operate with a volume-to-capacity (V/C ratio) less than 0.90 as previously cited. Roadway segment V/C ratio plots were generated using the RTC travel demand model for year 2015 base and year 2040 future weekday PM peak hour conditions.

The year 2040 weekday AM peak hour plots indicate the maximum V/C for any road segment entering or departing the NE 10th Avenue/NE 139th Street intersection is 0.79 (southbound 10th Avenue approaching NE 139th Street). Further, the year 2040 weekday PM peak hour plots indicate the maximum V/C for any road segment entering or departing the NE 10th Avenue/NE 139th Street intersection is 0.81 (northbound 10th Avenue departing NE 139th Street). Accordingly, no additional mitigation needs were identified to satisfy the County V/C standards based on the segment level capacity analysis.

Appendix 2 provides the RTC V/C ratio plots.

CONCLUSIONS

This study found that capacity mitigation will be needed at the intersection to satisfy Clark County Code standards in the year 2040 prior to rezoning the northeast quadrant property to commercial. As such, adding capacity mitigations at the intersection to the CFP is both reasonable and appropriate.

At a minimum, modification of the southbound NE 10th Avenue approach to NE 139th Street to provide either (1) a second southbound left-turn lane; or (2) a southbound shared through-left center lane (converted from the existing through only lane) is appropriate to add to the CFP. Construction of a

westbound right turn lane at the intersection with a right-turn signal overlap phase in addition to the southbound left-turn mitigation would benefit intersection and corridor operations, further reducing both queuing and delay at the intersection and at the Salmon Creek Park & Ride access on NE 139th Street. As such, we believe the westbound turn lane addition to the CFP is reasonable for County staff to consider.

The third mitigation option, modifying the north leg of NE 10th Avenue to include a northbound right-turn lane between NE 139th Street and NE 141st Street is an appropriate mitigation in conjunction with development of the concomitant rezone parcels but does not appear necessary as a CFP project.

We trust this letter provides Clark County staff with sufficient documentation to complete the CFP project review. Please contact us if you have questions and/or if you wish to further discuss.

Sincerely,
KITTELSON & ASSOCIATES, INC.

Chris Brehmer, PE
Senior Principal Engineer

Julia Kuhn, PE
Senior Principal Engineer

CHRISTOPHER LYNN BREHMER
STATE OF WASHINGTON
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REGISTERED
PROFESSIONAL ENGINEER

SIGNED
7-31-2019

ATTACHMENTS

Appendix 1: Vistro Analysis Worksheets

Appendix 2: RTC Segment V/C Ratio Plots

Appendix 1 Vistro Analysis Worksheets

Intersection Level Of Service Report
Intersection 1: NE 139th St/NE 10th Ave

Control Type:	Signalized	Delay (sec / veh):	36.8
Analysis Method:	HCM 2010	Level Of Service:	D
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.592

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	1	0	1	1	0	1	1	0	0	1	0	0
Pocket Length [ft]	400.00	100.00	240.00	285.00	100.00	190.00	370.00	100.00	100.00	385.00	100.00	100.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	36	137	59	330	345	95	81	338	41	49	361	191
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	3.00	3.00	3.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right-Turn on Red Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	36	137	59	330	345	95	81	338	41	49	361	191
Peak Hour Factor	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	10	38	16	92	96	26	23	94	11	14	100	53
Total Analysis Volume [veh/h]	40	152	66	367	383	106	90	376	46	54	401	212
Presence of On-Street Parking	No		No	No		No	No		No	No		No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrian Volume [ped/h]	5			5			6			6		
Bicycle Volume [bicycles/h]	0			0			0			1		

Intersection Settings

Located in CBD	No
Signal Coordination Group	-
Cycle Length [s]	110
Coordination Type	Time of Day Pattern Isolated
Actuation Type	Fully actuated
Offset [s]	79.0
Offset Reference	LeadGreen
Permissive Mode	SingleBand
Lost time [s]	12.00

Phasing & Timing

Control Type	Protecte	Permiss	Overlap	Protecte	Permiss	Overlap	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss
Signal Group	3	8	1	7	4	5	5	2	0	1	6	0
Auxiliary Signal Groups			1,8			4,5						
Lead / Lag	Lead	-	-	Lead	-	-	Lead	-	-	Lead	-	-
Minimum Green [s]	5	5	5	5	5	5	5	5	0	5	5	0
Maximum Green [s]	30	30	30	30	30	30	30	30	0	30	30	0
Amber [s]	3.0	3.6	3.0	3.0	3.6	3.0	3.0	3.6	0.0	3.0	3.6	0.0
All red [s]	2.4	2.2	2.4	2.4	2.5	2.4	2.4	2.6	0.0	2.4	2.6	0.0
Split [s]	30	25	25	30	25	25	25	30	0	25	30	0
Vehicle Extension [s]	2.0	2.0	1.5	1.2	2.0	1.2	1.2	1.2	0.0	1.5	1.2	0.0
Walk [s]	0	5	0	0	5	0	0	5	0	0	5	0
Pedestrian Clearance [s]	0	22	0	0	22	0	0	15	0	0	24	0
Rest In Walk		No			No			No			No	
I1, Start-Up Lost Time [s]	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	0.0	2.0	2.0	0.0
I2, Clearance Lost Time [s]	3.4	3.8	3.4	3.4	4.1	3.4	3.4	4.2	0.0	3.4	4.2	0.0
Minimum Recall	No	No	No	No	No	No	No	Yes		No	Yes	
Maximum Recall	No	No	No	No	No	No	No	No		No	No	
Pedestrian Recall	No	No	No	No	No	No	No	No		No	No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	C	R	L	C	R	L	C	C	L	C	C
C, Cycle Length [s]	110	110	110	110	110	110	110	110	110	110	110	110
L, Total Lost Time per Cycle [s]	5.40	5.80	5.40	5.40	6.10	5.40	5.40	6.20	6.20	5.40	6.20	6.20
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	3.40	3.80	0.00	3.40	4.10	0.00	3.40	4.20	4.20	3.40	4.20	4.20
g_i, Effective Green Time [s]	4	12	23	25	33	46	7	45	45	5	43	43
g / C, Green / Cycle	0.03	0.11	0.21	0.22	0.30	0.42	0.07	0.41	0.41	0.04	0.39	0.39
(v / s)_i Volume / Saturation Flow Rate	0.02	0.08	0.04	0.21	0.21	0.07	0.05	0.12	0.12	0.03	0.18	0.18
s, saturation flow rate [veh/h]	1757	1845	1568	1740	1827	1546	1740	1827	1756	1740	1827	1584
c, Capacity [veh/h]	58	208	329	389	549	653	116	754	724	77	712	618
d1, Uniform Delay [s]	52.68	47.23	35.92	42.07	34.09	19.71	50.59	21.53	21.55	51.93	24.90	25.08
k, delay calibration	0.04	0.04	0.04	0.22	0.06	0.04	0.04	0.50	0.50	0.04	0.50	0.50
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	5.28	1.85	0.11	19.31	0.97	0.04	4.15	0.95	1.00	4.34	2.08	2.54
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.69	0.73	0.20	0.94	0.70	0.16	0.78	0.28	0.29	0.70	0.45	0.47
d, Delay for Lane Group [s/veh]	57.96	49.09	36.03	61.38	35.06	19.76	54.74	22.47	22.55	56.27	26.98	27.62
Lane Group LOS	E	D	D	E	D	B	D	C	C	E	C	C
Critical Lane Group	No	Yes	No	Yes	No	No	Yes	No	No	No	No	Yes
50th-Percentile Queue Length [veh/ln]	1.18	4.12	1.48	11.78	9.11	1.69	2.57	3.85	3.75	1.56	6.60	6.02
50th-Percentile Queue Length [ft/ln]	29.45	103.11	36.95	294.62	227.77	42.24	64.24	96.26	93.76	39.03	164.96	150.44
95th-Percentile Queue Length [veh/ln]	2.12	7.42	2.66	17.41	14.06	3.04	4.63	6.93	6.75	2.81	10.81	10.04
95th-Percentile Queue Length [ft/ln]	53.00	185.60	66.52	435.37	351.53	76.03	115.63	173.26	168.77	70.25	270.27	251.02

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	57.96	49.09	36.03	61.38	35.06	19.76	54.74	22.51	22.55	56.27	27.10	27.62
Movement LOS	E	D	D	E	D	B	D	C	C	E	C	C
d_A, Approach Delay [s/veh]	47.12			44.45			28.18			29.63		
Approach LOS	D			D			C			C		
d_I, Intersection Delay [s/veh]	36.80											
Intersection LOS	D											
Intersection V/C	0.592											

Sequence

Ring 1	1	2	3	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	7	8	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Intersection Level Of Service Report
Intersection 1: NE 139th St/NE 10th Ave

Control Type:	Signalized	Delay (sec / veh):	34.3
Analysis Method:	HCM 2010	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.517

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	1	0	1	1	0	1	1	0	0	1	0	1
Pocket Length [ft]	400.00	100.00	240.00	285.00	100.00	190.00	370.00	100.00	100.00	385.00	100.00	310.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	36	137	59	330	345	95	81	338	41	49	361	191
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	3.00	3.00	3.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right-Turn on Red Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	36	137	59	330	345	95	81	338	41	49	361	191
Peak Hour Factor	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	10	38	16	92	96	26	23	94	11	14	100	53
Total Analysis Volume [veh/h]	40	152	66	367	383	106	90	376	46	54	401	212
Presence of On-Street Parking	No		No	No		No	No		No	No		No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrian Volume [ped/h]	5			5			6			6		
Bicycle Volume [bicycles/h]	0			0			0			1		

Intersection Settings

Located in CBD	No
Signal Coordination Group	-
Cycle Length [s]	110
Coordination Type	Time of Day Pattern Isolated
Actuation Type	Fully actuated
Offset [s]	79.0
Offset Reference	LeadGreen
Permissive Mode	SingleBand
Lost time [s]	12.00

