Indianola Avenue – Task 3 Highway Capacity Software Analysis

Introduction

Michael Baker International has been tasked by the City of Columbus with evaluating the feasibility of a lane reconfiguration along Indianola Avenue. The lane reconfiguration includes the addition of bicycle facilities by means of parking lane modifications between existing bike lanes at Oakland Park Avenue and the cycle track at E Hudson Street and Summit Street.

Purpose

The purpose of the Highway Capacity Software (HCS) analysis is to evaluate the feasibility of implementing a lane reconfiguration along Indianola Avenue. This reconfiguration would reduce a traveled lane in the peak period along Indianola Avenue as well as on-street parking to allow for new bicycle facilities to be installed.

Traffic Data

Traffic Counts

Turning Movement Counts (TMC) were conducted by the City of Columbus in September of 2020. Due to the ongoing COVID-19 pandemic, these turning movement counts were adjusted to represent pre-pandemic traffic volumes.

Certified Traffic

No-Build and Build turning movement volumes were developed for the Opening Year (2024) and Design Year (2044) including both AM and PM peak volumes. These Certified Traffic volumes were developed in April of 2021 and certified by ODOT. See **Appendix A** for the Certified Traffic report and traffic plates.

Methodology

Highway Capacity Software

The Highway Capacity Software (HCS) analysis was split up into two files. The two intersections along Hudson St are contained in one file, and the remaining four intersections along Indianola Ave are included in the second. Based on the roadway volumes, the eastbound movement along Hudson St was coded as the forward direction whereas the northbound movement along Indianola Ave was considered the forward direction.

The City of Columbus provided the existing signal timing for the study intersections. The E North Broadway intersection and Oakland Park Avenue intersection had a different cycle length when compared to the other intersections along the corridor. Therefore, in the HCS coding, it was considered an "uncoordinated intersection". Due to the high volumes at the E North Broadway intersection, and distance from the Oakland Park Avenue intersection to the rest of the corridor, they remained coded as uncoordinated for the proposed analysis.

The HCS analysis was conducted in accordance with the ODOT Analysis and Traffic Simulation Manual (OATS). AM and PM peak volumes were analyzed under the No-Build and Build conditions. The Opening Year (2024) and Design Year (2044) were optimized to obtain the results for the respective traffic volumes, see **Table 3** and **Table 4**.

The cycle length and splits were optimized in accordance with Chapter 6 of the OATS manual. The cycle length was set to a minimum of 60 seconds and a maximum of 120 seconds with 5 second intervals. Cycle lengths for the AM and PM peak hours were analyzed separately, and therefore may be different durations. Because the intersections of E North Broadway and Oakland Park Ave were considered uncoordinated, the optimized cycle lengths may fall outside of the 60-120 second window.

Conditions

The existing configuration (No Build) was first analyzed to set a baseline. Then the base lane reconfiguration was analyzed and compared to the No Build. As will be discussed in later sections, additional configurations beyond the base lane reconfiguration were then analyzed for the E North Broadway intersection to evaluate signal operation improvements and a recommended Build Condition was recommended and detailed. The HCS Reports can be found in **Appendix B**

No Build Condition

The segment of Indianola Avenue from E Hudson Street to E Arcadia Avenue is two travel lanes in each direction with on-street parking available on both sides. However, on-street parking is not permitted on weekdays between 7:00-9:00 AM and 4:00-6:00 PM in either direction. Anecdotal observations indicate that cars are occasionally parked in the curb lane during peak restricted hours.

From E Arcadia Avenue to E North Broadway, the corridor is two travel lanes in each direction with a center turn lane between Parkview Drive and E North Broadway. On-street parking is present but parking on the east side of the roadway is prohibited between 4:00-6:00 PM, and parking on the west side is prohibited from 7:00-9:00 AM.

The northernmost segment from E North Broadway through Oakland Park Avenue has one travel lane and one merge lane in the northbound direction and two travel lanes in the southbound direction. The existing intersection lane configurations are shown below in **Table 1**.

Table 1. No Build Intersection Lane Configurations

Intersection	Direction	Lane Designation					
		Left Only	Left+Thru	Thru Only	Thru+Right	Right Only	All Movements
Hudson & Summit	Eastbound			X	X		
	Westbound		X	X			
	Northbound						
	Southbound						X
Indianola & Hudson	Eastbound				X		
	Westbound			X		X	
	Northbound			X		X	
	Southbound	X			X		
Indianola & Arcadia	Eastbound		X			X	
	Westbound						X
	Northbound		X		X		
	Southbound		X		X		
Indianola & Weber	Eastbound	X			X		
	Westbound	X			X		
	Northbound	X		X	X*		
	Southbound	X		X	X*		
Indianola & North Broadway	Eastbound	X			X		
	Westbound	X		X		X	
	Northbound	X		X	X*		
	Southbound	X		X	X*		
Indianola & Oakland Park	Eastbound	X			X		
	Westbound	X			X		
	Northbound	X			X		
	Southbound	X			X		

* Coded in HCS as right turn only in the off-peak direction due to on-street parking

Alternatives Analysis

Initially, the following base lane reconfiguration was assessed within HCS to determine the expected LOS and delay. The base lane reconfiguration would modify existing on street parking along Indianola Avenue and a dedicated parking lane would be provided on one side of the street based on recommendations from the parking utilization assessment. The corridor would then operate with one lane of travel in each direction. This reflects current operations of the corridor during off-peak periods when parking is not restricted. The center turn lane would remain and a bike lane would be installed in each direction. Additionally, the outside, eastbound lane along Hudson St was initially evaluated for the feasibility of conversion to a cycle track.

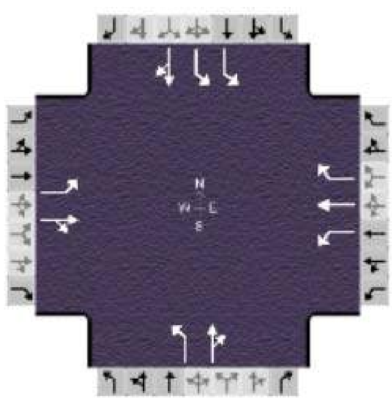
It was determined that every intersection would operate at an acceptable vehicular level of service with the base lane reconfiguration except for the Indianola Ave & E North Broadway intersection. The conversion of vehicular travel lanes to bike lanes through this intersection would cause the intersection delay to increase to 67.1 seconds and the LOS to decay to E during the PM Peak hour in the 2024 opening year (See the HCS reports in Appendix B for details). The Certified Traffic volumes show that a minimum of 350 southbound vehicles are turning left at this intersection. With only a single southbound left turning lane, this movement requires a significant portion of the cycle length causing all movement's Level of Service (LOS) to degrade below an acceptable level.

The outside, eastbound lane along Hudson St was evaluated for the feasibility of conversion to a cycle track. The results showed that the Hudson St & Summit St intersection would operate with an intersection delay of at least 170.5 seconds and a LOS F. However, after correspondence with McTrans, the producer of HCS software, the limitations of the HCS program in analyzing capacity regarding cycle track conversions was apparent. Therefore, further evaluation outside of the scope of this project is recommended, including access management as well as traffic operation impacts.

Once the Base Analysis ruled out the traditional implementation of the bike lanes at E North Broadway, an Alternatives Analysis was conducted to increase signalized operation for all movements at the E North Broadway intersection, while also providing accommodations for bike traffic. Additional configurations were investigated to improve the LOS.

An additional southbound left-turn lane was analyzed due to the high turning volume. **Figure 1** above shows the lane configuration for this alternative analysis. The alternative analysis (**Alt 1 Build**) includes 5-foot bike lanes on both sides of Indianola Ave, and a 10-foot painted median to offset the northbound left turn lane for alignment reasons. With dual southbound turning lanes, the southbound left turn movement was coded as protected only in HCS.

(E North Broadway)



(Indianola Avenue)

Figure 1. Alt 1 North Broadway Lane Configuration

As shown in **Table 3** and **Table 4** the addition of a second southbound left turn lane results in reduced delay. However, in 2044 the LOS is still not ideal during the PM peak. A second alternative (**Alt 2 Build**) was investigated which included the lane designations in **Figure 1** and adds an additional eastbound through lane. The right of way at the E North Broadway intersection was evaluated and determined to have ample width for the additional lane. However, further evaluation would be needed to determine impacts and appropriate design for the sidewalk and tree lawn at this location. Engagement with adjacent and area residents would be needed if this improvement were to be pursued at a future date. The second alternative results in acceptable LOS for all approaches, see **Table 3** and **Table 4**.

Finally, given that Alt 1 and Alt 2 would require physical modifications to the intersection, a third, hybrid alternative (incorporated into the **Build Condition** discussed below) was identified that balances the objective of accommodating bicycle movement through the intersection while maintaining acceptable vehicular traffic operations. In this alternative, the intersection would be restriped so that the outside right curb lane on the north and south legs of Indianola become dedicated right turn only lanes. Bike lanes will merge into the right turn lanes and cyclists will mix with turning traffic in the lane. Cyclists will be permitted to proceed directly through the intersection, while vehicles in the lane will only be permitted to turn right. This has the added benefit of separating right turning vehicles from those proceeding directly through the intersection. The outside lane will transition back to a bike lane on the opposite side of the intersection. A similar treatment has been used for bike lane transitions elsewhere in the City. Options for enhanced signage and bicycle pavement markings will be explored to emphasize to drivers the presence of cyclists mixing with traffic through the intersection area.

As shown in **Table 3** and **Table 4** this configuration will minimize traffic delay impacts as opposed to the other alternatives considered. Currently, vehicles traveling through this intersection experience between 31 and 42 seconds of delay on average while waiting at the traffic signal. No significant change in travel delay is anticipated with this modification on opening day. A failure analysis was also performed to identify potential traffic impacts over the course of the following 20 years from the project opening year of 2024. As is shown in **Table 5**, the analysis indicates that starting around year 2034, additional intersection improvements may be necessary to accommodate future traffic growth while maintaining acceptable traffic signal operations and minimizing vehicular delay. Volumes for the years 2029, 2034, and 2039 were interpolated between the 2024 and 2044 certified traffic volumes as shown in **Table 2** below.

Table 2. Interpolated Volumes at E North Broadway

		PM Build Volume				
Approach	**Movement**	**2024 Certified**	**2029**	**2034**	**2039**	**2044 Certified**
Eastbound	**Left**	120	123	125	128	130
	Thru	620	640	660	680	700
	Right	80	80	80	80	80
Westbound	**Left**	120	123	125	128	130
	Thru	570	588	605	623	640
	Right	330	340	350	360	370
Northbound	**Left**	100	100	100	100	100
	Thru	350	353	355	358	360
	Right	90	90	90	90	90
Southbound	**Left**	350	360	370	380	390
	Thru	360	363	365	368	370
	Right	140	143	145	148	150

Build Condition

The proposed Build Condition as shown in **Table 3** and **Table 4** is made up of a mix of cross sections as determined through the Alternatives Analysis above. First, since the cycle track on Hudson St was deemed infeasible at this time, the bike lanes are proposed to begin on Indianola Ave at Arcadia with the connection from this point to the existing bike facilities on Summit St occuring via sharrows on Arcadia Ave between Indianola Ave and Summit St and a bike boulevard on Summit St between Arcadia Ave and Hudson St. The Build Condition for the Hudson St at Summit St matches the no-build configuration. However, the Build Condition does include converting the existing four-lane segment of Indianola Ave between Hudson St and Arcadia Ave to a three-lane segment, including a dedicated left turn at Hudson St and at Arcadia Ave. The Build Condition for the intersections of Weber Rd with Indianola Ave and Oakland Park Ave with Indianola Ave are also reflective of a three-lane section with a dedicated left turn lane. The Build Condition for the Indianola Ave intersection with E North Broadway shows the results of the analysis of the “hybrid alternative” as detailed in the Alternatives Analysis above, including a left-turn only, through only, and right-turn only lanes with the bike lanes ending just upstream of the approaches and merging into the right-turn only lanes.

Table 3. AM Peak HCS Analysis Results

Intersection	Approach	AM Peak															
		2024 No Build		2044 No Build		2024 Build		2044 Build		2024 Alt 1 Build		2044 Alt 1 Build		2024 Alt 2 Build		2044 Alt 2 Build	
		Delay (s)	LOS	Delay (s)	LOS	Delay (s)	LOS	Delay (s)	LOS	Delay (s)	LOS	Delay (s)	LOS	Delay (s)	LOS	Delay (s)	LOS
Hudson & Summit	Eastbound	3.8	A	4.7	A	7.1	A	6.0	A	-	-	-	-	-	-	-	-
	Westbound	9.6	A	11.0	B	10.9	B	9.0	A	-	-	-	-	-	-	-	-
	Northbound	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Southbound	25.1	C	24.1	C	20.7	C	14.8	B	-	-	-	-	-	-	-	-
	Intersection	6.6	A	8.0	A	9.0	A	7.6	A	-	-	-	-	-	-	-	-
Hudson & Indianola	Eastbound	30.1	C	23.8	C	34.8	C	35.9	D	-	-	-	-	-	-	-	-
	Westbound	15.5	B	14.9	B	20.3	C	18.4	B	-	-	-	-	-	-	-	-
	Northbound	23.8	C	27.8	C	25.0	C	26.8	C	-	-	-	-	-	-	-	-
	Southbound	18.3	B	21.0	C	24.8	C	34.7	C	-	-	-	-	-	-	-	-
	Intersection	21.6	C	20.7	C	26.4	C	28.8	C	-	-	-	-	-	-	-	-
Indianola & Arcadia	Eastbound	22.6	C	23.4	C	22.7	C	23.5	C	-	-	-	-	-	-	-	-
	Westbound	21.5	C	23.1	C	21.4	C	21.4	C	-	-	-	-	-	-	-	-
	Northbound	10.9	B	6.0	A	6.0	A	7.7	A	-	-	-	-	-	-	-	-
	Southbound	7.2	A	7.1	A	6.6	A	7.6	A	-	-	-	-	-	-	-	-
	Intersection	12.2	B	12.3	B	10.7	B	12.3	B	-	-	-	-	-	-	-	-
Indianola & Weber	Eastbound	19.0	B	16.8	B	18.2	B	16.8	B	-	-	-	-	-	-	-	-
	Westbound	19.8	B	17.7	B	19.0	B	17.7	B	-	-	-	-	-	-	-	-
	Northbound	9.6	A	11.0	B	10.5	B	13.3	B	-	-	-	-	-	-	-	-
	Southbound	8.2	A	10.3	B	10.1	B	12.5	B	-	-	-	-	-	-	-	-
	Intersection	12.8	B	13.8	B	14.1	B	15.0	B	-	-	-	-	-	-	-	-
Indianola & Broadway	Eastbound	31.2	C	37.9	D	33.4	C	34.7	C	30.3	C	31.5	C	-	-	24.8	C
	Westbound	31.3	C	40.6	D	31.9	C	43.3	D	26.2	C	30.1	C	-	-	27.2	C
	Northbound	35.9	D	45.7	D	34.1	C	47.3	D	32.8	C	44.7	D	-	-	44.6	D
	Southbound	26.5	C	34.5	C	26.0	C	36.3	D	36.4	D	45.7	D	-	-	45.6	D
	Intersection	31.1	C	39.0	D	30.8	C	40.0	D	30.8	C	36.5	D	-	-	33.9	C
Indianola & Oakland Park	Eastbound	12.0	B	12.0	B	12.0	B	12.2	B	-	-	-	-	-	-	-	-
	Westbound	12.4	B	12.5	B	12.5	B	12.7	B	-	-	-	-	-	-	-	-
	Northbound	9.3	A	7.2	A	7.1	A	7.5	A	-	-	-	-	-	-	-	-
	Southbound	8.8	A	8.1	A	7.7	A	8.6	A	-	-	-	-	-	-	-	-
	Intersection	9.5	A	8.4	A	8.1	A	8.6	A	-	-	-	-	-	-	-	-

Table 4. PM Peak HCS Analysis Results

Intersection	Approach	PM Peak															
		2024 No Build		2044 No Build		2024 Build		2044 Build		2024 Alt 1 Build		2044 Alt 1 Build		2024 Alt 2 Build		2044 Alt 2 Build	
		Delay (s)	LOS	Delay (s)	LOS	Delay (s)	LOS	Delay (s)	LOS	Delay (s)	LOS	Delay (s)	LOS	Delay (s)	LOS	Delay (s)	LOS
Hudson & Summit	Eastbound	3.3	A	3.4	A	16.7	B	21.9	C	-	-	-	-	-	-	-	-
	Westbound	11.9	B	14.0	B	7.9	A	8.4	A	-	-	-	-	-	-	-	-
	Northbound	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Southbound	34.8	C	43.6	D	28.1	C	28.8	C	-	-	-	-	-	-	-	-
	Intersection	6.8	A	8.0	A	13.8	B	17.3	B	-	-	-	-	-	-	-	-
Hudson & Indianola	Eastbound	30.0	C	35.7	D	42.1	D	36.2	D	-	-	-	-	-	-	-	-
	Westbound	16.0	B	18.7	B	16.7	B	18.8	B	-	-	-	-	-	-	-	-
	Northbound	30.1	C	38.9	D	27.0	C	36.8	D	-	-	-	-	-	-	-	-
	Southbound	21.8	C	23.8	C	18.6	B	21.8	C	-	-	-	-	-	-	-	-
	Intersection	23.2	C	27.6	C	26.0	C	27.1	C	-	-	-	-	-	-	-	-
Indianola & Arcadia	Eastbound	31.7	C	17.1	B	24.8	C	22.1	C	-	-	-	-	-	-	-	-
	Westbound	28.8	C	15.9	B	22.9	C	20.7	C	-	-	-	-	-	-	-	-
	Northbound	5.5	A	8.4	A	7.3	A	8.5	A	-	-	-	-	-	-	-	-
	Southbound	8.5	A	10.5	B	7.1	A	7.6	A	-	-	-	-	-	-	-	-
	Intersection	12.2	B	11.0	B	11.0	B	11.0	B	-	-	-	-	-	-	-	-
Indianola & Weber	Eastbound	24.7	C	13.9	B	19.3	B	15.8	B	-	-	-	-	-	-	-	-
	Westbound	25.9	C	16.1	B	20.1	C	17.5	B	-	-	-	-	-	-	-	-
	Northbound	11.1	B	11.9	B	14.3	B	17.8	B	-	-	-	-	-	-	-	-
	Southbound	11.4	B	13.3	B	13.2	B	17.4	B	-	-	-	-	-	-	-	-
	Intersection	17.6	B	13.8	B	16.5	B	17.2	B	-	-	-	-	-	-	-	-
Indianola & Broadway	Eastbound	40.3	D	42.0	D	48.6	D	**154.5**	**F**	52.3	D	181.9	F	-	-	37.2	D
	Westbound	31.1	C	45.3	D	31.0	C	**46.1**	**D**	30.0	C	44.8	D	-	-	40.5	D
	Northbound	42.0	D	59.9	E	47.1	D	**59.9**	**E**	53.8	D	68.7	E	-	-	46.2	D
	Southbound	32.4	C	44.0	D	39.6	D	**75.8**	**E**	50.2	D	59.3	E	-	-	45.2	D
	Intersection	35.7	D	46.6	D	40.5	D	**83.8**	**F**	44.9	D	87.9	F	-	-	41.8	D
Indianola & Oakland Park	Eastbound	12.1	B	13.2	B	12.2	B	14.1	B	-	-	-	-	-	-	-	-
	Westbound	12.5	B	13.6	B	12.6	B	14.5	B	-	-	-	-	-	-	-	-
	Northbound	8.7	A	13.4	B	8.5	A	8.5	A	-	-	-	-	-	-	-	-
	Southbound	9.2	A	12.4	B	8.2	A	8.2	A	-	-	-	-	-	-	-	-
	Intersection	9.4	A	13.0	B	8.9	A	9.0	A	-	-	-	-	-	-	-	-

Table 5. Failure Analysis at E North Broadway Intersection

Intersection	Approach	PM Peak									
		2024 Build		2029 Build		2034 Build		2039 Build		2044 Build	
		Delay (s)	LOS	Delay (s)	LOS	Delay (s)	LOS	Delay (s)	LOS	Delay (s)	LOS
Indianola & E North Broadway	Eastbound	48.6	D	40.9	D	61.3	E	75.1	E	154.5	F
	Westbound	31.0	C	36.9	D	44.4	D	56.2	E	46.1	D
	Northbound	47.1	D	48.8	D	54.5	D	59.3	E	59.9	E
	Southbound	39.6	D	51.1	D	40.7	D	53.8	D	75.8	E
	Intersection	40.5	D	43.6	D	49.4	D	61.0	E	83.8	F

Traffic Recommendations

Michael Baker was tasked with evaluating the feasibility of a lane reconfiguration along Indianola Avenue to add bicycle facilities via HCS analysis. Based on the results of the HCS analysis, Michael Baker recommends the following:

- Reconfigure existing roadway to a three-lane segment, one through lane both northbound and southbound and one two-way left turn lane, along Indianola Ave between Hudson St and Oakland Park Ave and add right-turn only lanes at E. North Broadway
- Install dedicated northbound and southbound left-turn lanes at signalized intersections per turn lane length calculations.
- Install bike lanes on Indianola Ave from Hudson St to 300’ south of E North Broadway.
- Merge northbound and southbound approaching bike lanes to North Broadway into vehicular right-turn only lane.
- Consolidate parking to one side of Indianola Ave based on results of the Parking Utilization Assessment.
- Continue to monitor the E North Broadway intersection over time. Additional modifications could be required in the future to maintain intersection operation.
- Consider installing a second southbound left turn lane on Indianola Ave at E. North Broadway when monitoring listed above warrants it.
- Do not convert outside eastbound through lane on Hudson St to a cycle track until further evaluation can determine the feasibility.

Turn Lane Lengths

A center turn lane is present under existing conditions, therefore, analysis was only conducted to determine the turn lane length for the Build condition. The Opening Year and Design Year AM and PM peak volumes were used in conjunction with ODOT’s L&D Volume 1 to calculate the turn lane length, see **Table 6**.

Table 6. Left Turn Lane Lengths (including 50’ diverging taper)

<table>
<tr><th rowspan="3">Intersection</th><th rowspan="3">Movement</th><th rowspan="3">Queue Type</th><th colspan="6">Build Condition</th></tr>
<tr><th colspan="2">2024</th><th colspan="2">2044</th><th colspan="2">2044 Alt</th></tr>
<tr><th>AM Peak</th><th>PM Peak</th><th>AM Peak</th><th>PM Peak</th><th>AM Peak</th><th>PM Peak</th></tr>
<tr><td rowspan="6">Indianola Ave & Hudson St</td><td>NBL</td><td></td><td>N/A</td><td>N/A</td><td>N/A</td><td>N/A</td><td>-</td><td>-</td></tr>
<tr><td rowspan="2">SBL</td><td>Storage (ft)</td><td>400</td><td>300</td><td>325</td><td>375</td><td>-</td><td>-</td></tr>
<tr><td>95th Percentile</td><td>208</td><td>219</td><td>450</td><td>268</td><td>-</td><td>-</td></tr>
<tr><td>EBL</td><td></td><td>N/A</td><td>N/A</td><td>N/A</td><td>N/A</td><td>-</td><td>-</td></tr>
<tr><td>WBL</td><td></td><td>N/A</td><td>N/A</td><td>N/A</td><td>N/A</td><td>-</td><td>-</td></tr>
<tr><td colspan="2">Cycle Length (s)</td><td>95</td><td>70</td><td>90</td><td>90</td><td>-</td><td>-</td></tr>
</table>

Intersection	Movement	Queue Type	Build Condition 2024 AM Peak	2024 PM Peak	2044 AM Peak	2044 PM Peak	2044 Alt AM Peak	2044 Alt PM Peak
Indianola Ave & Arcadia Ave	NBL	Storage (ft)	150	200	200	200	-	-
		95th Percentile	100	150	122	179	-	-
	SBL	Storage (ft)	100	100	100	100	-	-
		95th Percentile	152	184	185	190	-	-
	EBR	Storage (ft)	150	150	225	150	-	-
		95th Percentile	131	159	177	146	-	-
	WBL	Storage (ft)	100	100	100	100	-	-
		95th Percentile	88	79	109	87	-	-
	Cycle Length (s)		60	65	60	60	-	-
Indianola Ave & Weber Rd	NBL	Storage (ft)	100	100	100	100	-	-
		95th Percentile	164	265	200	264	-	-
	SBL	Storage (ft)	100	100	100	100	-	-
		95th Percentile	178	227	204	242	-	-
	EBL	Storage (ft)	100	100	100	150	-	-
		95th Percentile	192	228	223	233	-	-
	WBL	Storage (ft)	150	100	100	150	-	-
		95th Percentile	170	263	174	282	-	-
	Cycle Length (s)		60	65	60	60	-	-
Indianola Ave & North Broadway	NBL	Storage (ft)	200	200	250	225	225	250
		95th Percentile	243	469	304	594	377	789
	SBL	Storage (ft)	450	500	575	600	525*	675*
		95th Percentile	312	379	445	700	499	671
	EBL	Storage (ft)	200	225	225	250	225	300
		95th Percentile	484	850	596	1793	555	2041
	WBL	Storage (ft)	225	225	250	250	250	300
		95th Percentile	608	578	913	811	771	893
	Cycle Length (s)		106	125	131	148	117	163
Indianola Ave & Oakland Park	NBL	Storage (ft)	100	100	100	100	-	-
		95th Percentile	129	183	143	198	-	-
	SBL	Storage (ft)	100	100	100	100	-	-
		95th Percentile	162	174	193	198	-	-
	EBL	Storage (ft)	100	100	100	100	-	-
		95th Percentile	73	65	74	68	-	-
	WBL	Storage (ft)	100	100	100	100	-	-
		95th Percentile	64	69	64	73	-	-
	Cycle Length (s)		39	40	40	44	-	-

*Storage length accommodated by 2 lanes.
Note: The 95^{th} Percentile Queue lengths take from HCS Reports. This length is the longer of the left lane or thru lane queue.

Table 6 shows that the alternative build condition results in reduced left turn lane lengths due to improved intersection LOS. The presence of the center turn lane will be allow left turning vehicles access to the left turn lane. Turning lane calculations are available in **Appendix C**.

Turn Lane Lengths Recommendations

Michael Baker International recommends, at minimum, the turn lane lengths shown in **Table 7** below to accommodate left turn storage. Where field conditions allow, additional left turn lane length will be extended, up to the preferred lengths shown in **Appendix C,** to alleviate blockage. Actual left turn lane lengths will be determined during design.

Table 6. Minimum Turn Lane Lengths

Intersection	Movement	Storage	Taper	Total
Indianola Ave & Hudson St*	SBL	350	50	400
Indianola Ave & Arcadia Ave	NBL	150	50	200
	SBL	50	50	100
	EBR**	175	50	225
Indianola Ave & Weber Rd	NBL	50	50	100
	SBL	50	50	100
	EBL	100	50	150
	WBL	100	50	150
Indianola Ave & North Broadway	NBL	200	50	250
	SBL	550	50	600
	EBL	250	50	300
	WBL	250	50	300
Indianola Ave & Oakland Park	NBL	50	50	100
	SBL	50	50	100
	EBL	50	50	100
	WBL	50	50	100

*Intersection restricts all other left turns except southbound
*Approach has right-turn only, but no left-turn only

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Appendix A:

Certified Traffic Report and Traffic Plates

Michael Baker INTERNATIONAL

4/9/2021

Indianola Avenue Road Diet Study

Design Traffic for Certification

We Make a Difference

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Attachment E – Pre-Pandemic Tube Counts

Attachment F – Pre-Pandemic TMC, Raw 2020 TMC, and Scaled 2020 TMC Plates

Attachment G – Partial Count Factor Forms

Attachment H – Scaled 2020 AADT Plate

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Attachment L – ODOT Provided Model Outputs

Michael Baker International (Michael Baker) has been retained by the City of Columbus to develop Design Traffic for the Indianola Avenue Road Diet Study. This narrative summarizes the assumptions used to prepare the design hour volume (DHV) and daily traffic forecasts. The traffic data years utilized in the forecast development are 2020 Existing Year, 2024 Opening Year, and 2044 Design Year. The analysis conducted is consistent with Ohio Department of Transportation (ODOT) methodologies and assumptions.

The design traffic forecast plates have been prepared and are included in **Attachment A**.

1. Project Purpose and Location

Michael Baker developed the design traffic needed to perform a road diet study along approximately 1.2 miles of Indianola Avenue from E Hudson Street to Oakland Park Avenue and approximately 0.1 miles of E Hudson Street from Indianola Avenue to Summit Street. The proposed project will extend the existing on-street bike lanes that currently end north of Oakland Park Avenue.

There are six (6) existing signalized intersections within the project limits which are included in the design traffic forecast:

1. E Hudson Street and Summit Street
2. Indianola Avenue and E Hudson Street
3. Indianola Avenue and E Arcadia Avenue
4. Indianola Avenue and E Weber Road
5. Indianola Avenue and E North Broadway
6. Indianola Avenue and Oakland Park Avenue

The segment of Indianola Avenue from E Hudson Street to E Arcadia Avenue is two travel lanes in each direction with on-street parking available on both sides. However, on-street parking is not permitted on weekdays between 7:00-9:00 AM and 4:00-6:00 PM in either direction.

From just north of E Arcadia Avenue to E North Broadway, the corridor is two travel lanes in each direction plus a center turn lane. On-street parking is present but parking on the east side of the roadway is prohibited between 4:00-6:00 PM, and parking on the west side is prohibited from 7:00-9:00 AM. The northernmost segment from E North Broadway through Oakland Park Avenue has one travel lane in the northbound direction and two travel lanes in the southbound direction.

As part of the proposed road diet, all existing on-street parking will be removed, and the corridor shall operate with one lane of travel in each direction throughout.

1.1. Traffic Count Data

1.1.1. Intersection Turning Movement Counts

Intersection turning movement counts were collected by the City of Columbus in September of 2020 between the hours of 7:30 AM – 9:30 AM and 12:00 PM – 6:30 PM at the following intersections (**Attachment B**):

1. E Hudson Street and Summit Street
2. Indianola Avenue and E Hudson Street
3. Indianola Avenue and E Arcadia Avenue
4. Indianola Avenue and E Weber Road
5. Indianola Avenue and E North Broadway
6. Indianola Avenue and Oakland Park Avenue

Due to the ongoing COVID-19 pandemic and its potential impacts to vehicular traffic demand, recent pre-COVID turning movement counts were also provided by the City at the following intersections (**Attachment C**):

1. Indianola Avenue and E North Broadway (February 2020)
2. Indianola Avenue and E Weber Road (February 2020)
3. Indianola Avenue and Cliffside Drive (July 2019)
4. Indianola Avenue and Arcadia Avenue (September 2019)

1.1.2. 24-hour Link Data

The City collected 24-hour tube counts on Indianola Ave between Cliffside Drive and Parkview Drive, including directional bicycle volumes and vehicular volumes, speed, and classification (**Attachment D**). Additionally, pre-COVID 24-hour tube counts were available on ODOT's Transportation Data Management System on Indianola Avenue, south of E North Broadway (August 2019) (**Attachment E**).

1.2. Travel Demand Forecasts

Design Traffic Forecasts are based on existing traffic counts and traffic forecasts from a travel demand model. ODOT provided 24-hour volume, AM Peak Period, and PM Peak Period travel demand model outputs for the following scenarios to aid in the development of certified traffic:

1. Opening Year 2024 No Build Model
2. Opening Year 2024 Build Model
3. Design Year 2044 No Build Model
4. Design Year 2044 Build Model

It is important to note that the models do not include the I-71 Hard Shoulder Running (HSR) project. The addition of an HSR on I-71, a nearby route parallel to Indianola Ave, would increase I-71 capacity during the peak hours and thus potentially reducing traffic along Indianola Avenue. This approach is therefore conservative for estimating traffic forecasts on Indianola Avenue.

The turning movement count data and model data was translated into AM DHV, PM DHV, and 24-hour turning movement counts using the adjustment factors and procedures described in the following sections.

2. Existing Traffic Volumes

2.1. Peak Hour Selection

The turning movement counts in September 2020 took place during a time of decreased traffic volumes as a result of the COVID-19 pandemic. Therefore, the guidance in ODOT's *Traffic Counts for Traffic Forecasts COVID19 Supplement* was followed for adjusting counts to more closely represent typical, pre-pandemic demands. ODOT's COVID19 supplement states that the peak hour should be determined from the pre-pandemic counts. Three of the study intersections and a non-study intersection within the project limits had recent pre-pandemic turning movement count data available. The peak hour was identified by the largest aggregate volume across the intersections with a morning peak from 7:45 – 8:45 AM, see **Table 1**, and an evening peak of 4:45 – 5:45 PM, see **Table 2**.

Table 1. AM Period Pre-Pandemic Counts

Intersection	7:00 AM	7:15 AM	7:30 AM	7:45 AM	8:00 AM
Indianola & North Broadway	2312	2490	2506	2500	2431
Indianola & Weber	1527	1677	1713	1747	1661
Indianola & Arcadia	820	946	1063	1104	1134
Indianola & Cliffside	564	630	675	698	704
Total	5223	5743	5957	**6049**	5930

Table 2. PM Period Pre-Pandemic Counts

Intersection	4:00 PM	4:15 PM	4:30 PM	4:45 PM	5:00 PM
Indianola & North Broadway	2601	2575	2652	2689	2677
Indianola & Weber	1985	2028	2081	2087	1985
Indianola & Arcadia	1476	1565	1581	1589	1579
Indianola & Cliffside	1148	1220	1227	1247	1275
Total	7210	7388	7541	**7612**	7516

2.2. Traffic Count Comparison

Table 3 and **Table** 4 show intersections which had both pre-pandemic and September 2020 counts, which were compared to determine if the September 2020 count volumes were within 15% of the pre-pandemic volumes.

Table 3. AM Peak Hour Volume Comparison

Intersection	Pre-COVID Count		COVID Count		Decrease of Pre-Pandemic Value
	AM Peak Hour	AM Volume	AM Peak Hour	AM Volume	
Indianola & North Broadway	7:30 - 8:30	2506	7:45 - 8:45	1622	35%
Indianola & Weber	7:45 - 8:45	1747	7:30 - 8:30	858	51%
Indianola & Arcadia	8:00 - 9:00	1134	7:45 - 8:45	647	43%

Table 4. PM Peak Hour Volume Comparison

Intersection	Pre-COVID Count		COVID Count		Decrease of Pre-Pandemic Value
	PM Peak Hour	PM Volume	PM Peak Hour	PM Volume	
Indianola & North Broadway	4:45 - 5:45	2689	5:00 - 6:00	2339	13%
Indianola & Weber	4:45 - 5:45	2087	5:00 - 6:00	1448	31%
Indianola & Arcadia	4:45 - 5:45	1589	5:00 - 6:00	1059	33%

Because the variance was greater than 15%, COVID adjustment factors were developed for each peak hour and applied to the September 2020 turning movement counts to develop a new base volume set. These adjustment factors were determined utilizing the total entering volumes counted in the peak hour identified in the previous section. **Table 5** and **Table 6** show the calculated adjustment factors based on the peak hour.

Table 5. AM Peak COVID Adjustment Factor

AM Peak (7:45-8:45)		
Intersection	**Pre-Covid Counts**	**Covid Counts**
Indianola & North Broadway	2500	1622
Indianola & Weber	1747	856
Indianola & Arcadia	1104	647
Total	5351	3125
AM Adjustment Factor	**1.71**	

Table 6. PM Peak COVID Adjustment Factor

PM Peak (4:45-5:45)		
Intersection	**Pre-Covid Counts**	**Covid Counts**
Indianola & North Broadway	2689	2335
Indianola & Weber	2087	1410
Indianola & Arcadia	1589	1032
Total	6365	4777
PM Adjustment Factor	**1.33**	

See **Attachment F** for the pre-pandemic peak hour TMC, Raw 2020 TMC, and Scaled 2020 TMC. Since there are multiple access driveways and unsignalized side streets between study intersections, no effort was taken to balance volumes.

2.3. Intersection AADT Estimates

The ODOT partial count factor form (partialcountfactorform.xls) was used to process the extrapolation to a daily volume and is provided as **Attachment G**. Pre-COVID 24-hour tube counts were available on Indianola Avenue, south of E North Broadway (August 2019) which was seasonally adjusted to determine the 2019 AADT. The partial daily count data (September 2020) at the intersection of Indianola

Ave and North Broadway was used to determine the bi-directional volume along Indianola Ave at the same location as the 2019 24-hour count station. The partial count volume was compared to the 2019 AADT to determine the adjustment factor of 1.831. Because the 2019 AADT was already seasonally adjusted and took place during pre-pandemic traffic volumes, this adjustment factor acted as the combined partial count expansion factor, seasonal adjustment factor, and COVID adjustment factor. The adjustment factor was applied to the intersection turning movement volumes to develop the AADT turning movement volumes and Total AADT. Implementation of this factor yielded reasonable AADT estimates based on ODOT's TMMS website's available data for the study area. **Attachment H** illustrates the Scaled 2020 AADT.

2.4. TD and T24 Factors

The design hour and daily truck percentages, TD and T24, were estimated based on the sources of existing count data provided above. The count data collected in September 2020 was used to estimate the existing truck percentages. This truck percentage should be considered the TD and T24. With no major changes expected in the immediate area, the existing truck percentages should represent an accurate estimate of future conditions as well. The resulting TD and T24 factors for each intersection are included with the final Design Traffic found in **Attachment I**.

3. Forecast Development

3.1. NCHRP 255/765 Process

ODOT Procedures for preparing design traffic forecasts for capital improvements are based on National Cooperative Highway Research Program (NCHRP) 255 and NCHRP 765 methodologies. The procedures are implemented in an Excel spreadsheet tool (*nchrp255_revised_volume_adjuster_v7+w_ix_diagram*) as developed by ODOT. The tool is flexible and can be applied to link volumes (arterial mainline) and to turning volumes at intersections. The procedure at intersections converts the approach growth into turns based on existing counts and iterative proportional fitting. The tool is applied at each individual location, and the results at each location are combined into one common set of traffic forecasts.

The NCHRP 255 tool was applied separately at each study intersection for both No Build and Build conditions. Additionally, the provided AM peak period and PM peak period model outputs were used to develop growth factors specific to the respective peak. This approach was used due to the presence of on-street parking, which is generally restricted in the peak direction of travel. As a result, it is expected that the proposed road diet will have a greater impact to traffic forecasts in the southbound direction in the AM, and in the northbound direction in the PM.

In order to properly develop growth factors based on AM and PM peak period model outputs, the September 2020 turning movement counts were extrapolated to match the model time periods of 6:00-9:00 AM and 3:00-7:00 PM. A similar method to the daily volume extrapolation was implemented. The 24-hour tube count from September 2020 was used to determine the percentage of daily traffic occurring between 7:30-9:30 AM and 3:00-6:30 PM for the September 2020 TMC. The percentage of daily traffic occurring during the model timeframe, 6:00-9:00 AM and 3:00-7:00 PM, was also calculated. The ratio between these two values was used to correct the scaled 2020 TMC fit the model timeframe. **Attachment J** includes the Scaled September 2020 count data volumes adjusted to the model timeframe.