Phasing & Timing

Control Type	Protecte	Permiss	Overlap	Protecte	Permiss	Overlap	Protecte	Permiss	Permiss	Protecte	Permiss	Overlap
Signal Group	3	8	1	7	4	5	5	2	0	1	6	7
Auxiliary Signal Groups			1,8			4,5						6,7
Lead / Lag	Lead	-	-	Lead	-	-	Lead	-	-	Lead	-	-
Minimum Green [s]	5	5	5	5	5	5	5	5	0	5	5	5
Maximum Green [s]	30	30	30	30	30	30	30	30	0	30	30	30
Amber [s]	3.0	3.6	3.0	3.0	3.6	3.0	3.0	3.6	0.0	3.0	3.6	3.0
All red [s]	2.4	2.2	2.4	2.4	2.5	2.4	2.4	2.6	0.0	2.4	2.6	2.4
Split [s]	30	25	25	30	25	25	25	30	0	25	30	30
Vehicle Extension [s]	2.0	2.0	1.5	1.2	2.0	1.2	1.2	1.2	0.0	1.5	1.2	1.2
Walk [s]	0	5	0	0	5	0	0	5	0	0	5	0
Pedestrian Clearance [s]	0	22	0	0	22	0	0	15	0	0	24	0
Rest In Walk		No			No			No			No	
I1, Start-Up Lost Time [s]	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	0.0	2.0	2.0	2.0
I2, Clearance Lost Time [s]	3.4	3.8	3.4	3.4	4.1	3.4	3.4	4.2	0.0	3.4	4.2	3.4
Minimum Recall	No	No	No	No	No	No	No	Yes		No	Yes	No
Maximum Recall	No	No	No	No	No	No	No	No		No	No	No
Pedestrian Recall	No	No	No	No	No	No	No	No		No	No	No
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	C	R	L	C	R	L	C	C	L	C	R
C, Cycle Length [s]	110	110	110	110	110	110	110	110	110	110	110	110
L, Total Lost Time per Cycle [s]	5.40	5.80	5.40	5.40	6.10	5.40	5.40	6.20	6.20	5.40	6.20	5.40
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	3.40	3.80	0.00	3.40	4.10	0.00	3.40	4.20	4.20	3.40	4.20	0.00
g_i, Effective Green Time [s]	4	12	23	25	33	46	7	45	45	5	43	74
g / C, Green / Cycle	0.03	0.11	0.21	0.22	0.30	0.42	0.07	0.41	0.41	0.04	0.39	0.67
(v / s)_i Volume / Saturation Flow Rate	0.02	0.08	0.04	0.21	0.21	0.07	0.05	0.12	0.12	0.03	0.12	0.14
s, saturation flow rate [veh/h]	1757	1845	1568	1740	1827	1546	1740	1827	1756	1740	3478	1515
c, Capacity [veh/h]	58	208	329	389	549	653	116	754	724	77	1357	1015
d1, Uniform Delay [s]	52.68	47.23	35.92	42.07	34.09	19.71	50.59	21.53	21.55	51.93	23.16	6.98
k, delay calibration	0.04	0.04	0.04	0.22	0.06	0.04	0.04	0.50	0.50	0.04	0.50	0.50
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	5.28	1.85	0.11	19.31	0.97	0.04	4.15	0.95	1.00	4.34	0.56	0.47
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.69	0.73	0.20	0.94	0.70	0.16	0.78	0.28	0.29	0.70	0.30	0.21
d, Delay for Lane Group [s/veh]	57.96	49.09	36.03	61.38	35.06	19.76	54.74	22.47	22.55	56.27	23.72	7.45
Lane Group LOS	E	D	D	E	D	B	D	C	C	E	C	A
Critical Lane Group	No	Yes	No	Yes	No	No	Yes	No	No	No	Yes	No
50th-Percentile Queue Length [veh/ln]	1.18	4.12	1.48	11.78	9.11	1.69	2.57	3.85	3.75	1.56	3.67	1.90
50th-Percentile Queue Length [ft/ln]	29.45	103.11	36.95	294.62	227.77	42.24	64.24	96.26	93.76	39.03	91.83	47.58
95th-Percentile Queue Length [veh/ln]	2.12	7.42	2.66	17.41	14.06	3.04	4.63	6.93	6.75	2.81	6.61	3.43
95th-Percentile Queue Length [ft/ln]	53.00	185.60	66.52	435.37	351.53	76.03	115.63	173.26	168.77	70.25	165.29	85.65

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	57.96	49.09	36.03	61.38	35.06	19.76	54.74	22.51	22.55	56.27	23.72	7.45
Movement LOS	E	D	D	E	D	B	D	C	C	E	C	A
d_A, Approach Delay [s/veh]	47.12			44.45			28.18			21.18		
Approach LOS	D			D			C			C		
d_I, Intersection Delay [s/veh]	34.35											
Intersection LOS	C											
Intersection V/C	0.517											

Sequence

Ring 1	1	2	3	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	7	8	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Intersection Level Of Service Report
Intersection 1: NE 139th St/NE 10th Ave

Control Type:	Signalized	Delay (sec / veh):	34.0
Analysis Method:	HCM 2010	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.524

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	1	0	1	2	0	1	1	0	0	1	0	0
Pocket Length [ft]	400.00	100.00	240.00	285.00	100.00	190.00	370.00	100.00	100.00	385.00	100.00	100.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	36	137	59	330	345	95	81	338	41	49	361	191
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	3.00	3.00	3.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right-Turn on Red Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	36	137	59	330	345	95	81	338	41	49	361	191
Peak Hour Factor	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	10	38	16	92	96	26	23	94	11	14	100	53
Total Analysis Volume [veh/h]	40	152	66	367	383	106	90	376	46	54	401	212
Presence of On-Street Parking	No		No	No		No	No		No	No		No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrian Volume [ped/h]	5			5			6			6		
Bicycle Volume [bicycles/h]	0			0			0			1		

Intersection Settings

Located in CBD	No
Signal Coordination Group	-
Cycle Length [s]	110
Coordination Type	Time of Day Pattern Isolated
Actuation Type	Fully actuated
Offset [s]	79.0
Offset Reference	LeadGreen
Permissive Mode	SingleBand
Lost time [s]	12.00

Phasing & Timing

Control Type	Protecte	Permiss	Overlap	Protecte	Permiss	Overlap	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss
Signal Group	3	8	1	7	4	5	5	2	0	1	6	7
Auxiliary Signal Groups			1,8			4,5						6,7
Lead / Lag	Lead	-	-	Lead	-	-	Lead	-	-	Lead	-	-
Minimum Green [s]	5	5	5	5	5	5	5	5	0	5	5	5
Maximum Green [s]	30	30	30	30	30	30	30	30	0	30	30	30
Amber [s]	3.0	3.6	3.0	3.0	3.6	3.0	3.0	3.6	0.0	3.0	3.6	3.0
All red [s]	2.4	2.2	2.4	2.4	2.5	2.4	2.4	2.6	0.0	2.4	2.6	2.4
Split [s]	30	25	25	30	25	25	25	30	0	25	30	30
Vehicle Extension [s]	2.0	2.0	1.5	1.2	2.0	1.2	1.2	1.2	0.0	1.5	1.2	1.2
Walk [s]	0	5	0	0	5	0	0	5	0	0	5	0
Pedestrian Clearance [s]	0	22	0	0	22	0	0	15	0	0	24	0
Rest In Walk		No			No			No			No	
I1, Start-Up Lost Time [s]	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	0.0	2.0	2.0	2.0
I2, Clearance Lost Time [s]	3.4	3.8	3.4	3.4	4.1	3.4	3.4	4.2	0.0	3.4	4.2	3.4
Minimum Recall	No	No	No	No	No	No	No	Yes		No	Yes	
Maximum Recall	No	No	No	No	No	No	No	No		No	No	
Pedestrian Recall	No	No	No	No	No	No	No	No		No	No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	C	R	L	C	R	L	C	C	L	C	C
C, Cycle Length [s]	110	110	110	110	110	110	110	110	110	110	110	110
L, Total Lost Time per Cycle [s]	5.40	5.80	5.40	5.40	6.10	5.40	5.40	6.20	6.20	5.40	6.20	6.20
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	3.40	3.80	0.00	3.40	4.10	0.00	3.40	4.20	4.20	3.40	4.20	4.20
g_i, Effective Green Time [s]	4	15	26	14	25	39	7	53	53	5	51	51
g / C, Green / Cycle	0.03	0.14	0.23	0.13	0.23	0.35	0.07	0.49	0.49	0.04	0.46	0.46
(v / s)_i Volume / Saturation Flow Rate	0.02	0.08	0.04	0.11	0.21	0.07	0.05	0.12	0.12	0.03	0.18	0.18
s, saturation flow rate [veh/h]	1757	1845	1568	3379	1827	1545	1740	1827	1756	1740	1827	1586
c, Capacity [veh/h]	58	255	367	429	419	543	116	885	851	75	843	731
d1, Uniform Delay [s]	52.68	44.58	33.74	47.07	41.38	24.88	50.59	16.57	16.59	52.03	19.42	19.56
k, delay calibration	0.04	0.04	0.04	0.04	0.06	0.04	0.04	0.50	0.50	0.04	0.50	0.50
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	5.28	0.84	0.09	1.92	5.21	0.06	4.15	0.65	0.68	4.72	1.32	1.60
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.69	0.60	0.18	0.85	0.91	0.20	0.78	0.24	0.24	0.72	0.38	0.40
d, Delay for Lane Group [s/veh]	57.96	45.42	33.82	48.99	46.60	24.94	54.74	17.21	17.27	56.74	20.75	21.16
Lane Group LOS	E	D	C	D	D	C	D	B	B	E	C	C
Critical Lane Group	Yes	No	No	No	Yes	No	Yes	No	No	No	No	Yes
50th-Percentile Queue Length [veh/ln]	1.18	3.95	1.43	5.02	10.63	1.94	2.57	3.27	3.19	1.57	5.63	5.13
50th-Percentile Queue Length [ft/ln]	29.45	98.72	35.64	125.43	265.81	48.53	64.24	81.83	79.69	39.22	140.87	128.22
95th-Percentile Queue Length [veh/ln]	2.12	7.11	2.57	8.69	15.98	3.49	4.63	5.89	5.74	2.82	9.53	8.84
95th-Percentile Queue Length [ft/ln]	53.00	177.70	64.15	217.26	399.50	87.35	115.63	147.30	143.45	70.59	238.19	221.07

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	57.96	45.42	33.82	48.99	46.60	24.94	54.74	17.24	17.27	56.74	20.83	21.16
Movement LOS	E	D	C	D	D	C	D	B	B	E	C	C
d_A, Approach Delay [s/veh]	44.40			44.94			23.83			23.84		
Approach LOS	D			D			C			C		
d_I, Intersection Delay [s/veh]	34.03											
Intersection LOS	C											
Intersection V/C	0.524											

Sequence

Ring 1	1	2	3	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	7	8	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Intersection Level Of Service Report
Intersection 1: NE 139th St/NE 10th Ave

Control Type:	Signalized	Delay (sec / veh):	42.0
Analysis Method:	HCM 2010	Level Of Service:	D
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.592