Table 7. AM Percentage of Daily Traffic

Start Time	NB Volume	NB Hourly Percent	SB Volume	SB Hourly Percent
6:00 AM	23	0.51%	42	0.99%
6:15 AM	22	0.49%	50	1.18%
6:30 AM	33	0.73%	57	1.35%
6:45 AM	45	0.99%	83	1.96%
7:00 AM	58	1.28%	57	1.35%
7:15 AM	48	1.06%	58	1.37%
7:30 AM	49	1.08%	57	1.35%
7:45 AM	43	0.95%	54	1.28%
8:00 AM	51	1.13%	53	1.25%
8:15 AM	48	1.06%	53	1.25%
8:30 AM	45	0.99%	49	1.16%
8:45 AM	47	1.04%	45	1.07%
9:00 AM	48	1.06%	49	1.16%
9:15 AM	62	1.37%	47	1.11%
Percent of Daily Traffic 7:30-9:30		**8.68%**		**9.63%**
Percent of Daily Traffic 6:00-9:00		**11.30%**		**15.57%**
Time of Day Adjustment Factor		**1.303**		**1.617**

Table 8. PM Percentage of Daily Traffic

Start Time	NB Volume	NB Hourly Percent	SB Volume	SB Hourly Percent
3:00 PM	102	2.25%	77	1.82%
3:15 PM	121	2.67%	89	2.11%
3:30 PM	100	2.21%	84	1.99%
3:45 PM	93	2.05%	78	1.85%
4:00 PM	111	2.45%	88	2.08%
4:15 PM	113	2.50%	71	1.68%
4:30 PM	101	2.23%	85	2.01%
4:45 PM	94	2.08%	103	2.44%
5:00 PM	90	1.99%	71	1.68%
5:15 PM	84	1.85%	71	1.68%
5:30 PM	88	1.94%	81	1.92%
5:45 PM	88	1.94%	84	1.99%
6:00 PM	77	1.70%	71	1.68%
6:15 PM	66	1.46%	69	1.63%
6:30 PM	60	1.32%	69	1.63%
6:45 PM	56	1.24%	70	1.66%
Percent of Daily Traffic 3:00-6:30		**29.32%**		**26.56%**
Percent of Daily Traffic 3:00-7:00		**31.88%**		**29.85%**
Time of Day Adjustment Factor		**1.087**		**1.124**

The worksheets are included in **Attachment K**. The opening year and design year model inputs were pulled from the results contained in **Attachment L**.

3.2. Assumed K Factors

The 2020 turning movement counts took place during the COVID-19 pandemic and the traffic patterns and volumes may not be representative of future conditions. Therefore, design hour K factors were estimated from the data contained in the 2019 K & D Factors Report provided on ODOT's Technical Services Website. Future K factors were based on the average of urban roadways with the same functional classification. Verification of the selected K factors was conducted by comparing calculated K factors from the 2020 count data and was determined to be acceptable. The 2019 K & D Factors Report did not provide K factors for local roadways, so the K factor calculation was conducted based on the September 2020 traffic counts, and 10% was determined to be acceptable.

Table 7. Assumed K-Factors by Functional Classification

Roadway	Functional Classification	Assumed K-Factor
Oakland Park Ave	Urban Local	10.00%
North Broadway	Urban Minor Arterial	11.17%
Weber Rd	Urban Minor Arterial	11.17%
Arcadia Ave	Urban Local	10.00%
Hudson St	Urban Minor Arterial	11.17%
Indianola Ave	Urban Minor Arterial	11.17%
Indianola Ave South of Hudson St	Urban Local	10.00%
Hudson St East of Summit St	Urban Principal Arterial	10.22%
Summit St South of Hudson St	Urban Principal Arterial	10.22%
Summit St North of Hudson St	Urban Local	10.00%

4. Design Traffic for Certification

The design traffic developed as described in this memorandum is included in **Attachment A**. The methodologies prescribed by ODOT were used in development of the design traffic volumes but cannot be referred to as "certified" unless reviewed by ODOT.

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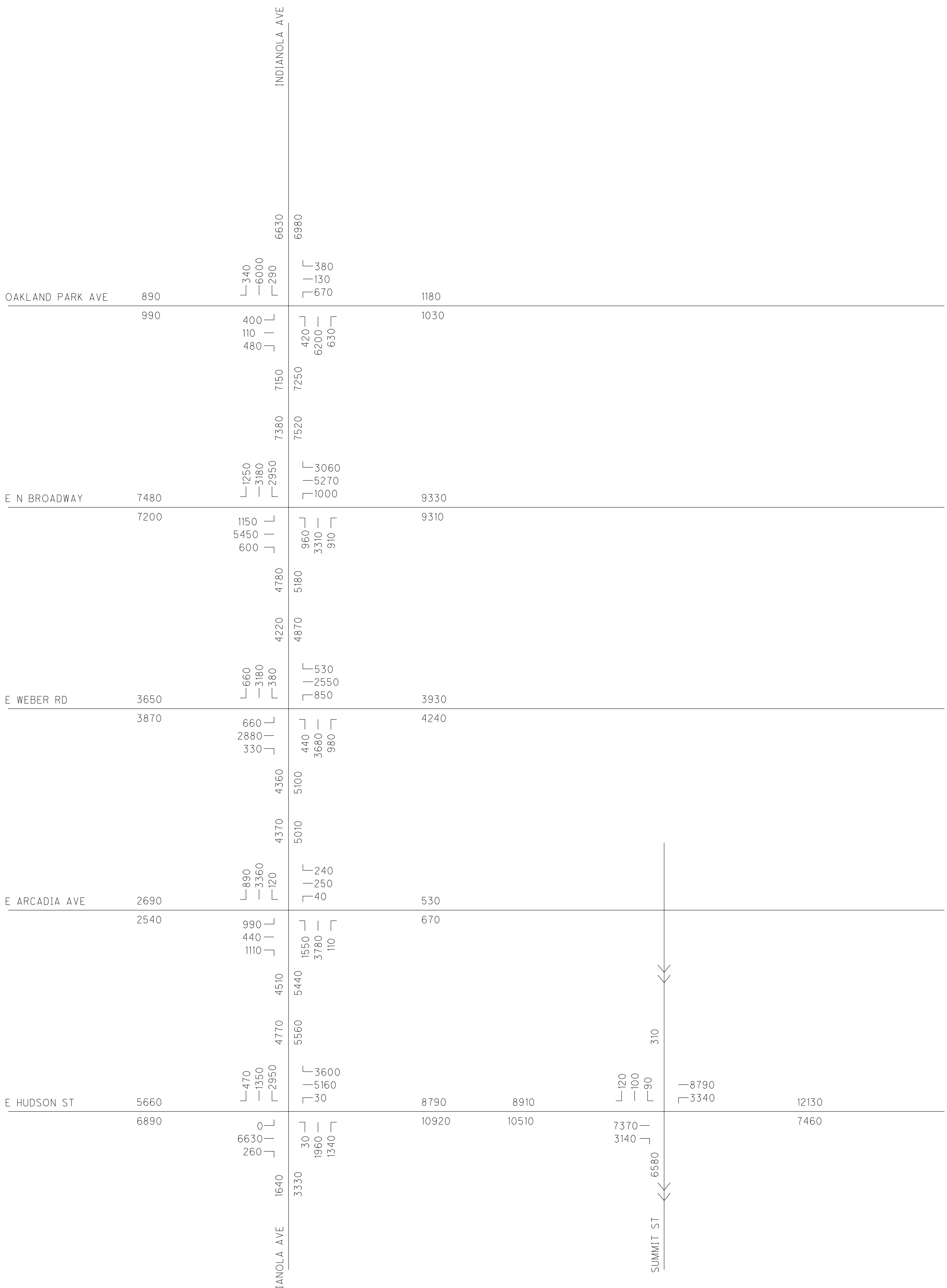
Attachment A:

Design Traffic Forecast Plates

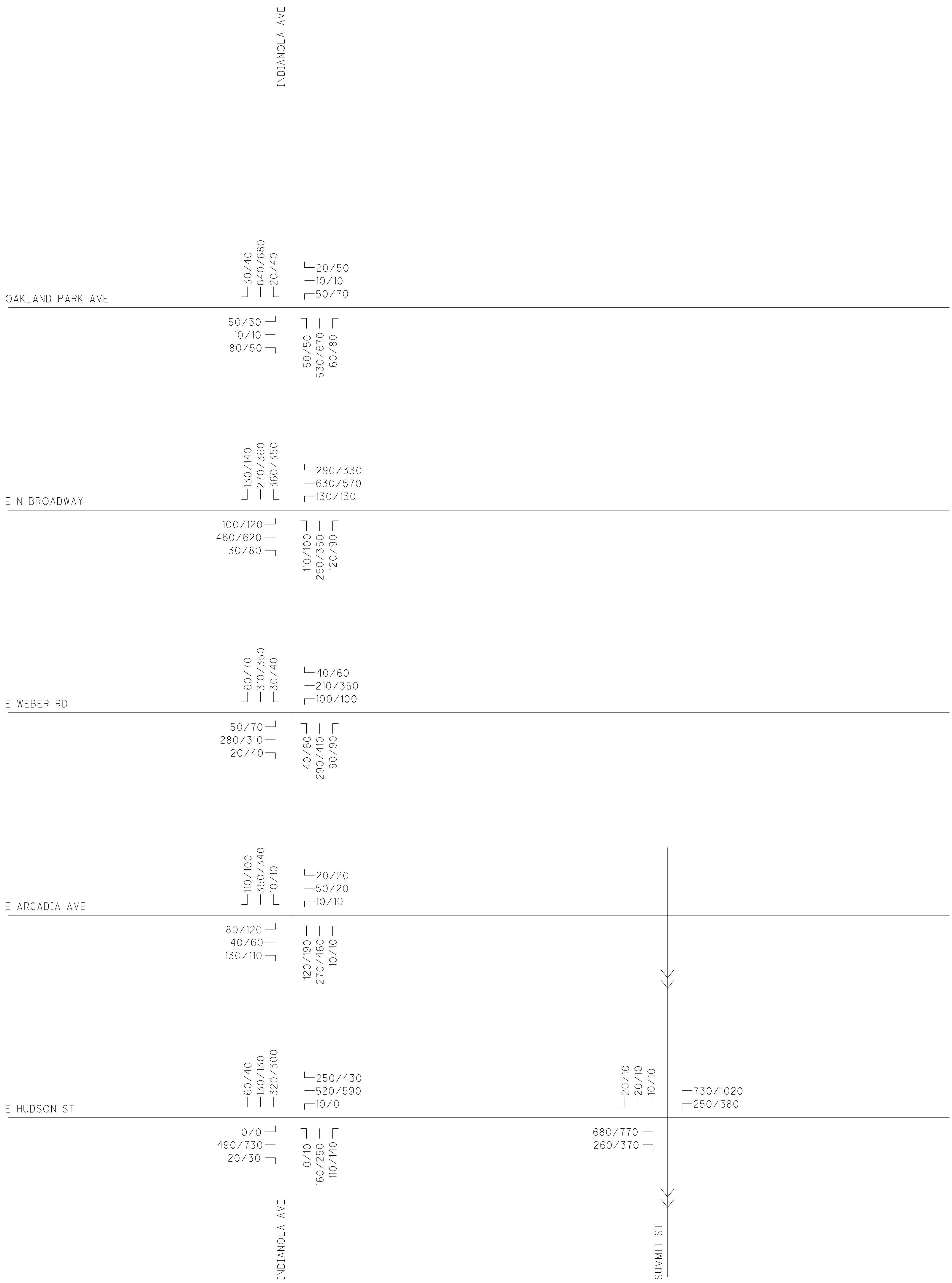


INDIANOLA AVENUE ROAD DIET STUDY

NO-BUILD CONDITION

2024 AADT

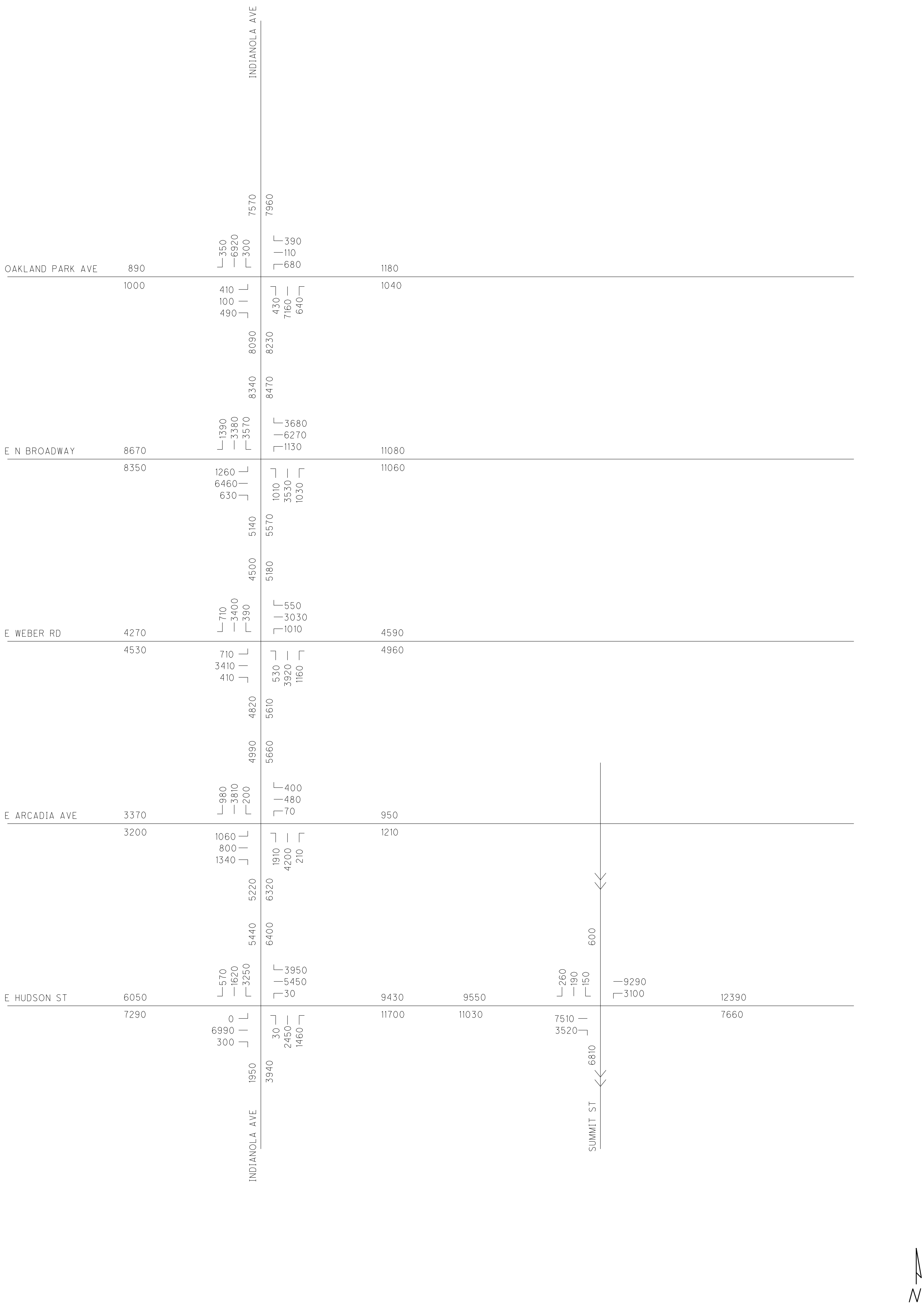
APRIL 9, 2021 | NOT TO SCALE



X/X AM PEAK/PM PEAK

N

INDIANOLA AVENUE ROAD DIET STUDY
NO-BUILD CONDITION
2024 AM PEAK/PM PEAK
APRIL 9, 2021 | NOT TO SCALE

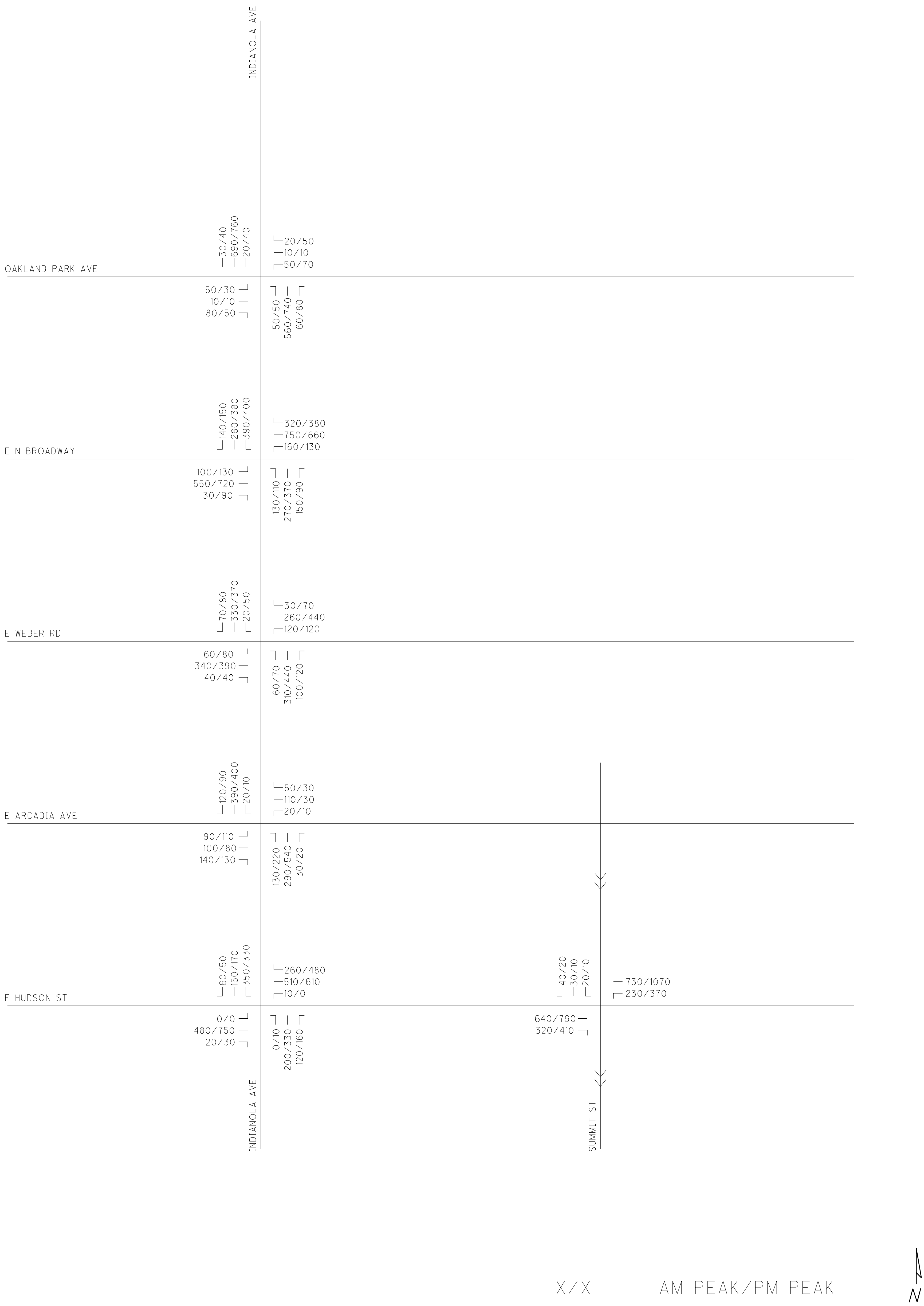


INDIANOLA AVENUE ROAD DIET STUDY

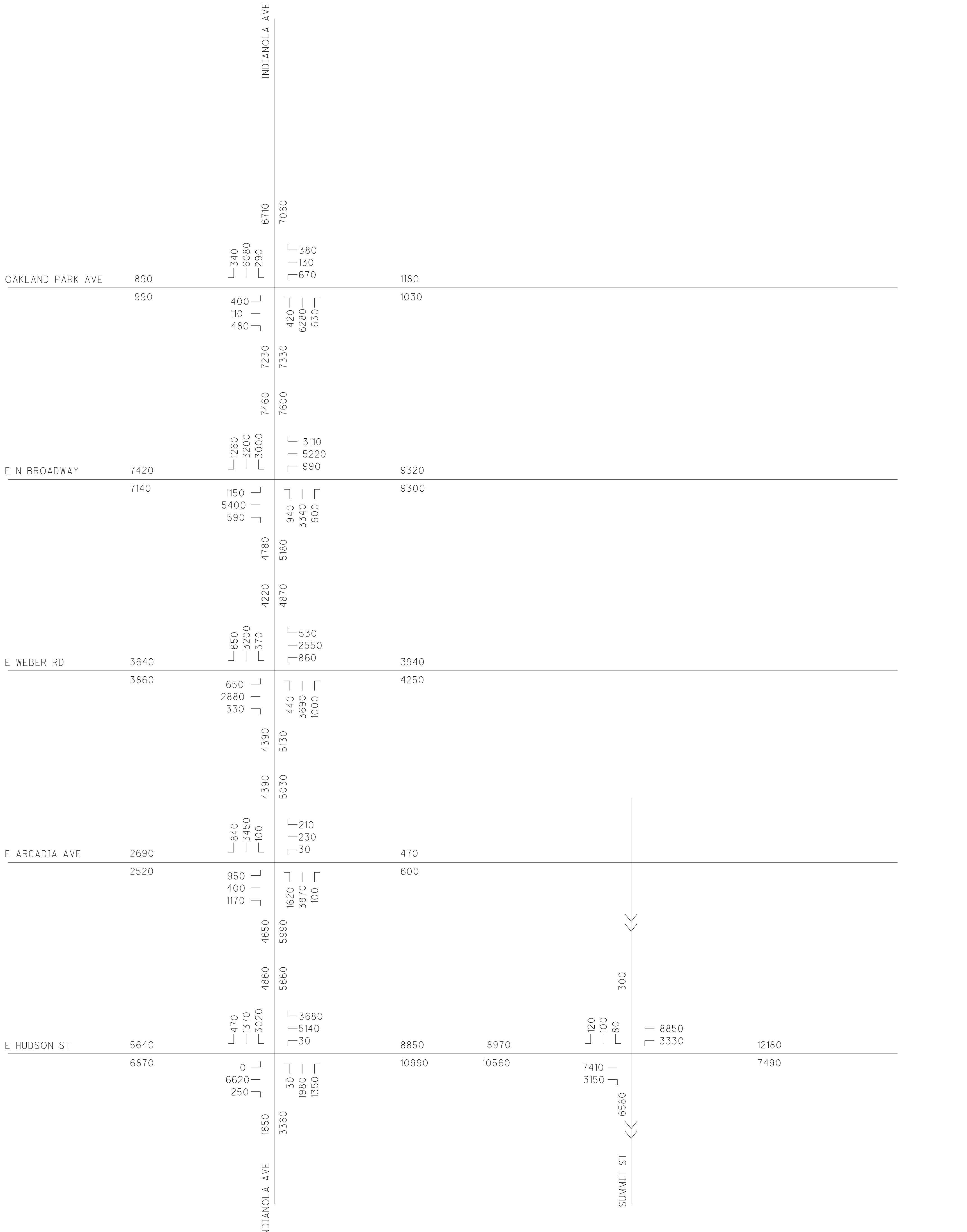
NO-BUILD CONDITION

2044 AADT

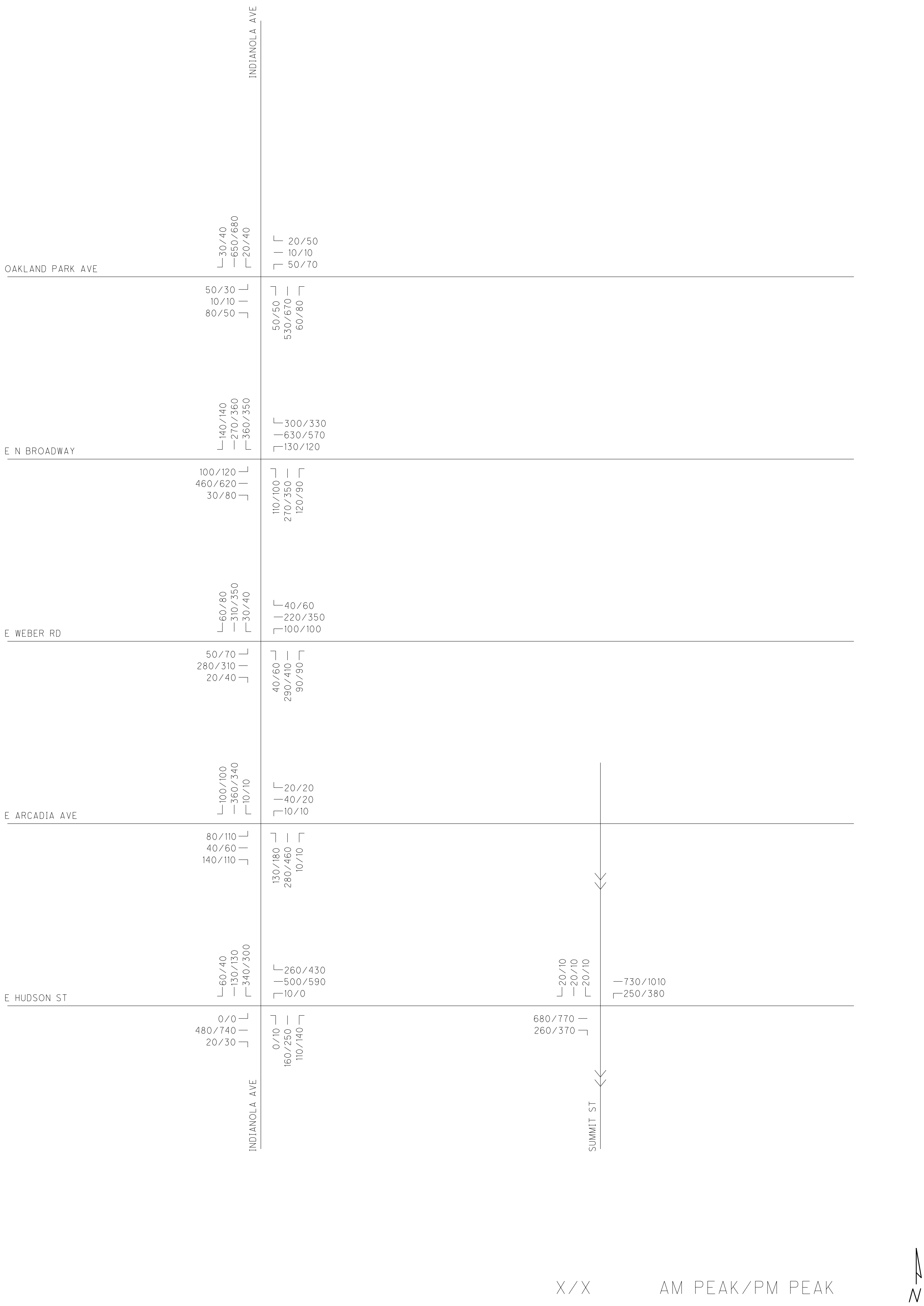
APRIL 9, 2021 | NOT TO SCALE



INDIANOLA AVENUE ROAD DIET STUDY
NO-BUILD CONDITION
2044 AM PEAK/PM PEAK
APRIL 9, 2021 | NOT TO SCALE



INDIANOLA AVENUE ROAD DIET STUDY
BUILD CONDITION
2024 AADT
APRIL 9, 2021 | NOT TO SCALE

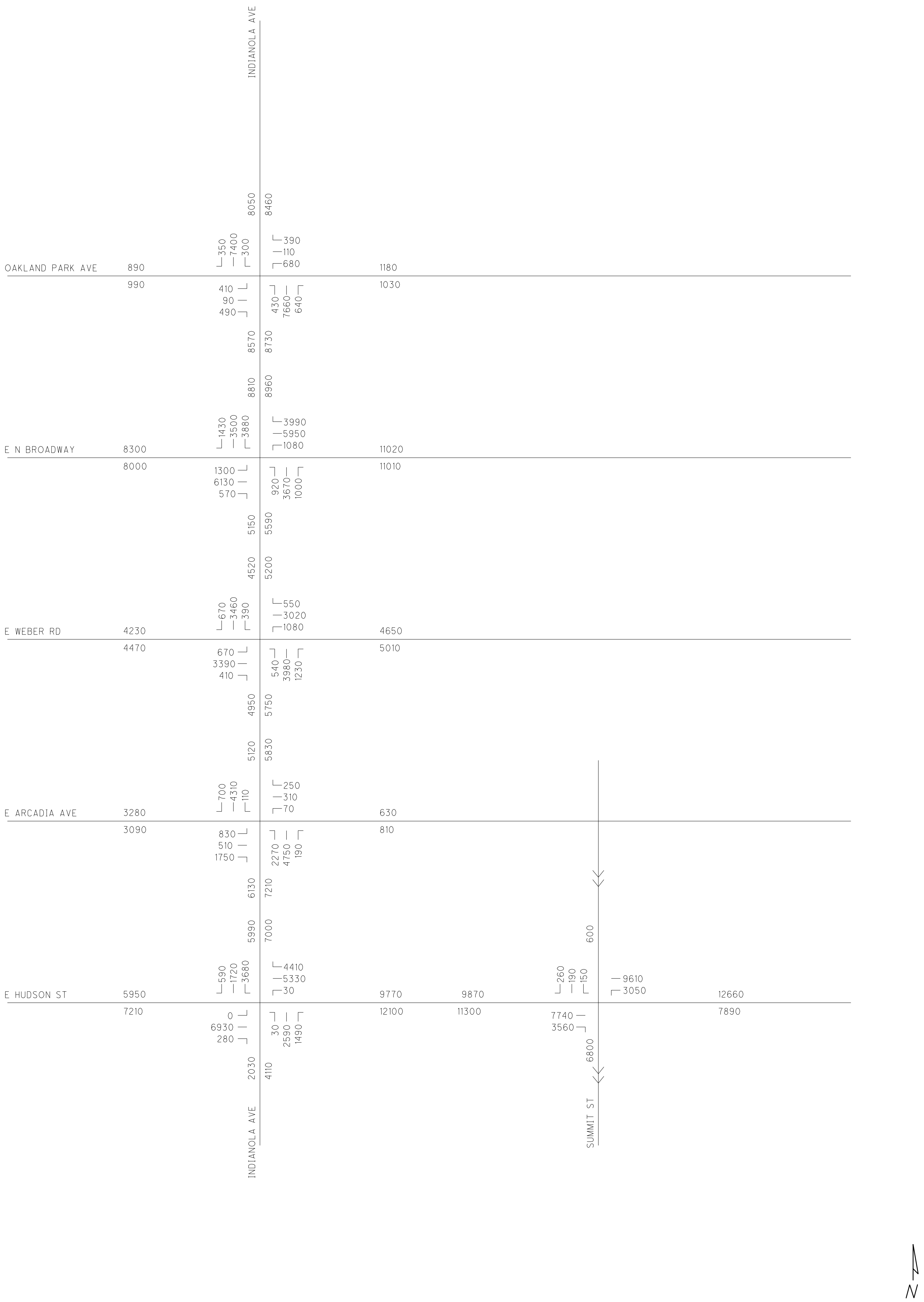


INDIANOLA AVENUE ROAD DIET STUDY

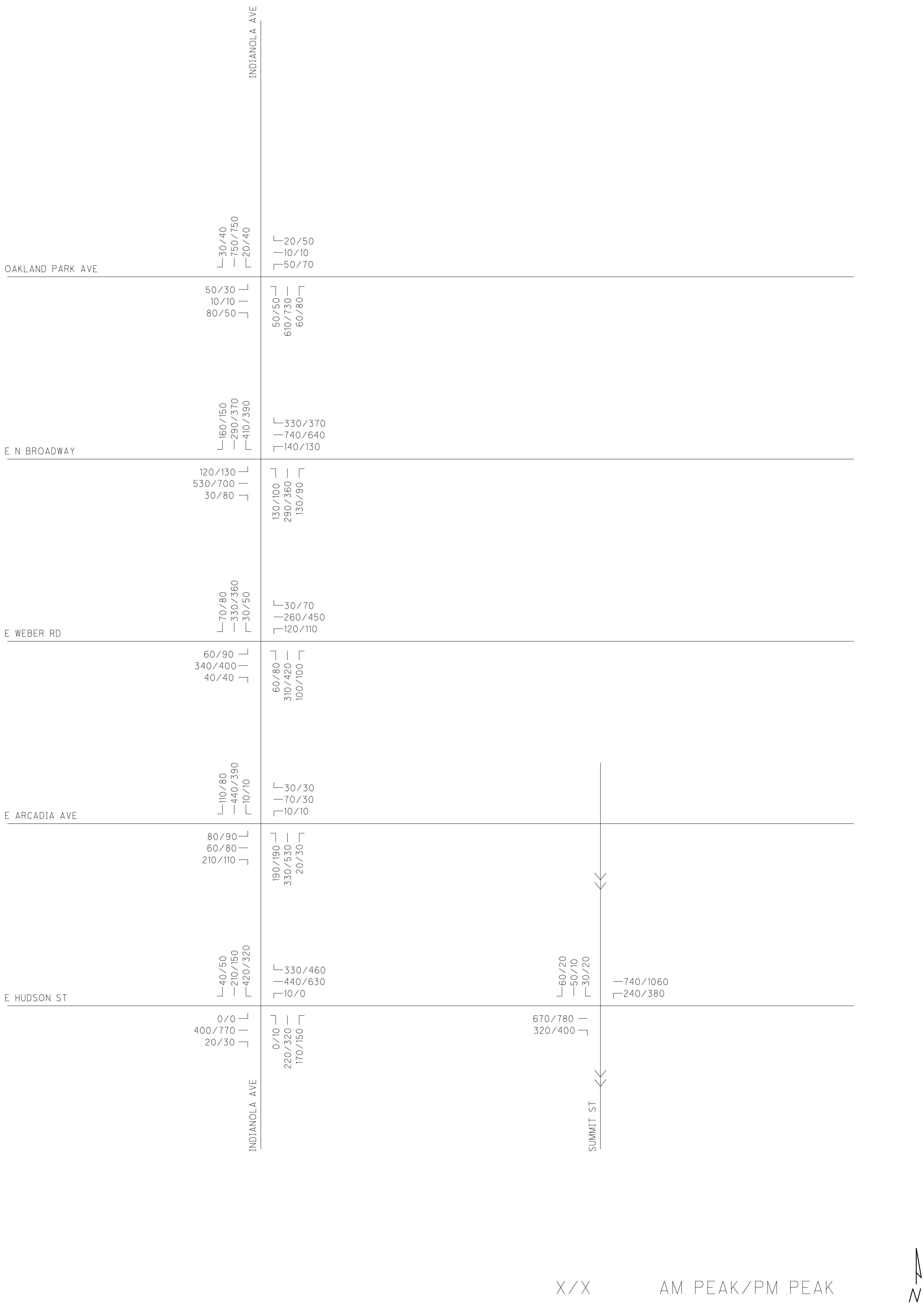
BUILD CONDITION

2024 AM PEAK/PM PEAK

APRIL 9, 2021 | NOT TO SCALE



INDIANOLA AVENUE ROAD DIET STUDY
BUILD CONDITION
2044 AADT
APRIL 9, 2021 | NOT TO SCALE



INDIANOLA AVENUE ROAD DIET STUDY
BUILD CONDITION
2044 AM PEAK/PM PEAK
APRIL 9, 2021 | NOT TO SCALE

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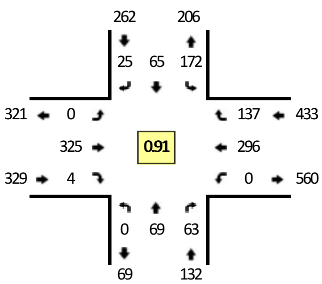
Attachment B:

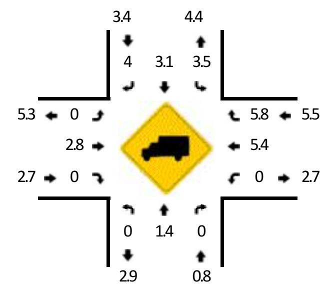
September 2020 Raw Turning Movement Counts

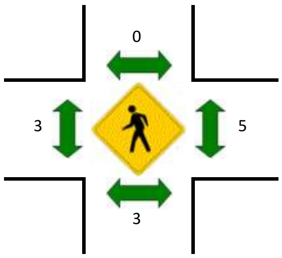
Type of peak hour being reported: Intersection Peak | Method for determining peak hour: Total Entering Volume

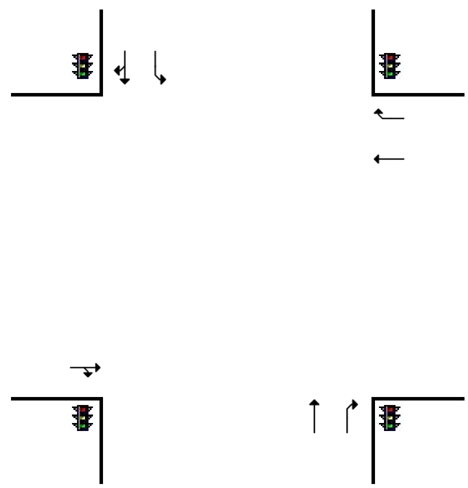
LOCATION: Indianola Ave -- Hudson St | **QC JOB #:** 15283601
CITY/STATE: Columbus, OH | **DATE:** Wed, Sep 23 2020

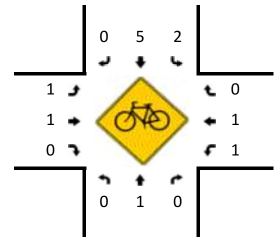
Peak-Hour: 8:15 AM -- 9:15 AM
Peak 15-Min: 8:45 AM -- 9:00 AM

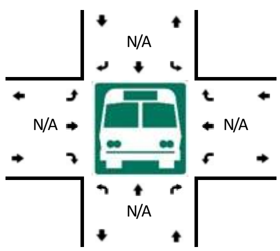


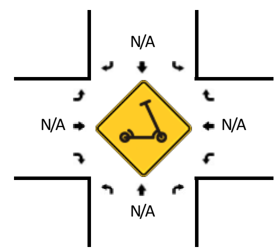












15-Min Count Period Beginning At	Indianola Ave (Northbound) Left	Thru	Right	U	Indianola Ave (Southbound) Left	Thru	Right	U	Hudson St (Eastbound) Left	Thru	Right	U	Hudson St (Westbound) Left	Thru	Right	U	Total	Hourly Totals
7:30 AM	0	8	15	0	31	14	10	0	0	80	1	0	0	55	27	0	241	
7:45 AM	0	21	14	0	47	23	11	0	0	66	2	0	0	64	34	0	282	
8:00 AM	0	23	8	0	44	13	9	0	0	51	5	0	1	66	46	0	266	
8:15 AM	0	23	17	0	42	21	5	0	0	59	1	0	0	70	30	0	268	1057
8:30 AM	0	21	20	0	49	13	6	0	0	84	1	0	0	75	30	0	299	1115
8:45 AM	0	10	20	0	40	18	7	0	0	97	2	0	0	88	35	0	317	1150
9:00 AM	0	15	6	0	41	13	7	0	0	85	0	0	0	63	42	0	272	1156
9:15 AM	0	22	16	0	37	15	1	0	0	68	4	0	0	59	39	0	261	1149

Peak 15-Min Flowrates	Northbound Left	Thru	Right	U	Southbound Left	Thru	Right	U	Eastbound Left	Thru	Right	U	Westbound Left	Thru	Right	U	Total
All Vehicles	0	40	80	0	160	72	28	0	0	388	8	0	0	352	140	0	1268
Heavy Trucks	0	4	0		4	4	0		0	12	0		0	8	4		36
Buses																	
Pedestrians		0				0				0				4			4
Bicycles	0	4	0		0	16	0		0	0	0		0	4	0		24
Scooters																	

Comments:

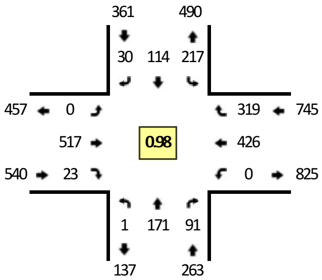
Report generated on 10/1/2020 8:43 AM | SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

PEDESTRIAN VOLUMES

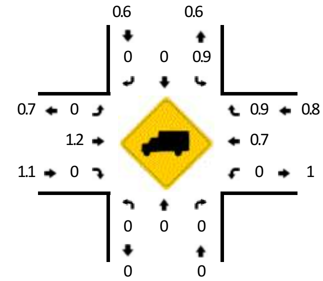
Time Period	South Leg	North Leg	West Leg	East Leg	Total
7:30 AM	2	0	1	1	4
7:45 AM	1	0	1	0	2
8:00 AM	0	0	2	0	2
8:15 AM	2	0	1	1	4
8:30 AM	0	0	1	2	3
8:45 AM	0	0	0	1	1
9:00 AM	1	0	1	1	3
9:15 AM	0	0	1	1	2

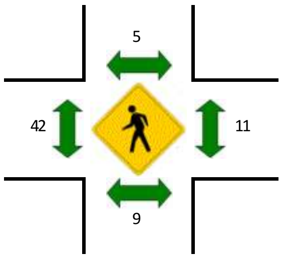
Type of peak hour being reported: Intersection Peak | Method for determining peak hour: Total Entering Volume

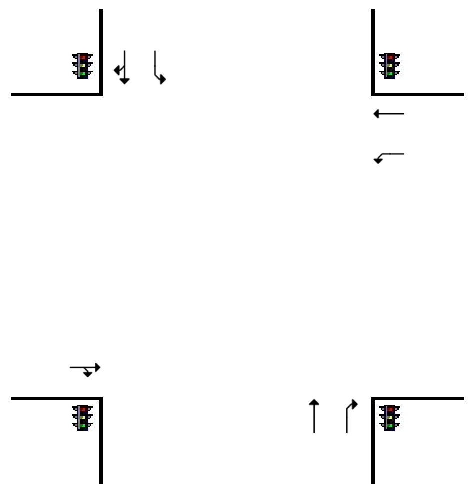
LOCATION: Indianola Ave -- Hudson St | **QC JOB #:** 15283602
CITY/STATE: Columbus, OH | **DATE:** Wed, Sep 23 2020

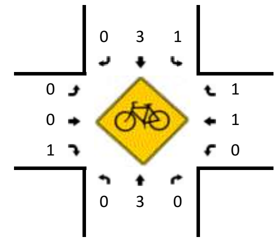


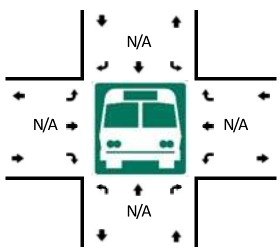
Peak-Hour: 5:00 PM -- 6:00 PM
Peak 15-Min: 5:45 PM -- 6:00 PM

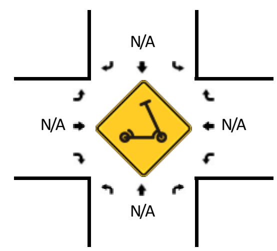












15-Min Count Period Beginning At	Indianola Ave (Northbound)				Indianola Ave (Southbound)				Hudson St (Eastbound)				Hudson St (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
12:30 PM	0	31	22	0	49	20	5	0	0	110	6	0	0	88	88	0	419	
12:45 PM	0	35	24	0	60	23	10	0	0	100	4	0	0	83	102	0	441	
1:00 PM	1	25	18	0	41	25	10	0	0	99	7	0	0	94	61	0	381	
1:15 PM	0	34	18	0	50	26	10	0	1	123	3	0	0	81	67	0	413	1654
1:30 PM	1	24	22	0	46	26	9	0	0	104	2	0	1	98	61	0	394	1629
1:45 PM	0	20	16	0	54	15	10	0	0	107	9	0	0	81	53	0	365	1553
2:00 PM	1	30	21	0	49	21	9	0	0	122	5	0	0	85	56	0	399	1571
2:15 PM	0	34	20	0	33	19	9	0	0	114	7	0	0	84	51	0	371	1529
2:30 PM	0	29	30	0	49	23	7	0	0	130	5	0	0	105	51	0	429	1564
2:45 PM	0	31	36	0	56	24	7	0	0	117	2	0	0	82	74	0	429	1628
3:00 PM	2	37	25	0	67	25	7	0	0	139	6	0	0	87	64	0	459	1688
3:15 PM	0	44	21	0	46	24	7	0	0	127	4	0	1	92	70	0	436	1753
3:30 PM	0	42	39	0	53	23	5	0	0	141	4	0	0	96	63	0	466	1790
3:45 PM	0	38	24	0	36	27	11	0	0	121	4	0	1	101	64	0	427	1788
4:00 PM	0	40	24	0	64	20	5	0	0	152	3	0	0	90	64	0	462	1791
4:15 PM	0	45	32	0	55	32	8	0	0	127	3	0	0	96	70	0	468	1823
4:30 PM	0	39	28	0	62	29	5	0	0	146	9	0	0	105	75	0	498	1855
4:45 PM	0	42	26	0	57	17	6	0	0	121	3	0	0	91	66	0	429	1857
5:00 PM	0	56	32	0	42	33	3	0	0	110	5	0	0	102	77	0	460	1855
5:15 PM	1	47	23	0	52	27	13	0	0	126	9	0	0	91	93	0	482	1869
5:30 PM	0	34	23	0	65	18	5	0	0	142	3	0	0	116	75	0	481	1852
5:45 PM	0	34	13	0	58	36	9	0	0	139	6	0	0	117	74	0	486	1909
6:00 PM	0	37	34	0	48	27	7	0	1	136	7	0	0	82	66	0	445	1894
6:15 PM	0	43	33	0	55	21	12	0	0	138	6	0	0	99	58	0	465	1877

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	0	136	52	0	232	144	36	0	0	556	24	0	0	468	296	0	1944
Heavy Trucks	0	0	0		4	0	0		0	4	0		0	8	0		16
Buses																	
Pedestrians		4				4				116				4			128
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Scooters																	

Comments:

Report generated on 10/1/2020 8:43 AM | SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

PEDESTRIAN VOLUMES

Time Period	South Leg	North Leg	West Leg	East Leg	Total
12:30 PM	2	4	4	3	13
12:45 PM	0	2	0	3	5
1:00 PM	2	0	2	0	4
1:15 PM	3	1	5	2	11
1:30 PM	0	0	4	0	4
1:45 PM	1	0	3	0	4
2:00 PM	0	1	1	3	5
2:15 PM	2	0	0	1	3
2:30 PM	5	0	3	2	10
2:45 PM	3	0	2	0	5
3:00 PM	3	1	2	5	11
3:15 PM	3	1	0	5	9
3:30 PM	4	2	2	1	9
3:45 PM	5	3	2	0	10
4:00 PM	5	2	3	3	13
4:15 PM	7	1	3	1	12
4:30 PM	2	0	0	3	5
4:45 PM	1	1	4	2	8
5:00 PM	3	1	0	2	6
5:15 PM	3	2	7	6	18
5:30 PM	2	1	6	2	11
5:45 PM	1	1	29	1	32
6:00 PM	3	3	1	4	11
6:15 PM	0	1	0	1	2

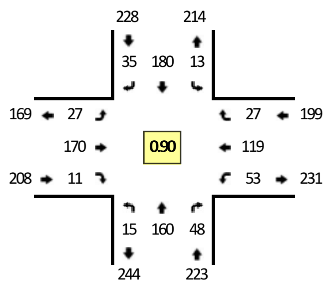
Type of peak hour being reported: Intersection Peak | Method for determining peak hour: Total Entering Volume

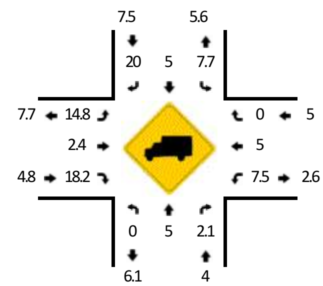
LOCATION: Indianola Ave -- Weber Rd | **QC JOB #:** 15283605

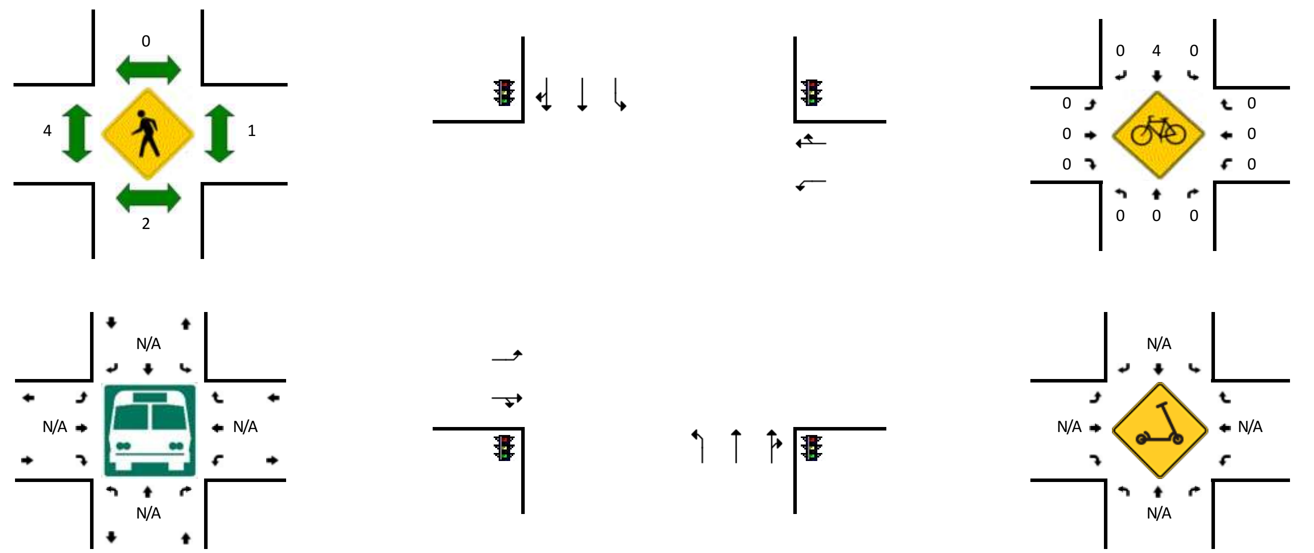
CITY/STATE: Columbus, OH | **DATE:** Wed, Sep 23 2020

Peak-Hour: 7:30 AM -- 8:30 AM

Peak 15-Min: 7:45 AM -- 8:00 AM







15-Min Count Period Beginning At	Indianola Ave (Northbound)				Indianola Ave (Southbound)				Weber Rd (Eastbound)				Weber Rd (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
7:30 AM	2	33	7	0	1	44	9	0	4	42	4	0	8	25	9	0	188	
7:45 AM	3	45	12	0	9	62	7	0	4	44	0	0	12	37	4	0	239	
8:00 AM	4	41	20	0	1	41	13	0	8	42	4	0	12	26	8	0	220	
8:15 AM	6	41	9	0	2	33	6	0	11	42	3	0	21	31	6	0	211	858
8:30 AM	6	39	7	0	7	37	10	0	6	30	4	0	8	26	6	0	186	856
8:45 AM	5	29	9	0	3	34	11	0	5	34	4	0	8	25	4	0	171	788
9:00 AM	3	40	10	0	1	34	3	0	10	25	4	0	13	40	8	0	191	759
9:15 AM	3	35	9	0	3	38	7	0	9	44	4	0	8	27	5	0	192	740

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	12	180	48	0	36	248	28	0	16	176	0	0	48	148	16	0	956
Heavy Trucks	0	16	4		4	20	0		0	8	0		0	8	0		60
Buses																	
Pedestrians		0				0				0				4			4
Bicycles	0	0	0		0	4	0		0	0	0		0	0	0		4
Scooters																	

Comments:

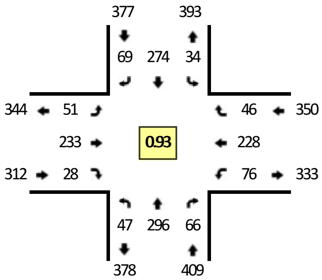
Report generated on 10/1/2020 8:43 AM | SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

PEDESTRIAN VOLUMES

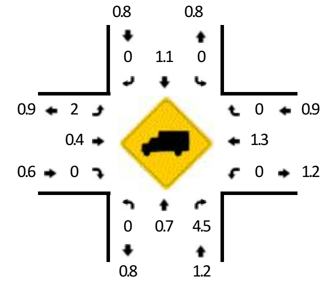
Time Period	South Leg	North Leg	West Leg	East Leg	Total
7:30 AM	0	0	1	0	1
7:45 AM	0	0	0	1	1
8:00 AM	2	0	2	0	4
8:15 AM	0	0	1	0	1
8:30 AM	0	0	0	1	1
8:45 AM	1	0	0	3	4
9:00 AM	0	1	2	1	4
9:15 AM	1	0	2	2	5

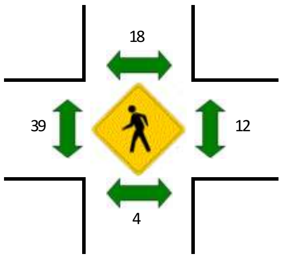
Type of peak hour being reported: Intersection Peak | Method for determining peak hour: Total Entering Volume

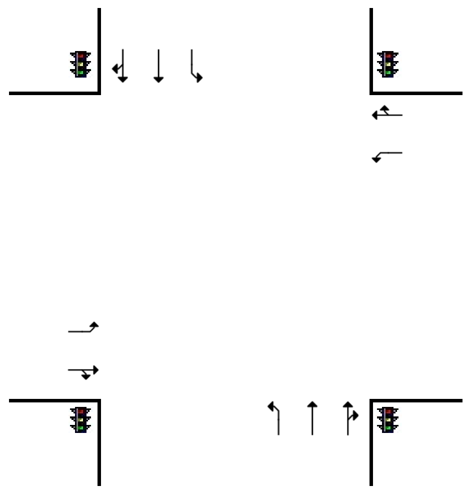
LOCATION: Indianola Ave -- Weber Rd | **QC JOB #:** 15283606
CITY/STATE: Columbus, OH | **DATE:** Wed, Sep 23 2020

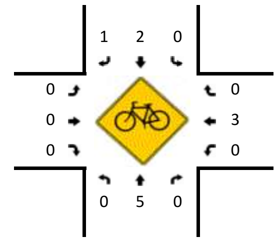


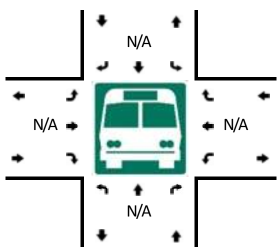
Peak-Hour: 5:00 PM -- 6:00 PM
Peak 15-Min: 5:00 PM -- 5:15 PM

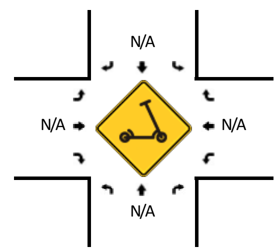












15-Min Count Period Beginning At	Indianola Ave (Northbound)				Indianola Ave (Southbound)				Weber Rd (Eastbound)				Weber Rd (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
12:30 PM	10	93	22	0	3	47	10	0	7	42	13	0	11	30	16	0	304	
12:45 PM	6	100	15	0	11	74	15	0	13	38	5	0	10	37	8	0	332	
1:00 PM	9	64	15	0	3	66	2	0	11	48	5	0	16	46	9	0	294	
1:15 PM	5	62	22	0	5	60	4	0	7	47	4	0	14	35	8	0	273	1203
1:30 PM	11	57	12	0	9	37	11	0	13	44	1	0	17	36	10	0	258	1157
1:45 PM	5	45	14	0	7	44	14	0	4	45	7	0	11	39	10	0	245	1070
2:00 PM	7	63	19	0	5	44	9	0	10	49	3	0	18	42	9	0	278	1054
2:15 PM	5	61	17	0	7	45	11	0	7	46	4	0	9	40	15	0	267	1048
2:30 PM	6	44	15	0	6	55	10	0	17	47	7	0	14	44	6	0	271	1061
2:45 PM	4	77	21	0	5	55	8	0	13	38	7	0	12	33	7	0	280	1096
3:00 PM	10	61	13	0	11	72	9	0	7	33	2	0	17	20	4	0	259	1077
3:15 PM	4	81	26	0	4	48	11	0	13	55	4	0	11	39	8	0	304	1114
3:30 PM	4	75	13	0	7	54	13	0	16	56	5	0	11	59	20	0	333	1176
3:45 PM	9	64	21	0	7	53	12	0	10	68	5	0	14	61	9	0	333	1229
4:00 PM	8	70	32	0	8	58	10	0	13	49	10	0	15	57	4	0	334	1304
4:15 PM	15	95	20	0	12	71	15	0	14	60	8	0	22	48	4	0	384	1384
4:30 PM	10	73	22	0	8	62	19	0	16	57	8	0	11	41	6	0	333	1384
4:45 PM	9	65	12	0	6	60	10	0	17	47	5	0	12	66	13	0	322	1373
5:00 PM	10	80	21	0	10	60	20	0	10	68	8	0	23	69	10	0	389	1428
5:15 PM	9	85	15	0	10	68	13	0	9	53	5	0	10	63	15	0	355	1399
5:30 PM	14	71	14	0	6	69	13	0	19	53	7	0	20	49	9	0	344	1410
5:45 PM	14	60	16	0	8	77	23	0	13	59	8	0	23	47	12	0	360	1448
6:00 PM	6	69	19	0	7	56	15	0	22	59	7	0	15	52	7	0	334	1393
6:15 PM	7	65	19	0	11	56	13	0	18	49	8	0	21	50	17	0	334	1372

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	40	320	84	0	40	240	80	0	40	272	32	0	92	276	40	0	1556
Heavy Trucks	0	8	0		0	4	0		0	0	0		0	4	0		16
Buses																	
Pedestrians		0				4				8				12			24
Bicycles	0	0	0		0	8	0		0	0	0		0	0	0		8
Scooters																	

Comments:

Report generated on 10/1/2020 8:43 AM | SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

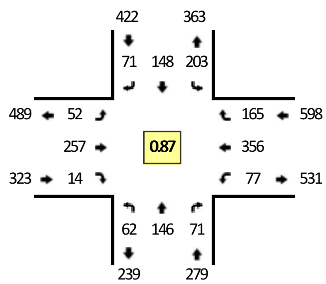
PEDESTRIAN VOLUMES

Time Period	South Leg	North Leg	West Leg	East Leg	Total
12:30 PM	0	0	1	1	2
12:45 PM	0	0	1	0	1
1:00 PM	0	0	1	0	1
1:15 PM	0	1	2	1	4
1:30 PM	0	0	5	1	6
1:45 PM	0	4	1	1	6
2:00 PM	1	1	1	3	6
2:15 PM	1	0	4	0	5
2:30 PM	0	0	0	0	0
2:45 PM	0	0	1	0	1
3:00 PM	0	0	0	1	1
3:15 PM	0	0	1	2	3
3:30 PM	0	0	3	0	3
3:45 PM	0	0	2	0	2
4:00 PM	2	1	2	1	6
4:15 PM	0	1	3	0	4
4:30 PM	0	0	1	0	1
4:45 PM	0	1	1	3	5
5:00 PM	0	1	2	3	6
5:15 PM	0	5	0	4	9
5:30 PM	2	6	7	1	16
5:45 PM	2	6	30	4	42
6:00 PM	0	1	3	0	4
6:15 PM	1	1	7	0	9

Type of peak hour being reported: Intersection Peak | Method for determining peak hour: Total Entering Volume

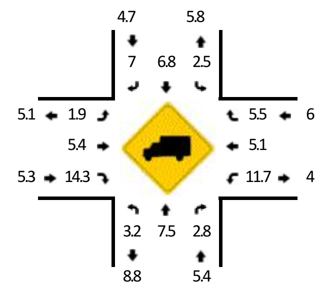
LOCATION: Indianola Ave -- N Broadway | **QC JOB #:** 15283607

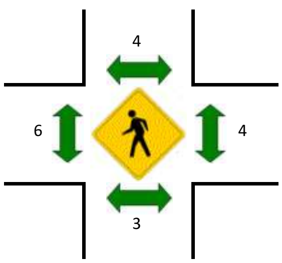
CITY/STATE: Columbus, OH | **DATE:** Wed, Sep 23 2020

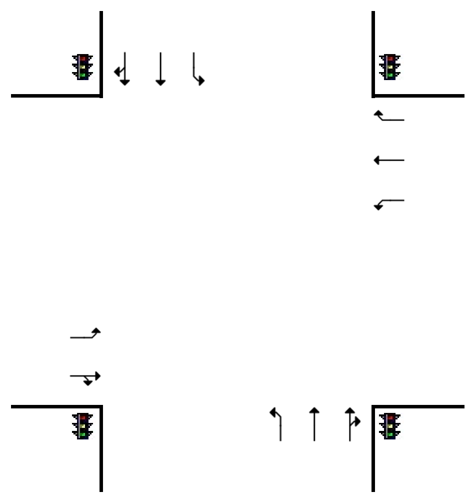


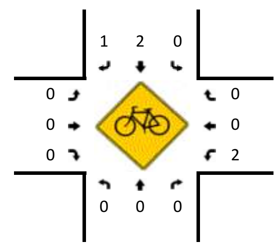
Peak-Hour: 7:45 AM -- 8:45 AM

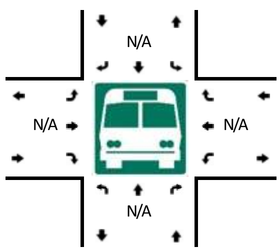
Peak 15-Min: 7:45 AM -- 8:00 AM

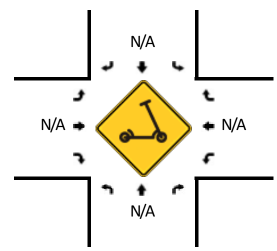












15-Min Count Period Beginning At	Indianola Ave (Northbound)				Indianola Ave (Southbound)				N Broadway (Eastbound)				N Broadway (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
7:30 AM	11	35	14	0	53	44	20	0	3	52	4	0	11	95	39	0	381	
7:45 AM	14	34	25	0	63	47	17	0	12	72	2	0	30	93	59	0	468	
8:00 AM	17	46	7	0	66	37	18	0	12	60	2	0	16	85	34	0	400	
8:15 AM	18	44	16	0	32	27	17	0	7	61	4	0	14	85	38	0	363	1612
8:30 AM	13	22	23	0	42	37	19	0	21	64	6	0	17	93	34	0	391	1622
8:45 AM	15	33	14	0	41	36	14	0	11	63	6	0	10	71	61	0	375	1529
9:00 AM	8	45	8	0	27	28	15	0	18	75	5	0	9	60	34	0	332	1461
9:15 AM	15	35	12	0	35	40	17	0	14	71	4	0	7	70	34	0	354	1452

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	56	136	100	0	252	188	68	0	48	288	8	0	120	372	236	0	1872
Heavy Trucks	4	4	4		8	12	4		0	16	4		16	12	12		96
Buses																	
Pedestrians		0				8				8				8			24
Bicycles	0	0	0		0	0	0		0	0	0		4	0	0		4
Scooters																	

Comments:

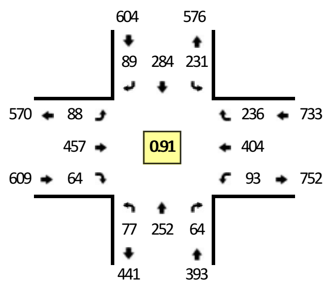
Report generated on 10/1/2020 8:43 AM | SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

PEDESTRIAN VOLUMES

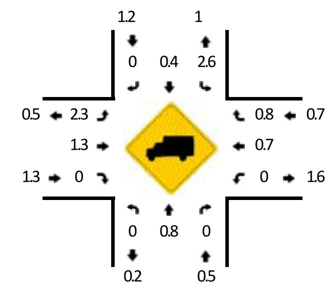
Time Period	South Leg	North Leg	West Leg	East Leg	Total
7:30 AM	0	1	0	1	2
7:45 AM	0	2	2	2	6
8:00 AM	1	0	1	1	3
8:15 AM	2	0	3	0	5
8:30 AM	0	2	0	1	3
8:45 AM	0	0	0	1	1
9:00 AM	0	2	3	1	6
9:15 AM	0	0	0	1	1

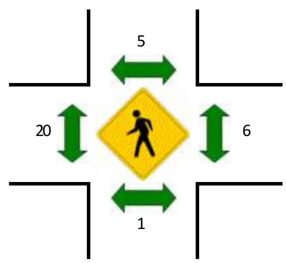
Type of peak hour being reported: Intersection Peak | Method for determining peak hour: Total Entering Volume

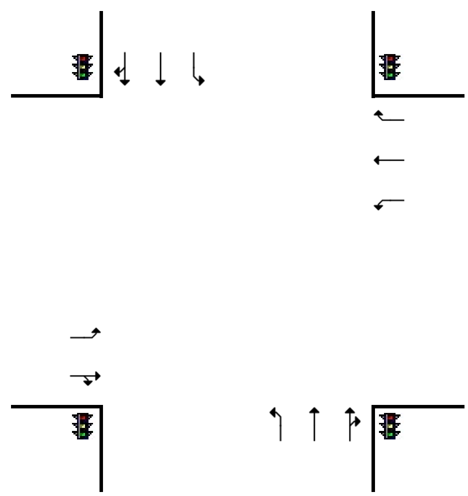
LOCATION: Indianola Ave -- N Broadway | **QC JOB #:** 15283608
CITY/STATE: Columbus, OH | **DATE:** Wed, Sep 23 2020

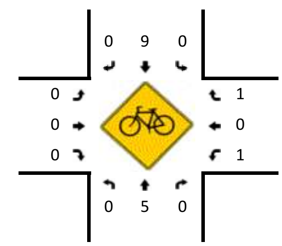


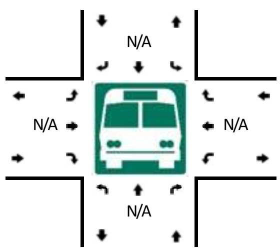
Peak-Hour: 5:00 PM -- 6:00 PM
Peak 15-Min: 5:15 PM -- 5:30 PM

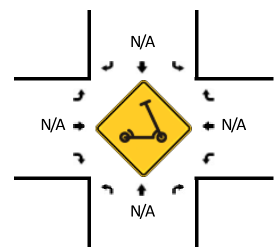












15-Min Count Period Beginning At	Indianola Ave (Northbound)				Indianola Ave (Southbound)				N Broadway (Eastbound)				N Broadway (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
12:30 PM	26	67	14	0	45	48	22	0	22	78	12	0	18	75	36	0	463	
12:45 PM	38	85	21	0	37	65	26	0	22	88	15	0	19	69	41	0	526	
1:00 PM	11	64	10	0	59	58	22	0	20	82	14	0	16	83	56	0	495	
1:15 PM	18	46	9	0	53	58	31	0	35	80	10	0	13	92	37	0	482	1966
1:30 PM	21	51	12	0	46	47	25	0	19	96	6	0	14	83	64	0	484	1987
1:45 PM	17	34	11	0	51	47	15	0	16	87	9	0	17	68	38	0	410	1871
2:00 PM	17	53	9	0	49	41	21	0	27	90	10	0	12	67	35	0	431	1807
2:15 PM	13	61	15	0	41	38	23	0	8	83	8	0	13	95	54	0	452	1777
2:30 PM	17	52	6	0	49	60	19	0	14	89	11	0	10	101	55	0	483	1776
2:45 PM	9	69	24	0	39	63	26	0	24	104	11	0	12	80	66	0	527	1893
3:00 PM	10	54	20	0	47	64	21	0	22	84	14	0	20	86	60	0	502	1964
3:15 PM	16	61	22	0	45	46	23	0	20	117	11	0	16	95	59	0	531	2043
3:30 PM	12	78	20	0	65	62	25	0	24	104	3	0	17	84	55	0	549	2109
3:45 PM	11	70	13	0	39	50	23	0	35	124	15	0	21	92	63	0	556	2138
4:00 PM	24	54	16	0	45	60	20	0	19	98	17	0	13	83	49	0	498	2134
4:15 PM	17	69	15	0	41	70	12	0	27	110	14	0	22	90	66	0	553	2156
4:30 PM	18	71	16	0	60	75	20	0	19	100	11	0	13	90	67	0	560	2167
4:45 PM	9	64	14	0	64	58	19	0	16	91	15	0	21	102	42	0	515	2126
5:00 PM	18	58	18	0	64	67	29	0	23	135	12	0	24	96	63	0	607	2235
5:15 PM	26	73	21	0	61	64	28	0	21	124	19	0	28	111	69	0	645	2327
5:30 PM	21	58	13	0	62	73	17	0	20	104	13	0	22	103	62	0	568	2335
5:45 PM	12	63	12	0	44	80	15	0	24	94	20	0	19	94	42	0	519	2339
6:00 PM	10	65	17	0	42	54	22	0	17	101	11	0	23	87	42	0	491	2223
6:15 PM	18	71	14	0	36	71	25	0	21	85	12	0	14	90	44	0	501	2079

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	104	292	84	0	244	256	112	0	84	496	76	0	112	444	276	0	2580
Heavy Trucks	0	0	0		4	0	0		0	4	0		0	8	8		24
Buses																	
Pedestrians		0				0				16				0			16
Bicycles	0	4	0		0	4	0		0	0	0		0	0	0		8
Scooters																	

Comments:

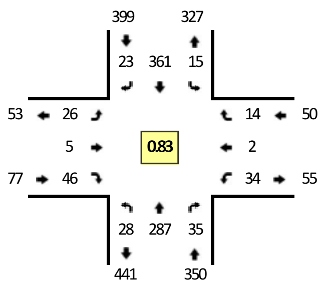
Report generated on 10/1/2020 8:43 AM

PEDESTRIAN VOLUMES

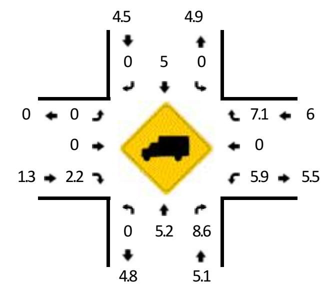
Time Period	South Leg	North Leg	West Leg	East Leg	Total
12:30 PM	0	1	3	1	5
12:45 PM	1	0	2	3	6
1:00 PM	2	1	0	2	5
1:15 PM	0	2	3	0	5
1:30 PM	1	1	1	4	7
1:45 PM	0	0	4	2	6
2:00 PM	2	0	2	1	5
2:15 PM	0	2	0	2	4
2:30 PM	0	0	0	2	2
2:45 PM	0	1	0	1	2
3:00 PM	0	0	0	0	0
3:15 PM	2	2	2	1	7
3:30 PM	0	0	0	2	2
3:45 PM	0	2	2	0	4
4:00 PM	0	0	0	0	0
4:15 PM	0	1	0	0	1
4:30 PM	1	0	0	1	2
4:45 PM	1	0	1	2	4
5:00 PM	0	2	2	2	6
5:15 PM	0	0	4	0	4
5:30 PM	1	3	8	3	15
5:45 PM	0	0	6	1	7
6:00 PM	5	1	2	2	10
6:15 PM	0	0	4	0	4

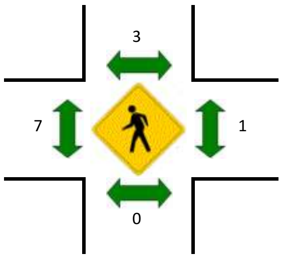
Type of peak hour being reported: Intersection Peak | Method for determining peak hour: Total Entering Volume

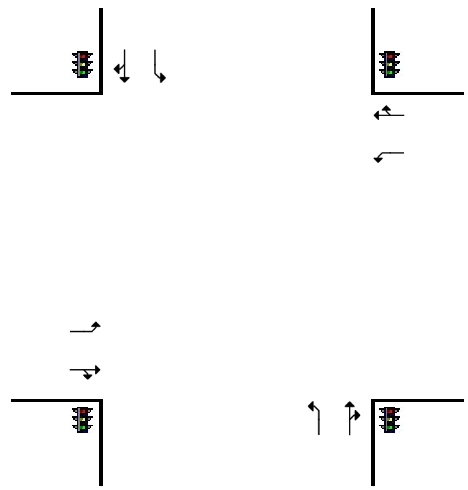
LOCATION: Indianola Ave -- Oakland Park Ave | **QC JOB #:** 15283609
CITY/STATE: Columbus, OH | **DATE:** Wed, Sep 23 2020

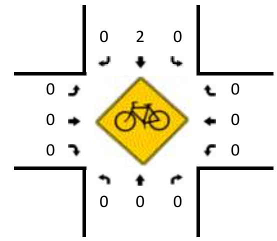


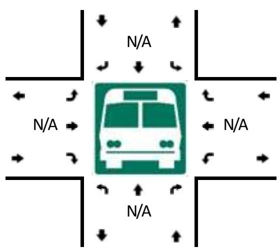
Peak-Hour: 7:30 AM -- 8:30 AM
Peak 15-Min: 7:45 AM -- 8:00 AM

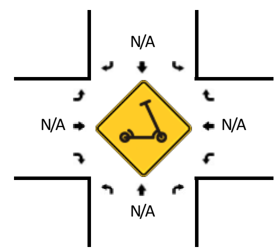












15-Min Count Period Beginning At	Indianola Ave (Northbound)				Indianola Ave (Southbound)				Oakland Park Ave (Eastbound)				Oakland Park Ave (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
7:30 AM	6	67	5	0	4	103	6	0	1	2	7	0	10	1	4	0	216	
7:45 AM	11	77	11	0	5	109	11	0	11	1	18	0	8	1	0	0	263	
8:00 AM	3	76	12	0	5	97	2	0	11	2	16	0	11	0	6	0	241	
8:15 AM	8	67	7	0	1	52	4	0	3	0	5	0	5	0	4	0	156	876
8:30 AM	5	63	5	0	1	88	1	0	4	2	7	0	7	2	3	0	188	848
8:45 AM	5	84	9	0	7	65	4	0	4	0	5	0	11	0	4	0	198	783
9:00 AM	6	79	11	0	7	61	5	0	4	2	6	0	6	0	2	3	0	192	734
9:15 AM	5	64	10	0	5	70	4	0	3	1	5	0	10	2	4	0	183	761

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	44	308	44	0	20	436	44	0	44	4	72	0	32	4	0	0	1052
Heavy Trucks	0	8	4		0	24	0		0	0	0		4	0	0		40
Buses																	
Pedestrians		0				4				4				0			8
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Scooters																	

Comments:

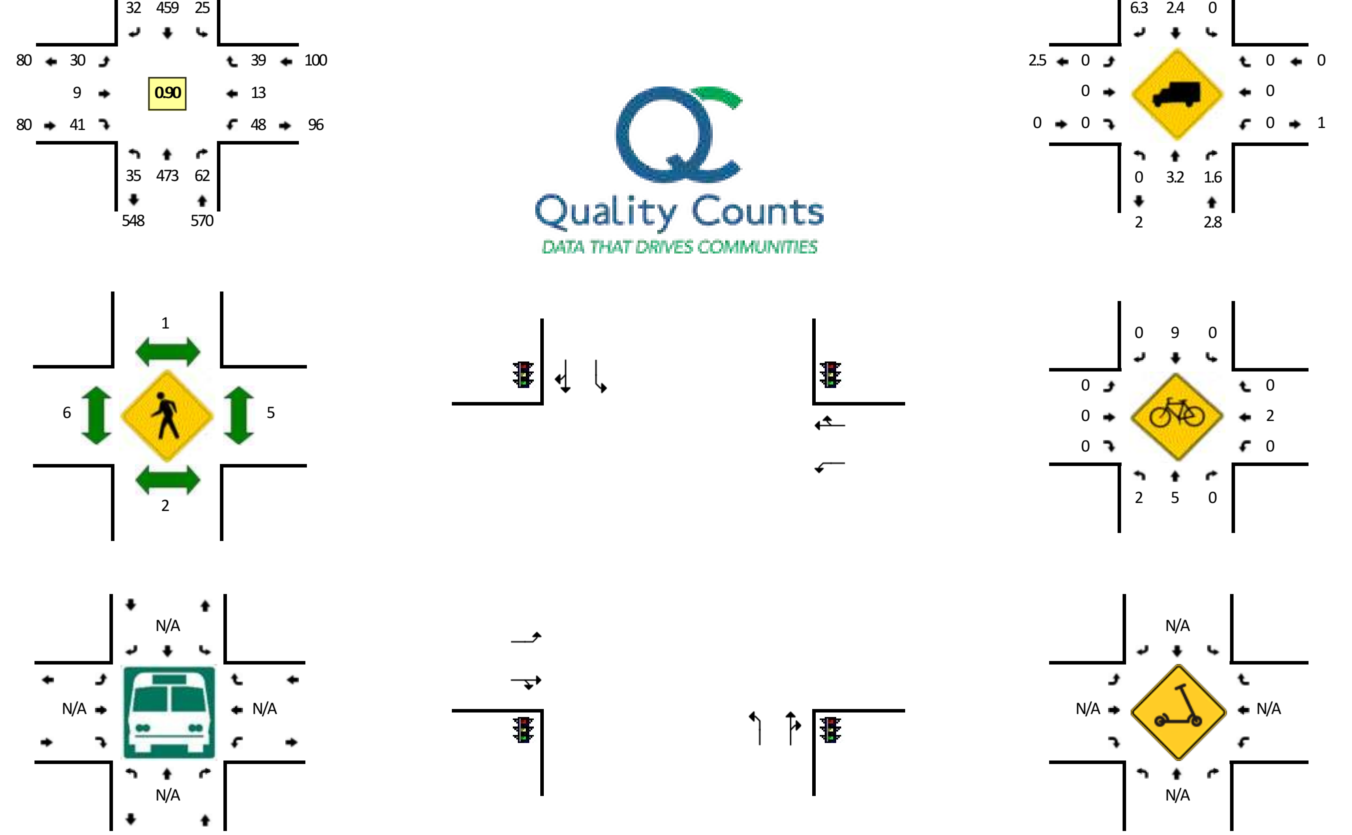
Report generated on 10/1/2020 8:43 AM | SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

PEDESTRIAN VOLUMES

Time Period	South Leg	North Leg	West Leg	East Leg	Total
7:30 AM	0	1	3	0	4
7:45 AM	0	1	1	0	2
8:00 AM	0	0	0	0	0
8:15 AM	0	1	3	1	5
8:30 AM	0	1	1	0	2
8:45 AM	1	1	1	4	7
9:00 AM	0	0	5	0	5
9:15 AM	0	2	0	1	3

LOCATION: Indianola Ave -- Oakland Park Ave — **QC JOB #:** 15283610
CITY/STATE: Columbus, OH — **DATE:** Wed, Sep 23 2020

Peak-Hour: 4:30 PM -- 5:30 PM
Peak 15-Min: 5:15 PM -- 5:30 PM



15-Min Count Period Beginning At	Indianola Ave (Northbound) Left	Thru	Right	U	Indianola Ave (Southbound) Left	Thru	Right	U	Oakland Park Ave (Eastbound) Left	Thru	Right	U	Oakland Park Ave (Westbound) Left	Thru	Right	U	Total	Hourly Totals
12:30 PM	10	103	6	0	5	114	4	0	9	2	6	0	7	1	5	0	272	
12:45 PM	10	120	12	0	7	87	4	0	7	0	6	0	21	4	6	0	284	
1:00 PM	7	119	11	0	2	111	8	0	6	4	10	0	11	2	10	0	301	
1:15 PM	7	95	7	0	3	119	1	0	5	3	3	0	16	4	5	0	268	1125
1:30 PM	10	112	18	0	3	102	4	0	3	0	3	0	10	4	6	0	275	1128
1:45 PM	4	70	6	0	2	93	1	0	1	3	9	0	7	0	2	0	198	1042
2:00 PM	3	97	7	0	5	88	5	0	5	1	2	0	16	3	8	0	240	981
2:15 PM	8	97	16	0	5	83	7	0	5	1	10	0	11	4	4	0	251	964
2:30 PM	12	94	9	0	3	113	6	0	7	1	11	0	12	4	5	0	277	966
2:45 PM	10	125	13	0	2	94	7	0	27	3	18	0	8	0	2	0	309	1077
3:00 PM	3	128	7	0	7	99	11	0	6	1	13	0	16	2	7	0	300	1137
3:15 PM	8	116	15	0	9	98	11	0	13	4	6	0	15	0	6	0	301	1187
3:30 PM	7	132	13	0	7	124	10	0	7	3	8	0	8	2	7	0	328	1238
3:45 PM	7	140	10	0	7	94	5	0	12	3	11	0	8	5	9	0	311	1240
4:00 PM	8	109	10	0	8	100	6	0	5	3	11	0	13	1	15	0	289	1229
4:15 PM	7	128	18	0	8	95	6	0	8	7	7	0	22	7	9	0	322	1250
4:30 PM	9	121	18	0	4	118	6	0	12	2	8	0	10	4	8	0	320	1242
4:45 PM	10	94	11	0	7	113	8	0	7	2	11	0	11	6	9	0	289	1220
5:00 PM	3	119	17	0	3	120	6	0	7	2	7	0	14	0	9	0	307	1238
5:15 PM	13	139	16	0	11	108	12	0	4	3	15	0	13	3	13	0	350	1266
5:30 PM	10	107	12	0	7	129	4	0	3	3	5	0	14	2	9	0	305	1251
5:45 PM	6	110	7	0	3	116	5	0	6	1	4	0	8	3	8	0	277	1239
6:00 PM	4	114	8	0	4	103	5	0	8	0	6	0	13	3	4	0	272	1204
6:15 PM	7	116	6	0	4	105	9	0	4	0	4	0	12	3	1	0	280	1134