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	1	0	1	1	0	1	1	0	0	1	0	0
Pocket Length [ft]	400.00	100.00	240.00	285.00	100.00	190.00	370.00	100.00	100.00	385.00	100.00	100.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	36	137	59	330	345	95	81	338	41	49	361	191
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	3.00	3.00	3.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right-Turn on Red Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	36	137	59	330	345	95	81	338	41	49	361	191
Peak Hour Factor	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	10	38	16	92	96	26	23	94	11	14	100	53
Total Analysis Volume [veh/h]	40	152	66	367	383	106	90	376	46	54	401	212
Presence of On-Street Parking	No		No	No		No	No		No	No		No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrian Volume [ped/h]	5			5			6			6		
Bicycle Volume [bicycles/h]	0			0			0			1		

Intersection Settings

Located in CBD	No
Signal Coordination Group	-
Cycle Length [s]	110
Coordination Type	Time of Day Pattern Isolated
Actuation Type	Fully actuated
Offset [s]	79.0
Offset Reference	LeadGreen
Permissive Mode	SingleBand
Lost time [s]	12.00

Phasing & Timing

Control Type	Split	Split	Overlap	Split	Split	Overlap	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss
Signal Group	3	8	1	7	4	5	5	2	0	1	6	7
Auxiliary Signal Groups			1,8			4,5						
Lead / Lag	-	-	-	-	-	-	Lead	-	-	Lead	-	-
Minimum Green [s]	0	5	5	0	5	5	5	5	0	5	5	0
Maximum Green [s]	0	30	30	0	30	30	30	30	0	30	30	0
Amber [s]	0.0	3.6	3.0	0.0	3.6	3.0	3.0	3.6	0.0	3.0	3.6	0.0
All red [s]	0.0	2.2	2.4	0.0	2.5	2.4	2.4	2.6	0.0	2.4	2.6	0.0
Split [s]	0	25	25	0	30	25	25	30	0	25	30	0
Vehicle Extension [s]	0.0	2.0	1.5	0.0	2.0	1.2	1.2	1.2	0.0	1.5	1.2	0.0
Walk [s]	0	5	0	0	5	0	0	5	0	0	5	0
Pedestrian Clearance [s]	0	22	0	0	22	0	0	15	0	0	24	0
Rest In Walk		No			No			No			No	
I1, Start-Up Lost Time [s]	0.0	2.0	2.0	0.0	2.0	2.0	2.0	2.0	0.0	2.0	2.0	0.0
I2, Clearance Lost Time [s]	0.0	3.8	3.4	0.0	4.1	3.4	3.4	4.2	0.0	3.4	4.2	0.0
Minimum Recall		No	No		No	No	No	Yes		No	Yes	
Maximum Recall		No	No		No	No	No	No		No	No	
Pedestrian Recall		No	No		No	No	No	No		No	No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	C	R	L	C	R	L	C	C	L	C	C
C, Cycle Length [s]	110	110	110	110	110	110	110	110	110	110	110	110
L, Total Lost Time per Cycle [s]	5.80	5.80	5.40	6.10	6.10	5.40	5.40	6.20	6.20	5.40	6.20	6.20
l1_p, Permitted Start-Up Lost Time [s]	2.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	3.80	3.80	0.00	4.10	4.10	0.00	3.40	4.20	4.20	3.40	4.20	4.20
g_i, Effective Green Time [s]	12	12	23	24	24	56	7	45	45	5	43	43
g / C, Green / Cycle	0.11	0.11	0.21	0.22	0.22	0.50	0.07	0.41	0.41	0.04	0.39	0.39
(v / s)_i Volume / Saturation Flow Rate	0.03	0.08	0.04	0.21	0.21	0.07	0.05	0.12	0.12	0.03	0.18	0.18
s, saturation flow rate [veh/h]	1398	1845	1568	1740	1827	1547	1740	1827	1756	1740	1827	1584
c, Capacity [veh/h]	202	209	329	378	397	781	116	753	724	77	712	617
d1, Uniform Delay [s]	46.18	47.20	35.89	42.76	42.69	14.48	50.59	21.55	21.58	51.93	24.93	25.10
k, delay calibration	0.04	0.04	0.04	0.21	0.20	0.04	0.04	0.50	0.50	0.04	0.50	0.50
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	0.18	1.83	0.11	23.53	21.49	0.03	4.15	0.95	1.00	4.34	2.09	2.55
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.20	0.73	0.20	0.97	0.97	0.14	0.78	0.28	0.29	0.70	0.45	0.47
d, Delay for Lane Group [s/veh]	46.36	49.03	36.00	66.29	64.18	14.51	54.74	22.50	22.58	56.28	27.01	27.65
Lane Group LOS	D	D	D	E	E	B	D	C	C	E	C	C
Critical Lane Group	No	Yes	No	Yes	No	No	Yes	No	No	No	No	Yes
50th-Percentile Queue Length [veh/ln]	1.03	4.12	1.48	12.26	12.57	1.40	2.57	3.85	3.75	1.56	6.60	6.02
50th-Percentile Queue Length [ft/ln]	25.70	103.05	36.94	306.48	314.21	35.07	64.24	96.32	93.82	39.03	165.07	150.55
95th-Percentile Queue Length [veh/ln]	1.85	7.42	2.66	18.00	18.38	2.53	4.63	6.94	6.76	2.81	10.82	10.05
95th-Percentile Queue Length [ft/ln]	46.26	185.48	66.49	450.04	459.56	63.13	115.63	173.38	168.88	70.26	270.43	251.16

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	46.36	49.03	36.00	66.29	64.18	14.51	54.74	22.53	22.58	56.28	27.14	27.65
Movement LOS	D	D	D	E	E	B	D	C	C	E	C	C
d_A, Approach Delay [s/veh]	45.28			58.93			28.20			29.66		
Approach LOS	D			E			C			C		
d_I, Intersection Delay [s/veh]	42.02											
Intersection LOS	D											
Intersection V/C	0.592											

Sequence

Ring 1	1	2	4	8	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Intersection Level Of Service Report
Intersection 1: NE 139th St/NE 10th Ave

Control Type:	Signalized	Delay (sec / veh):	32.4
Analysis Method:	HCM 2010	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.453

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	1	0	1	2	0	1	1	0	0	1	0	1
Pocket Length [ft]	400.00	100.00	240.00	285.00	100.00	190.00	370.00	100.00	100.00	385.00	100.00	310.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	36	137	59	330	345	95	81	338	41	49	361	191
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	3.00	3.00	3.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right-Turn on Red Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	36	137	59	330	345	95	81	338	41	49	361	191
Peak Hour Factor	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	10	38	16	92	96	26	23	94	11	14	100	53
Total Analysis Volume [veh/h]	40	152	66	367	383	106	90	376	46	54	401	212
Presence of On-Street Parking	No		No	No		No	No		No	No		No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrian Volume [ped/h]	5			5			6			6		
Bicycle Volume [bicycles/h]	0			0			0			1		

Intersection Settings

Located in CBD	No
Signal Coordination Group	-
Cycle Length [s]	110
Coordination Type	Time of Day Pattern Isolated
Actuation Type	Fully actuated
Offset [s]	79.0
Offset Reference	LeadGreen
Permissive Mode	SingleBand
Lost time [s]	12.00

Phasing & Timing

Control Type	Protecte	Permiss	Overlap	Protecte	Permiss	Overlap	Protecte	Permiss	Permiss	Protecte	Permiss	Overlap
Signal Group	3	8	1	7	4	5	5	2	0	1	6	7
Auxiliary Signal Groups			1,8			4,5						6,7
Lead / Lag	Lead	-	-	Lead	-	-	Lead	-	-	Lead	-	-
Minimum Green [s]	5	5	5	5	5	5	5	5	0	5	5	5
Maximum Green [s]	30	30	30	30	30	30	30	30	0	30	30	30
Amber [s]	3.0	3.6	3.0	3.0	3.6	3.0	3.0	3.6	0.0	3.0	3.6	3.0
All red [s]	2.4	2.2	2.4	2.4	2.5	2.4	2.4	2.6	0.0	2.4	2.6	2.4
Split [s]	30	25	25	30	25	25	25	30	0	25	30	30
Vehicle Extension [s]	2.0	2.0	1.5	1.2	2.0	1.2	1.2	1.2	0.0	1.5	1.2	1.2
Walk [s]	0	5	0	0	5	0	0	5	0	0	5	0
Pedestrian Clearance [s]	0	22	0	0	22	0	0	15	0	0	24	0
Rest In Walk		No			No			No			No	
I1, Start-Up Lost Time [s]	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	0.0	2.0	2.0	2.0
I2, Clearance Lost Time [s]	3.4	3.8	3.4	3.4	4.1	3.4	3.4	4.2	0.0	3.4	4.2	3.4
Minimum Recall	No	No	No	No	No	No	No	Yes		No	Yes	No
Maximum Recall	No	No	No	No	No	No	No	No		No	No	No
Pedestrian Recall	No	No	No	No	No	No	No	No		No	No	No
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	C	R	L	C	R	L	C	C	L	C	R
C, Cycle Length [s]	110	110	110	110	110	110	110	110	110	110	110	110
L, Total Lost Time per Cycle [s]	5.40	5.80	5.40	5.40	6.10	5.40	5.40	6.20	6.20	5.40	6.20	5.40
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	3.40	3.80	0.00	3.40	4.10	0.00	3.40	4.20	4.20	3.40	4.20	0.00
g_i, Effective Green Time [s]	4	15	26	14	25	39	7	53	53	5	51	71
g / C, Green / Cycle	0.03	0.14	0.23	0.13	0.23	0.35	0.07	0.49	0.49	0.04	0.46	0.65
(v / s)_i Volume / Saturation Flow Rate	0.02	0.08	0.04	0.11	0.21	0.07	0.05	0.12	0.12	0.03	0.12	0.14
s, saturation flow rate [veh/h]	1757	1845	1568	3379	1827	1545	1740	1827	1756	1740	3478	1515
c, Capacity [veh/h]	58	253	365	432	419	543	116	885	851	75	1604	978
d1, Uniform Delay [s]	52.68	44.68	33.81	46.98	41.38	24.88	50.59	16.57	16.59	52.02	18.07	8.05
k, delay calibration	0.04	0.04	0.04	0.04	0.06	0.04	0.04	0.50	0.50	0.04	0.50	0.50
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	5.28	0.85	0.09	1.82	5.21	0.06	4.15	0.65	0.68	4.70	0.37	0.51
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.69	0.60	0.18	0.85	0.91	0.20	0.78	0.24	0.24	0.72	0.25	0.22
d, Delay for Lane Group [s/veh]	57.96	45.53	33.90	48.80	46.60	24.94	54.74	17.22	17.27	56.73	18.44	8.55
Lane Group LOS	E	D	C	D	D	C	D	B	B	E	B	A
Critical Lane Group	Yes	No	No	No	Yes	No	Yes	No	No	No	No	Yes
50th-Percentile Queue Length [veh/ln]	1.18	3.95	1.43	5.01	10.63	1.94	2.57	3.27	3.19	1.57	3.15	2.09
50th-Percentile Queue Length [ft/ln]	29.45	98.86	35.69	125.16	265.81	48.53	64.24	81.84	79.70	39.21	78.87	52.32
95th-Percentile Queue Length [veh/ln]	2.12	7.12	2.57	8.68	15.98	3.49	4.63	5.89	5.74	2.82	5.68	3.77
95th-Percentile Queue Length [ft/ln]	53.00	177.95	64.24	216.89	399.49	87.35	115.63	147.31	143.46	70.58	141.96	94.17