Peak 15-Min Flowrates	Northbound Left	Thru	Right	U	Southbound Left	Thru	Right	U	Eastbound Left	Thru	Right	U	Westbound Left	Thru	Right	U	Total
All Vehicles	52	556	64	0	44	432	48	0	16	12	60	0	52	12	52	0	1400
Heavy Trucks	0	4	4		0	4	4		0	0	0		0	0	0		16
Buses																	
Pedestrians		0				0				12				4			16
Bicycles	0	4	0		0	4	0		0	0	0		0	8	0		16
Scooters																	

Comments:

Report generated on 10/1/2020 8:43 AM — SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

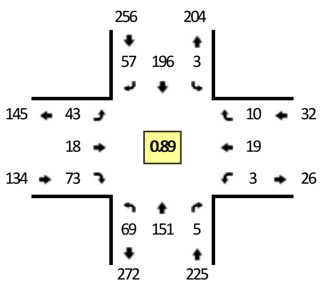
PEDESTRIAN VOLUMES

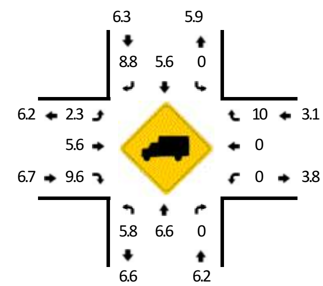
Time Period	South Leg	North Leg	West Leg	East Leg	Total
12:30 PM	0	2	2	1	5
12:45 PM	0	0	3	1	4
1:00 PM	2	1	3	0	6
1:15 PM	2	0	1	2	5
1:30 PM	1	0	4	3	8
1:45 PM	2	1	7	0	10
2:00 PM	2	1	2	0	5
2:15 PM	0	0	0	0	0
2:30 PM	0	1	2	0	3
2:45 PM	0	0	0	1	1
3:00 PM	2	0	4	5	11
3:15 PM	0	0	0	0	0
3:30 PM	1	0	0	2	3
3:45 PM	3	3	5	1	12
4:00 PM	0	0	1	1	2
4:15 PM	2	0	0	0	2
4:30 PM	0	1	1	1	3
4:45 PM	0	0	1	0	1
5:00 PM	2	0	1	3	6
5:15 PM	0	0	3	1	4
5:30 PM	1	0	7	2	10
5:45 PM	0	1	7	5	13
6:00 PM	1	0	2	1	4
6:15 PM	1	2	6	0	9

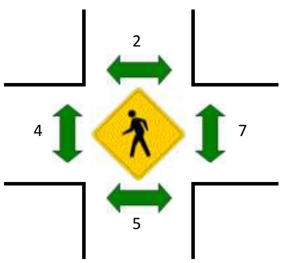
Type of peak hour being reported: Intersection Peak — Method for determining peak hour: Total Entering Volume

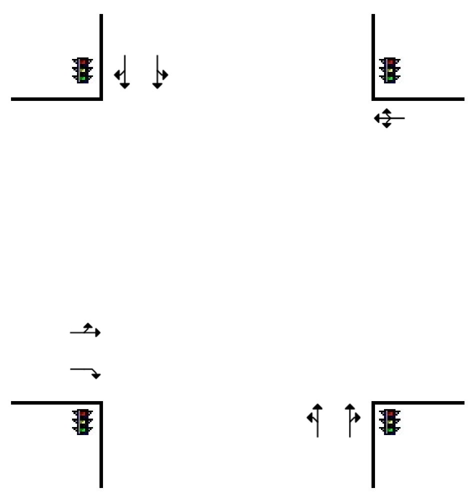
LOCATION: Indianola Ave -- Arcadia Ave — **QC JOB #:** 15283603
CITY/STATE: Columbus, OH — **DATE:** Wed, Sep 23 2020

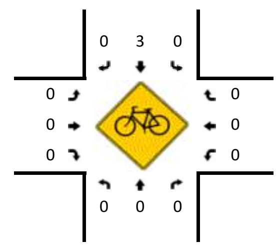
Peak-Hour: 7:45 AM -- 8:45 AM
Peak 15-Min: 7:45 AM -- 8:00 AM

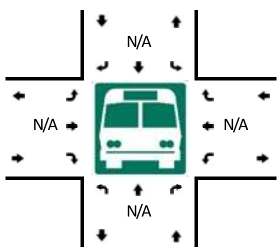


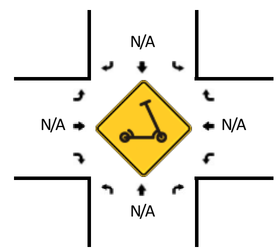












15-Min Count Period Beginning At	Indianola Ave (Northbound)				Indianola Ave (Southbound)				Arcadia Ave (Eastbound)				Arcadia Ave (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
7:30 AM	12	24	0	0	1	47	12	0	5	2	8	0	0	6	2	0	119	
7:45 AM	24	32	2	0	1	62	24	0	11	2	18	0	0	2	3	0	181	
8:00 AM	14	40	0	0	0	41	14	0	17	4	21	0	2	7	1	0	161	
8:15 AM	17	39	3	0	1	49	9	0	8	6	17	0	1	4	3	0	157	618
8:30 AM	14	40	0	0	1	44	10	0	7	6	17	0	0	6	3	0	148	647
8:45 AM	12	25	0	0	2	49	10	0	15	7	15	0	1	1	1	0	138	604
9:00 AM	16	43	2	0	2	44	9	0	7	1	13	0	1	3	1	0	142	585
9:15 AM	18	37	0	0	0	37	14	0	7	7	14	0	0	5	2	0	141	569

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	96	128	8	0	4	248	96	0	44	8	72	0	0	8	12	0	724
Heavy Trucks	12	8	0		0	12	4		0	4	0		0	0	0		40
Buses																	
Pedestrians		0				4				0				0			4
Bicycles	0	0	0		0	4	0		0	0	0		0	0	0		4
Scooters																	

Comments:

Report generated on 10/1/2020 8:43 AM — SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

PEDESTRIAN VOLUMES

Time Period	South Leg	North Leg	West Leg	East Leg	Total
7:30 AM	0	0	0	3	3
7:45 AM	0	1	0	0	1
8:00 AM	2	0	2	4	8
8:15 AM	2	1	1	1	5
8:30 AM	1	0	1	2	4
8:45 AM	0	0	1	1	2
9:00 AM	4	2	2	0	8
9:15 AM	0	0	2	0	2

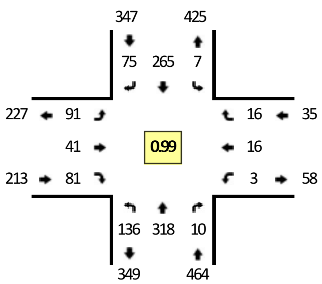
Type of peak hour being reported: Intersection Peak | Method for determining peak hour: Total Entering Volume

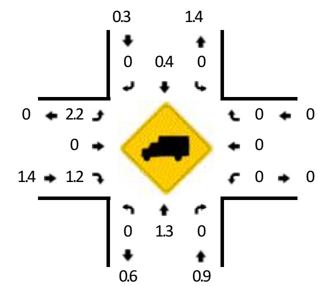
LOCATION: Indianola Ave -- Arcadia Ave | **QC JOB #:** 15283604

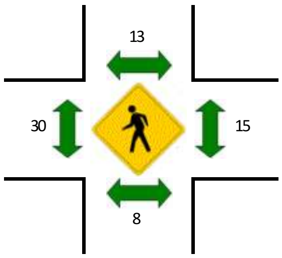
CITY/STATE: Columbus, OH | **DATE:** Wed, Sep 23 2020

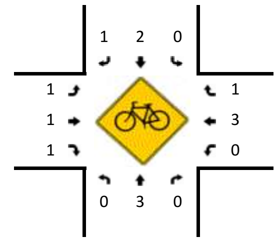
Peak-Hour: 5:00 PM -- 6:00 PM

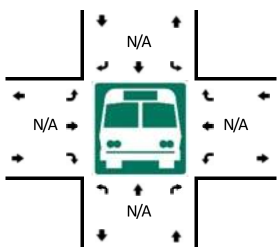
Peak 15-Min: 5:15 PM -- 5:30 PM

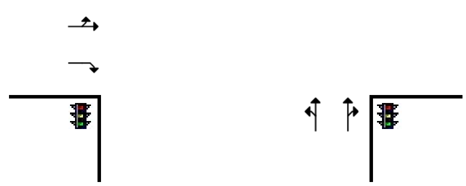


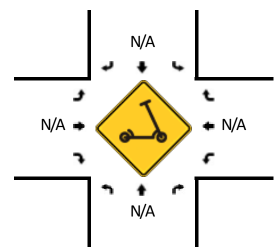












15-Min Count Period Beginning At	Indianola Ave (Northbound)				Indianola Ave (Southbound)				Arcadia Ave (Eastbound)				Arcadia Ave (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
12:30 PM	22	102	2	0	2	57	14	0	21	4	13	0	1	8	5	0	251	
12:45 PM	25	94	2	0	4	66	17	0	10	8	20	0	0	4	8	0	258	
1:00 PM	19	73	0	0	3	60	17	0	12	9	17	0	1	2	1	0	214	
1:15 PM	24	75	1	0	4	56	12	0	8	7	20	0	1	2	2	0	212	935
1:30 PM	25	60	1	0	2	57	11	0	9	5	17	0	0	2	5	0	194	878
1:45 PM	23	47	2	0	4	46	12	0	19	1	21	0	0	2	3	0	180	800
2:00 PM	19	66	1	0	2	55	15	0	21	6	13	0	0	4	2	0	204	790
2:15 PM	28	57	1	0	1	43	13	0	13	9	17	0	0	1	6	0	189	767
2:30 PM	20	57	2	0	1	56	16	0	13	4	20	0	1	3	5	0	198	771
2:45 PM	31	68	2	0	1	60	15	0	25	3	13	0	0	1	3	0	222	813
3:00 PM	41	58	1	0	2	71	17	0	14	7	21	0	0	4	4	0	240	849
3:15 PM	27	77	1	0	2	48	8	0	19	10	26	0	1	3	2	0	224	884
3:30 PM	32	73	6	0	3	59	10	0	17	1	18	0	0	5	5	0	229	915
3:45 PM	28	69	0	0	1	55	16	0	21	8	11	0	0	0	3	0	212	905
4:00 PM	29	72	3	0	3	58	17	0	29	7	18	0	0	5	5	0	246	911
4:15 PM	21	94	2	0	1	70	19	0	31	5	23	0	0	4	2	0	272	959
4:30 PM	34	71	0	0	0	68	14	0	25	6	19	0	1	5	5	0	248	978
4:45 PM	31	71	1	0	0	51	23	0	20	16	20	0	1	4	2	0	240	1006
5:00 PM	43	79	3	0	0	64	17	0	24	11	13	0	1	3	5	0	263	1023
5:15 PM	37	86	3	0	1	61	15	0	25	12	24	0	1	2	1	0	268	1019
5:30 PM	29	85	2	0	2	60	18	0	18	5	27	0	1	6	8	0	261	1032
5:45 PM	27	68	2	0	4	80	25	0	24	13	17	0	0	5	2	0	267	1059
6:00 PM	38	72	1	0	1	49	19	0	23	4	24	0	0	4	4	0	239	1035
6:15 PM	29	63	1	0	2	58	13	0	18	7	23	0	1	3	3	0	221	988

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	148	344	12	0	4	244	60	0	100	48	96	0	4	8	4	0	1072
Heavy Trucks	0	4	0		0	0	0		8	0	4		0	0	0		16
Buses																	
Pedestrians		0				8				4				16			28
Bicycles	0	4	0		0	4	4		0	0	0		0	0	0		12
Scooters																	

Comments:

Report generated on 10/1/2020 8:43 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

PEDESTRIAN VOLUMES

Time Period	South Leg	North Leg	West Leg	East Leg	Total
12:30 PM	3	1	3	2	9
12:45 PM	0	2	1	0	3
1:00 PM	3	0	1	0	4
1:15 PM	1	1	3	1	6
1:30 PM	0	2	1	0	3
1:45 PM	1	0	1	2	4
2:00 PM	0	3	0	2	5
2:15 PM	2	1	1	2	6
2:30 PM	1	0	0	0	1
2:45 PM	0	2	2	0	4
3:00 PM	1	1	1	0	3
3:15 PM	1	1	0	2	4
3:30 PM	1	3	1	2	7
3:45 PM	0	1	0	0	1
4:00 PM	1	1	4	3	9
4:15 PM	2	0	2	0	4
4:30 PM	4	1	0	2	7
4:45 PM	0	1	2	3	6
5:00 PM	1	2	1	5	9
5:15 PM	0	2	1	4	7
5:30 PM	2	6	2	1	11
5:45 PM	5	3	26	5	39
6:00 PM	1	0	3	3	7
6:15 PM	5	1	0	3	9

Michael Baker INTERNATIONAL

We Make a Difference

Attachment C:

Pre-Pandemic Turning Movement Counts

Cliffside Dr and Indianola Ave - TMC
Thu Jul 18, 2019
Full Length (7 AM-9 AM, 4 PM-6 PM)
All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)
All Movements
ID: 679148, Location: 40.018425, -83.002031

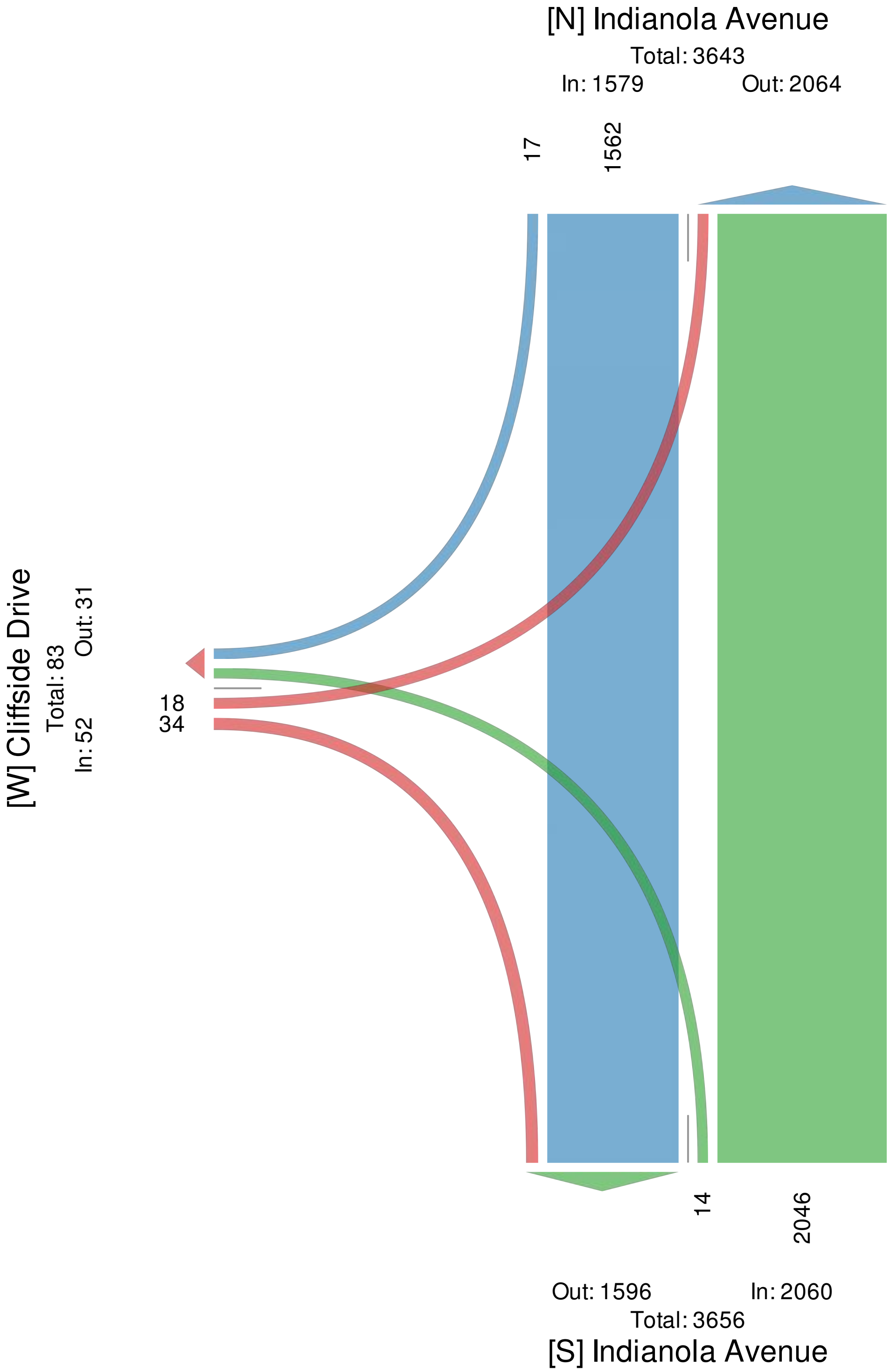
Provided by: Carpenter Marty (CM) Transportation Inc.
6612 Singletree Drive, Columbus, OH, 43229, US

Leg Direction	Cliffside Drive Eastbound				Indianola Avenue Northbound				Indianola Avenue Southbound				
Time	L	R	U	**App**	L	T	U	**App**	T	R	U	**App**	**Int**
2019-07-18 7:00AM	1	2	0	**3**	0	35	0	**35**	65	0	0	**65**	**103**
7:15AM	0	2	0	**2**	0	38	0	**38**	84	0	0	**84**	**124**
7:30AM	1	1	0	**2**	0	46	0	**46**	112	0	0	**112**	**160**
7:45AM	4	2	0	**6**	0	45	0	**45**	126	0	0	**126**	**177**
Hourly Total	6	7	0	**13**	0	164	0	**164**	387	0	0	**387**	**564**
8:00AM	0	1	0	**1**	1	41	0	**42**	125	1	0	**126**	**169**
8:15AM	0	5	0	**5**	0	53	0	**53**	111	0	0	**111**	**169**
8:30AM	2	2	0	**4**	1	47	0	**48**	130	1	0	**131**	**183**
8:45AM	3	1	0	**4**	3	58	0	**61**	118	0	0	**118**	**183**
Hourly Total	5	9	0	**14**	5	199	0	**204**	484	2	0	**486**	**704**
4:00PM	1	1	0	**2**	1	169	0	**170**	73	1	0	**74**	**246**
4:15PM	2	5	0	**7**	2	210	0	**212**	73	2	0	**75**	**294**
4:30PM	0	2	0	**2**	1	229	0	**230**	80	1	0	**81**	**313**
4:45PM	2	1	0	**3**	0	200	0	**200**	89	3	0	**92**	**295**
Hourly Total	5	9	0	**14**	4	808	0	**812**	315	7	0	**322**	**1148**
5:00PM	0	3	0	**3**	1	222	0	**223**	90	2	0	**92**	**318**
5:15PM	0	2	0	**2**	0	215	0	**215**	83	1	0	**84**	**301**
5:30PM	1	2	0	**3**	1	228	0	**229**	98	3	0	**101**	**333**
5:45PM	1	2	0	**3**	3	210	0	**213**	105	2	0	**107**	**323**
Hourly Total	2	9	0	**11**	5	875	0	**880**	376	8	0	**384**	**1275**
Total	18	34	0	**52**	14	2046	0	**2060**	1562	17	0	**1579**	**3691**
% Approach	34.6%	65.4%	0%	-	0.7%	99.3%	0%	-	98.9%	1.1%	0%	-	-
% Total	0.5%	0.9%	0%	**1.4%**	0.4%	55.4%	0%	**55.8%**	42.3%	0.5%	0%	**42.8%**	-
Lights	18	34	0	**52**	13	2012	0	**2025**	1524	17	0	**1541**	3618
% Lights	100%	100%	0%	**100%**	92.9%	98.3%	0%	**98.3%**	97.6%	100%	0%	**97.6%**	98.0%
Articulated Trucks	0	0	0	**0**	0	1	0	**1**	3	0	0	**3**	4
% Articulated Trucks	0%	0%	0%	**0%**	0%	0%	0%	**0%**	0.2%	0%	0%	**0.2%**	0.1%
Buses and Single-Unit Trucks	0	0	0	**0**	1	33	0	**34**	35	0	0	**35**	69
% Buses and Single-Unit Trucks	0%	0%	0%	**0%**	7.1%	1.6%	0%	**1.7%**	2.2%	0%	0%	**2.2%**	1.9%

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

Cliffside Dr and Indianola Ave - TMC
Thu Jul 18, 2019
Full Length (7 AM-9 AM, 4 PM-6 PM)
All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)
All Movements
ID: 679148, Location: 40.018425, -83.002031

Provided by: Carpenter Marty (CM) Transportation Inc.
6612 Singletree Drive, Columbus, OH, 43229, US



Cliffside Dr and Indianola Ave - TMC
Thu Jul 18, 2019
AM Peak (8 AM - 9 AM)
All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)
All Movements
ID: 679148, Location: 40.018425, -83.002031

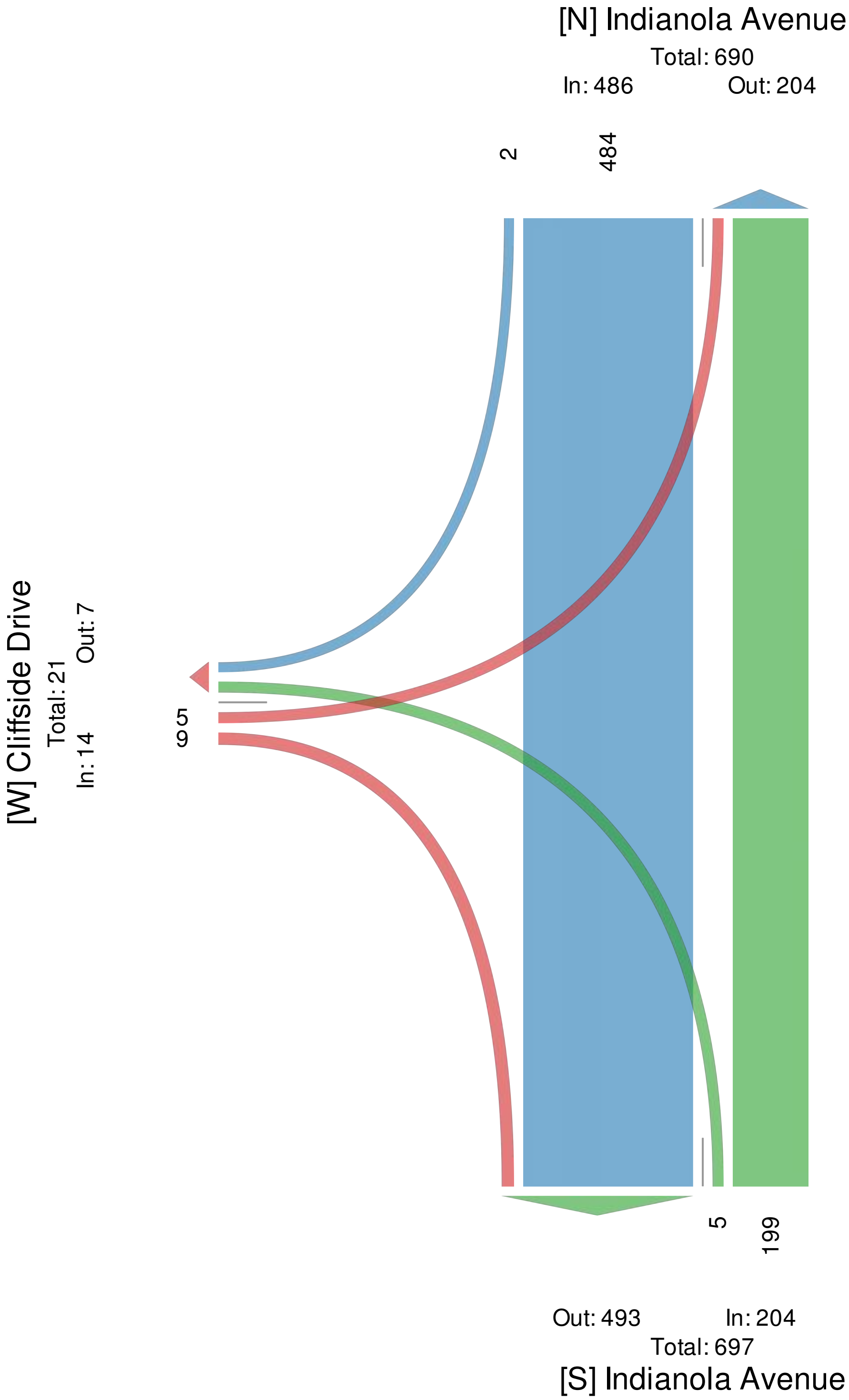
Provided by: Carpenter Marty (CM) Transportation Inc.
6612 Singletree Drive, Columbus, OH, 43229, US

Leg	Cliffside Drive				Indianola Avenue				Indianola Avenue				
Direction	Eastbound				Northbound				Southbound				
Time	L	R	U	**App**	L	T	U	**App**	T	R	U	**App**	**Int**
2019-07-18 8:00AM	0	1	0	**1**	1	41	0	**42**	125	1	0	**126**	**169**
8:15AM	0	5	0	**5**	0	53	0	**53**	111	0	0	**111**	**169**
8:30AM	2	2	0	**4**	1	47	0	**48**	130	1	0	**131**	**183**
8:45AM	3	1	0	**4**	3	58	0	**61**	118	0	0	**118**	**183**
Total	5	9	0	**14**	5	199	0	**204**	484	2	0	**486**	**704**
% Approach	35.7%	64.3%	0%	-	2.5%	97.5%	0%	-	99.6%	0.4%	0%	-	-
% Total	0.7%	1.3%	0%	**2.0%**	0.7%	28.3%	0%	**29.0%**	68.8%	0.3%	0%	**69.0%**	-
PHF	0.417	0.450	-	**0.700**	0.417	0.858	-	**0.836**	0.931	0.500	-	**0.927**	0.962
Lights	5	9	0	**14**	4	191	0	**195**	474	2	0	**476**	685
% Lights	100%	100%	0%	**100%**	80.0%	96.0%	0%	**95.6%**	97.9%	100%	0%	**97.9%**	97.3%
Articulated Trucks	0	0	0	**0**	0	0	0	**0**	0	0	0	**0**	0
% Articulated Trucks	0%	0%	0%	**0%**	0%	0%	0%	**0%**	0%	0%	0%	**0%**	0%
Buses and Single-Unit Trucks	0	0	0	**0**	1	8	0	**9**	10	0	0	**10**	19
% Buses and Single-Unit Trucks	0%	0%	0%	**0%**	20.0%	4.0%	0%	**4.4%**	2.1%	0%	0%	**2.1%**	2.7%

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

Cliffside Dr and Indianola Ave - TMC
Thu Jul 18, 2019
AM Peak (8 AM - 9 AM)
All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)
All Movements
ID: 679148, Location: 40.018425, -83.002031

Provided by: Carpenter Marty (CM) Transportation Inc.
6612 Singletree Drive, Columbus, OH, 43229, US



Cliffside Dr and Indianola Ave - TMC
Thu Jul 18, 2019
PM Peak (5 PM - 6 PM) - Overall Peak Hour
All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)
All Movements
ID: 679148, Location: 40.018425, -83.002031

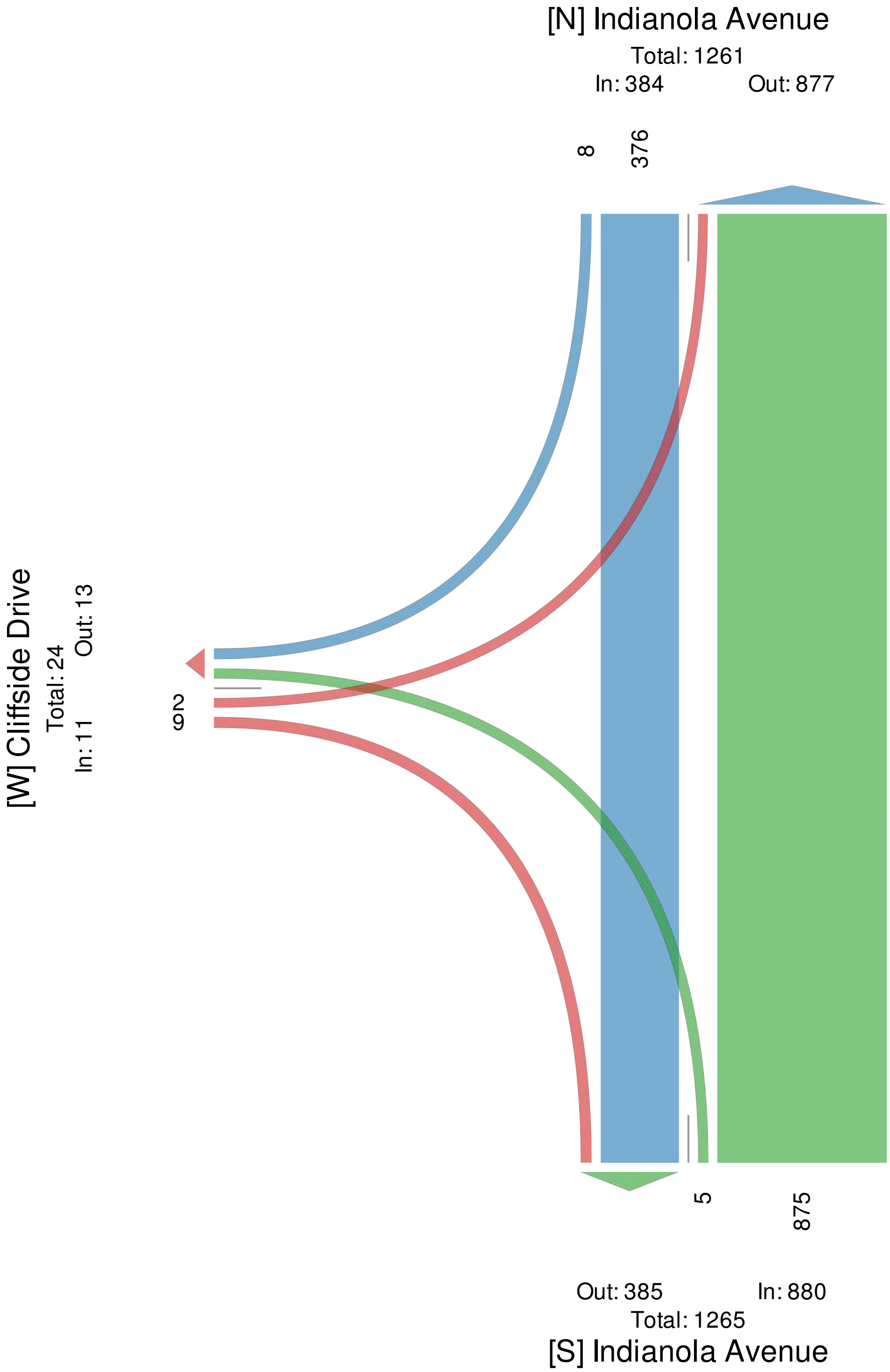
Provided by: Carpenter Marty (CM) Transportation Inc.
6612 Singletree Drive, Columbus, OH, 43229, US

Leg Direction	Cliffside Drive Eastbound				Indianola Avenue Northbound				Indianola Avenue Southbound				
Time	L	R	U	**App**	L	T	U	**App**	T	R	U	**App**	**Int**
2019-07-18 5:00PM	0	3	0	**3**	1	222	0	**223**	90	2	0	**92**	**318**
5:15PM	0	2	0	**2**	0	215	0	**215**	83	1	0	**84**	**301**
5:30PM	1	2	0	**3**	1	228	0	**229**	98	3	0	**101**	**333**
5:45PM	1	2	0	**3**	3	210	0	**213**	105	2	0	**107**	**323**
Total	2	9	0	**11**	5	875	0	**880**	376	8	0	**384**	**1275**
% Approach	18.2%	81.8%	0%	-	0.6%	99.4%	0%	-	97.9%	2.1%	0%	-	-
% Total	0.2%	0.7%	0%	**0.9%**	0.4%	68.6%	0%	**69.0%**	29.5%	0.6%	0%	**30.1%**	-
PHF	0.500	0.750	-	**0.917**	0.417	0.959	-	**0.961**	0.895	0.667	-	**0.897**	0.957
Lights	2	9	0	**11**	5	868	0	**873**	370	8	0	**378**	1262
% Lights	100%	100%	0%	**100%**	100%	99.2%	0%	**99.2%**	98.4%	100%	0%	**98.4%**	99.0%
Articulated Trucks	0	0	0	**0**	0	1	0	**1**	0	0	0	**0**	1
% Articulated Trucks	0%	0%	0%	**0%**	0%	0.1%	0%	**0.1%**	0%	0%	0%	**0%**	0.1%
Buses and Single-Unit Trucks	0	0	0	**0**	0	6	0	**6**	6	0	0	**6**	12
% Buses and Single-Unit Trucks	0%	0%	0%	**0%**	0%	0.7%	0%	**0.7%**	1.6%	0%	0%	**1.6%**	0.9%

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

Cliffside Dr and Indianola Ave - TMC
Thu Jul 18, 2019
PM Peak (5 PM - 6 PM) - Overall Peak Hour
All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)
All Movements
ID: 679148, Location: 40.018425, -83.002031

Provided by: Carpenter Marty (CM) Transportation Inc.
6612 Singletree Drive, Columbus, OH, 43229, US



Peak Hour Data for Intersection

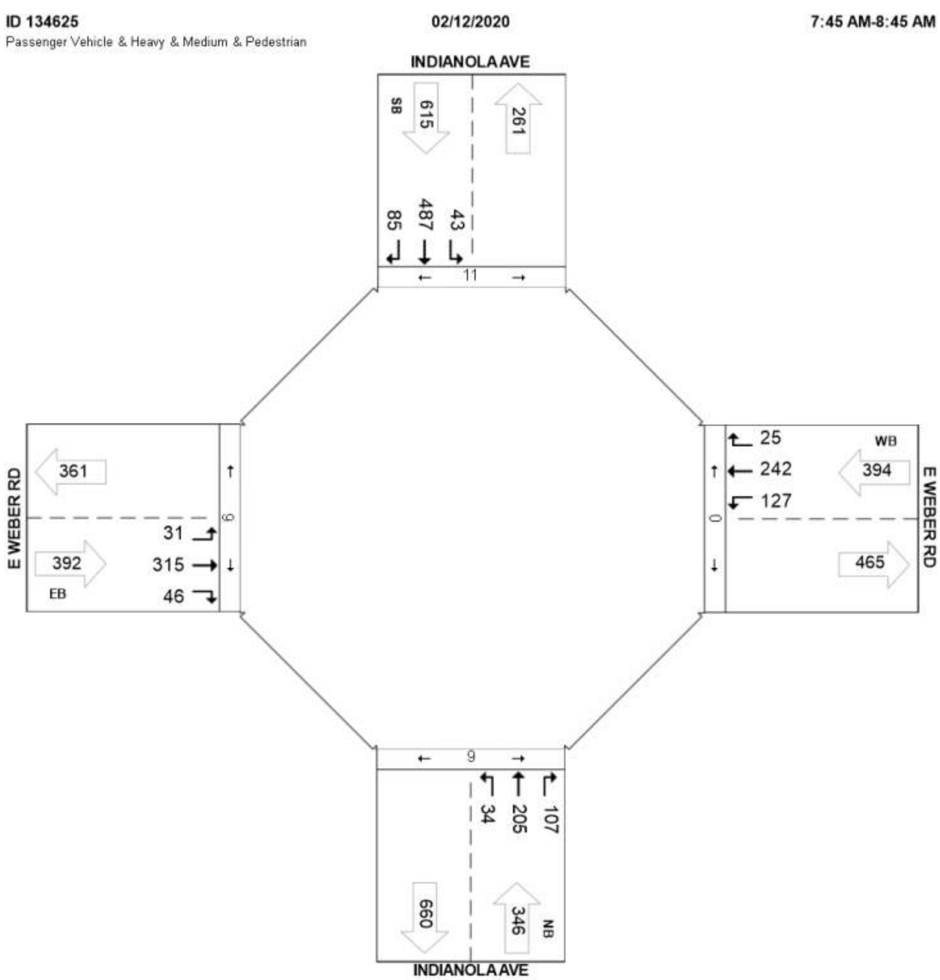
OHIO DEPARTMENT OF TRANSPORTATION

Int ID:	134625		
Community:	COLUMBUS	**Zone:**	N/A
Road 1:	INDIANOLA AVE	**Road 2:**	E WEBER RD
Road 3:	INDIANOLA AVE	**Road 4:**	E WEBER RD

AM Peak Hour (02/12/2020)

☑ Passenger Vehicle ☑ Heavy ☑ Medium ☑ Pedestrian

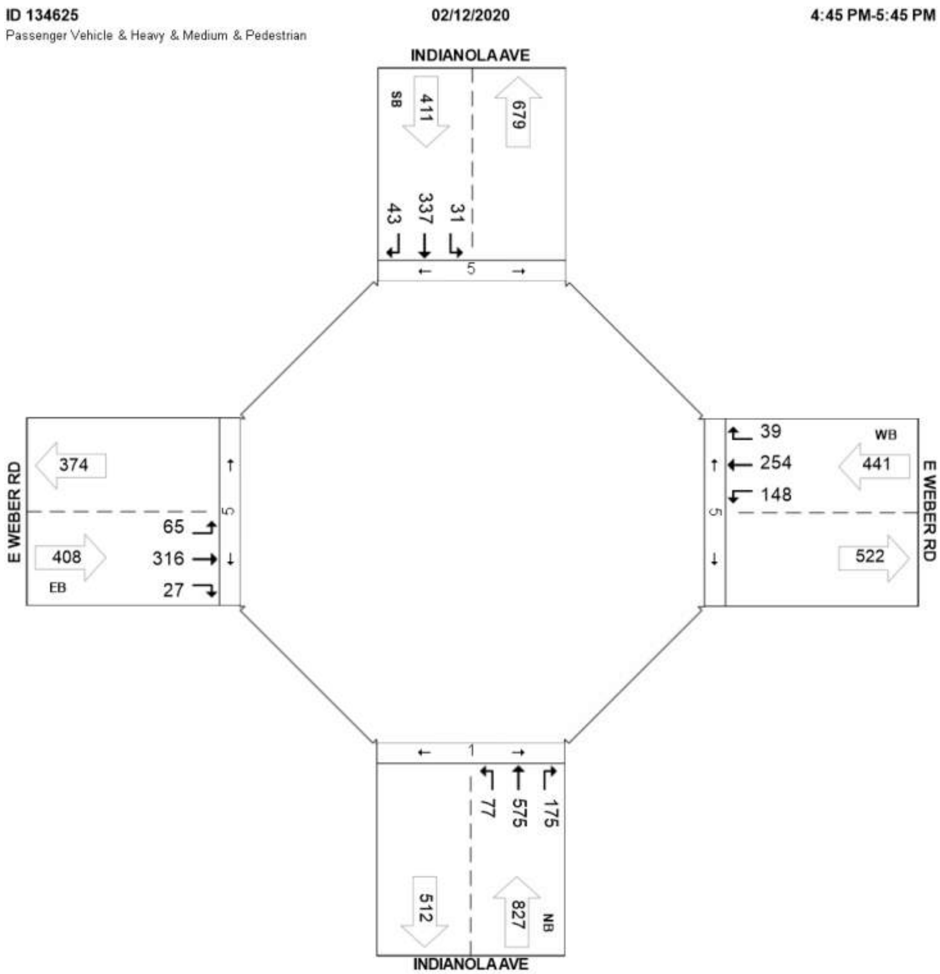
	NB					EB					SB					WB				
Start Time	Left	Thru	Right	Ped	Total	Left	Thru	Right	Ped	Total	Left	Thru	Right	Ped	Total	Left	Thru	Right	Ped	Total
7:45 AM	3	33	29	0	**65**	2	84	12	1	**98**	16	135	24	0	**175**	31	62	4	0	**97**
8:00 AM	5	51	23	0	**79**	8	82	9	2	**99**	6	114	20	0	**140**	39	62	4	9	**105**
8:15 AM	11	65	26	0	**102**	7	65	11	3	**83**	16	103	20	3	**139**	28	58	9	1	**95**
8:30 AM	15	56	29	0	**100**	14	84	14	3	**112**	5	135	21	3	**161**	29	60	8	1	**97**
Total	34	205	107	0	**346**	31	315	46	9	**392**	43	487	85	6	**615**	127	242	25	11	**394**
App %	10%	59%	31%			8%	80%	12%			7%	79%	14%			32%	61%	6%		
PHF	0.57	0.79	0.92		**0.85**	0.55	0.94	0.82		**0.88**	0.67	0.90	0.89		**0.88**	0.81	0.98	0.69		**0.94**
HV %	9%	4%	3%		**4%**	6%	1%	30%		**5%**	2%	3%	7%		**3%**	3%	2%			**2%**
Total %	2%	12%	6%		**20%**	2%	18%	3%		**22%**	2%	28%	5%		**35%**	7%	14%	1%		**23%**



PM Peak Hour (02/12/2020)

☑ Passenger Vehicle ☑ Heavy ☑ Medium ☑ Pedestrian

	NB					EB					SB					WB				
Start Time	Left	Thru	Right	Ped	Total	Left	Thru	Right	Ped	Total	Left	Thru	Right	Ped	Total	Left	Thru	Right	Ped	Total
4:45 PM	12	135	52	0	**199**	17	88	7	0	**112**	9	93	11	1	**113**	35	63	13	0	**111**
5:00 PM	21	136	45	2	**202**	17	85	6	0	**108**	7	68	11	2	**86**	32	61	12	2	**105**
5:15 PM	21	147	47	2	**215**	17	78	5	1	**100**	8	80	12	0	**100**	45	66	9	2	**120**
5:30 PM	23	157	31	1	**211**	14	65	9	0	**88**	7	96	9	2	**112**	36	64	5	1	**105**
Total	77	575	175	5	**827**	65	316	27	1	**408**	31	337	43	5	**411**	148	254	39	5	**441**
App %	9%	70%	21%			16%	77%	7%			8%	82%	10%			34%	58%	9%		
PHF	0.84	0.92	0.84		**0.96**	0.96	0.90	0.75		**0.91**	0.86	0.88	0.90		**0.91**	0.82	0.96	0.75		**0.92**
HV %		1%			**0%**		1%			**0%**	3%	2%	2%		**2%**		1%			**0%**
Total %	4%	28%	8%		**40%**	3%	15%	1%		**20%**	1%	16%	2%		**20%**	7%	12%	2%		**21%**



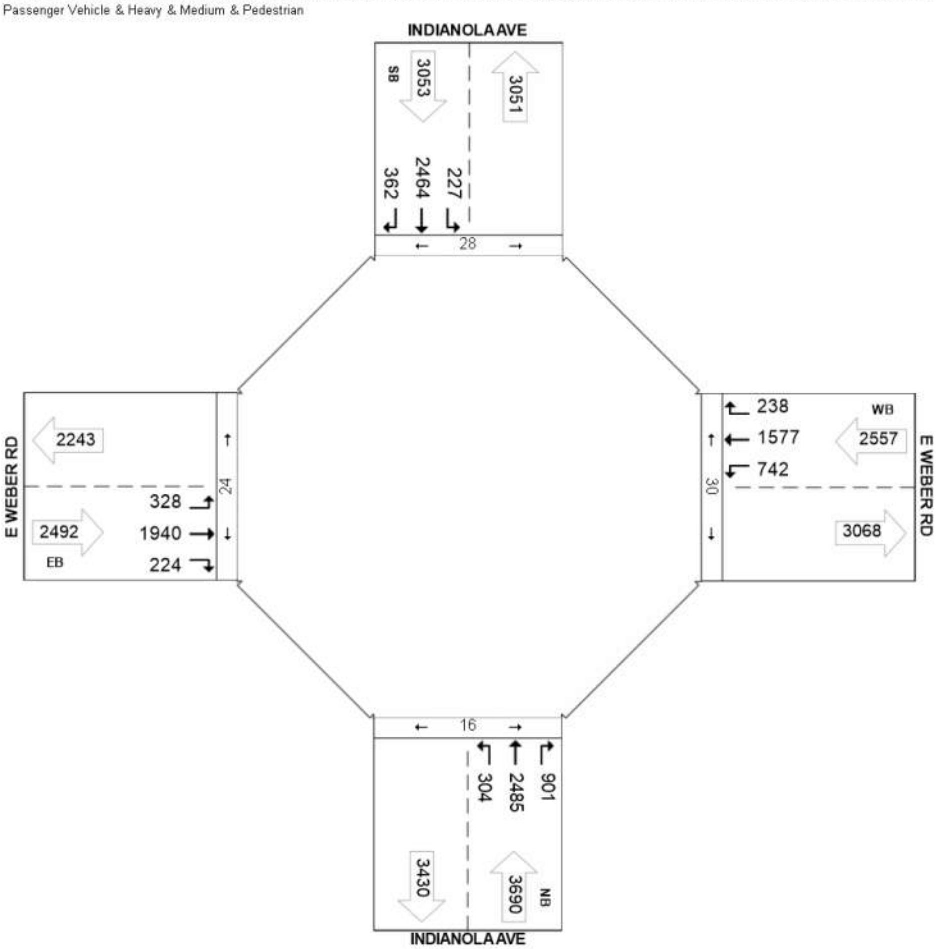
AllDay (02/12/2020)

☑ Passenger Vehicle ☑ Heavy ☑ Medium ☑ Pedestrian

	NB					EB					SB					WB				
Start Time	Left	Thru	Right	Ped	Total	Left	Thru	Right	Ped	Total	Left	Thru	Right	Ped	Total	Left	Thru	Right	Ped	Total
6:00 AM	1	13	3	0	**17**	2	15	2	0	**19**	0	28	3	1	**31**	4	9	1	0	**14**
6:15 AM	1	18	12	0	**31**	1	26	3	0	**30**	5	46	8	1	**59**	8	16	2	0	**26**
6:30 AM	1	21	9	0	**31**	2	35	2	0	**39**	3	42	8	0	**53**	10	32	7	0	**49**
6:45 AM	3	27	13	0	**43**	4	37	6	1	**47**	4	54	11	1	**69**	6	40	6	1	**52**
7:00 AM	3	38	8	0	**49**	3	45	4	1	**52**	11	90	9	0	**110**	22	35	5	0	**62**
7:15 AM	1	33	22	0	**56**	5	83	10	0	**98**	9	118	18	0	**145**	23	52	9	0	**84**
7:30 AM	4	37	26	0	**67**	9	73	8	0	**90**	13	164	12	3	**189**	27	55	8	0	**90**
7:45 AM	3	33	29	0	**65**	2	84	12	1	**98**	16	135	24	0	**175**	31	62	4	0	**97**
8:00 AM	5	51	23	0	**79**	8	82	9	2	**99**	6	114	20	0	**140**	39	62	4	9	**105**
8:15 AM	11	65	26	0	**102**	7	65	11	3	**83**	16	103	20	3	**139**	28	58	9	1	**95**
8:30 AM	15	56	29	0	**100**	14	84	14	3	**112**	5	135	21	3	**161**	29	60	8	1	**97**
8:45 AM	2	52	20	0	**74**	14	65	9	1	**88**	8	82	18	3	**108**	28	50	1	2	**79**
9:00 AM	3	34	16	0	**53**	9	36	8	0	**53**	6	62	7	0	**75**	15	29	5	0	**49**
9:15 AM	3	37	15	0	**55**	10	48	6	0	**64**	5	53	8	2	**66**	16	37	6	0	**59**
9:30 AM	10	54	18	0	**82**	10	48	6	0	**64**	4	47	8	0	**59**	6	32	10	0	**48**
9:45 AM	8	36	12	0	**56**	3	47	2	0	**52**	3	40	6	0	**49**	6	29	4	0	**39**
11:30 AM	0	0	0	1	**0**	0	0	0	0	**0**	0	0	0	0	**0**	0	0	0	0	**0**
11:45 AM	0	0	0	1	**0**	0	0	0	0	**0**	0	0	0	0	**0**	0	0	0	0	**0**
12:15 PM	0	0	0	1	**0**	0	0	0	0	**0**	0	0	0	0	**0**	0	0	0	0	**0**
1:00 PM	0	0	0	1	**0**	0	0	0	0	**0**	0	0	0	0	**0**	0	0	0	0	**0**
1:30 PM	0	0	0	10	**0**	0	0	0	0	**0**	0	0	0	0	**0**	0	0	0	0	**0**
1:45 PM	0	0	0	3	**0**	0	0	0	0	**0**	0	0	0	0	**0**	0	0	0	0	**0**
2:00 PM	0	0	0	2	**0**	0	0	0	0	**0**	0	0	0	0	**0**	0	0	0	0	**0**
3:00 PM	8	77	29	0	**114**	14	58	9	0	**81**	6	65	9	0	**80**	17	62	9	0	**88**
3:15 PM	6	70	43	0	**119**	14	57	12	0	**83**	13	79	12	0	**104**	11	39	13	0	**63**
3:30 PM	9	135	50	0	**194**	12	69	9	1	**90**	9	62	10	0	**81**	11	34	7	0	**52**
3:45 PM	11	100	43	0	**154**	19	75	3	0	**97**	7	64	6	0	**77**	23	50	5	0	**78**
4:00 PM	15	122	56	0	**193**	18	74	7	0	**99**	7	62	5	1	**74**	23	57	12	0	**92**
4:15 PM	10	134	64	0	**208**	15	77	9	1	**101**	3	68	10	0	**81**	24	54	14	0	**92**
4:30 PM	18	124	66	1	**208**	19	91	7	0	**117**	7	76	9	0	**92**	28	58	7	1	**93**
4:45 PM	12	135	52	0	**199**	17	88	7	0	**112**	9	93	11	1	**113**	35	63	13	0	**111**
5:00 PM	21	136	45	2	**202**	17	85	6	0	**108**	7	68	11	2	**86**	32	61	12	2	**105**
5:15 PM	21	147	47	2	**215**	17	78	5	1	**100**	8	80	12	0	**100**	45	66	9	2	**120**
5:30 PM	23	157	31	1	**211**	14	65	9	0	**88**	7	96	9	2	**112**	36	64	5	1	**105**
5:45 PM	16	121	20	2	**157**	12	59	8	1	**79**	7	65	20	0	**92**	31	68	6	4	**105**
6:00 PM	14	110	22	1	**146**	10	50	8	0	**68**	6	75	7	1	**88**	27	63	7	3	**97**
6:15 PM	16	122	19	1	**157**	8	48	8	0	**64**	7	80	11	0	**98**	38	70	10	0	**118**
6:30 PM	20	101	18	1	**139**	11	53	0	0	**64**	3	68	12	0	**83**	39	58	14	1	**111**
6:45 PM	10	89	15	0	**114**	8	40	5	0	**53**	7	50	7	0	**64**	24	52	6	0	**82**

	NB					EB					SB					WB				
Start Time	Left	Thru	Right	Ped	Total	Left	Thru	Right	Ped	Total	Left	Thru	Right	Ped	Total	Left	Thru	Right	Ped	Total
Total	304	2,485	901	30	**3,690**	328	1,940	224	16	**2,492**	227	2,464	362	24	**3,053**	742	1,577	238	28	**2,557**
App %	8%	67%	24%			13%	78%	9%			7%	81%	12%			29%	62%	9%		
PHF	0.34	0.41	0.35		**0.44**	0.44	0.55	0.41		**0.55**	0.36	0.39	0.39		**0.41**	0.42	0.58	0.44		**0.55**
HV %	3%	2%	1%		**2%**	3%	1%	9%		**2%**	4%	2%	3%		**3%**	1%	1%	3%		**1%**
Total %	3%	21%	8%		**31%**	3%	16%	2%		**21%**	2%	21%	3%		**26%**	6%	13%	2%		**22%**

ID 134625: Total Count 6:00 AM-10:00 AM,11:30 AM-12:00 PM,12:15 PM-12:30 PM,1:00 PM-1:15 PM,1:30 PM-2:15 PM,3:00 PM-7:00 PM
Passenger Vehicle & Heavy & Medium & Pedestrian



Arcadia Avenue and Indianola Avenue - TMC

Thu Sep 26, 2019
Full Length (7 AM-9 AM, 4 PM-6 PM)
All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)
All Movements
ID: 700898, Location: 40.01738, -83.002083

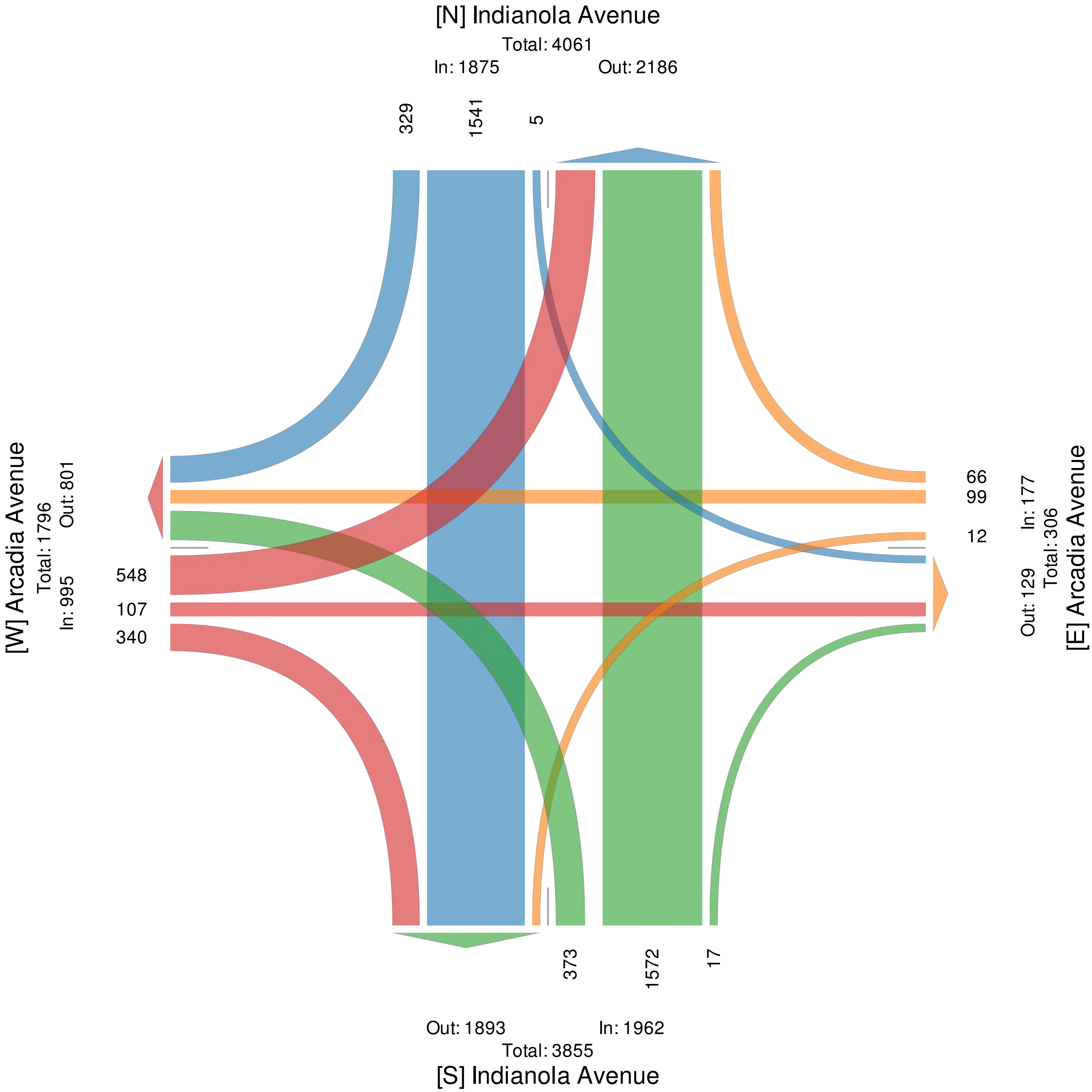
Provided by: Carpenter Marty (CM) Transportation Inc.
6612 Singletree Drive, Columbus, OH, 43229, US

Leg Direction	Arcadia Avenue Eastbound					Arcadia Avenue Westbound					Indianola Avenue Northbound					Indianola Avenue Southbound					
Time	L	T	R	U	App	L	T	R	U	App	L	T	R	U	App	L	T	R	U	App	Int
2019-09-26 7:00AM	6	1	8	0	**15**	3	3	3	0	**9**	6	21	0	0	**27**	1	75	12	0	**88**	**139**
7:15AM	6	2	18	0	**26**	1	4	0	0	**5**	9	28	0	0	**37**	0	95	20	0	**115**	**183**
7:30AM	7	1	29	0	**37**	1	9	3	0	**13**	12	31	1	0	**44**	1	127	19	0	**147**	**241**
7:45AM	11	3	25	0	**39**	0	4	2	0	**6**	12	34	0	0	**46**	0	138	28	0	**166**	**257**
Hourly Total	30	7	80	0	**117**	5	20	8	0	**33**	39	114	1	0	**154**	2	435	79	0	**516**	**820**
8:00AM	13	2	29	0	**44**	0	8	3	0	**11**	15	36	2	0	**53**	1	131	25	0	**157**	**265**
8:15AM	9	2	38	0	**49**	0	8	4	0	**12**	17	46	0	0	**63**	0	149	27	0	**176**	**300**
8:30AM	10	2	41	0	**53**	0	4	4	0	**8**	12	62	1	0	**75**	0	113	33	0	**146**	**282**
8:45AM	13	9	31	0	**53**	0	3	7	0	**10**	11	60	2	0	**73**	1	121	29	0	**151**	**287**
Hourly Total	45	15	139	0	**199**	0	23	18	0	**41**	55	204	5	0	**264**	2	514	114	0	**630**	**1134**
4:00PM	58	11	15	0	**84**	2	4	3	0	**9**	30	113	1	0	**144**	1	65	13	0	**79**	**316**
4:15PM	81	12	20	0	**113**	0	7	5	0	**12**	35	129	1	0	**165**	0	73	14	0	**87**	**377**
4:30PM	76	12	15	0	**103**	0	6	5	0	**11**	35	155	4	0	**194**	0	63	13	0	**76**	**384**
4:45PM	64	8	10	0	**82**	1	5	11	0	**17**	39	183	0	0	**222**	0	65	13	0	**78**	**399**
Hourly Total	279	43	60	0	**382**	3	22	24	0	**49**	139	580	6	0	**725**	1	266	53	0	**320**	**1476**
5:00PM	52	9	20	0	**81**	1	12	3	0	**16**	35	192	0	0	**227**	0	64	17	0	**81**	**405**
5:15PM	53	10	14	0	**77**	0	4	4	0	**8**	26	164	2	0	**192**	0	91	25	0	**116**	**393**
5:30PM	48	13	9	0	**70**	3	8	6	0	**17**	39	161	1	0	**201**	0	91	13	0	**104**	**392**
5:45PM	41	10	18	0	**69**	0	10	3	0	**13**	40	157	2	0	**199**	0	80	28	0	**108**	**389**
Hourly Total	194	42	61	0	**297**	4	34	16	0	**54**	140	674	5	0	**819**	0	326	83	0	**409**	**1579**
Total	548	107	340	0	**995**	12	99	66	0	**177**	373	1572	17	0	**1962**	5	1541	329	0	**1875**	**5009**
% Approach	55.1%	10.8%	34.2%	0%	-	6.8%	55.9%	37.3%	0%	-	19.0%	80.1%	0.9%	0%	-	0.3%	82.2%	17.5%	0%	-	-
% Total	10.9%	2.1%	6.8%	0%	**19.9%**	0.2%	2.0%	1.3%	0%	**3.5%**	7.4%	31.4%	0.3%	0%	**39.2%**	0.1%	30.8%	6.6%	0%	**37.4%**	-
Lights	543	105	332	0	**980**	10	99	66	0	**175**	362	1535	16	0	**1913**	5	1487	325	0	**1817**	4885
% Lights	99.1%	98.1%	97.6%	0%	**98.5%**	83.3%	100%	100%	0%	**98.9%**	97.1%	97.6%	94.1%	0%	**97.5%**	100%	96.5%	98.8%	0%	**96.9%**	97.5%
Articulated Trucks	1	0	0	0	**1**	0	0	0	0	**0**	0	4	0	0	**4**	0	4	0	0	**4**	9
% Articulated Trucks	0.2%	0%	0%	0%	**0.1%**	0%	0%	0%	0%	**0%**	0%	0.3%	0%	0%	**0.2%**	0%	0.3%	0%	0%	**0.2%**	0.2%
Buses and Single-Unit Trucks	4	2	8	0	**14**	2	0	0	0	**2**	11	33	1	0	**45**	0	50	4	0	**54**	115
% Buses and Single-Unit Trucks	0.7%	1.9%	2.4%	0%	**1.4%**	16.7%	0%	0%	0%	**1.1%**	2.9%	2.1%	5.9%	0%	**2.3%**	0%	3.2%	1.2%	0%	**2.9%**	2.3%

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

Arcadia Avenue and Indianola Avenue - TMC
Thu Sep 26, 2019
Full Length (7 AM-9 AM, 4 PM-6 PM)
All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)
All Movements
ID: 700898, Location: 40.01738, -83.002083

Provided by: Carpenter Marty (CM) Transportation Inc.
6612 Singletree Drive, Columbus, OH, 43229, US



Arcadia Avenue and Indianola Avenue - TMC
Thu Sep 26, 2019
AM Peak (8 AM - 9 AM)
All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)
All Movements
ID: 700898, Location: 40.01738, -83.002083

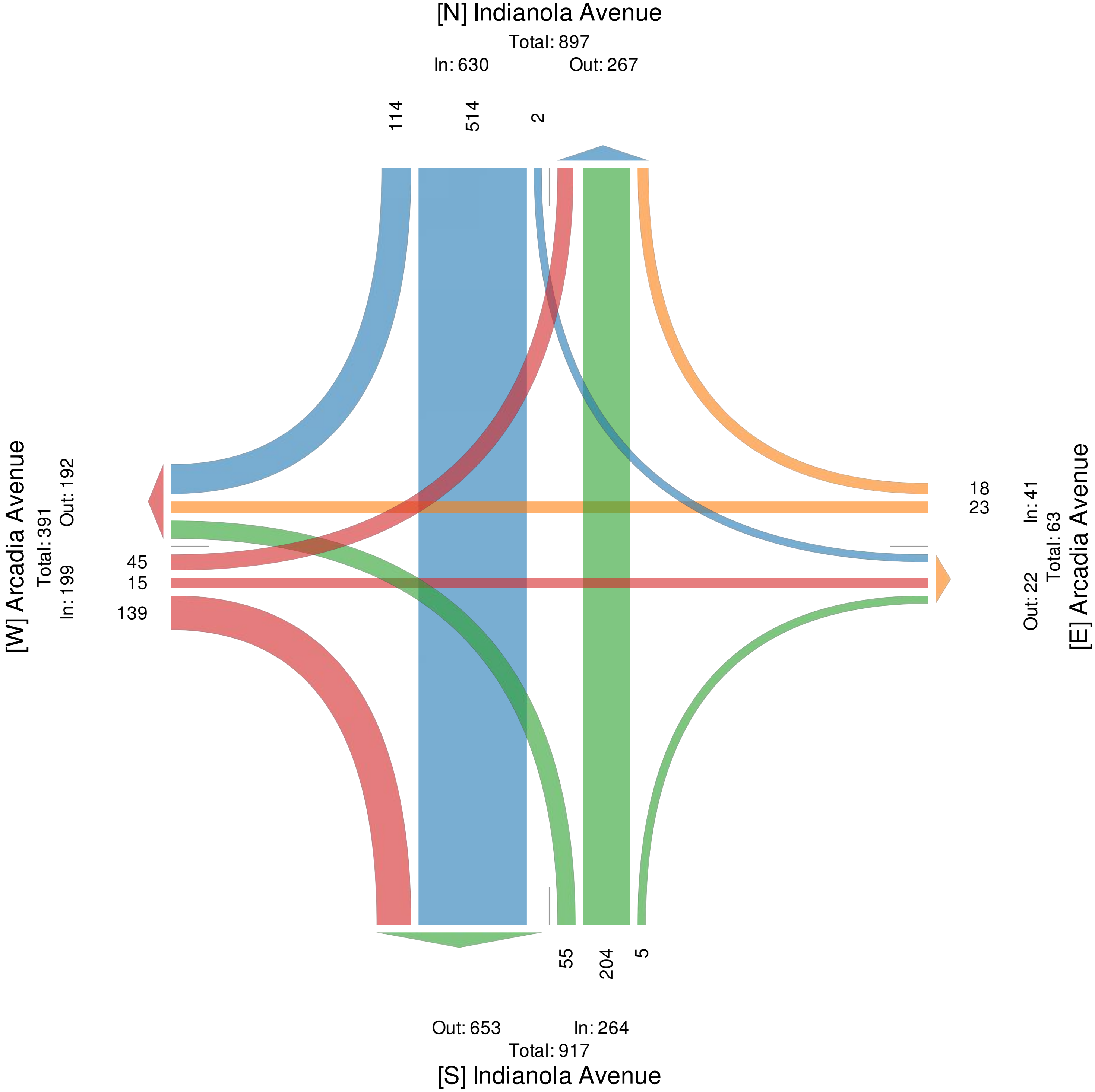
Provided by: Carpenter Marty (CM) Transportation Inc.
6612 Singletree Drive, Columbus, OH, 43229, US

Leg	Arcadia Avenue					Arcadia Avenue					Indianola Avenue					Indianola Avenue					
Direction	Eastbound					Westbound					Northbound					Southbound					
Time	L	T	R	U	**App**	L	T	R	U	**App**	L	T	R	U	**App**	L	T	R	U	**App**	**Int**
2019-09-26 8:00AM	13	2	29	0	**44**	0	8	3	0	**11**	15	36	2	0	**53**	1	131	25	0	**157**	**265**
8:15AM	9	2	38	0	**49**	0	8	4	0	**12**	17	46	0	0	**63**	0	149	27	0	**176**	**300**
8:30AM	10	2	41	0	**53**	0	4	4	0	**8**	12	62	1	0	**75**	0	113	33	0	**146**	**282**
8:45AM	13	9	31	0	**53**	0	3	7	0	**10**	11	60	2	0	**73**	1	121	29	0	**151**	**287**
Total	45	15	139	0	**199**	0	23	18	0	**41**	55	204	5	0	**264**	2	514	114	0	**630**	**1134**
% Approach	22.6%	7.5%	69.8%	0%	-	0%	56.1%	43.9%	0%	-	20.8%	77.3%	1.9%	0%	-	0.3%	81.6%	18.1%	0%	-	-
% Total	4.0%	1.3%	12.3%	0%	**17.5%**	0%	2.0%	1.6%	0%	**3.6%**	4.9%	18.0%	0.4%	0%	**23.3%**	0.2%	45.3%	10.1%	0%	**55.6%**	-
PHF	0.865	0.417	0.848	-	**0.939**	-	0.719	0.643	-	**0.854**	0.809	0.823	0.625	-	**0.880**	0.500	0.862	0.864	-	**0.895**	0.945
Lights	43	15	136	0	**194**	0	23	18	0	**41**	47	191	5	0	**243**	2	487	112	0	**601**	1079
% Lights	95.6%	100%	97.8%	0%	**97.5%**	0%	100%	100%	0%	**100%**	85.5%	93.6%	100%	0%	**92.0%**	100%	94.7%	98.2%	0%	**95.4%**	95.1%
Articulated Trucks	1	0	0	0	**1**	0	0	0	0	**0**	0	3	0	0	**3**	0	3	0	0	**3**	7
% Articulated Trucks	2.2%	0%	0%	0%	**0.5%**	0%	0%	0%	0%	**0%**	0%	1.5%	0%	0%	**1.1%**	0%	0.6%	0%	0%	**0.5%**	0.6%
Buses and Single-Unit Trucks	1	0	3	0	**4**	0	0	0	0	**0**	8	10	0	0	**18**	0	24	2	0	**26**	48
% Buses and Single-Unit Trucks	2.2%	0%	2.2%	0%	**2.0%**	0%	0%	0%	0%	**0%**	14.5%	4.9%	0%	0%	**6.8%**	0%	4.7%	1.8%	0%	**4.1%**	4.2%

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

Arcadia Avenue and Indianola Avenue - TMC
Thu Sep 26, 2019
AM Peak (8 AM - 9 AM)
All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)
All Movements
ID: 700898, Location: 40.01738, -83.002083

Provided by: Carpenter Marty (CM) Transportation Inc.
6612 Singletree Drive, Columbus, OH, 43229, US



Arcadia Avenue and Indianola Avenue - TMC
Thu Sep 26, 2019
PM Peak (4:45 PM - 5:45 PM) - Overall Peak Hour
All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)
All Movements
ID: 700898, Location: 40.01738, -83.002083

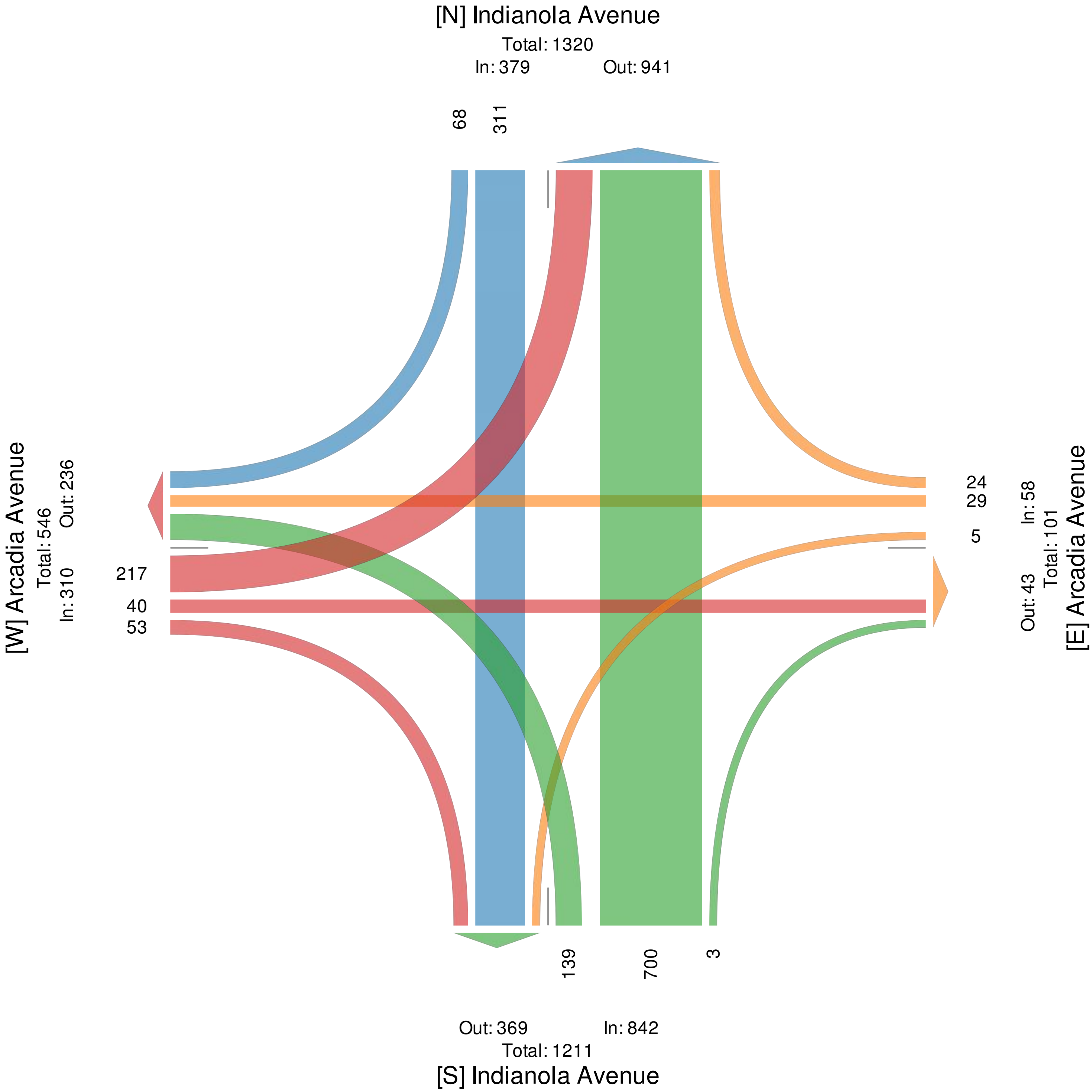
Provided by: Carpenter Marty (CM) Transportation Inc.
6612 Singletree Drive, Columbus, OH, 43229, US

Leg	Arcadia Avenue					Arcadia Avenue					Indianola Avenue					Indianola Avenue					
Direction	Eastbound					Westbound					Northbound					Southbound					
Time	L	T	R	U	App	L	T	R	U	App	L	T	R	U	App	L	T	R	U	App	Int
2019-09-26 4:45PM	64	8	10	0	**82**	1	5	11	0	**17**	39	183	0	0	**222**	0	65	13	0	**78**	**399**
5:00PM	52	9	20	0	**81**	1	12	3	0	**16**	35	192	0	0	**227**	0	64	17	0	**81**	**405**
5:15PM	53	10	14	0	**77**	0	4	4	0	**8**	26	164	2	0	**192**	0	91	25	0	**116**	**393**
5:30PM	48	13	9	0	**70**	3	8	6	0	**17**	39	161	1	0	**201**	0	91	13	0	**104**	**392**
Total	217	40	53	0	**310**	5	29	24	0	**58**	139	700	3	0	**842**	0	311	68	0	**379**	**1589**
% Approach	70.0%	12.9%	17.1%	0%	-	8.6%	50.0%	41.4%	0%	-	16.5%	83.1%	0.4%	0%	-	0%	82.1%	17.9%	0%	-	-
% Total	13.7%	2.5%	3.3%	0%	**19.5%**	0.3%	1.8%	1.5%	0%	**3.7%**	8.7%	44.1%	0.2%	0%	**53.0%**	0%	19.6%	4.3%	0%	**23.9%**	-
PHF	0.848	0.769	0.663	-	**0.945**	0.417	0.604	0.545	-	**0.853**	0.891	0.911	0.375	-	**0.927**	-	0.854	0.680	-	**0.817**	0.981
Lights	216	40	51	0	**307**	5	29	24	0	**58**	137	693	2	0	**832**	0	302	68	0	**370**	1567
% Lights	99.5%	100%	96.2%	0%	**99.0%**	100%	100%	100%	0%	**100%**	98.6%	99.0%	66.7%	0%	**98.8%**	0%	97.1%	100%	0%	**97.6%**	98.6%
Articulated Trucks	0	0	0	0	**0**	0	0	0	0	**0**	0	0	0	0	**0**	0	1	0	0	**1**	1
% Articulated Trucks	0%	0%	0%	0%	**0%**	0%	0%	0%	0%	**0%**	0%	0%	0%	0%	**0%**	0%	0.3%	0%	0%	**0.3%**	0.1%
Buses and Single-Unit Trucks	1	0	2	0	**3**	0	0	0	0	**0**	2	7	1	0	**10**	0	8	0	0	**8**	21
% Buses and Single-Unit Trucks	0.5%	0%	3.8%	0%	**1.0%**	0%	0%	0%	0%	**0%**	1.4%	1.0%	33.3%	0%	**1.2%**	0%	2.6%	0%	0%	**2.1%**	1.3%

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

Arcadia Avenue and Indianola Avenue - TMC
Thu Sep 26, 2019
PM Peak (4:45 PM - 5:45 PM) - Overall Peak Hour
All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)
All Movements
ID: 700898, Location: 40.01738, -83.002083

Provided by: Carpenter Marty (CM) Transportation Inc.
6612 Singletree Drive, Columbus, OH, 43229, US



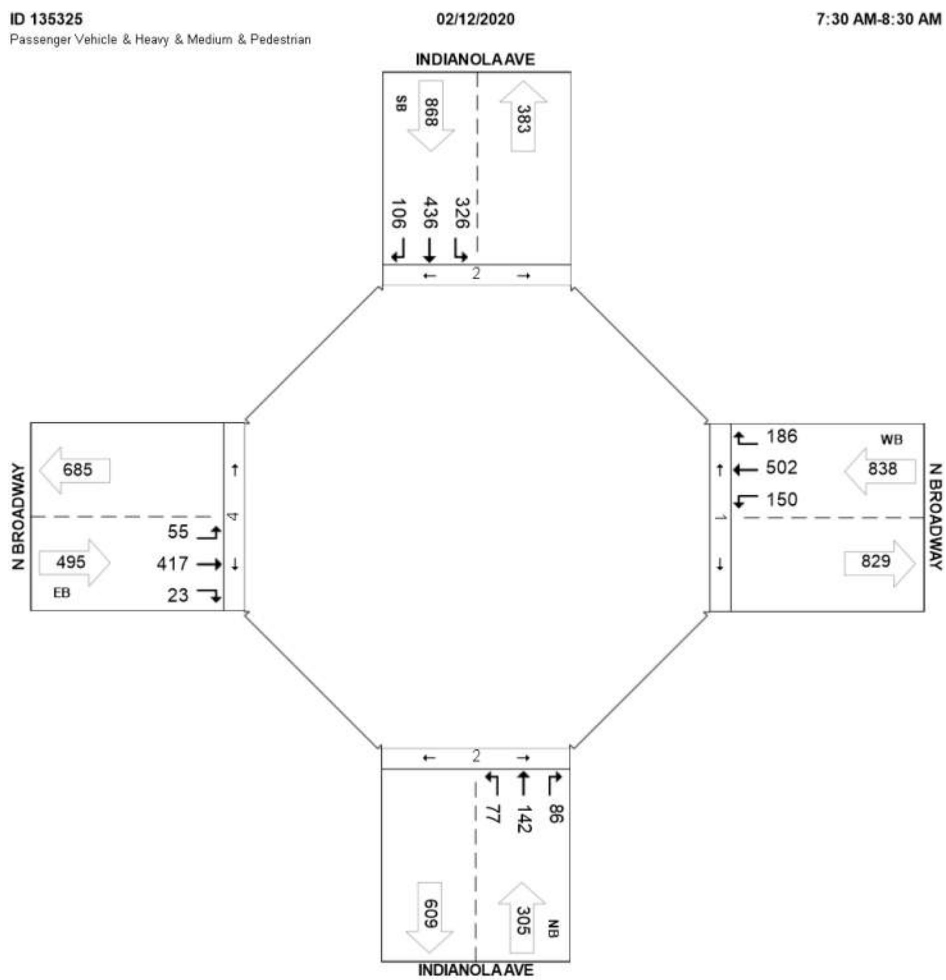
Peak Hour Data for Intersection

Int ID:	135325		
Community:	COLUMBUS	**Zone:**	N/A
Road 1:	INDIANOLA AVE	**Road 2:**	N BROADWAY
Road 3:	INDIANOLA AVE	**Road 4:**	N BROADWAY

AM Peak Hour (02/12/2020)