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	57.96	45.53	33.90	48.80	46.60	24.94	54.74	17.24	17.27	56.73	18.44	8.55
Movement LOS	E	D	C	D	D	C	D	B	B	E	B	A
d_A, Approach Delay [s/veh]	44.48			44.86			23.83			18.40		
Approach LOS	D			D			C			B		
d_I, Intersection Delay [s/veh]	32.42											
Intersection LOS	C											
Intersection V/C	0.453											

Sequence

Ring 1	1	2	3	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	7	8	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Intersection Level Of Service Report
Intersection 1: NE 139th St/NE 10th Ave

Control Type:	Signalized	Delay (sec / veh):	39.5
Analysis Method:	HCM 2010	Level Of Service:	D
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.517

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	1	0	1	1	0	1	1	0	0	1	0	1
Pocket Length [ft]	400.00	100.00	240.00	285.00	100.00	190.00	370.00	100.00	100.00	385.00	100.00	310.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	36	137	59	330	345	95	81	338	41	49	361	191
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	3.00	3.00	3.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right-Turn on Red Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	36	137	59	330	345	95	81	338	41	49	361	191
Peak Hour Factor	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	10	38	16	92	96	26	23	94	11	14	100	53
Total Analysis Volume [veh/h]	40	152	66	367	383	106	90	376	46	54	401	212
Presence of On-Street Parking	No		No	No		No	No		No	No		No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrian Volume [ped/h]	5			5			6			6		
Bicycle Volume [bicycles/h]	0			0			0			1		

Intersection Settings

Located in CBD	No
Signal Coordination Group	-
Cycle Length [s]	110
Coordination Type	Time of Day Pattern Isolated
Actuation Type	Fully actuated
Offset [s]	79.0
Offset Reference	LeadGreen
Permissive Mode	SingleBand
Lost time [s]	12.00

Phasing & Timing

Control Type	Split	Split	Overlap	Split	Split	Overlap	Protecte	Permiss	Permiss	Protecte	Permiss	Overlap
Signal Group	3	8	1	7	4	5	5	2	0	1	6	4
Auxiliary Signal Groups			1,8			4,5						4,6
Lead / Lag	-	-	-	-	-	-	Lead	-	-	Lead	-	-
Minimum Green [s]	0	5	5	0	5	5	5	5	0	5	5	5
Maximum Green [s]	0	30	30	0	30	30	30	30	0	30	30	30
Amber [s]	0.0	3.6	3.0	0.0	3.6	3.0	3.0	3.6	0.0	3.0	3.6	3.6
All red [s]	0.0	2.2	2.4	0.0	2.5	2.4	2.4	2.6	0.0	2.4	2.6	2.5
Split [s]	0	25	25	0	30	25	25	30	0	25	30	30
Vehicle Extension [s]	0.0	2.0	1.5	0.0	2.0	1.2	1.2	1.2	0.0	1.5	1.2	2.0
Walk [s]	0	5	0	0	5	0	0	5	0	0	5	5
Pedestrian Clearance [s]	0	22	0	0	22	0	0	15	0	0	24	22
Rest In Walk		No			No			No			No	
I1, Start-Up Lost Time [s]	0.0	2.0	2.0	0.0	2.0	2.0	2.0	2.0	0.0	2.0	2.0	2.0
I2, Clearance Lost Time [s]	0.0	3.8	3.4	0.0	4.1	3.4	3.4	4.2	0.0	3.4	4.2	4.1
Minimum Recall		No	No		No	No	No	Yes		No	Yes	No
Maximum Recall		No	No		No	No	No	No		No	No	No
Pedestrian Recall		No	No		No	No	No	No		No	No	No
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	C	R	L	C	R	L	C	C	L	C	R
C, Cycle Length [s]	110	110	110	110	110	110	110	110	110	110	110	110
L, Total Lost Time per Cycle [s]	5.80	5.80	5.40	6.10	6.10	5.40	5.40	6.20	6.20	5.40	6.20	6.10
l1_p, Permitted Start-Up Lost Time [s]	2.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	3.80	3.80	0.00	4.10	4.10	0.00	3.40	4.20	4.20	3.40	4.20	0.00
g_i, Effective Green Time [s]	12	12	23	24	24	56	7	45	45	5	43	73
g / C, Green / Cycle	0.11	0.11	0.21	0.22	0.22	0.50	0.07	0.41	0.41	0.04	0.39	0.66
(v / s)_i Volume / Saturation Flow Rate	0.03	0.08	0.04	0.21	0.21	0.07	0.05	0.12	0.12	0.03	0.12	0.14
s, saturation flow rate [veh/h]	1398	1845	1568	1740	1827	1547	1740	1827	1756	1740	3478	1515
c, Capacity [veh/h]	202	209	329	378	397	781	116	753	724	77	1355	1005
d1, Uniform Delay [s]	46.18	47.20	35.89	42.76	42.69	14.48	50.59	21.55	21.58	51.93	23.19	7.26
k, delay calibration	0.04	0.04	0.04	0.21	0.20	0.04	0.04	0.50	0.50	0.04	0.50	0.04
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	0.18	1.83	0.11	23.53	21.49	0.03	4.15	0.95	1.00	4.34	0.56	0.04
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.20	0.73	0.20	0.97	0.97	0.14	0.78	0.28	0.29	0.70	0.30	0.21
d, Delay for Lane Group [s/veh]	46.36	49.03	36.00	66.29	64.18	14.51	54.74	22.50	22.58	56.28	23.74	7.30
Lane Group LOS	D	D	D	E	E	B	D	C	C	E	C	A
Critical Lane Group	No	Yes	No	Yes	No	No	Yes	No	No	No	Yes	No
50th-Percentile Queue Length [veh/ln]	1.03	4.12	1.48	12.26	12.57	1.40	2.57	3.85	3.75	1.56	3.68	1.83
50th-Percentile Queue Length [ft/ln]	25.70	103.05	36.94	306.48	314.21	35.07	64.24	96.32	93.82	39.03	91.89	45.81
95th-Percentile Queue Length [veh/ln]	1.85	7.42	2.66	18.00	18.38	2.53	4.63	6.94	6.76	2.81	6.62	3.30
95th-Percentile Queue Length [ft/ln]	46.26	185.48	66.49	450.04	459.56	63.13	115.63	173.38	168.88	70.26	165.40	82.46

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	46.36	49.03	36.00	66.29	64.18	14.51	54.74	22.53	22.58	56.28	23.74	7.30
Movement LOS	D	D	D	E	E	B	D	C	C	E	C	A
d_A, Approach Delay [s/veh]	45.28			58.93			28.20			21.15		
Approach LOS	D			E			C			C		
d_I, Intersection Delay [s/veh]	39.54											
Intersection LOS	D											
Intersection V/C	0.517											

Sequence

Ring 1	1	2	4	8	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Intersection Level Of Service Report
Intersection 1: NE 139th St/NE 10th Ave

Control Type:	Signalized	Delay (sec / veh):	88.4
Analysis Method:	HCM 2010	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.908

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	1	0	1	1	0	1	1	0	0	1	0	0
Pocket Length [ft]	400.00	100.00	240.00	285.00	100.00	190.00	370.00	100.00	100.00	385.00	100.00	100.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	16	135	113	429	327	91	152	448	32	84	511	582
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right-Turn on Red Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	16	135	113	429	327	91	152	448	32	84	511	582
Peak Hour Factor	0.9400	0.9400	0.9400	0.9400	0.9400	0.9400	0.9400	0.9400	0.9400	0.9400	0.9400	0.9400
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	4	36	30	114	87	24	40	119	9	22	136	155
Total Analysis Volume [veh/h]	17	144	120	456	348	97	162	477	34	89	544	619
Presence of On-Street Parking	No		No	No		No	No		No	No		No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrian Volume [ped/h]	16			16			1			1		
Bicycle Volume [bicycles/h]	0			0			0			1		

Intersection Settings

Located in CBD	No
Signal Coordination Group	-
Cycle Length [s]	130
Coordination Type	Time of Day Pattern Isolated
Actuation Type	Fully actuated
Offset [s]	37.0
Offset Reference	LeadGreen
Permissive Mode	SingleBand
Lost time [s]	12.00