☑ Passenger Vehicle ☑ Heavy ☑ Medium ☑ Pedestrian

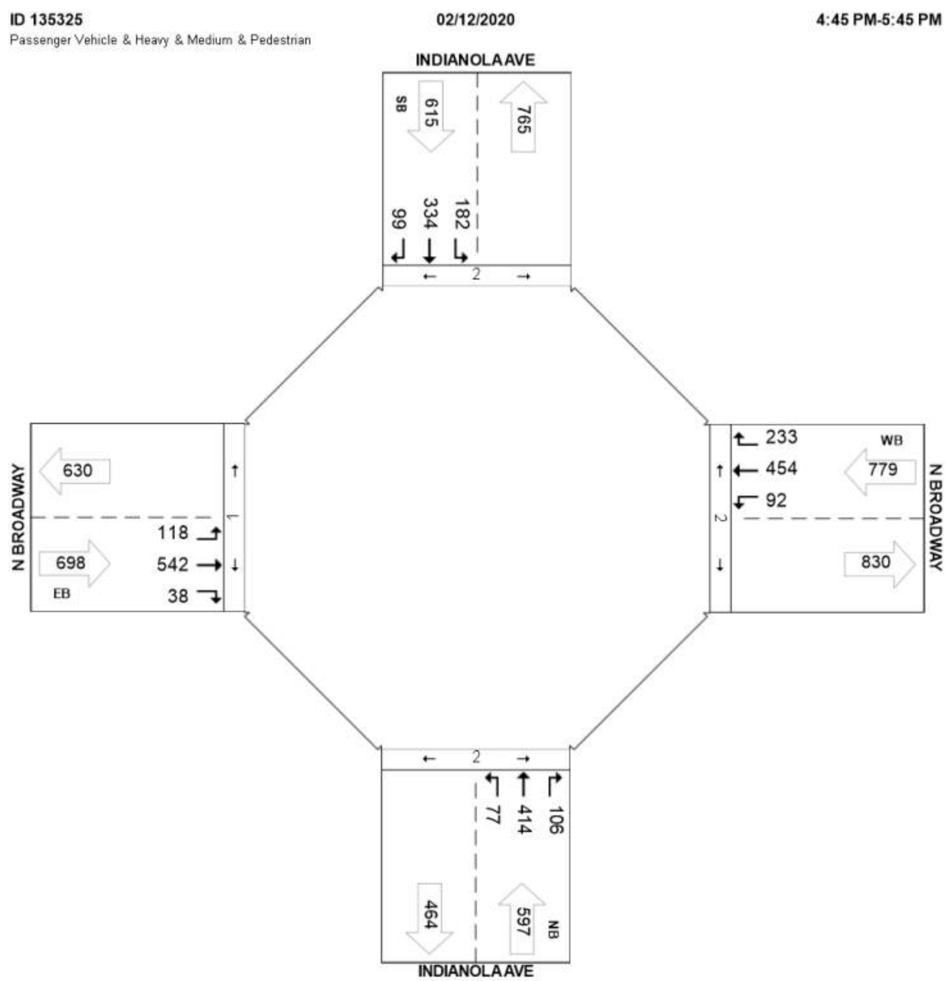
	NB					EB					SB					WB				
Start Time	Left	Thru	Right	Ped	Total	Left	Thru	Right	Ped	Total	Left	Thru	Right	Ped	Total	Left	Thru	Right	Ped	Total
7:30 AM	21	32	22	0	**75**	15	102	6	0	**123**	81	108	27	1	**216**	31	137	42	1	**210**
7:45 AM	18	35	18	1	**71**	12	108	4	1	**124**	76	128	29	1	**233**	52	126	66	0	**244**
8:00 AM	14	28	20	0	**62**	14	102	8	1	**124**	94	109	21	1	**224**	40	124	37	0	**201**
8:15 AM	24	47	26	0	**97**	14	105	5	0	**124**	75	91	29	1	**195**	27	115	41	1	**183**
Total	77	142	86	1	**305**	55	417	23	2	**495**	326	436	106	4	**868**	150	502	186	2	**838**
App %	25%	47%	28%			11%	84%	5%			38%	50%	12%			18%	60%	22%		
PHF	0.80	0.76	0.83		**0.79**	0.92	0.97	0.72		**1.00**	0.87	0.85	0.91		**0.93**	0.72	0.92	0.70		**0.86**
HV %	1%	4%	1%		**2%**	4%	4%	13%		**4%**	2%	3%	4%		**3%**	3%	5%	3%		**4%**
Total %	3%	6%	3%		**12%**	2%	17%	1%		**20%**	13%	17%	4%		**35%**	6%	20%	7%		**33%**



PM Peak Hour (02/12/2020)

☑ Passenger Vehicle ☑ Heavy ☑ Medium ☑ Pedestrian

	NB					EB					SB					WB				
Start Time	**Left**	**Thru**	**Right**	**Ped**	**Total**	**Left**	**Thru**	**Right**	**Ped**	**Total**	**Left**	**Thru**	**Right**	**Ped**	**Total**	**Left**	**Thru**	**Right**	**Ped**	**Total**
4:45 PM	25	108	23	0	**156**	30	131	8	0	**169**	57	87	21	0	**165**	21	109	58	0	**188**
5:00 PM	20	87	22	2	**129**	26	140	11	2	**177**	49	71	18	0	**138**	26	99	50	0	**175**
5:15 PM	13	122	37	0	**172**	29	128	9	0	**166**	37	90	33	0	**160**	22	100	52	1	**174**
5:30 PM	19	97	24	0	**140**	33	143	10	0	**186**	39	86	27	1	**152**	23	146	73	1	**242**
Total	77	414	106	2	**597**	118	542	38	2	**698**	182	334	99	1	**615**	92	454	233	2	**779**
App %	13%	69%	18%			17%	78%	5%			30%	54%	16%			12%	58%	30%		
PHF	0.77	0.85	0.72		**0.87**	0.89	0.95	0.86		**0.94**	0.80	0.93	0.75		**0.93**	0.88	0.78	0.80		**0.80**
HV %	3%	1%			**1%**	1%	0%			**0%**	1%	3%	2%		**2%**		1%			**0%**
Total %	3%	15%	4%		**22%**	4%	20%	1%		**26%**	7%	12%	4%		**23%**	3%	17%	9%		**29%**

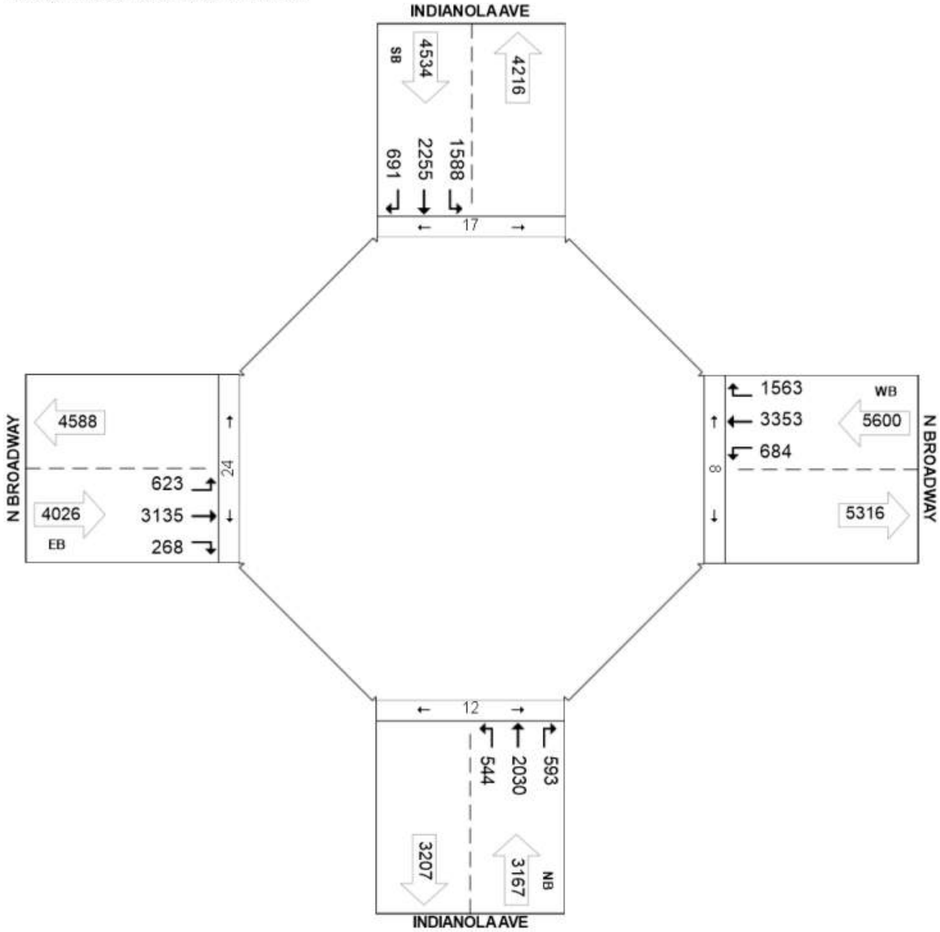


AllDay (02/12/2020)

☑ Passenger Vehicle ☑ Heavy ☑ Medium ☑ Pedestrian

	NB					EB					SB					WB				
Start Time	Left	Thru	Right	Ped	Total	Left	Thru	Right	Ped	Total	Left	Thru	Right	Ped	Total	Left	Thru	Right	Ped	Total
6:00 AM	4	14	5	0	**23**	3	15	1	0	**19**	12	18	4	0	**34**	12	50	30	0	**92**
6:15 AM	10	11	7	1	**28**	13	26	0	0	**39**	18	16	9	2	**43**	7	70	32	0	**109**
6:30 AM	11	15	14	0	**40**	7	28	4	0	**39**	41	38	7	1	**86**	17	83	40	0	**140**
6:45 AM	14	25	15	0	**54**	12	50	3	0	**65**	47	37	8	1	**92**	11	96	45	1	**152**
7:00 AM	11	24	18	1	**53**	11	76	2	2	**89**	54	58	19	1	**131**	18	109	33	1	**160**
7:15 AM	13	37	18	0	**68**	15	95	2	0	**112**	70	88	36	0	**194**	25	146	38	0	**209**
7:30 AM	21	32	22	0	**75**	15	102	6	0	**123**	81	108	27	1	**216**	31	137	42	1	**210**
7:45 AM	18	35	18	1	**71**	12	108	4	1	**124**	76	128	29	1	**233**	52	126	66	0	**244**
8:00 AM	14	28	20	0	**62**	14	102	8	1	**124**	94	109	21	1	**224**	40	124	37	0	**201**
8:15 AM	24	47	26	0	**97**	14	105	5	0	**124**	75	91	29	1	**195**	27	115	41	1	**183**
8:30 AM	25	48	29	0	**102**	14	99	8	0	**121**	53	105	29	2	**187**	37	133	38	1	**208**
8:45 AM	16	51	20	0	**87**	18	116	7	0	**141**	72	87	21	0	**180**	43	99	53	1	**195**
9:00 AM	20	50	15	1	**85**	17	73	11	0	**101**	36	61	24	0	**121**	14	91	34	1	**139**
9:15 AM	16	33	11	0	**60**	15	87	5	0	**107**	40	57	11	0	**108**	15	109	43	0	**167**
9:30 AM	12	43	9	0	**64**	18	71	3	0	**92**	45	54	16	0	**115**	15	70	35	0	**120**
9:45 AM	16	46	12	0	**74**	14	80	8	0	**102**	43	43	12	0	**98**	8	88	48	2	**144**
3:00 PM	10	53	5	1	**68**	24	77	10	0	**111**	56	64	15	0	**135**	18	78	66	1	**162**
3:15 PM	11	62	19	0	**92**	18	115	5	2	**138**	64	70	27	0	**161**	20	89	57	0	**166**
3:30 PM	8	77	25	0	**110**	22	115	14	0	**151**	72	73	25	2	**170**	18	87	54	0	**159**
3:45 PM	22	85	32	0	**139**	25	150	10	0	**185**	47	61	33	1	**141**	16	132	64	0	**212**
4:00 PM	19	104	22	0	**145**	19	122	14	1	**155**	50	80	33	2	**163**	10	108	64	0	**182**
4:15 PM	24	90	25	0	**139**	38	148	11	0	**197**	29	51	22	0	**102**	16	103	38	0	**157**
4:30 PM	27	123	27	0	**177**	25	132	16	2	**173**	59	75	22	1	**156**	18	106	53	2	**177**
4:45 PM	25	108	23	0	**156**	30	131	8	0	**169**	57	87	21	0	**165**	21	109	58	0	**188**
5:00 PM	20	87	22	2	**129**	26	140	11	2	**177**	49	71	18	0	**138**	26	99	50	0	**175**
5:15 PM	13	122	37	0	**172**	29	128	9	0	**166**	37	90	33	0	**160**	22	100	52	1	**174**
5:30 PM	19	97	24	0	**140**	33	143	10	0	**186**	39	86	27	1	**152**	23	146	73	1	**242**
5:45 PM	22	117	31	0	**170**	26	98	12	0	**136**	36	89	28	2	**153**	25	125	57	0	**207**
6:00 PM	20	85	17	0	**122**	25	113	16	0	**154**	40	64	27	2	**131**	25	127	67	3	**219**
6:15 PM	20	82	6	1	**108**	30	101	12	1	**143**	43	68	13	1	**124**	21	114	65	0	**200**
6:30 PM	17	97	9	0	**123**	16	99	18	0	**133**	31	66	27	0	**124**	20	88	43	0	**151**
6:45 PM	22	102	10	0	**134**	25	90	15	0	**130**	22	62	18	1	**102**	13	96	47	0	**156**
Total	544	2,030	593	8	**3,167**	623	3,135	268	12	**4,026**	1,588	2,255	691	24	**4,534**	684	3,353	1,563	17	**5,600**
App %	17%	64%	19%			15%	78%	7%			35%	50%	15%			12%	60%	28%		
PHF	0.63	0.52	0.50		**0.56**	0.51	0.65	0.47		**0.64**	0.53	0.55	0.60		**0.61**	0.41	0.72	0.67		**0.72**
HV %	2%	3%	2%		**2%**	2%	3%	1%		**2%**	2%	3%	1%		**2%**	2%	3%	2%		**2%**
Total %	3%	12%	3%		**18%**	4%	18%	2%		**23%**	9%	13%	4%		**26%**	4%	19%	9%		**32%**

Passenger Vehicle & Heavy & Medium & Pedestrian



Michael Baker
INTERNATIONAL

We Make a Difference

Attachment D:

September 2020 Tube Counts

Type of report: Tube Count - Speed Data

LOCATION: Indianola Ave north of Glen Echo Bridge (btwn Cliffside and Olentangy) [VSC] **QC JOB #:** 15283701
SPECIFIC LOCATION: **DIRECTION:** NB
CITY/STATE: Columbus, OH **DATE:** Sep 23 2020

Start Time	1 15	16 20	21 25	26 30	31 35	36 40	41 45	46 50	51 55	56 60	61 65	66 70	71 75	76 999	Total	Pace Speed	Number in Pace
12:00 AM	0	0	0	1	3	1	0	0	0	0	0	0	0	0	5	28-37	4
12:15 AM	1	0	0	0	1	1	0	1	0	0	0	0	0	0	4	31-40	2
12:30 AM	0	0	0	2	2	5	0	0	0	0	0	0	0	0	9	31-40	7
12:45 AM	0	0	0	0	3	3	0	0	0	0	0	0	0	0	6	31-40	6
01:00 AM	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	31-40	1
01:15 AM	0	0	1	1	0	2	0	0	0	0	0	0	0	0	4	31-40	2
01:30 AM	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	31-40	1
01:45 AM	0	0	0	0	3	0	1	0	0	0	0	0	0	0	4	26-35	3
02:00 AM	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	26-35	1
02:15 AM	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	31-40	1
02:30 AM	0	0	0	0	2	1	1	1	0	0	0	0	0	0	5	31-40	3
02:45 AM	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	31-40	1
03:00 AM	0	0	0	0	1	1	0	0	0	0	0	0	0	0	2	31-40	2
03:15 AM	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	26-35	1
03:30 AM	0	0	0	0	0	4	0	0	0	0	0	0	0	0	4	31-40	4
03:45 AM	0	0	0	0	0	1	0	1	1	0	0	0	0	0	3	46-55	2
04:00 AM	0	0	0	0	1	1	0	0	0	0	0	0	0	0	2	31-40	2
04:15 AM	0	0	0	0	1	2	1	0	0	0	0	0	0	0	4	36-45	3
04:30 AM	0	0	0	0	2	3	1	0	0	0	0	0	0	0	6	31-40	5
04:45 AM	0	0	0	2	1	7	1	1	0	0	0	0	0	0	12	35-44	8
05:00 AM	1	0	0	1	0	2	1	0	0	0	0	0	0	0	5	36-45	3
05:15 AM	0	0	0	0	2	6	2	0	0	0	0	0	0	0	10	33-42	8
05:30 AM	0	0	0	2	2	7	1	0	0	0	0	0	0	0	12	31-40	9
05:45 AM	1	0	0	1	6	8	5	0	0	0	0	0	0	0	21	31-40	14
Day Total **Percent**																	
AM Peak **15-min Vol**																	
PM Peak **15-min Vol**																	

Comments:

Report generated on 10/1/2020 3:12 PM SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of report: Tube Count - Speed Data

LOCATION: Indianola Ave north of Glen Echo Bridge (btwn Cliffside and Olentangy) [VSC] **QC JOB #:** 15283701

SPECIFIC LOCATION: **DIRECTION:** NB

CITY/STATE: Columbus, OH **DATE:** Sep 23 2020

Start Time	1 15	16 20	21 25	26 30	31 35	36 40	41 45	46 50	51 55	56 60	61 65	66 70	71 75	76 999	Total	Pace Speed	Number in Pace
06:00 AM	0	0	2	0	5	12	4	0	0	0	0	0	0	0	23	31-40	17
06:15 AM	0	0	0	0	10	11	1	0	0	0	0	0	0	0	22	31-40	21
06:30 AM	0	0	0	1	12	13	6	1	0	0	0	0	0	0	33	31-40	25
06:45 AM	0	0	0	7	14	20	2	2	0	0	0	0	0	0	45	31-40	34
07:00 AM	0	1	2	12	22	14	7	0	0	0	0	0	0	0	58	31-40	36
07:15 AM	0	0	2	8	15	17	6	0	0	0	0	0	0	0	48	31-40	32
07:30 AM	0	0	0	11	21	16	1	0	0	0	0	0	0	0	49	31-40	37
07:45 AM	0	0	2	3	17	17	3	1	0	0	0	0	0	0	43	31-40	34
08:00 AM	1	0	1	5	16	19	8	1	0	0	0	0	0	0	51	31-40	35
08:15 AM	0	0	1	5	15	17	9	1	0	0	0	0	0	0	48	31-40	32
08:30 AM	1	0	0	0	19	20	5	0	0	0	0	0	0	0	45	31-40	39
08:45 AM	0	0	1	7	10	18	9	2	0	0	0	0	0	0	47	31-40	28
09:00 AM	1	0	2	2	8	21	12	1	1	0	0	0	0	0	48	36-45	33
09:15 AM	2	0	1	3	15	25	14	2	0	0	0	0	0	0	62	31-40	40
09:30 AM	0	0	0	3	25	39	7	0	0	0	0	0	0	0	74	31-40	64
09:45 AM	1	0	0	8	20	23	7	1	0	0	0	0	0	0	60	31-40	43
10:00 AM	1	1	0	7	28	26	7	0	0	0	0	0	0	0	70	31-40	54
10:15 AM	0	1	1	2	18	37	4	1	0	0	0	0	0	0	64	31-40	55
10:30 AM	0	0	0	1	19	30	10	2	0	0	0	0	0	0	62	31-40	49
10:45 AM	0	0	0	1	22	39	12	2	0	0	0	0	0	0	76	31-40	61
11:00 AM	2	1	1	11	30	22	3	3	0	0	0	0	0	0	73	31-40	52
11:15 AM	1	0	0	5	15	33	15	4	1	0	0	0	0	0	74	31-40	48
11:30 AM	0	0	2	4	37	59	22	2	0	0	0	0	0	0	126	31-40	96
11:45 AM	1	0	1	1	32	55	20	3	0	0	0	0	0	0	113	31-40	87
Day Total **Percent**																	
AM Peak **15-min Vol**																	
PM Peak **15-min Vol**																	

Comments:

Report generated on 10/1/2020 3:12 PM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of report: Tube Count - Speed Data

LOCATION: Indianola Ave north of Glen Echo Bridge (btwn Cliffside and Olentangy) [VSC] QC JOB #: 15283701
SPECIFIC LOCATION: DIRECTION: NB
CITY/STATE: Columbus, OH DATE: Sep 23 2020

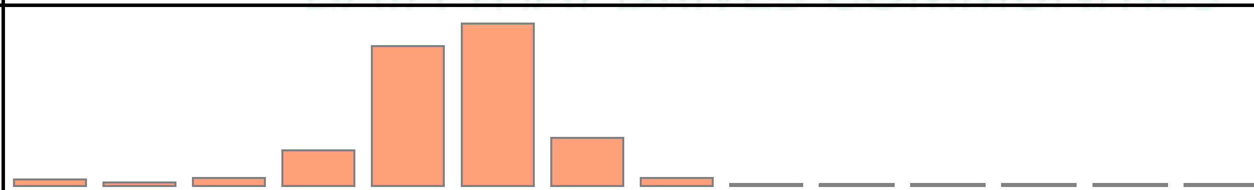
Start Time	1 15	16 20	21 25	26 30	31 35	36 40	41 45	46 50	51 55	56 60	61 65	66 70	71 75	76 999	Total	Pace Speed	Number in Pace
12:00 PM	1	**2**	1	3	20	46	8	0	**1**	0	0	0	0	0	82	31-40	66
12:15 PM	1	0	0	3	26	35	16	3	0	0	0	0	0	0	84	31-40	61
12:30 PM	2	0	2	3	23	28	13	3	1	0	0	0	0	0	75	31-40	51
12:45 PM	0	0	0	2	15	41	12	2	0	0	0	0	0	0	72	31-40	56
01:00 PM	0	0	0	2	26	39	16	2	0	0	0	0	0	0	85	31-40	65
01:15 PM	0	0	0	3	17	40	12	1	0	0	0	0	0	0	73	31-40	57
01:30 PM	0	1	1	12	23	30	8	1	0	0	0	0	0	0	76	31-40	53
01:45 PM	0	0	1	10	29	40	13	0	0	0	0	0	0	0	93	31-40	69
02:00 PM	1	0	2	10	41	20	2	0	0	0	0	0	0	0	76	31-40	61
02:15 PM	0	0	1	**13**	40	33	8	2	0	0	0	0	0	0	97	31-40	73
02:30 PM	1	1	1	8	29	43	8	0	0	0	0	0	0	0	91	31-40	72
02:45 PM	1	2	1	13	32	40	6	1	0	0	0	0	0	0	96	31-40	72
03:00 PM	1	1	4	11	30	46	8	1	0	0	0	0	0	0	102	31-40	76
03:15 PM	3	0	2	7	**53**	45	8	2	1	0	0	0	0	0	**121**	31-40	98
03:30 PM	1	0	1	10	45	29	11	2	1	0	0	0	0	0	100	31-40	74
03:45 PM	1	0	4	11	36	27	11	3	0	0	0	0	0	0	93	31-40	63
04:00 PM	2	1	1	6	41	38	**21**	1	0	0	0	0	0	0	111	31-40	79
04:15 PM	3	0	2	6	31	**47**	19	**5**	0	0	0	0	0	0	113	31-40	78
04:30 PM	**4**	1	3	10	36	40	6	1	0	0	0	0	0	0	101	31-40	76
04:45 PM	0	0	1	10	30	44	7	2	0	0	0	0	0	0	94	31-40	74
05:00 PM	1	0	2	13	35	31	8	0	0	0	0	0	0	0	90	31-40	66
05:15 PM	2	0	2	11	35	27	7	0	0	0	0	0	0	0	84	31-40	62
05:30 PM	1	0	2	12	32	29	10	2	0	0	0	0	0	0	88	31-40	61
05:45 PM	2	0	2	6	44	23	10	1	0	0	0	0	0	0	88	31-40	67
Day Total Percent																	
AM Peak 15-min Vol																	
PM Peak 15-min Vol																	

Comments:

Type of report: Tube Count - Speed Data

LOCATION: Indianola Ave north of Glen Echo Bridge (btwn Cliffside and Olentangy) [VSC] QC JOB #: 15283701
SPECIFIC LOCATION: DIRECTION: NB
CITY/STATE: Columbus, OH DATE: Sep 23 2020

Start Time	1 15	16 20	21 25	26 30	31 35	36 40	41 45	46 50	51 55	56 60	61 65	66 70	71 75	76 999	Total	Pace Speed	Number in Pace
06:00 PM	1	1	2	4	37	29	3	0	0	0	0	0	0	0	77	31-40	66
06:15 PM	0	1	5	9	28	20	1	2	0	0	0	0	0	0	66	31-40	48
06:30 PM	1	0	0	4	27	25	3	0	0	0	0	0	0	0	60	31-40	52
06:45 PM	2	0	2	8	24	15	5	0	0	0	0	0	0	0	56	31-40	39
07:00 PM	1	0	1	3	21	21	6	1	0	0	0	0	0	0	54	31-40	42
07:15 PM	0	0	0	9	20	15	2	0	0	0	0	0	0	0	46	31-40	35
07:30 PM	0	0	0	0	15	17	6	0	0	0	0	0	0	0	38	31-40	32
07:45 PM	1	2	0	4	6	13	4	0	0	0	0	0	0	0	30	31-40	19
08:00 PM	1	0	1	6	18	15	5	0	0	0	0	0	0	0	46	31-40	33
08:15 PM	0	1	3	4	19	5	3	0	0	0	0	0	0	0	35	31-40	24
08:30 PM	0	0	3	4	14	19	5	1	0	0	0	0	0	0	46	31-40	33
08:45 PM	0	0	0	4	18	22	5	2	0	0	0	0	0	0	51	31-40	40
09:00 PM	1	0	1	2	9	15	3	0	1	0	0	0	0	0	32	31-40	24
09:15 PM	0	0	1	2	10	6	2	0	0	0	0	0	0	0	21	31-40	16
09:30 PM	2	0	0	0	9	14	1	1	0	0	0	0	0	0	27	31-40	23
09:45 PM	1	0	1	2	7	7	0	0	0	0	0	0	0	0	18	31-40	14
10:00 PM	0	0	0	6	8	3	3	0	0	0	0	0	0	0	20	26-35	14
10:15 PM	1	0	0	0	11	5	1	0	0	0	0	0	0	0	18	31-40	16
10:30 PM	3	0	0	0	4	5	1	0	0	0	0	0	0	0	13	31-40	9
10:45 PM	2	0	1	1	6	3	3	0	0	0	0	0	0	0	16	31-40	9
11:00 PM	1	0	0	0	7	3	1	0	0	0	0	0	0	0	12	31-40	10
11:15 PM	0	0	0	1	2	2	3	3	0	0	0	0	0	0	11	41-50	6
11:30 PM	0	0	0	0	1	3	2	0	0	0	0	0	0	0	6	36-45	5
11:45 PM	0	0	0	0	0	4	2	1	0	0	0	0	0	0	7	36-45	6
Day Total Percent	60 1.3%	18 0.4%	77 1.7%	385 8.5%	1567 34.6%	1809 39.9%	526 11.6%	79 1.7%	8 0.2%	0 0%	0 0%	0 0%	0 0%	0 0%	4529	31-40	3376
AM Peak 15-min Vol	9:15 AM 2	7:00 AM 1	6:00 AM 2	7:00 AM 12	11:30 AM 37	11:30 AM 59	11:30 AM 22	11:15 AM 4	3:45 AM 1	12:00 AM 0	12:00 AM 0	12:00 AM 0	12:00 AM 0	12:00 AM 0	11:30 AM 126		
PM Peak 15-min Vol	4:30 PM 4	12:00 PM 2	6:15 PM 5	2:15 PM 13	3:15 PM 53	4:15 PM 47	4:00 PM 21	4:15 PM 5	12:00 PM 1	12:00 PM 0	12:00 PM 0	12:00 PM 0	12:00 PM 0	12:00 PM 0	3:15 PM 121		



Comments:

Report generated on 10/1/2020 3:12 PM SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

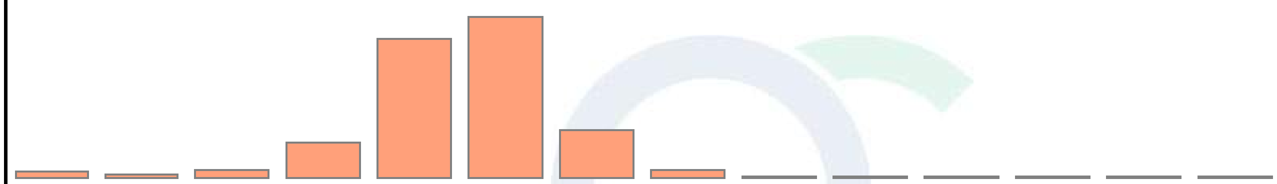
Type of report: Tube Count - Speed Data

SUMMARY - Tube Count - Speed Data

LOCATION: Indianola Ave north of Glen Echo Bridge (btwn Cliffside and Olentangy) [VSC]
QC JOB #: 15283701
SPECIFIC LOCATION:
DIRECTION: NB
CITY/STATE: Columbus, OH
DATE: Sep 23 2020 -

Speed Range	1 15	16 20	21 25	26 30	31 35	36 40	41 45	46 50	51 55	56 60	61 65	66 70	71 75	76 999	Total	Pace Speed	Number in Pace
Grand Total Percent	60 1.3%	18 0.4%	77 1.7%	385 8.5%	1567 34.6%	1809 39.9%	526 11.6%	79 1.7%	8 0.2%	0 0%	0 0%	0 0%	0 0%	0 0%	4529	31-40	3376
Cumulative Percent	1.3%	1.7%	3.4%	11.9%	46.5%	86.5%	98.1%	99.8%	100%	100%	100%	100%	100%	100%			

ADT
4529



85th Percentile: 39 MPH
Mean Speed(Average): 35 MPH
Median: 35 MPH
Mode: 38 MPH

Comments:

Report generated on 10/1/2020 3:12 PM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of report: Tube Count - Vehicle Classification Data

LOCATION: Indianola Ave north of Glen Echo Bridge (btwn Cliffside and Olentangy) [VSC] **QC JOB #:** 15283701
SPECIFIC LOCATION: **DIRECTION:** NB
CITY/STATE: Columbus, OH **DATE:** Sep 23 2020

Start Time	Motorcycles	Cars & Trailer	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axle Double	5 Axle Double	>6 Axle Double	<6 Axle Multi	6 Axle Multi	>6 Axle Multi	Not Classified	Total
12:00 AM	0	5	0	0	0	0	0	0	0	0	0	0	0	0	5
12:15 AM	0	3	0	0	0	0	0	0	0	0	0	0	0	1	4
12:30 AM	0	8	1	0	0	0	0	0	0	0	0	0	0	0	9
12:45 AM	0	5	0	0	1	0	0	0	0	0	0	0	0	0	6
01:00 AM	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
01:15 AM	0	3	1	0	0	0	0	0	0	0	0	0	0	0	4
01:30 AM	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
01:45 AM	0	4	0	0	0	0	0	0	0	0	0	0	0	0	4
02:00 AM	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
02:15 AM	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
02:30 AM	0	5	0	0	0	0	0	0	0	0	0	0	0	0	5
02:45 AM	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
03:00 AM	0	2	0	0	0	0	0	0	0	0	0	0	0	0	2
03:15 AM	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
03:30 AM	0	3	0	0	1	0	0	0	0	0	0	0	0	0	4
03:45 AM	0	3	0	0	0	0	0	0	0	0	0	0	0	0	3
04:00 AM	0	1	0	0	1	0	0	0	0	0	0	0	0	0	2
04:15 AM	0	3	0	0	1	0	0	0	0	0	0	0	0	0	4
04:30 AM	0	6	0	0	0	0	0	0	0	0	0	0	0	0	6
04:45 AM	0	10	1	0	1	0	0	0	0	0	0	0	0	0	12
05:00 AM	0	2	1	1	0	0	0	0	0	0	0	0	0	1	5
05:15 AM	0	9	0	0	1	0	0	0	0	0	0	0	0	0	10
05:30 AM	0	11	1	0	0	0	0	0	0	0	0	0	0	0	12
05:45 AM	0	18	2	0	0	0	0	0	0	0	0	0	0	1	21
Day Total Percent															
ADT 4529															
AM Peak 15-min Vol															
PM Peak 15-min Vol															

Comments:

Report generated on 10/1/2020 3:12 PM SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of report: Tube Count - Vehicle Classification Data

LOCATION: Indianola Ave north of Glen Echo Bridge (btwn Cliffside and Olentangy) [VSC] — **QC JOB #:** 15283701
SPECIFIC LOCATION: — **DIRECTION:** NB
CITY/STATE: Columbus, OH — **DATE:** Sep 23 2020

Start Time	Motorcycles	Cars & Trailer	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axle Double	5 Axle Double	>6 Axle Double	<6 Axle Multi	6 Axle Multi	>6 Axle Multi	Not Classified	Total
06:00 AM	0	17	3	1	1	0	0	1	0	0	0	0	0	0	23
06:15 AM	0	16	6	0	0	0	0	0	0	0	0	0	0	0	22
06:30 AM	0	28	3	0	1	0	0	1	0	0	0	0	0	0	33
06:45 AM	0	36	3	1	1	0	0	4	0	0	0	0	0	0	45
07:00 AM	0	43	12	1	1	0	0	1	0	0	0	0	0	0	58
07:15 AM	0	35	7	1	4	0	0	1	0	0	0	0	0	0	48
07:30 AM	0	36	12	0	1	0	0	0	0	0	0	0	0	0	49
07:45 AM	0	34	7	0	1	0	0	1	0	0	0	0	0	0	43
08:00 AM	0	35	10	1	3	0	0	1	0	0	0	0	0	1	51
08:15 AM	0	35	11	0	2	0	0	0	0	0	0	0	0	0	48
08:30 AM	0	31	10	0	2	0	0	1	0	0	0	0	0	1	45
08:45 AM	0	41	5	1	0	0	0	0	0	0	0	0	0	0	47
09:00 AM	0	38	5	1	3	0	0	0	0	0	0	0	0	1	48
09:15 AM	0	49	10	0	2	0	0	0	0	0	0	0	0	1	62
09:30 AM	0	55	16	0	2	0	0	1	0	0	0	0	0	0	74
09:45 AM	0	41	12	0	4	1	0	1	0	0	0	0	0	1	60
10:00 AM	0	52	11	1	5	0	0	0	0	0	0	0	0	1	70
10:15 AM	0	52	9	0	2	0	0	1	0	0	0	0	0	0	64
10:30 AM	0	50	11	0	1	0	0	0	0	0	0	0	0	0	62
10:45 AM	0	65	6	0	5	0	0	0	0	0	0	0	0	0	76
11:00 AM	0	55	12	1	1	0	0	2	0	0	0	0	0	2	73
11:15 AM	0	56	14	1	1	0	0	1	0	0	0	0	0	1	74
11:30 AM	0	103	16	0	4	0	0	3	0	0	0	0	0	0	126
11:45 AM	0	92	18	0	2	0	0	0	0	0	0	0	0	1	113
Day Total Percent															
ADT 4529															
AM Peak 15-min Vol															
PM Peak 15-min Vol															

Comments:

Report generated on 10/1/2020 3:12 PM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of report: Tube Count - Vehicle Classification Data

LOCATION: Indianola Ave north of Glen Echo Bridge (btwn Cliffside and Olentangy) [VSC] **QC JOB #:** 15283701
SPECIFIC LOCATION: **DIRECTION:** NB
CITY/STATE: Columbus, OH **DATE:** Sep 23 2020

Start Time	Motorcycles	Cars & Trailer	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axle Double	5 Axle Double	>6 Axle Double	<6 Axle Multi	6 Axle Multi	>6 Axle Multi	Not Classified	Total
12:00 PM	0	64	14	1	2	0	0	0	0	0	0	0	0	1	82
12:15 PM	0	70	11	0	2	0	0	0	0	0	0	0	0	1	84
12:30 PM	0	62	10	0	1	0	0	0	0	0	0	0	0	2	75
12:45 PM	0	60	8	0	3	0	0	**1**	0	0	0	0	0	0	72
01:00 PM	0	71	9	1	4	0	0	0	0	0	0	0	0	0	85
01:15 PM	0	61	11	0	0	0	0	1	0	0	0	0	0	0	73
01:30 PM	0	56	14	0	5	**1**	0	0	0	0	0	0	0	0	76
01:45 PM	0	75	14	0	3	0	0	1	0	0	0	0	0	0	93
02:00 PM	0	60	11	**2**	3	0	0	0	0	0	0	0	0	0	76
02:15 PM	0	78	**16**	0	3	0	0	0	0	0	0	0	0	0	97
02:30 PM	0	77	9	0	4	0	0	0	0	0	0	0	0	1	91
02:45 PM	0	81	10	0	4	0	0	0	0	0	0	0	0	1	96
03:00 PM	0	83	12	1	4	0	0	1	0	0	0	0	0	1	102
03:15 PM	0	**98**	15	0	5	0	0	0	0	0	0	0	0	**3**	**121**
03:30 PM	0	87	9	0	3	0	0	0	0	0	0	0	0	1	100
03:45 PM	0	70	16	0	**6**	0	0	0	0	0	0	0	0	1	93
04:00 PM	0	92	13	1	3	0	0	0	0	0	0	0	0	2	111
04:15 PM	0	91	16	0	2	0	0	1	0	0	0	0	0	3	113
04:30 PM	0	93	5	0	0	0	0	0	0	0	0	0	0	3	101
04:45 PM	0	80	11	0	3	0	0	0	0	0	0	0	0	0	94
05:00 PM	0	79	9	1	0	0	0	0	0	0	0	0	0	1	90
05:15 PM	0	72	6	1	3	0	0	0	0	0	0	0	0	2	84
05:30 PM	0	79	7	0	2	0	0	0	0	0	0	0	0	0	88
05:45 PM	0	83	4	0	0	0	0	0	0	0	0	0	0	1	88
Day Total Percent															
ADT 4529															
AM Peak 15-min Vol															
PM Peak 15-min Vol															

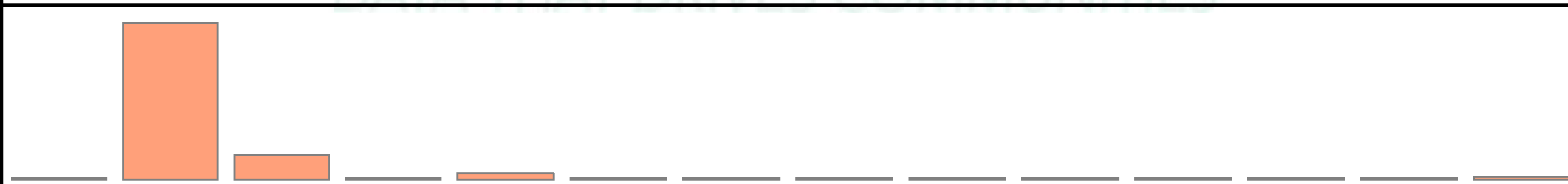
Comments:

Report generated on 10/1/2020 3:12 PM SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of report: Tube Count - Vehicle Classification Data

LOCATION: Indianola Ave north of Glen Echo Bridge (btwn Cliffside and Olentangy) [VSC] **QC JOB #:** 15283701
SPECIFIC LOCATION: **DIRECTION:** NB
CITY/STATE: Columbus, OH **DATE:** Sep 23 2020

Start Time	Motorcycles	Cars & Trailer	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axle Double	5 Axle Double	>6 Axle Double	<6 Axle Multi	6 Axle Multi	>6 Axle Multi	Not Classified	Total
06:00 PM	0	62	13	1	0	0	0	0	0	0	0	0	0	1	77
06:15 PM	0	58	8	0	0	0	0	0	0	0	0	0	0	0	66
06:30 PM	0	54	3	0	2	0	0	0	0	0	0	0	0	1	60
06:45 PM	0	45	7	1	1	0	0	0	0	0	0	0	0	2	56
07:00 PM	0	46	7	0	0	0	0	0	0	0	0	0	0	1	54
07:15 PM	0	42	3	0	1	0	0	0	0	0	0	0	0	0	46
07:30 PM	0	35	2	0	1	0	0	0	0	0	0	0	0	0	38
07:45 PM	0	24	5	0	0	0	0	0	0	0	0	0	0	1	30
08:00 PM	0	38	6	0	1	0	0	0	0	0	0	0	0	1	46
08:15 PM	0	34	0	1	0	0	0	0	0	0	0	0	0	0	35
08:30 PM	0	44	1	0	1	0	0	0	0	0	0	0	0	0	46
08:45 PM	0	43	8	0	0	0	0	0	0	0	0	0	0	0	51
09:00 PM	0	28	3	0	0	0	0	0	0	0	0	0	0	1	32
09:15 PM	0	19	1	1	0	0	0	0	0	0	0	0	0	0	21
09:30 PM	0	22	3	0	0	0	0	0	0	0	0	0	0	2	27
09:45 PM	0	16	1	0	0	0	0	0	0	0	0	0	0	1	18
10:00 PM	0	20	0	0	0	0	0	0	0	0	0	0	0	0	20
10:15 PM	0	17	0	0	0	0	0	0	0	0	0	0	0	1	18
10:30 PM	0	11	1	0	0	0	0	0	0	0	0	0	0	1	13
10:45 PM	0	13	1	0	0	0	0	0	0	0	0	0	0	2	16
11:00 PM	0	11	0	0	0	0	0	0	0	0	0	0	0	1	12
11:15 PM	0	10	1	0	0	0	0	0	0	0	0	0	0	0	11
11:30 PM	0	6	0	0	0	0	0	0	0	0	0	0	0	0	6
11:45 PM	0	7	0	0	0	0	0	0	0	0	0	0	0	0	7
Day Total	0	3729	570	23	127	2	0	25	0	0	0	0	0	53	4529
Percent	0%	82.3%	12.6%	0.5%	2.8%	0%	0%	0.6%	0%	0%	0%	0%	0%	1.2%	
ADT 4529															
AM Peak 15-min Vol	12:00 AM 0	11:30 AM 103	11:45 AM 18	5:00 AM 1	10:00 AM 5	9:45 AM 1	12:00 AM 0	6:45 AM 4	12:00 AM 0	12:00 AM 0	12:00 AM 0	12:00 AM 0	12:00 AM 0	11:00 AM 2	11:30 AM 126
PM Peak 15-min Vol	12:00 PM 0	3:15 PM 98	2:15 PM 16	2:00 PM 2	3:45 PM 6	1:30 PM 1	12:00 PM 0	12:45 PM 1	12:00 PM 0	12:00 PM 0	12:00 PM 0	12:00 PM 0	12:00 PM 0	3:15 PM 3	3:15 PM 121



Comments:

Type of report: Tube Count - Vehicle Classification Data

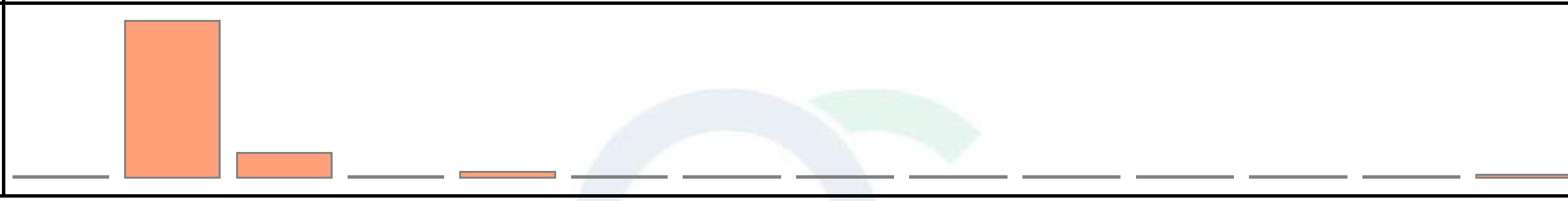
SUMMARY - Tube Count - Vehicle Classification Data

LOCATION: Indianola Ave north of Glen Echo Bridge (btwn Cliffside and Olentangy) [VSC]
SPECIFIC LOCATION:
CITY/STATE: Columbus, OH

QC JOB #: 15283701
DIRECTION: NB
DATE: Sep 23 2020

	Motorcycles	Cars & Trailer	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axle Double	5 Axle Double	>6 Axle Double	<6 Axle Multi	6 Axle Multi	>6 Axle Multi	Not Classified	Total
Grand Total	0	3729	570	23	127	2	0	25	0	0	0	0	0	53	4529
Percent	0%	82.3%	12.6%	0.5%	2.8%	0%	0%	0.6%	0%	0%	0%	0%	0%	1.2%	

ADT
4529



Comments:

Report generated on 10/1/2020 3:12 PM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of report: Tube Count - Volume Data

LOCATION: Indianola Ave north of Glen Echo Bridge (btwn Cliffside and Olentangy) [VSC] QC JOB #: 15283701
SPECIFIC LOCATION: DIRECTION: NB
CITY/STATE: Columbus, OH DATE: Sep 23 2020 - Sep 23 2020

Start Time	Mon	Tue	Wed 23 Sep 20	Thu	Fri	Average Weekday 15-min Traffic	Sat	Sun	Average Week 15-min Traffic	Average Week Profile
12:00 AM			5			5			5	
12:15 AM			4			4			4	
12:30 AM			9			9			9	
12:45 AM			6			6			6	
01:00 AM			1			1			1	
01:15 AM			4			4			4	
01:30 AM			1			1			1	
01:45 AM			4			4			4	
02:00 AM			1			1			1	
02:15 AM			1			1			1	
02:30 AM			5			5			5	
02:45 AM			1			1			1	
03:00 AM			2			2			2	
03:15 AM			1			1			1	
03:30 AM			4			4			4	
03:45 AM			3			3			3	
04:00 AM			2			2			2	
04:15 AM			4			4			4	
04:30 AM			6			6			6	
04:45 AM			12			12			12	
05:00 AM			5			5			5	
05:15 AM			10			10			10	
05:30 AM			12			12			12	
05:45 AM			21			21			21	
Day Total										
% Weekday Average										
% Week Average										
AM Peak 15-min Vol										
PM Peak 15-min Vol										

Comments:

Report generated on 10/1/2020 3:12 PM SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of report: Tube Count - Volume Data

LOCATION: Indianola Ave north of Glen Echo Bridge (btwn Cliffside and Olentangy) [VSC] **QC JOB #:** 15283701
SPECIFIC LOCATION: **DIRECTION:** NB
CITY/STATE: Columbus, OH **DATE:** Sep 23 2020 - Sep 23 2020

Start Time	Mon	Tue	Wed 23 Sep 20	Thu	Fri	Average Weekday 15-min Traffic	Sat	Sun	Average Week 15-min Traffic	Average Week Profile
06:00 AM			23			23			23	
06:15 AM			22			22			22	
06:30 AM			33			33			33	
06:45 AM			45			45			45	
07:00 AM			58			58			58	
07:15 AM			48			48			48	
07:30 AM			49			49			49	
07:45 AM			43			43			43	
08:00 AM			51			51			51	
08:15 AM			48			48			48	
08:30 AM			45			45			45	
08:45 AM			47			47			47	
09:00 AM			48			48			48	
09:15 AM			62			62			62	
09:30 AM			74			74			74	
09:45 AM			60			60			60	
10:00 AM			70			70			70	
10:15 AM			64			64			64	
10:30 AM			62			62			62	
10:45 AM			76			76			76	
11:00 AM			73			73			73	
11:15 AM			74			74			74	
11:30 AM			**126**			**126**			**126**	
11:45 AM			113			113			113	
Day Total										
% Weekday Average										
% Week Average										
AM Peak 15-min Vol										
PM Peak 15-min Vol										

Comments:

Report generated on 10/1/2020 3:12 PM SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

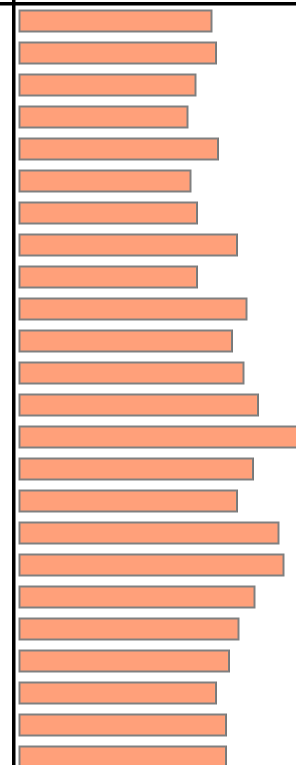
Type of report: Tube Count - Volume Data

LOCATION: Indianola Ave north of Glen Echo Bridge (btwn Cliffside and Olentangy) [VSC] — **QC JOB #:** 15283701

SPECIFIC LOCATION: — **DIRECTION:** NB

CITY/STATE: Columbus, OH — **DATE:** Sep 23 2020 - Sep 23 2020

Start Time	Mon	Tue	Wed 23 Sep 20	Thu	Fri	Average Weekday 15-min Traffic	Sat	Sun	Average Week 15-min Traffic	Average Week Profile
12:00 PM			82			82			82	
12:15 PM			84			84			84	
12:30 PM			75			75			75	
12:45 PM			72			72			72	
01:00 PM			85			85			85	
01:15 PM			73			73			73	
01:30 PM			76			76			76	
01:45 PM			93			93			93	
02:00 PM			76			76			76	
02:15 PM			97			97			97	
02:30 PM			91			91			91	
02:45 PM			96			96			96	
03:00 PM			102			102			102	
03:15 PM			**121**			**121**			**121**	
03:30 PM			100			100			100	
03:45 PM			93			93			93	
04:00 PM			111			111			111	
04:15 PM			113			113			113	
04:30 PM			101			101			101	
04:45 PM			94			94			94	
05:00 PM			90			90			90	
05:15 PM			84			84			84	
05:30 PM			88			88			88	
05:45 PM			88			88			88	
Day Total										
% Weekday Average										
% Week Average										
AM Peak 15-min Vol										
PM Peak 15-min Vol										



Comments:

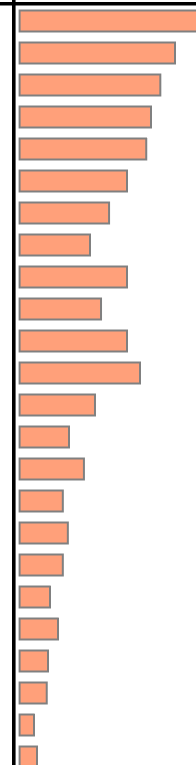
Report generated on 10/1/2020 3:12 PM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of report: Tube Count - Volume Data

LOCATION: Indianola Ave north of Glen Echo Bridge (btwn Cliffside and Olentangy) [VSC] **QC JOB #:** 15283701
SPECIFIC LOCATION: **DIRECTION:** NB
CITY/STATE: Columbus, OH **DATE:** Sep 23 2020 - Sep 23 2020

Start Time	Mon	Tue	Wed 23 Sep 20	Thu	Fri	Average Weekday 15-min Traffic	Sat	Sun	Average Week 15-min Traffic	Average Week Profile
06:00 PM			77			77			77	
06:15 PM			66			66			66	
06:30 PM			60			60			60	
06:45 PM			56			56			56	
07:00 PM			54			54			54	
07:15 PM			46			46			46	
07:30 PM			38			38			38	
07:45 PM			30			30			30	
08:00 PM			46			46			46	
08:15 PM			35			35			35	
08:30 PM			46			46			46	
08:45 PM			51			51			51	
09:00 PM			32			32			32	
09:15 PM			21			21			21	
09:30 PM			27			27			27	
09:45 PM			18			18			18	
10:00 PM			20			20			20	
10:15 PM			18			18			18	
10:30 PM			13			13			13	
10:45 PM			16			16			16	
11:00 PM			12			12			12	
11:15 PM			11			11			11	
11:30 PM			6			6			6	
11:45 PM			7			7			7	
Day Total			4529			4529			4529	
% Weekday Average			100%							
% Week Average			100%			100%				
AM Peak 15-min Vol			11:30 AM 126			11:30 AM 126			11:30 AM 126	
PM Peak 15-min Vol			3:15 PM 121			3:15 PM 121			3:15 PM 121	



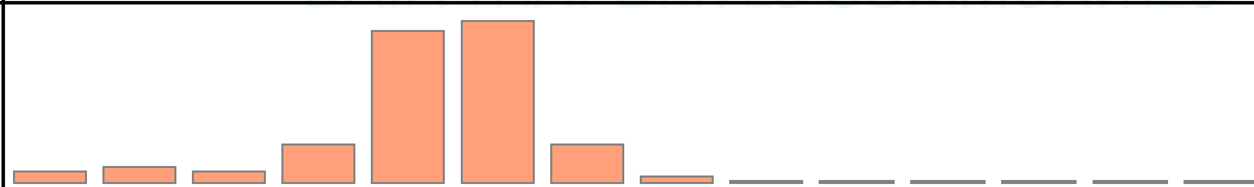
Comments:

Report generated on 10/1/2020 3:12 PM SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of report: Tube Count - Speed Data

LOCATION: Indianola Ave north of Glen Echo Bridge (btwn Cliffside and Olentangy) [VSC] **QC JOB #:** 15283701
SPECIFIC LOCATION: **DIRECTION:** SB
CITY/STATE: Columbus, OH **DATE:** Sep 23 2020

Start Time	1 15	16 20	21 25	26 30	31 35	36 40	41 45	46 50	51 55	56 60	61 65	66 70	71 75	76 999	Total	Pace Speed	Number in Pace
12:00 AM	0	0	0	0	7	6	6	0	0	0	0	0	0	0	19	31-40	13
01:00 AM	0	1	0	0	5	3	3	1	0	0	0	0	0	0	13	31-40	8
02:00 AM	0	0	0	0	1	6	1	1	0	0	0	0	0	0	9	31-40	7
03:00 AM	0	0	0	0	8	9	3	0	0	0	0	0	0	0	20	31-40	17
04:00 AM	0	3	3	1	5	12	8	4	**1**	0	0	0	0	0	37	36-45	20
05:00 AM	2	3	1	3	22	52	18	3	0	0	0	0	0	0	104	31-40	74
06:00 AM	6	10	4	14	56	110	27	5	0	0	0	0	0	0	232	31-40	166
07:00 AM	2	5	**6**	**26**	77	91	19	0	0	0	0	0	0	0	226	31-40	168
08:00 AM	4	7	6	10	66	81	22	3	1	0	0	0	0	0	200	31-40	147
09:00 AM	2	10	1	7	73	76	20	**7**	0	0	0	0	0	0	196	31-40	149
10:00 AM	6	4	6	12	76	119	**28**	0	1	0	0	0	0	0	252	31-40	195
11:00 AM	**8**	**12**	5	26	**110**	**127**	15	6	0	0	0	0	0	0	**309**	31-40	237
12:00 PM	4	6	5	18	86	**114**	**44**	3	0	0	0	0	0	0	280	31-40	200
01:00 PM	6	10	3	24	86	106	29	**7**	**1**	0	0	0	0	0	272	31-40	192
02:00 PM	6	12	9	**43**	132	76	18	1	0	0	0	0	0	0	297	31-40	208
03:00 PM	**11**	7	9	43	139	102	17	0	0	0	0	0	0	0	328	31-40	241
04:00 PM	10	**20**	**16**	42	**144**	103	12	0	0	0	0	0	0	0	**347**	31-40	247
05:00 PM	7	11	12	31	131	96	16	3	0	0	0	0	0	0	307	31-40	227
06:00 PM	8	11	2	34	119	86	17	2	0	0	0	0	0	0	279	31-40	205
07:00 PM	5	13	6	23	70	82	11	1	1	0	0	0	0	0	212	31-40	152
08:00 PM	2	5	1	5	29	63	17	2	0	0	0	0	0	0	124	31-40	92
09:00 PM	7	1	1	3	24	27	16	2	1	0	0	0	0	0	82	31-40	51
10:00 PM	1	1	1	2	15	24	4	0	0	0	0	0	0	0	48	31-40	39
11:00 PM	1	1	1	0	11	10	8	0	0	0	0	0	0	0	32	31-40	21
Day Total	98	153	98	367	1492	1581	379	51	6	0	0	0	0	0	4225	31-40	3073
Percent	2.3%	3.6%	2.3%	8.7%	35.3%	37.4%	9%	1.2%	0.1%	0%	0%	0%	0%	0%			
AM Peak	11:00 AM	11:00 AM	7:00 AM	7:00 AM	11:00 AM	11:00 AM	10:00 AM	9:00 AM	4:00 AM	12:00 AM	12:00 AM	12:00 AM	12:00 AM	12:00 AM	11:00 AM		
Volume	8	12	6	26	110	127	28	7	1	0	0	0	0	0	309		
PM Peak	3:00 PM	4:00 PM	4:00 PM	2:00 PM	4:00 PM	12:00 PM	12:00 PM	1:00 PM	1:00 PM	12:00 PM	12:00 PM	12:00 PM	12:00 PM	12:00 PM	4:00 PM		
Volume	11	20	16	43	144	114	44	7	1	0	0	0	0	0	347		



Comments:

Report generated on 10/1/2020 3:11 PM SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

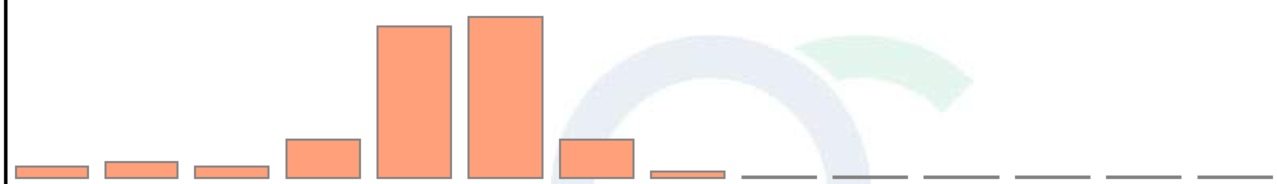
Type of report: Tube Count - Speed Data

SUMMARY - Tube Count - Speed Data

LOCATION: Indianola Ave north of Glen Echo Bridge (btwn Cliffside and Olentangy) [VSC]
QC JOB #: 15283701
SPECIFIC LOCATION:
DIRECTION: SB
CITY/STATE: Columbus, OH
DATE: Sep 23 2020 -

Speed Range	1 15	16 20	21 25	26 30	31 35	36 40	41 45	46 50	51 55	56 60	61 65	66 70	71 75	76 999	Total	Pace Speed	Number in Pace
Grand Total Percent	98 2.3%	153 3.6%	98 2.3%	367 8.7%	1492 35.3%	1581 37.4%	379 9%	51 1.2%	6 0.1%	0 0%	0 0%	0 0%	0 0%	0 0%	4225	31-40	3073
Cumulative Percent	2.3%	5.9%	8.3%	16.9%	52.3%	89.7%	98.7%	99.9%	100%	100%	100%	100%	100%	100%			

ADT
4225



85th Percentile: 39 MPH
Mean Speed(Average): 34 MPH
Median: 34 MPH
Mode: 38 MPH

Comments:

Report generated on 10/1/2020 3:11 PM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of report: Tube Count - Vehicle Classification Data

LOCATION: Indianola Ave north of Glen Echo Bridge (btwn Cliffside and Olentangy) [VSC] **QC JOB #:** 15283701

SPECIFIC LOCATION: **DIRECTION:** SB

CITY/STATE: Columbus, OH **DATE:** Sep 23 2020

Start Time	Motorcycles	Cars & Trailer	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axle Double	5 Axle Double	>6 Axle Double	<6 Axle Multi	6 Axle Multi	>6 Axle Multi	Not Classified	Total
12:00 AM	0	17	1	0	0	0	0	1	0	0	0	0	0	0	19
01:00 AM	0	12	1	0	0	0	0	0	0	0	0	0	0	0	13
02:00 AM	0	8	0	0	1	0	0	0	0	0	0	0	0	0	9
03:00 AM	0	16	4	0	0	0	0	0	0	0	0	0	0	0	20
04:00 AM	0	29	1	2	5	0	0	0	0	0	0	0	0	0	37
05:00 AM	0	89	9	1	3	0	0	1	0	0	0	0	0	1	104
06:00 AM	1	179	31	3	11	0	0	3	0	0	0	0	0	4	232
07:00 AM	0	164	39	3	15	0	0	5	0	0	0	0	0	0	226
08:00 AM	0	147	36	1	14	0	0	0	0	0	0	0	0	2	200
09:00 AM	0	149	34	1	10	0	0	2	0	0	0	0	0	0	196
10:00 AM	1	185	49	2	7	0	0	3	0	0	0	0	0	5	252
11:00 AM	1	238	43	2	19	0	0	1	0	0	0	0	0	5	309
12:00 PM	0	232	33	3	9	0	0	1	0	0	0	0	0	2	280
01:00 PM	1	220	39	1	8	0	0	1	0	0	0	0	0	2	272
02:00 PM	3	230	42	3	14	0	0	2	0	0	0	0	0	3	297
03:00 PM	0	273	33	1	12	0	0	1	0	0	0	0	0	8	328
04:00 PM	1	294	38	1	7	0	0	0	0	0	0	0	0	6	347
05:00 PM	0	261	37	2	2	0	0	1	0	0	0	0	0	4	307
06:00 PM	0	251	20	1	1	0	0	0	0	0	0	0	0	6	279
07:00 PM	2	185	19	1	3	0	0	0	0	0	0	0	0	2	212
08:00 PM	0	111	9	1	3	0	0	0	0	0	0	0	0	0	124
09:00 PM	0	73	4	0	2	0	0	0	0	0	0	0	0	3	82
10:00 PM	0	43	5	0	0	0	0	0	0	0	0	0	0	0	48
11:00 PM	0	28	2	0	1	0	0	0	0	0	0	0	0	1	32
Day Total	10	3434	529	29	147	0	0	22	0	0	0	0	0	54	4225
Percent	0.2%	81.3%	12.5%	0.7%	3.5%	0%	0%	0.5%	0%	0%	0%	0%	0%	1.3%	
ADT 4225															
AM Peak	6:00 AM	11:00 AM	10:00 AM	6:00 AM	11:00 AM	12:00 AM	12:00 AM	7:00 AM	12:00 AM	12:00 AM	12:00 AM	12:00 AM	12:00 AM	10:00 AM	11:00 AM
Volume	1	238	49	3	19	0	0	5	0	0	0	0	0	5	309
PM Peak	2:00 PM	4:00 PM	2:00 PM	12:00 PM	2:00 PM	12:00 PM	12:00 PM	2:00 PM	12:00 PM	12:00 PM	12:00 PM	12:00 PM	12:00 PM	3:00 PM	4:00 PM
Volume	3	294	42	3	14	0	0	2	0	0	0	0	0	8	347

Comments:

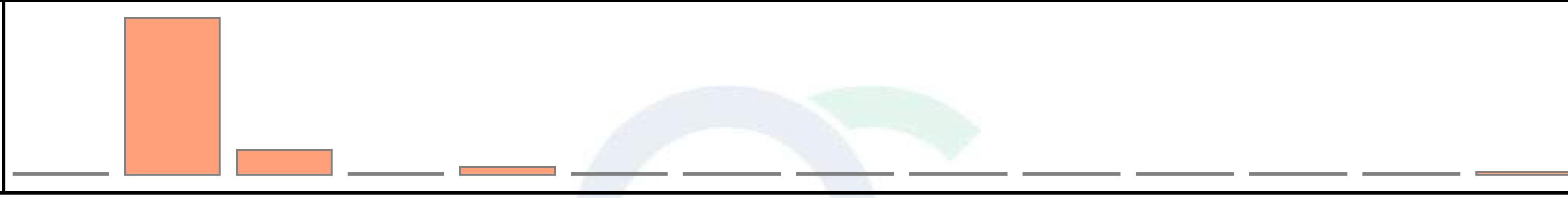
Report generated on 10/1/2020 3:11 PM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of report: Tube Count - Vehicle Classification Data

SUMMARY - Tube Count - Vehicle Classification Data

LOCATION: Indianola Ave north of Glen Echo Bridge (btwn Cliffside and Olentangy) [VSC] **QC JOB #:** 15283701
SPECIFIC LOCATION: **DIRECTION:** SB
CITY/STATE: Columbus, OH **DATE:** Sep 23 2020

	Motorcycles	Cars & Trailer	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axle Double	5 Axle Double	>6 Axle Double	<6 Axle Multi	6 Axle Multi	>6 Axle Multi	Not Classified	Total
Grand Total	10	3434	529	29	147	0	0	22	0	0	0	0	0	54	4225
Percent	0.2%	81.3%	12.5%	0.7%	3.5%	0%	0%	0.5%	0%	0%	0%	0%	0%	1.3%	
ADT 4225															

Comments:

Report generated on 10/1/2020 3:11 PM SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

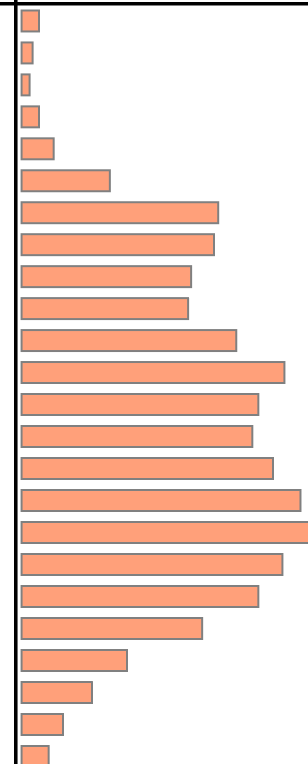
Type of report: Tube Count - Volume Data

LOCATION: Indianola Ave north of Glen Echo Bridge (btwn Cliffside and Olentangy) [VSC] **QC JOB #:** 15283701

SPECIFIC LOCATION: **DIRECTION:** SB

CITY/STATE: Columbus, OH **DATE:** Sep 23 2020 - Sep 23 2020

Start Time	Mon	Tue	Wed 23 Sep 20	Thu	Fri	Average Weekday Hourly Traffic	Sat	Sun	Average Week Hourly Traffic	Average Week Profile
12:00 AM			19			19			19	
01:00 AM			13			13			13	
02:00 AM			9			9			9	
03:00 AM			20			20			20	
04:00 AM			37			37			37	
05:00 AM			104			104			104	
06:00 AM			232			232			232	
07:00 AM			226			226			226	
08:00 AM			200			200			200	
09:00 AM			196			196			196	
10:00 AM			252			252			252	
11:00 AM			**309**			**309**			**309**	
12:00 PM			280			280			280	
01:00 PM			272			272			272	
02:00 PM			297			297			297	
03:00 PM			328			328			328	
04:00 PM			**347**			**347**			**347**	
05:00 PM			307			307			307	
06:00 PM			279			279			279	
07:00 PM			212			212			212	
08:00 PM			124			124			124	
09:00 PM			82			82			82	
10:00 PM			48			48			48	
11:00 PM			32			32			32	
Day Total			4225			4225			4225	
% Weekday Average			100%							
% Week Average			100%			100%				
AM Peak Volume			11:00 AM 309			11:00 AM 309			11:00 AM 309	
PM Peak Volume			4:00 PM 347			4:00 PM 347			4:00 PM 347	



Comments:

Report generated on 10/1/2020 3:11 PM SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Michael Baker INTERNATIONAL

We Make a Difference

Attachment E:

Pre-Pandemic Tube Counts

Location ID	4025_NB	Located On	INDIANOLA AVE	Community	COLUMBUS
Counted By	TCDS_Combined		US23 INDIANOLA AVE S OF N BROADWAY, IN COLUMBUS	County	FRANKLIN
Start Date	8/28/2019			Module	odot
Start Time	12:00:00 AM	Direction	NB	Agency	ODOT
Source	TCDS_BIN_IMPORT_COMBINE	QC Status	Accepted	Owner ID	southerntraffic

FHWA-Scheme F Classification

Start Time	Motor cycle	Car	Light Truck	Bus	2A SU	3A SU	>3A SU	<5A 2U	5A 2U	>5A 2U	<6A >2U	6A >2U	>6A >2U	14		Total
12:00 AM	0	34	5	1	1	0	0	0	0	0	0	0	0	0	0	41
1:00 AM	0	12	2	0	0	0	0	0	0	0	0	0	0	0	0	14
2:00 AM	0	11	0	0	0	0	0	0	0	0	0	0	0	0	0	11
3:00 AM	0	5	2	0	0	0	0	0	0	0	0	0	0	0	0	7
4:00 AM	0	11	2	1	0	0	0	0	0	0	0	0	0	0	0	14
5:00 AM	0	25	7	1	0	0	0	0	0	0	0	0	0	0	0	33
6:00 AM	1	132	5	8	2	0	0	0	1	0	0	0	0	0	0	149
7:00 AM	2	248	23	5	5	2	0	0	0	0	0	0	0	0	0	285
8:00 AM	0	260	34	8	7	0	0	0	0	1	0	0	0	0	0	310
9:00 AM	0	252	41	4	9	0	0	0	0	0	0	0	0	0	0	306
10:00 AM	3	202	43	1	13	4	0	2	0	0	0	0	0	0	0	268
11:00 AM	0	238	32	1	5	0	0	0	0	0	0	0	0	0	0	276
12:00 PM	1	254	45	2	8	4	0	2	0	0	0	0	0	0	0	316
1:00 PM	3	223	40	1	10	0	0	2	0	0	0	0	0	0	0	279
2:00 PM	1	260	47	1	10	0	0	0	0	0	0	0	0	0	0	319
3:00 PM	1	388	52	7	6	0	0	0	0	0	0	0	0	0	0	454
4:00 PM	5	477	50	1	3	0	0	1	0	0	0	0	0	0	0	537
5:00 PM	2	537	46	3	7	1	2	1	0	1	0	0	0	0	0	600
6:00 PM	1	505	39	3	3	0	0	0	0	0	0	0	0	0	0	551
7:00 PM	1	355	40	0	3	0	0	0	0	0	0	0	0	0	0	399
8:00 PM	3	202	28	2	4	0	0	0	0	0	0	0	0	0	0	239
9:00 PM	1	128	21	2	1	0	0	0	0	0	0	0	0	0	0	153
10:00 PM	0	77	7	1	2	0	0	0	0	0	0	0	0	0	0	87
11:00 PM	0	46	6	1	0	0	0	0	1	0	0	0	0	0	0	54
TOTAL	25	4882	617	54	99	11	2	8	2	2	0	0	0	0	0	5702

Location ID	4025_SB	Located On	INDIANOLA AVE	Community	COLUMBUS
Counted By	TCDS_Combined		US23 INDIANOLA AVE S OF N BROADWAY, IN COLUMBUS	County	FRANKLIN
Start Date	8/28/2019			Module	odot
Start Time	12:00:00 AM	Direction	SB	Agency	ODOT
Source	TCDS_BIN_IMPORT_COMBINE	QC Status	Accepted	Owner ID	southerntraffic

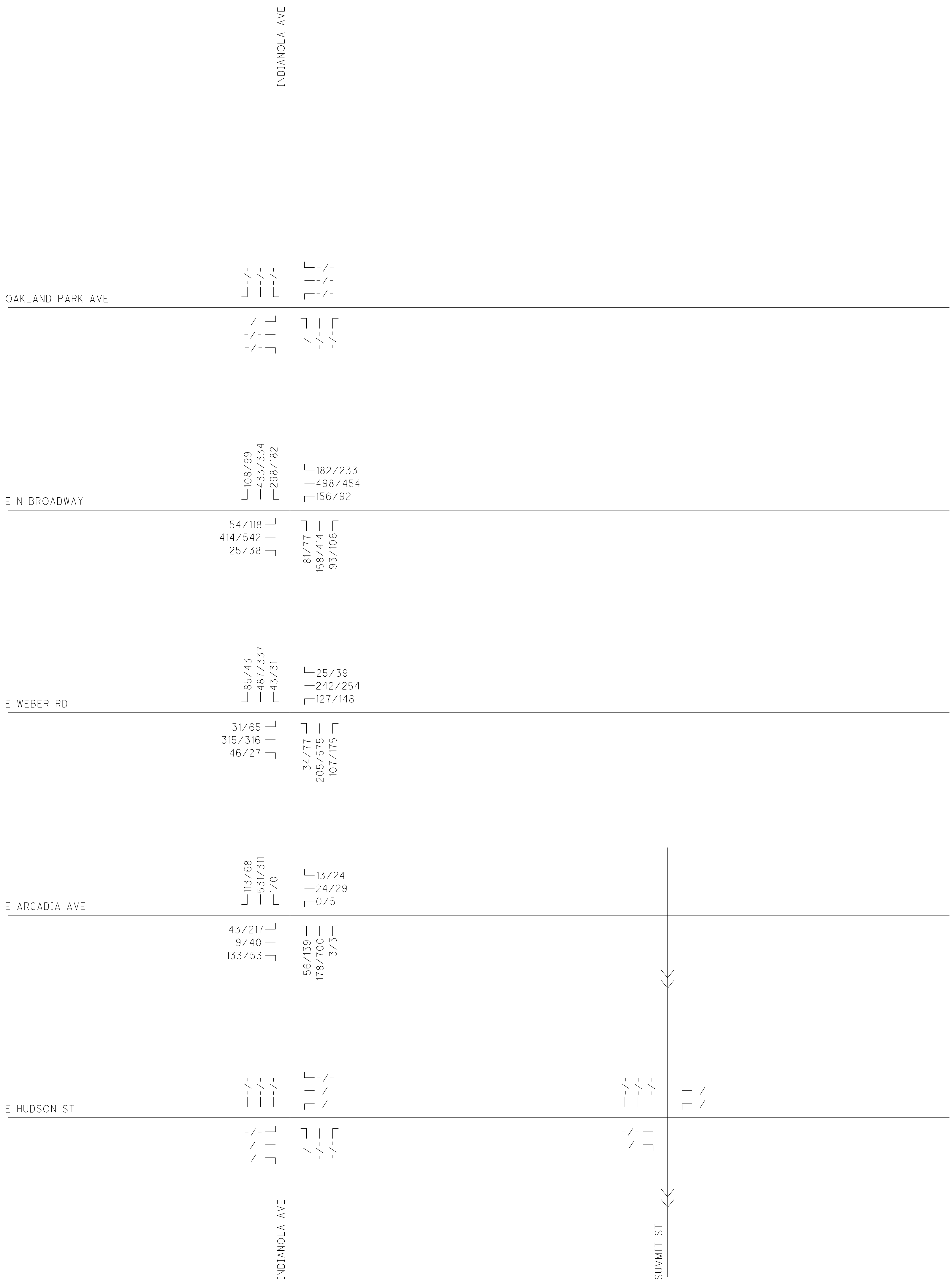
FHWA-Scheme F Classification

Start Time	Motor cycle	Car	Light Truck	Bus	2A SU	3A SU	>3A SU	<5A 2U	5A 2U	>5A 2U	<6A >2U	6A >2U	>6A >2U	14		Total
12:00 AM	2	38	3	0	0	0	0	0	0	0	0	0	0	0	0	43
1:00 AM	0	18	3	0	0	0	0	0	0	0	0	0	0	0	0	21
2:00 AM	0	9	0	0	0	0	0	0	0	0	0	0	0	0	0	9
3:00 AM	0	10	0	0	0	0	0	0	0	0	0	0	0	0	0	10
4:00 AM	0	6	0	1	0	1	0	0	0	0	0	0	0	0	0	8
5:00 AM	4	26	7	1	0	1	0	0	1	0	0	0	0	0	0	40
6:00 AM	5	136	9	0	0	0	0	0	0	0	0	0	0	0	0	150
7:00 AM	4	301	38	3	13	0	0	2	0	0	0	0	0	0	0	361
8:00 AM	7	375	74	1	6	0	0	2	0	0	0	0	0	0	0	465
9:00 AM	7	218	44	1	6	0	0	2	1	0	0	0	0	0	0	279
10:00 AM	2	234	45	0	5	0	0	0	0	0	0	0	0	0	0	286
11:00 AM	2	239	36	2	6	1	0	1	0	0	0	0	0	0	0	287
12:00 PM	3	258	45	1	7	0	0	1	1	0	0	0	0	0	0	316
1:00 PM	0	187	51	2	5	0	0	2	0	0	0	0	0	0	0	247
2:00 PM	1	254	64	0	8	0	0	2	0	0	0	0	0	0	0	329
3:00 PM	1	220	55	2	9	0	0	1	0	0	0	0	0	0	0	288
4:00 PM	4	336	30	1	4	0	0	0	0	0	0	0	0	0	0	375
5:00 PM	3	460	40	2	2	0	0	0	0	0	0	0	0	0	0	507
6:00 PM	5	382	28	0	3	0	0	0	0	0	0	0	0	0	0	418
7:00 PM	1	343	25	1	1	0	0	0	0	0	0	0	0	0	0	371
8:00 PM	1	297	18	1	3	0	0	0	0	0	0	0	1	0	0	321
9:00 PM	1	193	11	0	1	0	0	0	0	0	0	0	0	0	0	206
10:00 PM	1	130	8	0	0	0	0	0	0	0	0	0	0	0	0	139
11:00 PM	2	51	7	1	0	0	0	0	0	0	0	0	0	0	0	61
TOTAL	56	4721	641	20	79	3	0	13	3	0	0	0	1	0	0	5537

We Make a Difference

Attachment F:

Pre-Pandemic TMC, Raw 2020 TMC, and Scaled 2020 TMC Plates

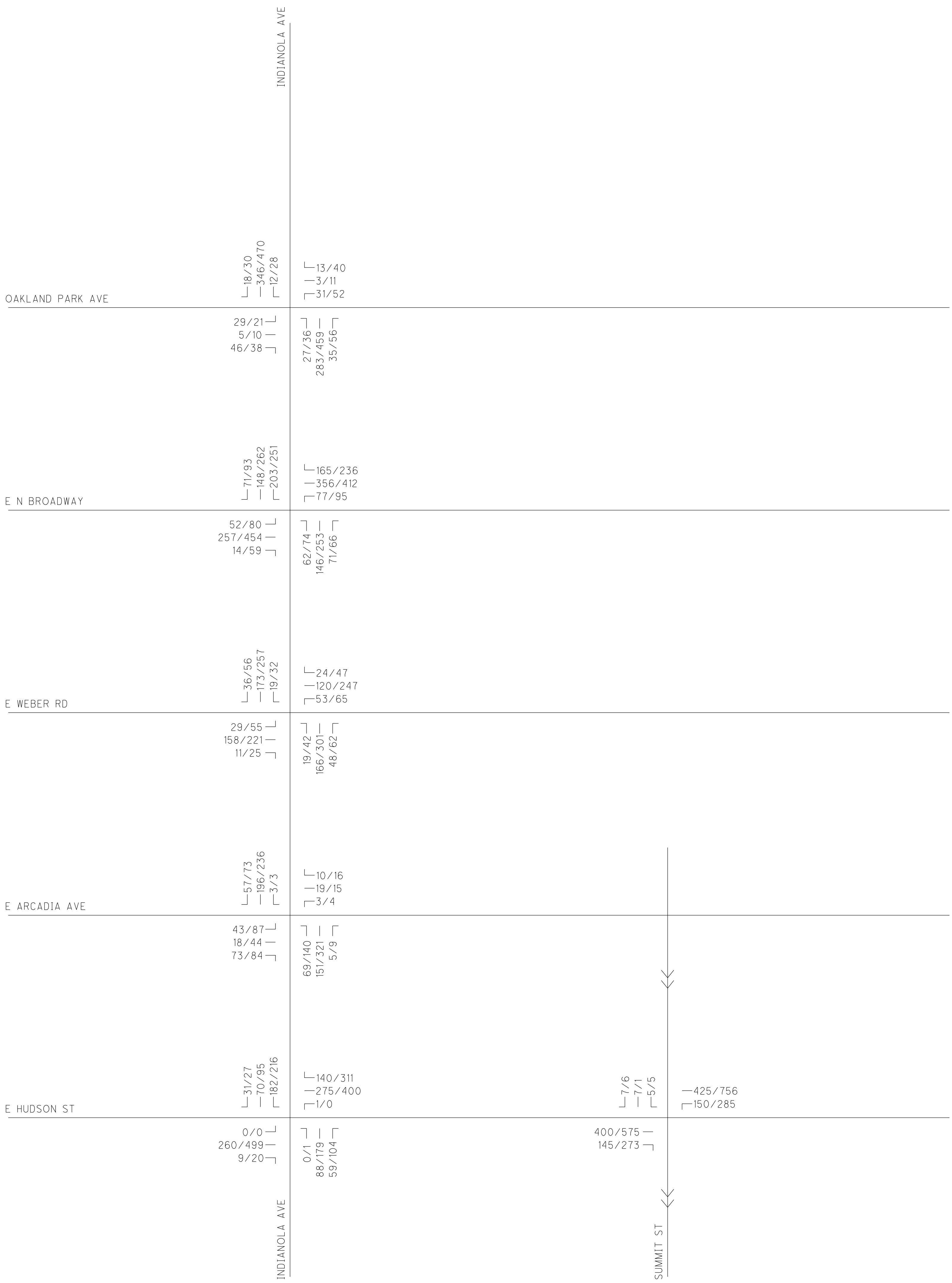


NOTE: NETWORK PEAK HOURS DISPLAYED.
AM PEAK: 7:45-8:45 AM
PM PEAK: 4:45-5:45 PM

X/X AM PEAK/PM PEAK

N

INDIANOLA AVENUE ROAD DIET STUDY	
PRE-PANDEMIC COUNTS	
EXISTING AM PEAK/PM PEAK	
APRIL 9, 2021	NOT TO SCALE



NOTE: NETWORK PEAK HOURS FROM PRE-PANDEMIC COUNTS DISPLAYED PER ODOT'S TRAFFIC COUNTS FOR TRAFFIC FORECASTS COVID19 SUPPLEMENT.