Phasing & Timing

Control Type	Protecte	Permiss	Overlap	Protecte	Permiss	Overlap	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss
Signal Group	3	8	1	7	4	5	5	2	0	1	6	0
Auxiliary Signal Groups			1,8			4,5						
Lead / Lag	Lead	-	-	Lead	-	-	Lead	-	-	Lead	-	-
Minimum Green [s]	5	5	5	5	5	5	5	5	0	5	5	0
Maximum Green [s]	30	30	30	30	30	30	30	30	0	30	30	0
Amber [s]	3.0	3.6	3.0	3.0	3.6	3.0	3.0	3.6	0.0	3.0	3.6	0.0
All red [s]	2.4	2.2	2.4	2.4	2.5	2.4	2.4	2.6	0.0	2.4	2.6	0.0
Split [s]	35	25	25	25	35	25	25	35	0	25	35	0
Vehicle Extension [s]	2.0	2.0	1.5	1.2	2.0	1.2	1.2	1.2	0.0	1.5	1.2	0.0
Walk [s]	0	5	0	0	5	0	0	5	0	0	5	0
Pedestrian Clearance [s]	0	22	0	0	22	0	0	15	0	0	24	0
Rest In Walk		No			No			No			No	
I1, Start-Up Lost Time [s]	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	0.0	2.0	2.0	0.0
I2, Clearance Lost Time [s]	3.4	3.8	3.4	3.4	4.1	3.4	3.4	4.2	0.0	3.4	4.2	0.0
Minimum Recall	No	No	No	No	No	No	No	Yes		No	Yes	
Maximum Recall	No	No	No	No	No	No	No	No		No	No	
Pedestrian Recall	No	No	No	No	No	No	No	No		No	No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	C	R	L	C	R	L	C	C	L	C	C
C, Cycle Length [s]	130	130	130	130	130	130	130	130	130	130	130	130
L, Total Lost Time per Cycle [s]	5.40	5.80	5.40	5.40	6.10	5.40	5.40	6.20	6.20	5.40	6.20	6.20
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	3.40	3.80	0.00	3.40	4.10	0.00	3.40	4.20	4.20	3.40	4.20	4.20
g_i, Effective Green Time [s]	2	12	28	20	29	49	14	65	65	10	62	62
g / C, Green / Cycle	0.02	0.09	0.22	0.15	0.23	0.38	0.10	0.50	0.50	0.08	0.47	0.47
(v / s)_i Volume / Saturation Flow Rate	0.01	0.08	0.08	0.25	0.18	0.06	0.09	0.14	0.14	0.05	0.29	0.40
s, saturation flow rate [veh/h]	1774	1863	1583	1792	1881	1598	1792	1881	1833	1792	1881	1539
c, Capacity [veh/h]	33	177	343	271	423	603	188	943	919	139	891	729
d1, Uniform Delay [s]	63.25	57.74	43.15	55.21	47.92	26.86	57.24	18.74	18.75	58.24	25.34	30.13
k, delay calibration	0.04	0.04	0.04	0.49	0.04	0.04	0.04	0.50	0.50	0.04	0.50	0.50
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	4.63	3.47	0.23	323.72	1.55	0.05	4.37	0.72	0.74	1.84	3.11	11.82
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.52	0.82	0.35	1.69	0.82	0.16	0.86	0.27	0.28	0.64	0.61	0.85
d, Delay for Lane Group [s/veh]	67.87	61.21	43.38	378.92	49.47	26.91	61.62	19.45	19.49	60.08	28.45	41.95
Lane Group LOS	E	E	D	F	D	C	E	B	B	E	C	D
Critical Lane Group	No	Yes	No	Yes	No	No	Yes	No	No	No	No	Yes
50th-Percentile Queue Length [veh/ln]	0.60	4.82	3.32	33.19	10.90	2.03	5.47	4.71	4.62	2.92	13.10	19.07
50th-Percentile Queue Length [ft/ln]	15.04	120.58	83.03	829.63	272.51	50.84	136.82	117.75	115.48	73.05	327.46	476.80
95th-Percentile Queue Length [veh/ln]	1.08	8.43	5.98	51.59	16.31	3.66	9.31	8.27	8.14	5.26	19.03	26.23
95th-Percentile Queue Length [ft/ln]	27.06	210.63	149.46	1289.86	407.87	91.50	232.73	206.73	203.60	131.48	475.85	655.86

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	67.87	61.21	43.38	378.92	49.47	26.91	61.62	19.47	19.49	60.08	28.45	41.95
Movement LOS	E	E	D	F	D	C	E	B	B	E	C	D
d_A, Approach Delay [s/veh]	54.00			213.78			29.62			37.37		
Approach LOS	D			F			C			D		
d_I, Intersection Delay [s/veh]	88.35											
Intersection LOS	F											
Intersection V/C	0.908											

Sequence

Ring 1	1	2	3	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	7	8	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Intersection Level Of Service Report
Intersection 1: NE 139th St/NE 10th Ave

Control Type:	Signalized	Delay (sec / veh):	81.6
Analysis Method:	HCM 2010	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.833

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	1	0	1	1	0	1	1	0	0	1	0	1
Pocket Length [ft]	400.00	100.00	240.00	285.00	100.00	190.00	370.00	100.00	100.00	385.00	100.00	310.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	16	135	113	429	327	91	152	448	32	84	511	582
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right-Turn on Red Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	16	135	113	429	327	91	152	448	32	84	511	582
Peak Hour Factor	0.9400	0.9400	0.9400	0.9400	0.9400	0.9400	0.9400	0.9400	0.9400	0.9400	0.9400	0.9400
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	4	36	30	114	87	24	40	119	9	22	136	155
Total Analysis Volume [veh/h]	17	144	120	456	348	97	162	477	34	89	544	619
Presence of On-Street Parking	No		No	No		No	No		No	No		No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrian Volume [ped/h]	16			16			1			1		
Bicycle Volume [bicycles/h]	0			0			0			1		

Intersection Settings

Located in CBD	No
Signal Coordination Group	-
Cycle Length [s]	130
Coordination Type	Time of Day Pattern Isolated
Actuation Type	Fully actuated
Offset [s]	37.0
Offset Reference	LeadGreen
Permissive Mode	SingleBand
Lost time [s]	12.00

Phasing & Timing

Control Type	Protecte	Permiss	Overlap	Protecte	Permiss	Overlap	Protecte	Permiss	Permiss	Protecte	Permiss	Overlap
Signal Group	3	8	1	7	4	5	5	2	0	1	6	7
Auxiliary Signal Groups			1,8			4,5						6,7
Lead / Lag	Lead	-	-	Lead	-	-	Lead	-	-	Lead	-	-
Minimum Green [s]	5	5	5	5	5	5	5	5	0	5	5	5
Maximum Green [s]	30	30	30	30	30	30	30	30	0	30	30	30
Amber [s]	3.0	3.6	3.0	3.0	3.6	3.0	3.0	3.6	0.0	3.0	3.6	3.0
All red [s]	2.4	2.2	2.4	2.4	2.5	2.4	2.4	2.6	0.0	2.4	2.6	2.4
Split [s]	35	25	25	25	35	25	25	35	0	25	35	25
Vehicle Extension [s]	2.0	2.0	1.5	1.2	2.0	1.2	1.2	1.2	0.0	1.5	1.2	1.2
Walk [s]	0	5	0	0	5	0	0	5	0	0	5	0
Pedestrian Clearance [s]	0	22	0	0	22	0	0	15	0	0	24	0
Rest In Walk		No			No			No			No	
I1, Start-Up Lost Time [s]	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	0.0	2.0	2.0	2.0
I2, Clearance Lost Time [s]	3.4	3.8	3.4	3.4	4.1	3.4	3.4	4.2	0.0	3.4	4.2	3.4
Minimum Recall	No	No	No	No	No	No	No	Yes		No	Yes	No
Maximum Recall	No	No	No	No	No	No	No	No		No	No	No
Pedestrian Recall	No	No	No	No	No	No	No	No		No	No	No
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	C	R	L	C	R	L	C	C	L	C	R
C, Cycle Length [s]	130	130	130	130	130	130	130	130	130	130	130	130
L, Total Lost Time per Cycle [s]	5.40	5.80	5.40	5.40	6.10	5.40	5.40	6.20	6.20	5.40	6.20	5.40
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	3.40	3.80	0.00	3.40	4.10	0.00	3.40	4.20	4.20	3.40	4.20	0.00
g_i, Effective Green Time [s]	2	12	28	20	29	49	14	65	65	10	62	87
g / C, Green / Cycle	0.02	0.09	0.22	0.15	0.23	0.38	0.10	0.50	0.50	0.08	0.47	0.67
(v / s)_i Volume / Saturation Flow Rate	0.01	0.08	0.08	0.25	0.18	0.06	0.09	0.14	0.14	0.05	0.15	0.40
s, saturation flow rate [veh/h]	1774	1863	1583	1792	1881	1598	1792	1881	1833	1792	3582	1548
c, Capacity [veh/h]	33	177	343	271	423	603	188	943	919	139	1697	1040
d1, Uniform Delay [s]	63.25	57.74	43.15	55.21	47.92	26.86	57.24	18.74	18.75	58.24	21.24	11.63
k, delay calibration	0.04	0.04	0.04	0.49	0.04	0.04	0.04	0.50	0.50	0.04	0.50	0.50
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	4.63	3.47	0.23	323.72	1.55	0.05	4.37	0.72	0.74	1.84	0.50	2.51
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.52	0.82	0.35	1.69	0.82	0.16	0.86	0.27	0.28	0.64	0.32	0.59
d, Delay for Lane Group [s/veh]	67.87	61.21	43.38	378.92	49.47	26.91	61.62	19.45	19.49	60.08	21.74	14.14
Lane Group LOS	E	E	D	F	D	C	E	B	B	E	C	B
Critical Lane Group	No	Yes	No	Yes	No	No	Yes	No	No	No	No	Yes
50th-Percentile Queue Length [veh/ln]	0.60	4.82	3.32	33.19	10.90	2.03	5.47	4.71	4.62	2.92	5.28	9.94
50th-Percentile Queue Length [ft/ln]	15.04	120.58	83.03	829.63	272.51	50.84	136.82	117.75	115.48	73.05	132.10	248.60
95th-Percentile Queue Length [veh/ln]	1.08	8.43	5.98	51.59	16.31	3.66	9.31	8.27	8.14	5.26	9.05	15.12
95th-Percentile Queue Length [ft/ln]	27.06	210.63	149.46	1289.86	407.87	91.50	232.73	206.73	203.60	131.48	226.35	377.89

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	67.87	61.21	43.38	378.92	49.47	26.91	61.62	19.47	19.49	60.08	21.74	14.14
Movement LOS	E	E	D	F	D	C	E	B	B	E	C	B
d_A, Approach Delay [s/veh]	54.00			213.78			29.62			20.71		
Approach LOS	D			F			C			C		
d_I, Intersection Delay [s/veh]	81.64											
Intersection LOS	F											
Intersection V/C	0.833											

Sequence

Ring 1	1	2	3	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	7	8	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Intersection Level Of Service Report
Intersection 1: NE 139th St/NE 10th Ave

Control Type:	Signalized	Delay (sec / veh):	40.8
Analysis Method:	HCM 2010	Level Of Service:	D
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.772

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	1	0	1	2	0	1	1	0	0	1	0	0
Pocket Length [ft]	400.00	100.00	240.00	285.00	100.00	190.00	370.00	100.00	100.00	385.00	100.00	100.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	16	135	113	429	327	91	152	448	32	84	511	582
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right-Turn on Red Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	16	135	113	429	327	91	152	448	32	84	511	582
Peak Hour Factor	0.9400	0.9400	0.9400	0.9400	0.9400	0.9400	0.9400	0.9400	0.9400	0.9400	0.9400	0.9400
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	4	36	30	114	87	24	40	119	9	22	136	155
Total Analysis Volume [veh/h]	17	144	120	456	348	97	162	477	34	89	544	619
Presence of On-Street Parking	No		No	No		No	No		No	No		No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrian Volume [ped/h]	16			16			1			1		
Bicycle Volume [bicycles/h]	0			0			0			1		

Intersection Settings

Located in CBD	No
Signal Coordination Group	-
Cycle Length [s]	130
Coordination Type	Time of Day Pattern Isolated
Actuation Type	Fully actuated
Offset [s]	37.0
Offset Reference	LeadGreen
Permissive Mode	SingleBand
Lost time [s]	12.00

Phasing & Timing

Control Type	Protecte	Permiss	Overlap	Protecte	Permiss	Overlap	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss
Signal Group	3	8	1	7	4	5	5	2	0	1	6	7
Auxiliary Signal Groups			1,8			4,5						6,7
Lead / Lag	Lead	-	-	Lead	-	-	Lead	-	-	Lead	-	-
Minimum Green [s]	5	5	5	5	5	5	5	5	0	5	5	5
Maximum Green [s]	30	30	30	30	30	30	30	30	0	30	30	30
Amber [s]	3.0	3.6	3.0	3.0	3.6	3.0	3.0	3.6	0.0	3.0	3.6	3.0
All red [s]	2.4	2.2	2.4	2.4	2.5	2.4	2.4	2.6	0.0	2.4	2.6	2.4
Split [s]	35	25	25	25	35	25	25	35	0	25	35	25
Vehicle Extension [s]	2.0	2.0	1.5	1.2	2.0	1.2	1.2	1.2	0.0	1.5	1.2	1.2
Walk [s]	0	5	0	0	5	0	0	5	0	0	5	0
Pedestrian Clearance [s]	0	22	0	0	22	0	0	15	0	0	24	0
Rest In Walk		No			No			No			No	
I1, Start-Up Lost Time [s]	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	0.0	2.0	2.0	2.0
I2, Clearance Lost Time [s]	3.4	3.8	3.4	3.4	4.1	3.4	3.4	4.2	0.0	3.4	4.2	3.4
Minimum Recall	No	No	No	No	No	No	No	Yes		No	Yes	
Maximum Recall	No	No	No	No	No	No	No	No		No	No	
Pedestrian Recall	No	No	No	No	No	No	No	No		No	No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	C	R	L	C	R	L	C	C	L	C	C
C, Cycle Length [s]	130	130	130	130	130	130	130	130	130	130	130	130
L, Total Lost Time per Cycle [s]	5.40	5.80	5.40	5.40	6.10	5.40	5.40	6.20	6.20	5.40	6.20	6.20
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	3.40	3.80	0.00	3.40	4.10	0.00	3.40	4.20	4.20	3.40	4.20	4.20
g_i, Effective Green Time [s]	2	12	28	19	28	48	14	66	66	10	62	62
g / C, Green / Cycle	0.02	0.09	0.22	0.14	0.22	0.37	0.10	0.51	0.51	0.08	0.48	0.48
(v / s)_i Volume / Saturation Flow Rate	0.01	0.08	0.08	0.13	0.18	0.06	0.09	0.14	0.14	0.05	0.29	0.40
s, saturation flow rate [veh/h]	1774	1863	1583	3479	1881	1598	1792	1881	1833	1792	1881	1540
c, Capacity [veh/h]	33	177	343	505	412	593	188	954	930	139	902	738
d1, Uniform Delay [s]	63.25	57.74	43.15	54.70	48.65	27.37	57.24	18.29	18.31	58.24	24.78	29.45
k, delay calibration	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.50	0.50	0.04	0.50	0.50
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	4.63	3.45	0.23	2.53	1.85	0.05	4.37	0.70	0.72	1.84	2.98	10.98
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.52	0.81	0.35	0.90	0.84	0.16	0.86	0.27	0.27	0.64	0.60	0.84
d, Delay for Lane Group [s/veh]	67.87	61.19	43.37	57.23	50.51	27.42	61.62	18.99	19.03	60.08	27.76	40.43
Lane Group LOS	E	E	D	E	D	C	E	B	B	E	C	D
Critical Lane Group	No	Yes	No	Yes	No	No	Yes	No	No	No	No	Yes
50th-Percentile Queue Length [veh/ln]	0.60	4.82	3.32	7.52	11.02	2.06	5.47	4.64	4.55	2.92	12.91	18.70
50th-Percentile Queue Length [ft/ln]	15.04	120.56	83.03	188.11	275.56	51.40	136.82	116.06	113.83	73.05	322.76	467.62
95th-Percentile Queue Length [veh/ln]	1.08	8.42	5.98	12.02	16.47	3.70	9.31	8.18	8.05	5.26	18.80	25.80
95th-Percentile Queue Length [ft/ln]	27.06	210.60	149.45	300.58	411.68	92.51	232.73	204.40	201.31	131.48	470.08	644.94

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	67.87	61.19	43.37	57.23	50.51	27.42	61.62	19.01	19.03	60.08	27.76	40.43
Movement LOS	E	E	D	E	D	C	E	B	B	E	C	D
d_A, Approach Delay [s/veh]	53.99			51.42			29.26			36.32		
Approach LOS	D			D			C			D		
d_I, Intersection Delay [s/veh]	40.77											
Intersection LOS	D											
Intersection V/C	0.772											

Sequence

Ring 1	1	2	3	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	7	8	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Intersection Level Of Service Report
Intersection 1: NE 139th St/NE 10th Ave

Control Type:	Signalized	Delay (sec / veh):	59.7
Analysis Method:	HCM 2010	Level Of Service:	E
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.875

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	1	0	1	1	0	1	1	0	0	1	0	0
Pocket Length [ft]	400.00	100.00	240.00	285.00	100.00	190.00	370.00	100.00	100.00	385.00	100.00	100.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	16	135	113	429	327	91	152	448	32	84	511	582
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right-Turn on Red Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	16	135	113	429	327	91	152	448	32	84	511	582
Peak Hour Factor	0.9400	0.9400	0.9400	0.9400	0.9400	0.9400	0.9400	0.9400	0.9400	0.9400	0.9400	0.9400
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	4	36	30	114	87	24	40	119	9	22	136	155
Total Analysis Volume [veh/h]	17	144	120	456	348	97	162	477	34	89	544	619
Presence of On-Street Parking	No		No	No		No	No		No	No		No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrian Volume [ped/h]	16			16			1			1		
Bicycle Volume [bicycles/h]	0			0			0			1		

Intersection Settings

Located in CBD	No
Signal Coordination Group	-
Cycle Length [s]	130
Coordination Type	Time of Day Pattern Isolated
Actuation Type	Fully actuated
Offset [s]	37.0
Offset Reference	LeadGreen
Permissive Mode	SingleBand
Lost time [s]	12.00

Phasing & Timing

Control Type	Split	Split	Overlap	Split	Split	Overlap	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss
Signal Group	3	8	1	7	4	5	5	2	0	1	6	7
Auxiliary Signal Groups			1,8			4,5						
Lead / Lag	-	-	-	-	-	-	Lead	-	-	Lead	-	-
Minimum Green [s]	0	5	5	0	5	5	5	5	0	5	5	0
Maximum Green [s]	0	30	30	0	30	30	30	30	0	30	30	0
Amber [s]	0.0	3.6	3.0	0.0	3.6	3.0	3.0	3.6	0.0	3.0	3.6	0.0
All red [s]	0.0	2.2	2.4	0.0	2.5	2.4	2.4	2.6	0.0	2.4	2.6	0.0
Split [s]	0	35	25	0	35	25	25	35	0	25	35	0
Vehicle Extension [s]	0.0	2.0	1.5	0.0	2.0	1.2	1.2	1.2	0.0	1.5	1.2	0.0
Walk [s]	0	5	0	0	5	0	0	5	0	0	5	0
Pedestrian Clearance [s]	0	22	0	0	22	0	0	15	0	0	24	0
Rest In Walk		No			No			No			No	
I1, Start-Up Lost Time [s]	0.0	2.0	2.0	0.0	2.0	2.0	2.0	2.0	0.0	2.0	2.0	0.0
I2, Clearance Lost Time [s]	0.0	3.8	3.4	0.0	4.1	3.4	3.4	4.2	0.0	3.4	4.2	0.0
Minimum Recall		No	No		No	No	No	Yes		No	Yes	
Maximum Recall		No	No		No	No	No	No		No	No	
Pedestrian Recall		No	No		No	No	No	No		No	No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	C	R	L	C	R	L	C	C	L	C	C
C, Cycle Length [s]	130	130	130	130	130	130	130	130	130	130	130	130
L, Total Lost Time per Cycle [s]	5.80	5.80	5.40	6.10	6.10	5.40	5.40	6.20	6.20	5.40	6.20	6.20
l1_p, Permitted Start-Up Lost Time [s]	2.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	3.80	3.80	0.00	4.10	4.10	0.00	3.40	4.20	4.20	3.40	4.20	4.20
g_i, Effective Green Time [s]	12	12	28	29	29	67	14	55	55	10	52	52
g / C, Green / Cycle	0.10	0.10	0.22	0.22	0.22	0.51	0.11	0.42	0.42	0.08	0.40	0.40
(v / s)_i Volume / Saturation Flow Rate	0.01	0.08	0.08	0.22	0.22	0.06	0.09	0.14	0.14	0.05	0.29	0.40
s, saturation flow rate [veh/h]	1412	1863	1583	1792	1868	1598	1792	1881	1832	1792	1881	1534
c, Capacity [veh/h]	173	179	345	398	415	823	189	797	776	139	744	607
d1, Uniform Delay [s]	55.37	57.62	43.03	50.60	50.23	16.27	57.21	25.05	25.07	58.24	33.43	39.32
k, delay calibration	0.04	0.04	0.04	0.36	0.34	0.04	0.04	0.50	0.50	0.04	0.50	0.50
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	0.09	3.22	0.22	39.41	30.59	0.02	4.25	1.08	1.12	1.82	6.25	41.71
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.10	0.81	0.35	1.00	0.97	0.12	0.86	0.32	0.33	0.64	0.73	1.02
d, Delay for Lane Group [s/veh]	55.46	60.84	43.25	90.01	80.81	16.30	61.46	26.13	26.19	60.06	39.68	81.03
Lane Group LOS	E	E	D	F	F	B	E	C	C	E	D	F
Critical Lane Group	No	Yes	No	Yes	No	No	Yes	No	No	No	No	Yes
50th-Percentile Queue Length [veh/ln]	0.53	4.81	3.32	17.26	16.54	1.52	5.47	5.60	5.49	2.92	15.77	26.03
50th-Percentile Queue Length [ft/ln]	13.13	120.25	82.95	431.54	413.44	37.98	136.68	140.01	137.34	73.05	394.31	650.63
95th-Percentile Queue Length [veh/ln]	0.95	8.41	5.97	24.13	23.21	2.73	9.30	9.48	9.34	5.26	22.29	34.90
95th-Percentile Queue Length [ft/ln]	23.63	210.17	149.30	603.27	580.17	68.36	232.54	237.04	233.44	131.49	557.13	872.58

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	55.46	60.84	43.25	88.91	80.81	16.30	61.46	26.16	26.19	60.06	39.68	81.03
Movement LOS	E	E	D	F	F	B	E	C	C	E	D	F
d_A, Approach Delay [s/veh]	53.00			77.95			34.66			61.57		
Approach LOS	D			E			C			E		
d_I, Intersection Delay [s/veh]	59.72											
Intersection LOS	E											
Intersection V/C	0.875											

Sequence

Ring 1	1	2	4	8	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Intersection Level Of Service Report
Intersection 1: NE 139th St/NE 10th Ave

Control Type:	Signalized	Delay (sec / veh):	34.2
Analysis Method:	HCM 2010	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.697

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	1	0	1	2	0	1	1	0	0	1	0	1
Pocket Length [ft]	400.00	100.00	240.00	285.00	100.00	190.00	370.00	100.00	100.00	385.00	100.00	310.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	16	135	113	429	327	91	152	448	32	84	511	582
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right-Turn on Red Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	16	135	113	429	327	91	152	448	32	84	511	582
Peak Hour Factor	0.9400	0.9400	0.9400	0.9400	0.9400	0.9400	0.9400	0.9400	0.9400	0.9400	0.9400	0.9400
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	4	36	30	114	87	24	40	119	9	22	136	155
Total Analysis Volume [veh/h]	17	144	120	456	348	97	162	477	34	89	544	619
Presence of On-Street Parking	No		No	No		No	No		No	No		No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrian Volume [ped/h]	16			16			1			1		
Bicycle Volume [bicycles/h]	0			0			0			1		

Intersection Settings

Located in CBD	No
Signal Coordination Group	-
Cycle Length [s]	130
Coordination Type	Time of Day Pattern Isolated
Actuation Type	Fully actuated
Offset [s]	37.0
Offset Reference	LeadGreen
Permissive Mode	SingleBand
Lost time [s]	12.00

Phasing & Timing

Control Type	Protecte	Permiss	Overlap	Protecte	Permiss	Overlap	Protecte	Permiss	Permiss	Protecte	Permiss	Overlap
Signal Group	3	8	1	7	4	5	5	2	0	1	6	7
Auxiliary Signal Groups			1,8			4,5						6,7
Lead / Lag	Lead	-	-	Lead	-	-	Lead	-	-	Lead	-	-
Minimum Green [s]	5	5	5	5	5	5	5	5	0	5	5	5
Maximum Green [s]	30	30	30	30	30	30	30	30	0	30	30	30
Amber [s]	3.0	3.6	3.0	3.0	3.6	3.0	3.0	3.6	0.0	3.0	3.6	3.0
All red [s]	2.4	2.2	2.4	2.4	2.5	2.4	2.4	2.6	0.0	2.4	2.6	2.4
Split [s]	35	25	25	25	35	25	25	35	0	25	35	25
Vehicle Extension [s]	2.0	2.0	1.5	1.2	2.0	1.2	1.2	1.2	0.0	1.5	1.2	1.2
Walk [s]	0	5	0	0	5	0	0	5	0	0	5	0
Pedestrian Clearance [s]	0	22	0	0	22	0	0	15	0	0	24	0
Rest In Walk		No			No			No			No	
I1, Start-Up Lost Time [s]	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	0.0	2.0	2.0	2.0
I2, Clearance Lost Time [s]	3.4	3.8	3.4	3.4	4.1	3.4	3.4	4.2	0.0	3.4	4.2	3.4
Minimum Recall	No	No	No	No	No	No	No	Yes		No	Yes	No
Maximum Recall	No	No	No	No	No	No	No	No		No	No	No
Pedestrian Recall	No	No	No	No	No	No	No	No		No	No	No
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	C	R	L	C	R	L	C	C	L	C	R
C, Cycle Length [s]	130	130	130	130	130	130	130	130	130	130	130	130
L, Total Lost Time per Cycle [s]	5.40	5.80	5.40	5.40	6.10	5.40	5.40	6.20	6.20	5.40	6.20	5.40
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	3.40	3.80	0.00	3.40	4.10	0.00	3.40	4.20	4.20	3.40	4.20	0.00
g_i, Effective Green Time [s]	2	12	28	20	29	49	14	65	65	10	62	87
g / C, Green / Cycle	0.02	0.09	0.22	0.15	0.23	0.38	0.10	0.50	0.50	0.08	0.47	0.67
(v / s)_i Volume / Saturation Flow Rate	0.01	0.08	0.08	0.13	0.18	0.06	0.09	0.14	0.14	0.05	0.15	0.40
s, saturation flow rate [veh/h]	1774	1863	1583	3479	1881	1598	1792	1881	1833	1792	3582	1548
c, Capacity [veh/h]	33	177	343	525	423	603	188	943	919	139	1697	1040
d1, Uniform Delay [s]	63.25	57.74	43.15	53.94	47.92	26.86	57.24	18.74	18.75	58.24	21.24	11.63
k, delay calibration	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.50	0.50	0.04	0.50	0.50
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	4.63	3.47	0.23	1.75	1.55	0.05	4.37	0.72	0.74	1.84	0.50	2.51
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.52	0.82	0.35	0.87	0.82	0.16	0.86	0.27	0.28	0.64	0.32	0.59
d, Delay for Lane Group [s/veh]	67.87	61.21	43.38	55.69	49.47	26.91	61.62	19.45	19.49	60.08	21.74	14.14
Lane Group LOS	E	E	D	E	D	C	E	B	B	E	C	B
Critical Lane Group	No	Yes	No	Yes	No	No	Yes	No	No	No	No	Yes
50th-Percentile Queue Length [veh/ln]	0.60	4.82	3.32	7.42	10.90	2.03	5.47	4.71	4.62	2.92	5.28	9.94
50th-Percentile Queue Length [ft/ln]	15.04	120.58	83.03	185.44	272.51	50.84	136.82	117.75	115.48	73.05	132.10	248.60
95th-Percentile Queue Length [veh/ln]	1.08	8.43	5.98	11.88	16.31	3.66	9.31	8.27	8.14	5.26	9.05	15.12
95th-Percentile Queue Length [ft/ln]	27.06	210.63	149.46	297.11	407.87	91.50	232.73	206.73	203.60	131.48	226.35	377.89

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	67.87	61.21	43.38	55.69	49.47	26.91	61.62	19.47	19.49	60.08	21.74	14.14
Movement LOS	E	E	D	E	D	C	E	B	B	E	C	B
d_A, Approach Delay [s/veh]	54.00			50.18			29.62			20.71		
Approach LOS	D			D			C			C		
d_I, Intersection Delay [s/veh]	34.20											
Intersection LOS	C											
Intersection V/C	0.697											

Sequence

Ring 1	1	2	3	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	7	8	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Intersection Level Of Service Report
Intersection 1: NE 139th St/NE 10th Ave

Control Type:	Signalized	Delay (sec / veh):	44.6
Analysis Method:	HCM 2010	Level Of Service:	D
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.767

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	1	0	1	1	0	1	1	0	0	1	0	1
Pocket Length [ft]	400.00	100.00	240.00	285.00	100.00	190.00	370.00	100.00	100.00	385.00	100.00	310.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	16	135	113	429	327	91	152	448	32	84	511	582
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right-Turn on Red Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	16	135	113	429	327	91	152	448	32	84	511	582
Peak Hour Factor	0.9400	0.9400	0.9400	0.9400	0.9400	0.9400	0.9400	0.9400	0.9400	0.9400	0.9400	0.9400
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	4	36	30	114	87	24	40	119	9	22	136	155
Total Analysis Volume [veh/h]	17	144	120	456	348	97	162	477	34	89	544	619
Presence of On-Street Parking	No		No	No		No	No		No	No		No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrian Volume [ped/h]	16			16			1			1		
Bicycle Volume [bicycles/h]	0			0			0			1		

Intersection Settings

Located in CBD	No
Signal Coordination Group	-
Cycle Length [s]	130
Coordination Type	Time of Day Pattern Isolated
Actuation Type	Fully actuated
Offset [s]	37.0
Offset Reference	LeadGreen
Permissive Mode	SingleBand
Lost time [s]	12.00

Phasing & Timing

Control Type	Split	Split	Overlap	Split	Split	Overlap	Protecte	Permiss	Permiss	Protecte	Permiss	Overlap
Signal Group	3	8	1	7	4	5	5	2	0	1	6	4
Auxiliary Signal Groups			1,8			4,5						4,6
Lead / Lag	-	-	-	-	-	-	Lead	-	-	Lead	-	-
Minimum Green [s]	0	5	5	0	5	5	5	5	0	5	5	5
Maximum Green [s]	0	30	30	0	30	30	30	30	0	30	30	30
Amber [s]	0.0	3.6	3.0	0.0	3.6	3.0	3.0	3.6	0.0	3.0	3.6	3.6
All red [s]	0.0	2.2	2.4	0.0	2.5	2.4	2.4	2.6	0.0	2.4	2.6	2.5
Split [s]	0	35	25	0	35	25	25	35	0	25	35	35
Vehicle Extension [s]	0.0	2.0	1.5	0.0	2.0	1.2	1.2	1.2	0.0	1.5	1.2	2.0
Walk [s]	0	5	0	0	5	0	0	5	0	0	5	5
Pedestrian Clearance [s]	0	22	0	0	22	0	0	15	0	0	24	22
Rest In Walk		No			No			No			No	
I1, Start-Up Lost Time [s]	0.0	2.0	2.0	0.0	2.0	2.0	2.0	2.0	0.0	2.0	2.0	2.0
I2, Clearance Lost Time [s]	0.0	3.8	3.4	0.0	4.1	3.4	3.4	4.2	0.0	3.4	4.2	4.1
Minimum Recall		No	No		No	No	No	Yes		No	Yes	No
Maximum Recall		No	No		No	No	No	No		No	No	No
Pedestrian Recall		No	No		No	No	No	No		No	No	No
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	C	R	L	C	R	L	C	C	L	C	R
C, Cycle Length [s]	130	130	130	130	130	130	130	130	130	130	130	130
L, Total Lost Time per Cycle [s]	5.80	5.80	5.40	6.10	6.10	5.40	5.40	6.20	6.20	5.40	6.20	6.10
l1_p, Permitted Start-Up Lost Time [s]	2.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	3.80	3.80	0.00	4.10	4.10	0.00	3.40	4.20	4.20	3.40	4.20	0.00
g_i, Effective Green Time [s]	12	12	28	29	29	67	14	55	55	10	52	87
g / C, Green / Cycle	0.10	0.10	0.22	0.22	0.22	0.51	0.11	0.42	0.42	0.08	0.40	0.67
(v / s)_i Volume / Saturation Flow Rate	0.01	0.08	0.08	0.22	0.22	0.06	0.09	0.14	0.14	0.05	0.15	0.40
s, saturation flow rate [veh/h]	1412	1863	1583	1792	1868	1598	1792	1881	1832	1792	3582	1547
c, Capacity [veh/h]	173	179	345	398	415	823	189	797	776	139	1417	1030
d1, Uniform Delay [s]	55.37	57.62	43.03	50.60	50.23	16.27	57.21	25.05	25.07	58.24	28.02	12.14
k, delay calibration	0.04	0.04	0.04	0.36	0.34	0.04	0.04	0.50	0.50	0.04	0.50	0.50
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	0.09	3.22	0.22	39.41	30.59	0.02	4.25	1.08	1.12	1.82	0.79	2.60
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.10	0.81	0.35	1.00	0.97	0.12	0.86	0.32	0.33	0.64	0.38	0.60
d, Delay for Lane Group [s/veh]	55.46	60.84	43.25	90.01	80.81	16.30	61.46	26.13	26.19	60.06	28.81	14.73
Lane Group LOS	E	E	D	F	F	B	E	C	C	E	C	B
Critical Lane Group	No	Yes	No	Yes	No	No	Yes	No	No	No	No	Yes
50th-Percentile Queue Length [veh/ln]	0.53	4.81	3.32	17.26	16.54	1.52	5.47	5.60	5.49	2.92	6.22	10.20
50th-Percentile Queue Length [ft/ln]	13.13	120.25	82.95	431.54	413.44	37.98	136.68	140.01	137.34	73.05	155.58	255.09
95th-Percentile Queue Length [veh/ln]	0.95	8.41	5.97	24.13	23.21	2.73	9.30	9.48	9.34	5.26	10.31	15.44
95th-Percentile Queue Length [ft/ln]	23.63	210.17	149.30	603.27	580.17	68.36	232.54	237.04	233.44	131.49	257.87	386.05

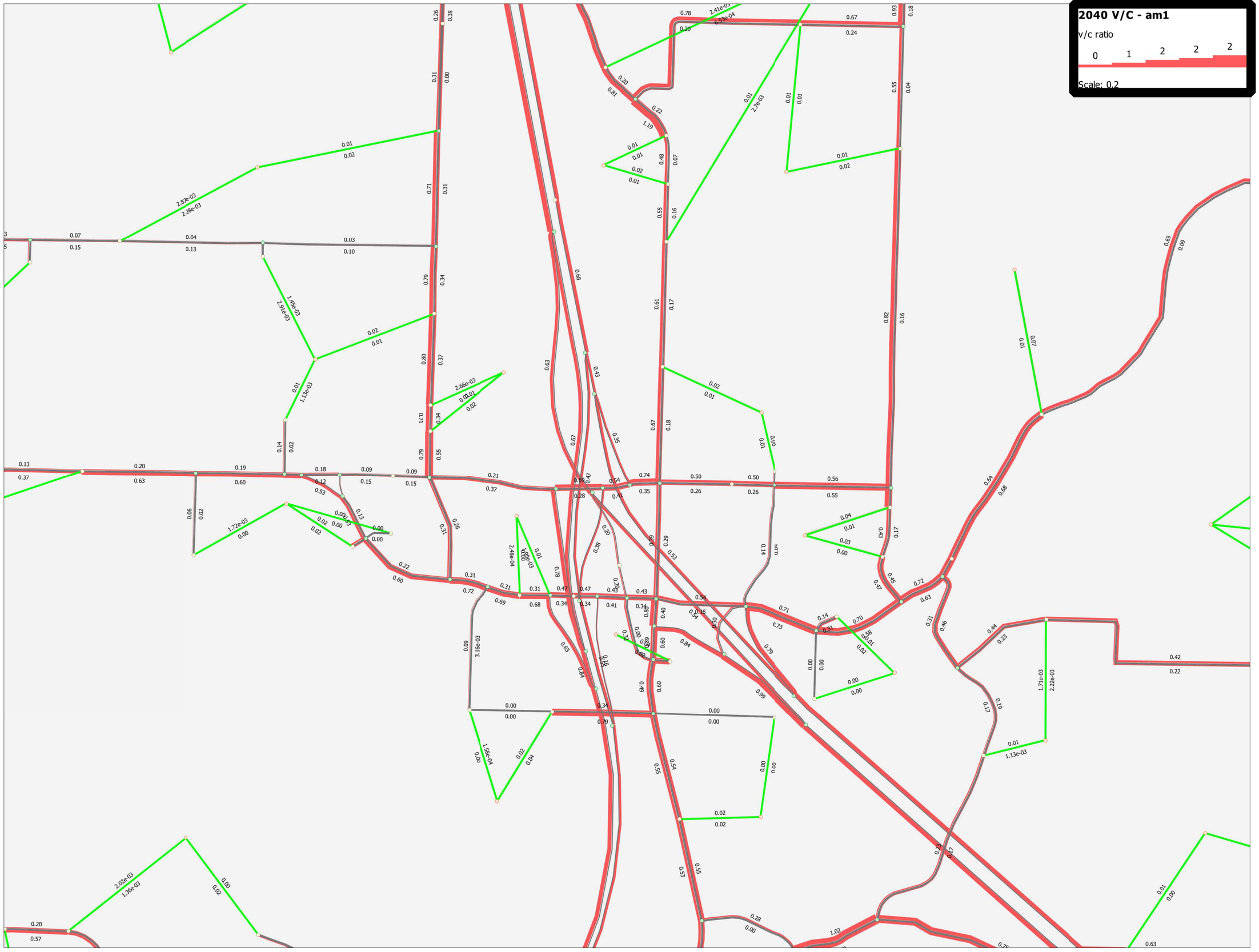
Movement, Approach, & Intersection Results

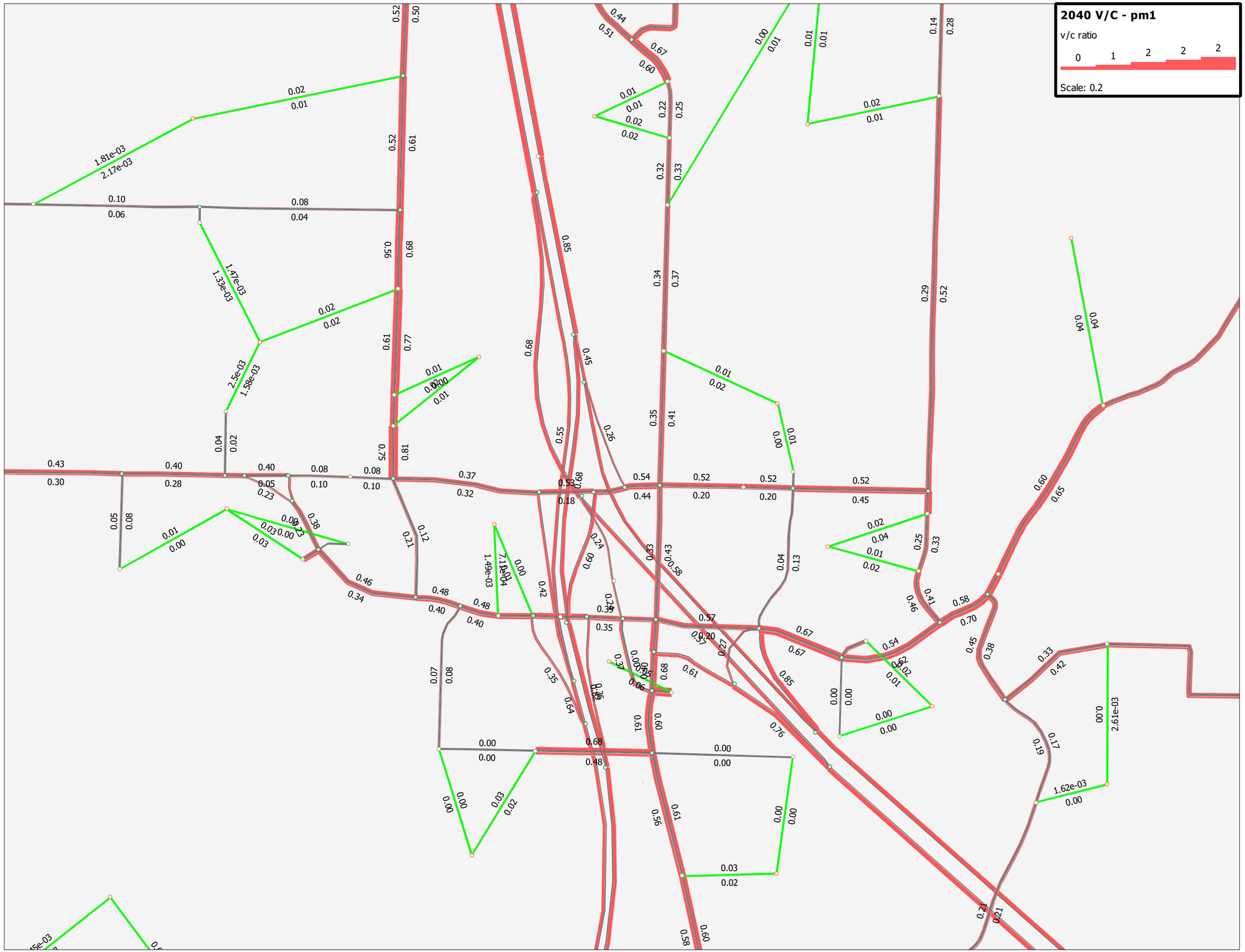
d_M, Delay for Movement [s/veh]	55.46	60.84	43.25	88.91	80.81	16.30	61.46	26.16	26.19	60.06	28.81	14.73
Movement LOS	E	E	D	F	F	B	E	C	C	E	C	B
d_A, Approach Delay [s/veh]	53.00			77.95			34.66			24.07		
Approach LOS	D			E			C			C		
d_I, Intersection Delay [s/veh]	44.60											
Intersection LOS	D											
Intersection V/C	0.767											

Sequence

Ring 1	1	2	4	8	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Appendix 2 RTC Segment V/C Ratio Plots


2040 V/C - am1
v/c ratio
0
1
2
2
2
Scale: 0.2


2040 V/C - pm1
v/c ratio
0
1
2
2
2
Scale: 0.2