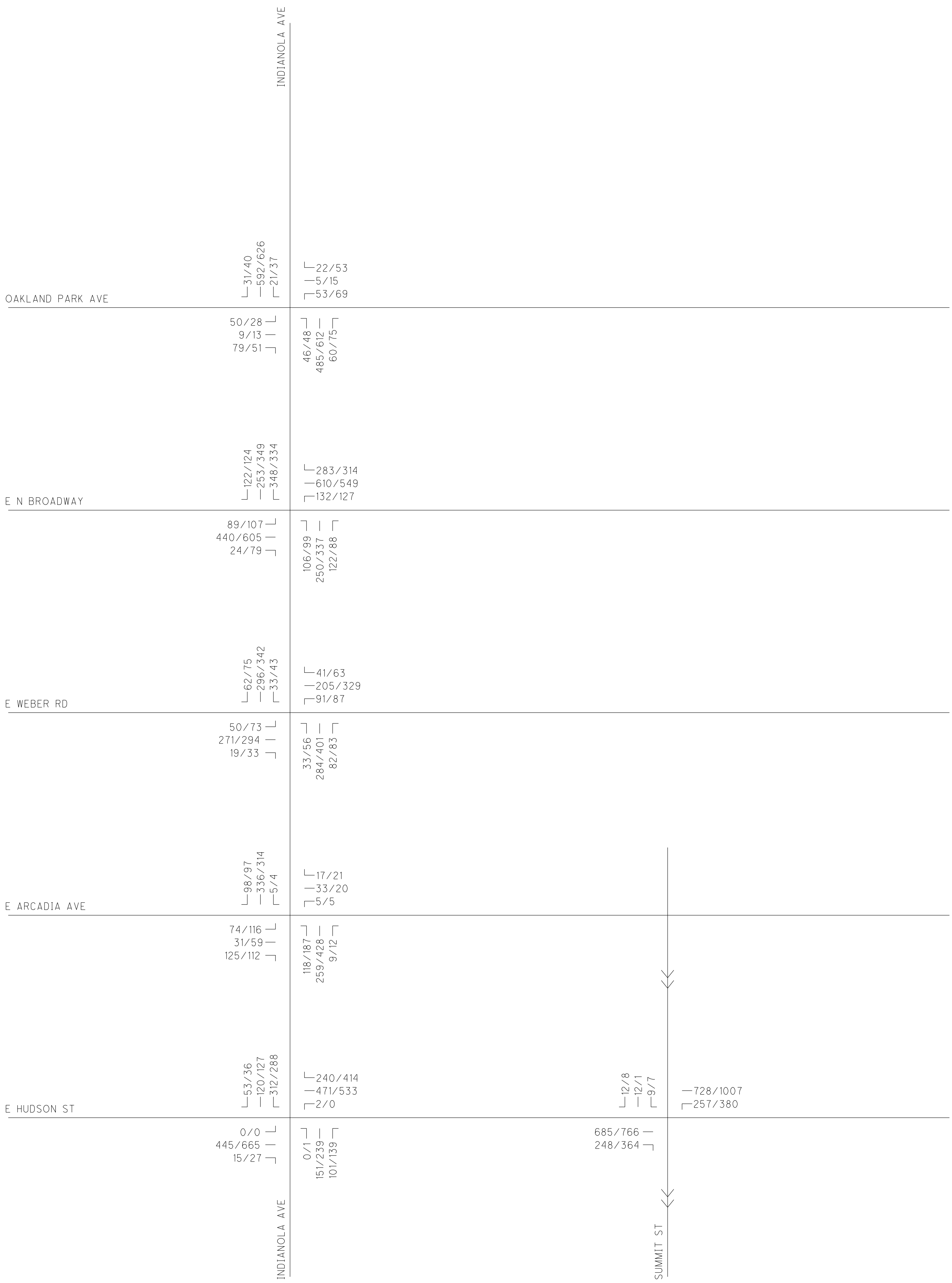
AM PEAK: 7:45-8:45 AM

PM PEAK: 4:45-5:45 PM

X/X AM PEAK/PM PEAK

N

INDIANOLA AVENUE ROAD DIET STUDY	
RAW COVID 2020 COUNTS	
EXISTING AM PEAK/PM PEAK	
APRIL 9, 2021	NOT TO SCALE



NOTE: NETWORK PEAK HOURS FROM PRE-PANDEMIC COUNTS DISPLAYED PER ODOT'S TRAFFIC COUNTS FOR TRAFFIC FORECASTS COVID19 SUPPLEMENT.

AM PEAK: 7:45-8:45 AM
PM PEAK: 4:45-5:45 PM

AM SCALING FACTOR: 1.71
PM SCALING FACTOR: 1.33

X/X AM PEAK/PM PEAK

N

INDIANOLA AVENUE ROAD DIET STUDY	
COVID 2020 SCALED COUNTS	
ADJUSTED AM PEAK/PM PEAK	
APRIL 9, 2021	NOT TO SCALE

Michael Baker
INTERNATIONAL

We Make a Difference

Attachment G:

Partial Count Factor Forms

Indianola Ave & Arcadia Ave

For converting partial day turning movements counts to seasonally adjusted 24 hour (AADT) counts.
Yellow boxes require user input. Scroll down for 24 hour diagrams. Use the Seasonal AdjustmtFactors_YYYY spreadsheet to lookup seasonal factor.
Use Avg TD by FC.xslx to compute P&A B&C FACTORs.

Date of Count: 9/23/2020 4 Wednesd September

PART 1: INPUT PARTIAL DAY P&A VEHICLES ROUTE
PARTIAL COUNT * FACTOR * SEASONAL FACTOR = 24 HR P&A

SOUTH LEG	Indianola A	*FC =*	4		northbound		APROACH	DEPART					
				LT	**THRU**	**RT**	TOTAL	TOTAL		**SOUTH LEG**		APROACH	DEPART
	LT	THRU	RT	809	2017	47	2873	2378	**LT**	**THRU**	**RT**	**TOTAL**	**TOTAL**
P&A FACTOR	1.831	1.831	1.831	1481.3	3693.1	86.057	5260.5	4354.1	1480	3690	90	5260	4360
SEASONAL FACTOR	1.000	1.000	1.000	1481.3	3693.1	86.057	5260.5	4354.1	***1480***	***3690***	***90***	***5260***	***4360***
WEST LEG	Arcadia Ave	FC =	7		eastbound		APROACH	DEPART					
	FACTOR			**LT**	**THRU**	**RT**	TOTAL	TOTAL		**WEST LEG**		APROACH	DEPART
	LT	THRU	RT	536	203	578	1317	1400	**LT**	**THRU**	**RT**	**TOTAL**	**TOTAL**
P&A FACTOR	1.831	1.831	1.831	981.42	371.69	1058.3	2411.4	2563.4	980	370	1060	2410	2560
SEASONAL F	1.000	1.000	1.000	981.42	371.69	1058.3	2411.4	2563.4	***980***	***370***	***1060***	***2410***	***2560***
NORTH LEG	Indianola A	FC =	4		southbound		APROACH	DEPART					
	FACTOR			**LT**	**THRU**	**RT**	TOTAL	TOTAL		**NORTH LEG**		APROACH	DEPART
	LT	THRU	RT	54	1784	475	2313	2660	**LT**	**THRU**	**RT**	**TOTAL**	**TOTAL**
P&A FACTOR	1.831	1.831	1.831	98.874	3266.5	869.73	4235.1	4870.5	100	3270	870	4240	4870
SEASONAL F	1.000	1.000	1.000	98.874	3266.5	869.73	4235.1	4870.5	***100***	***3270***	***870***	***4240***	***4870***
EAST LEG	Arcadia Ave	FC =	7		westbound		APROACH	DEPART					
	FACTOR			**LT**	**THRU**	**RT**	TOTAL	TOTAL		**EAST LEG**		APROACH	DEPART
	LT	THRU	RT	16	116	107	239	304	**LT**	**THRU**	**RT**	**TOTAL**	**TOTAL**
P&A FACTOR	1.831	1.831	1.831	29.296	212.4	195.92	437.61	556.62	30	210	200	440	560
SEASONAL F	1.000	1.000	1.000	29.296	212.4	195.92	437.61	556.62	***30***	***210***	***200***	***440***	***560***

PART 2: INPUT PARTIAL DAY B&C VEHICLES ROUTE
PARTIAL COUNT * FACTOR = 24 HR B&C

SOUTH LEG	Indianola A	*FC =*	4		northbound		APROACH	DEPART					
	FACTOR			**LT**	**THRU**	**RT**	TOTAL	TOTAL		**SOUTH LEG**		APROACH	DEPART
	LT	THRU	RT				0	0	**LT**	**THRU**	**RT**	**TOTAL**	**TOTAL**
B&C FACTOR				0	0	0	0	0	0	0	0	0	0
SEASONAL FACTOR				0	0	0	0	0	***0***	***0***	***0***	***0***	***0***
WEST LEG	Arcadia Ave	FC =	7		eastbound		APROACH	DEPART					
	FACTOR			**LT**	**THRU**	**RT**	TOTAL	TOTAL		**WEST LEG**		APROACH	DEPART
	LT	THRU	RT				0	0	**LT**	**THRU**	**RT**	**TOTAL**	**TOTAL**
B&C FACTOR				0	0	0	0	0	0	0	0	0	0
SEASONAL FACTOR				0	0	0	0	0	***0***	***0***	***0***	***0***	***0***
NORTH LEG	Indianola A	FC =	4		southbound		APROACH	DEPART					
	FACTOR			**LT**	**THRU**	**RT**	TOTAL	TOTAL		**NORTH LEG**		APROACH	DEPART
	LT	THRU	RT				0	0	**LT**	**THRU**	**RT**	**TOTAL**	**TOTAL**
B&C FACTOR				0	0	0	0	0	0	0	0	0	0
SEASONAL FACTOR				0	0	0	0	0	***0***	***0***	***0***	***0***	***0***
EAST LEG	Arcadia Ave	FC =	7		westbound		APROACH	DEPART					
	FACTOR			**LT**	**THRU**	**RT**	TOTAL	TOTAL		**EAST LEG**		APROACH	DEPART
	LT	THRU	RT				0	0	**LT**	**THRU**	**RT**	**TOTAL**	**TOTAL**
B&C FACTOR				0	0	0	0	0	0	0	0	0	0
SEASONAL FACTOR				0	0	0	0	0	***0***	***0***	***0***	***0***	***0***

P&A 24 HR

Indianola Ave
↓ 9110 ↑
4240 4870
870 3270 100
↵ ↓ ↳
↰ 200 Arcadia Ave
← 2560 ← 210 440 ←
4970 980 ↗ ↱ 30 1000
→ 2410 370 →
Arcadia Ave 1060 ↘ 560 →
↰ ↑ ↱
1480 3690 90
4360 5260
↑ 9620 ↓
Indianola Ave

B&C 24 HR

Indianola Ave
↓ 0 ↑
0 0
0 0 0
↵ ↓ ↳
↰ 0 Arcadia Ave
← 0 ← 0 0 ←
0 0 ↗ ↱ 0 0
→ 0 0 →
Arcadia Ave 0 ↘ 0 →
↰ ↑ ↱
0 0 0
0 0
↑ 0 ↓
Indianola Ave

TOTAL AADT

Indianola Ave
↓ 9110 ↑
4240 4870
870 3270 100
↵ ↓ ↳
↰ 200 Arcadia Ave
← 2560 ← 210 440 ←
4970 980 ↗ ↱ 30 1000
→ 2410 370 →
Arcadia Ave 1060 ↘ 560 →
↰ ↑ ↱
1480 3690 90
4360 5260
↑ 9620 ↓
Indianola Ave

Indianola Ave & North Broadway

For converting partial day turning movements counts to seasonally adjusted 24 hour (AADT) counts.
Yellow boxes require user input. Scroll down for 24 hour diagrams. Use the Seasonal AdjustmtFactors_YYYY spreadsheet to lookup seasonal factor.
Use Avg TD by FC.xlsx to compute P&A B&C FACTORs.

Date of Count: 9/23/2020 4 Wednesd September

PART 1: INPUT PARTIAL DAY P&A VEHICLES ROUTE
PARTIAL COUNT * FACTOR * SEASONAL FACTOR = 24 HR P&A

SOUTH LEG	Indianola Av	*FC =*	4		northbound		APROACH	DEPART					
				LT	**THRU**	**RT**	TOTAL	TOTAL		**SOUTH LEG**		**APROACH**	**DEPART**
	LT	THRU	RT	520	1785	481	2786	2572	**LT**	**THRU**	**RT**	**TOTAL**	**TOTAL**
P&A FACTOR	1.831	1.831	1.831	952.12	3268.3	880.71	5101.2	4709.3	950	3270	880	5100	4710
SEASONAL FACTOR	1.000	1.000	1.000	952.12	3268.3	880.71	5101.2	4709.3	***950***	***3270***	***880***	***5100***	***4710***
WEST LEG	Broadway	FC =	4		eastbound		APROACH	DEPART					
	FACTOR			**LT**	**THRU**	**RT**	TOTAL	TOTAL		**WEST LEG**		**APROACH**	**DEPART**
	LT	THRU	RT	613	2866	326	3805	3954	**LT**	**THRU**	**RT**	**TOTAL**	**TOTAL**
P&A FACTOR	1.831	1.831	1.831	1122.4	5247.6	596.91	6967	7239.8	1120	5250	600	6970	7240
SEASONAL F	1.000	1.000	1.000	1122.4	5247.6	596.91	6967	7239.8	***1120***	***5250***	***600***	***6970***	***7240***
NORTH LEG	Indianola Av	FC =	4		southbound		APROACH	DEPART					
	FACTOR			**LT**	**THRU**	**RT**	TOTAL	TOTAL		**NORTH LEG**		**APROACH**	**DEPART**
	LT	THRU	RT	1543	1715	666	3924	3996	**LT**	**THRU**	**RT**	**TOTAL**	**TOTAL**
P&A FACTOR	1.831	1.831	1.831	2825.2	3140.2	1219.4	7184.8	7316.7	2830	3140	1220	7190	7320
SEASONAL F	1.000	1.000	1.000	2825.2	3140.2	1219.4	7184.8	7316.7	***2830***	***3140***	***1220***	***7190***	***7320***
EAST LEG	Broadway	FC =	4		westbound		APROACH	DEPART					
	FACTOR			**LT**	**THRU**	**RT**	TOTAL	TOTAL		**EAST LEG**		**APROACH**	**DEPART**
	LT	THRU	RT	531	2768	1598	4897	4890	**LT**	**THRU**	**RT**	**TOTAL**	**TOTAL**
P&A FACTOR	1.831	1.831	1.831	972.26	5068.2	2925.9	8966.4	8953.6	970	5070	2930	8970	8960
SEASONAL F	1.000	1.000	1.000	972.26	5068.2	2925.9	8966.4	8953.6	***970***	***5070***	***2930***	***8970***	***8960***

PART 2: INPUT PARTIAL DAY B&C VEHICLES ROUTE
PARTIAL COUNT * FACTOR = 24 HR B&C

SOUTH LEG	Indianola Av	*FC =*	4		northbound		APROACH	DEPART					
	FACTOR			**LT**	**THRU**	**RT**	TOTAL	TOTAL		**SOUTH LEG**		**APROACH**	**DEPART**
	LT	THRU	RT				0	0	**LT**	**THRU**	**RT**	**TOTAL**	**TOTAL**
B&C FACTOR				0	0	0	0	0	0	0	0	0	0
SEASONAL FACTOR				0	0	0	0	0	***0***	***0***	***0***	***0***	***0***
WEST LEG	Broadway	FC =	4		eastbound		APROACH	DEPART					
	FACTOR			**LT**	**THRU**	**RT**	TOTAL	TOTAL		**WEST LEG**		**APROACH**	**DEPART**
	LT	THRU	RT				0	0	**LT**	**THRU**	**RT**	**TOTAL**	**TOTAL**
B&C FACTOR				0	0	0	0	0	0	0	0	0	0
SEASONAL FACTOR				0	0	0	0	0	***0***	***0***	***0***	***0***	***0***
NORTH LEG	Indianola Av	FC =	4		southbound		APROACH	DEPART					
	FACTOR			**LT**	**THRU**	**RT**	TOTAL	TOTAL		**NORTH LEG**		**APROACH**	**DEPART**
	LT	THRU	RT				0	0	**LT**	**THRU**	**RT**	**TOTAL**	**TOTAL**
B&C FACTOR				0	0	0	0	0	0	0	0	0	0
SEASONAL FACTOR				0	0	0	0	0	***0***	***0***	***0***	***0***	***0***
EAST LEG	Broadway	FC =	4		westbound		APROACH	DEPART					
	FACTOR			**LT**	**THRU**	**RT**	TOTAL	TOTAL		**EAST LEG**		**APROACH**	**DEPART**
	LT	THRU	RT				0	0	**LT**	**THRU**	**RT**	**TOTAL**	**TOTAL**
B&C FACTOR				0	0	0	0	0	0	0	0	0	0
SEASONAL FACTOR				0	0	0	0	0	***0***	***0***	***0***	***0***	***0***

P&A 24 HR

Indianola Ave
↓ 14510 ↑
7190 7320
1220 3140 2830
↵ ↓ ↳
↰ 2930 Broadway
← 5070 8970 ←
↱ 970 17930
← 7240
14210 1120 ⤴
→ 6970 5250 →
Broadway 600 ⤵
8960 →
↰ ↑ ↱
950 3270 880
4710 5100
↑ 9810 ↓
Indianola Ave

B&C 24 HR

Indianola Ave
↓ 0 ↑
0 0
0 0 0
↵ ↓ ↳
↰ 0 Broadway
← 0 0 ←
↱ 0 0
← 0
0 0 ⤴
→ 0 0 →
Broadway 0 ⤵
0 →
↰ ↑ ↱
0 0 0
0 0
↑ 0 ↓
Indianola Ave

TOTAL AADT

Indianola Ave
↓ 14510 ↑
7190 7320
1220 3140 2830
↵ ↓ ↳
↰ 2930 Broadway
← 5070 8970 ←
↱ 970 17930
← 7240
14210 1120 ⤴
→ 6970 5250 →
Broadway 600 ⤵
8960 →
↰ ↑ ↱
950 3270 880
4710 5100
↑ 9810 ↓
Indianola Ave

Hudson St & Summit St

For converting partial day turning movements counts to seasonally adjusted 24 hour (AADT) counts.
Yellow boxes require user input. Scroll down for 24 hour diagrams. Use the Seasonal AdjustmtFactors_YYYY spreadsheet to lookup seasonal factor.
Use Avg TD by FC.xslx to compute P&A B&C FACTORs.

Date of Count: 9/23/2020 | 4 | Wednesd | September

PART 1: INPUT PARTIAL DAY P&A VEHICLES | ROUTE
PARTIAL COUNT * FACTOR * SEASONAL FACTOR = 24 HR P&A

SOUTH LEG	Summit St	*FC =*	3		northbound		APROACH	DEPART					
				LT	**THRU**	**RT**	TOTAL	TOTAL		**SOUTH LEG**		**APROACH**	**DEPART**
	LT	THRU	RT	0	0	0	0	3565	**LT**	**THRU**	**RT**	**TOTAL**	**TOTAL**
P&A FACTOR	1.831	1.831	1.831	0	0	0	0	6527.5	0	0	0	0	6530
SEASONAL FACTOR	1.000	1.000	1.000	0	0	0	0	6527.5	***0***	***0***	***0***	***0***	***6530***
WEST LEG	Hudson St	FC =	4		eastbound		APROACH	DEPART					
	FACTOR			**LT**	**THRU**	**RT**	TOTAL	TOTAL		**WEST LEG**		**APROACH**	**DEPART**
	LT	THRU	RT	0	4009	1672	5681	4797	**LT**	**THRU**	**RT**	**TOTAL**	**TOTAL**
P&A FACTOR	1.831	1.831	1.831	0	7340.5	3061.4	10402	8783.3	0	7340	3060	10400	8780
SEASONAL F	1.000	1.000	1.000	0	7340.5	3061.4	10402	8783.3	***0***	***7340***	***3060***	***10400***	***8780***
NORTH LEG	Summit St	FC =	7		southbound		APROACH	DEPART					
	FACTOR			**LT**	**THRU**	**RT**	TOTAL	TOTAL		**NORTH LEG**		**APROACH**	**DEPART**
	LT	THRU	RT	39	42	51	132	0	**LT**	**THRU**	**RT**	**TOTAL**	**TOTAL**
P&A FACTOR	1.831	1.831	1.831	71.409	76.902	93.381	241.69	0	70	80	90	240	0
SEASONAL F	1.000	1.000	1.000	71.409	76.902	93.381	241.69	0	***70***	***80***	***90***	***240***	***0***
EAST LEG	Hudson St	FC =	3		westbound		APROACH	DEPART					
	FACTOR			**LT**	**THRU**	**RT**	TOTAL	TOTAL		**EAST LEG**		**APROACH**	**DEPART**
	LT	THRU	RT	1851	4746	0	6597	4048	**LT**	**THRU**	**RT**	**TOTAL**	**TOTAL**
P&A FACTOR	1.831	1.831	1.831	3389.2	8689.9	0	12079	7411.9	3390	8690	0	12080	7410
SEASONAL F	1.000	1.000	1.000	3389.2	8689.9	0	12079	7411.9	***3390***	***8690***	***0***	***12080***	***7410***

PART 2: INPUT PARTIAL DAY B&C VEHICLES | ROUTE
PARTIAL COUNT * FACTOR = 24 HR B&C

SOUTH LEG	Summit St	*FC =*	3		northbound		APROACH	DEPART					
	FACTOR			**LT**	**THRU**	**RT**	TOTAL	TOTAL		**SOUTH LEG**		**APROACH**	**DEPART**
	LT	THRU	RT				0	0	**LT**	**THRU**	**RT**	**TOTAL**	**TOTAL**
B&C FACTOR	1.831	1.831	1.831	0	0	0	0	0	0	0	0	0	0
SEASONAL FACTOR	1	1	1	0	0	0	0	0	***0***	***0***	***0***	***0***	***0***
WEST LEG	Hudson St	FC =	4		eastbound		APROACH	DEPART					
	FACTOR			**LT**	**THRU**	**RT**	TOTAL	TOTAL		**WEST LEG**		**APROACH**	**DEPART**
	LT	THRU	RT				0	0	**LT**	**THRU**	**RT**	**TOTAL**	**TOTAL**
B&C FACTOR	1.831	1.831	1.831	0	0	0	0	0	0	0	0	0	0
SEASONAL FACTOR	1.000	1.000	1.000	0	0	0	0	0	***0***	***0***	***0***	***0***	***0***
NORTH LEG	Summit St	FC =	7		southbound		APROACH	DEPART					
	FACTOR			**LT**	**THRU**	**RT**	TOTAL	TOTAL		**NORTH LEG**		**APROACH**	**DEPART**
	LT	THRU	RT				0	0	**LT**	**THRU**	**RT**	**TOTAL**	**TOTAL**
B&C FACTOR	1.831	1.831	1.831	0	0	0	0	0	0	0	0	0	0
SEASONAL FACTOR	1.000	1.000	1.000	0	0	0	0	0	***0***	***0***	***0***	***0***	***0***
EAST LEG	Hudson St	FC =	3		westbound		APROACH	DEPART					
	FACTOR			**LT**	**THRU**	**RT**	TOTAL	TOTAL		**EAST LEG**		**APROACH**	**DEPART**
	LT	THRU	RT				0	0	**LT**	**THRU**	**RT**	**TOTAL**	**TOTAL**
B&C FACTOR	1.831	1.831	1.831	0	0	0	0	0	0	0	0	0	0
SEASONAL FACTOR	1.000	1.000	1.000	0	0	0	0	0	***0***	***0***	***0***	***0***	***0***

P&A 24 HR

Summit St
240
240 0
90 80 70
0 Hudson St
8780 8690 12080
19180 0 3390 19490
10400 7340
Hudson St 3060 7410
0 0 0
6530 0
6530
Summit St

B&C 24 HR

Summit St
0
0 0
0 0 0
0 Hudson St
0 0 0
0 0 0 0
0 0
Hudson St 0 0
0 0 0
0 0
0
Summit St

TOTAL AADT

Summit St
240
240 0
90 80 70
0 Hudson St
8780 8690 12080
19180 0 3390 19490
10400 7340
Hudson St 3060 7410
0 0 0
6530 0
6530
Summit St

Indianola Ave & Hudson St

For converting partial day turning movements counts to seasonally adjusted 24 hour (AADT) counts.
Yellow boxes require user input. Scroll down for 24 hour diagrams. Use the Seasonal AdjuistmtFactors_YYYY spreadsheet to lookup seasonal factor.
Use Avg TD by FC.xslx to compute P&A B&C FACTORs.

Date of Count: 9/23/2020 4 Wednesd September

PART 1: INPUT PARTIAL DAY P&A VEHICLES — ROUTE
PARTIAL COUNT * FACTOR * SEASONAL FACTOR = 24 HR P&A

SOUTH LEG	Indianola Av	*FC =*	7		northbound		APROACH	DEPART					
				LT	**THRU**	**RT**	TOTAL	TOTAL		**SOUTH LEG**		APROACH	**DEPART**
	LT	THRU	RT	6	1014	720	1740	853	**LT**	**THRU**	**RT**	**TOTAL**	**TOTAL**
P&A FACTOR	1.831	1.831	1.831	10.986	1856.6	1318.3	3185.9	1561.8	10	1860	1320	3190	1560
SEASONAL FACTOR	1.000	1.000	1.000	10.986	1856.6	1318.3	3185.9	1561.8	***10***	***1860***	***1320***	***3190***	***1560***
WEST LEG	Hudson St	FC =	4		eastbound		APROACH	DEPART					
	FACTOR			**LT**	**THRU**	**RT**	TOTAL	TOTAL		**WEST LEG**		APROACH	**DEPART**
	LT	THRU	RT	2	3581	138	3721	3037	**LT**	**THRU**	**RT**	**TOTAL**	**TOTAL**
P&A FACTOR	1.831	1.831	1.831	3.662	6556.8	252.68	6813.2	5560.7	0	6560	250	6810	5560
SEASONAL F	1.000	1.000	1.000	3.662	6556.8	252.68	6813.2	5560.7	***0***	***6560***	***250***	***6810***	***5560***
NORTH LEG	Indianola Av	FC =	4		southbound		APROACH	DEPART					
	FACTOR			**LT**	**THRU**	**RT**	TOTAL	TOTAL		**NORTH LEG**		APROACH	**DEPART**
	LT	THRU	RT	1578	711	245	2534	2942	**LT**	**THRU**	**RT**	**TOTAL**	**TOTAL**
P&A FACTOR	1.831	1.831	1.831	2889.3	1301.8	448.6	4639.8	5386.8	2890	1300	450	4640	5390
SEASONAL F	1.000	1.000	1.000	2889.3	1301.8	448.6	4639.8	5386.8	***2890***	***1300***	***450***	***4640***	***5390***
EAST LEG	Hudson St	FC =	4		westbound		APROACH	DEPART					
	FACTOR			**LT**	**THRU**	**RT**	TOTAL	TOTAL		**EAST LEG**		APROACH	**DEPART**
	LT	THRU	RT	4	2786	1926	4716	5879	**LT**	**THRU**	**RT**	**TOTAL**	**TOTAL**
P&A FACTOR	1.831	1.831	1.831	7.324	5101.2	3526.5	8635	10764	10	5100	3530	8640	10770
SEASONAL F	1.000	1.000	1.000	7.324	5101.2	3526.5	8635	10764	***10***	***5100***	***3530***	***8640***	***10770***

PART 2: INPUT PARTIAL DAY B&C VEHICLES — ROUTE
PARTIAL COUNT * FACTOR = 24 HR B&C

SOUTH LEG	Indianola Av	*FC =*	7		northbound		APROACH	DEPART					
	FACTOR			**LT**	**THRU**	**RT**	TOTAL	TOTAL		**SOUTH LEG**		APROACH	**DEPART**
	LT	THRU	RT				0	0	**LT**	**THRU**	**RT**	**TOTAL**	**TOTAL**
B&C FACTOR				0	0	0	0	0	0	0	0	0	0
SEASONAL FACTOR				0	0	0	0	0	***0***	***0***	***0***	***0***	***0***
WEST LEG	Hudson St	FC =	4		eastbound		APROACH	DEPART					
	FACTOR			**LT**	**THRU**	**RT**	TOTAL	TOTAL		**WEST LEG**		APROACH	**DEPART**
	LT	THRU	RT				0	0	**LT**	**THRU**	**RT**	**TOTAL**	**TOTAL**
B&C FACTOR				0	0	0	0	0	0	0	0	0	0
SEASONAL FACTOR				0	0	0	0	0	***0***	***0***	***0***	***0***	***0***
NORTH LEG	Indianola Av	FC =	4		southbound		APROACH	DEPART					
	FACTOR			**LT**	**THRU**	**RT**	TOTAL	TOTAL		**NORTH LEG**		APROACH	**DEPART**
	LT	THRU	RT				0	0	**LT**	**THRU**	**RT**	**TOTAL**	**TOTAL**
B&C FACTOR				0	0	0	0	0	0	0	0	0	0
SEASONAL FACTOR				0	0	0	0	0	***0***	***0***	***0***	***0***	***0***
EAST LEG	Hudson St	FC =	4		westbound		APROACH	DEPART					
	FACTOR			**LT**	**THRU**	**RT**	TOTAL	TOTAL		**EAST LEG**		APROACH	**DEPART**
	LT	THRU	RT				0	0	**LT**	**THRU**	**RT**	**TOTAL**	**TOTAL**
B&C FACTOR				0	0	0	0	0	0	0	0	0	0
SEASONAL FACTOR				0	0	0	0	0	***0***	***0***	***0***	***0***	***0***

P&A 24 HR

Indianola Ave
↓ 10030 ↑
4640 5390
450 1300 2890
↵ ↓ ↳
↰ 3530 Hudson St
← 5560 ← 5100 8640 ←
12370 0 ↱ ↱ 10 19410
→ 6810 6560 →
Hudson St 250 ↴ ↰ ↑ ↱ 10770 →
10 1860 1320
1560 3190
↑ 4750 ↓
Indianola Ave

B&C 24 HR

Indianola Ave
↓ 0 ↑
0 0
0 0 0
↵ ↓ ↳
↰ 0 Hudson St
← 0 ← 0 0 ←
0 0 ↱ ↱ 0 0
→ 0 0 →
Hudson St 0 ↴ ↰ ↑ ↱ 0 →
0 0 0
0 0
↑ 0 ↓
Indianola Ave

TOTAL AADT

Indianola Ave
↓ 10030 ↑
4640 5390
450 1300 2890
↵ ↓ ↳
↰ 3530 Hudson St
← 5560 ← 5100 8640 ←
12370 0 ↱ ↱ 10 19410
→ 6810 6560 →
Hudson St 250 ↴ ↰ ↑ ↱ 10770 →
10 1860 1320
1560 3190
↑ 4750 ↓
Indianola Ave

Indianola Ave & Oakland Park Ave

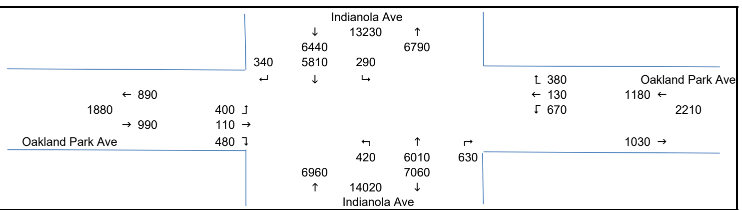
For converting partial day turning movements counts to seasonally adjusted 24 hour (AADT) counts.
Yellow boxes require user input. Scroll down for 24 hour diagrams. Use the Seasonal AdjustmtFactors_YYYY spreadsheet to lookup seasonal factor.
Use Avg TD by FC.xlsx to compute P&A B&C FACTORs.

Date of Count: 9/23/2020 4 Wednesd September

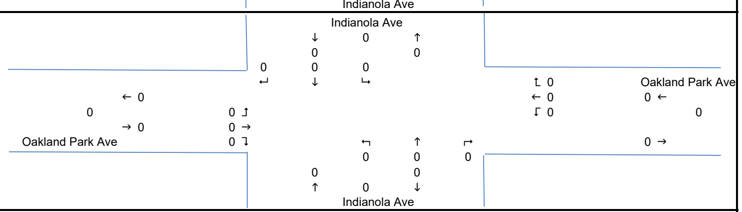
PART 1:	INPUT PARTIAL DAY P&A VEHICLES								ROUTE				
	PARTIAL COUNT * FACTOR * SEASONAL FACTOR = 24 HR P&A												
SOUTH LEG	Indianola Av	FC =	4		northbound		APROACH	DEPART					
				LT	**THRU**	**RT**	TOTAL	TOTAL		**SOUTH LEG**		APROACH	DEPART
	LT	THRU	RT	232	3282	343	3857	3798	**LT**	**THRU**	**RT**	**TOTAL**	**TOTAL**
P&A FACTOR	1.831	1.831	1.831	424.79	6009.3	628.03	7062.2	6954.1	420	6010	630	7060	6960
SEASONAL FACTOR	1.000	1.000	1.000	424.79	6009.3	628.03	7062.2	6954.1	***420***	***6010***	***630***	***7060***	***6960***
WEST LEG	Oakland Pa	FC =	7		eastbound		APROACH	DEPART					
	FACTOR			**LT**	**THRU**	**RT**	TOTAL	TOTAL		**WEST LEG**		APROACH	DEPART
	LT	THRU	RT	218	62	263	543	493	**LT**	**THRU**	**RT**	**TOTAL**	**TOTAL**
P&A FACTOR	1.831	1.831	1.831	399.16	113.52	481.55	994.23	902.68	400	110	480	990	890
SEASONAL F	1.000	1.000	1.000	399.16	113.52	481.55	994.23	902.68	***400***	***110***	***480***	***990***	***890***
NORTH LEG	Indianola Av	FC =	4		southbound		APROACH	DEPART					
	FACTOR			**LT**	**THRU**	**RT**	TOTAL	TOTAL		**NORTH LEG**		APROACH	DEPART
	LT	THRU	RT	161	3171	188	3520	3706	**LT**	**THRU**	**RT**	**TOTAL**	**TOTAL**
P&A FACTOR	1.831	1.831	1.831	294.79	5806.1	344.23	6445.1	6785.7	290	5810	340	6440	6790
SEASONAL F	1.000	1.000	1.000	294.79	5806.1	344.23	6445.1	6785.7	***290***	***5810***	***340***	***6440***	***6790***
EAST LEG	Oakland Pa	FC =	7		westbound		APROACH	DEPART					
	FACTOR			**LT**	**THRU**	**RT**	TOTAL	TOTAL		**EAST LEG**		APROACH	DEPART
	LT	THRU	RT	364	73	206	643	566	**LT**	**THRU**	**RT**	**TOTAL**	**TOTAL**
P&A FACTOR	1.831	1.831	1.831	666.48	133.66	377.19	1177.3	1036.3	670	130	380	1180	1030
SEASONAL F	1.000	1.000	1.000	666.48	133.66	377.19	1177.3	1036.3	***670***	***130***	***380***	***1180***	***1030***

PART 2:	INPUT PARTIAL DAY B&C VEHICLES								ROUTE				
	PARTIAL COUNT * FACTOR = 24 HR B&C												
SOUTH LEG	Indianola Av	FC =	4		northbound		APROACH	DEPART					
	FACTOR			**LT**	**THRU**	**RT**	TOTAL	TOTAL		**SOUTH LEG**		APROACH	DEPART
	LT	THRU	RT				0	0	**LT**	**THRU**	**RT**	**TOTAL**	**TOTAL**
B&C FACTOR				0	0	0	0	0	0	0	0	0	0
SEASONAL FACTOR				0	0	0	0	0	***0***	***0***	***0***	***0***	***0***
WEST LEG	Oakland Pa	FC =	7		eastbound		APROACH	DEPART					
	FACTOR			**LT**	**THRU**	**RT**	TOTAL	TOTAL		**WEST LEG**		APROACH	DEPART
	LT	THRU	RT				0	0	**LT**	**THRU**	**RT**	**TOTAL**	**TOTAL**
B&C FACTOR				0	0	0	0	0	0	0	0	0	0
SEASONAL FACTOR				0	0	0	0	0	***0***	***0***	***0***	***0***	***0***
NORTH LEG	Indianola Av	FC =	4		southbound		APROACH	DEPART					
	FACTOR			**LT**	**THRU**	**RT**	TOTAL	TOTAL		**NORTH LEG**		APROACH	DEPART
	LT	THRU	RT				0	0	**LT**	**THRU**	**RT**	**TOTAL**	**TOTAL**
B&C FACTOR				0	0	0	0	0	0	0	0	0	0
SEASONAL FACTOR				0	0	0	0	0	***0***	***0***	***0***	***0***	***0***
EAST LEG	Oakland Pa	FC =	7		westbound		APROACH	DEPART					
	FACTOR			**LT**	**THRU**	**RT**	TOTAL	TOTAL		**EAST LEG**		APROACH	DEPART
	LT	THRU	RT				0	0	**LT**	**THRU**	**RT**	**TOTAL**	**TOTAL**
B&C FACTOR				0	0	0	0	0	0	0	0	0	0
SEASONAL FACTOR				0	0	0	0	0	***0***	***0***	***0***	***0***	***0***

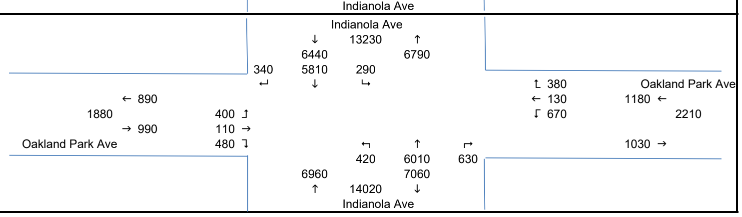
P&A 24 HR



B&C 24 HR



TOTAL AADT



Indianola Ave & Weber Rd

For converting partial day turning movements counts to seasonally adjusted 24 hour (AADT) counts.
Yellow boxes require user input. Scroll down for 24 hour diagrams. Use the Seasonal AdjustmtFactors_YYYY spreadsheet to lookup seasonal factor.
Use Avg TD by FC.xlsx to compute P&A B&C FACTORs.

Date of Count: 9/23/2020 4 Wednesd September

PART 1:	INPUT PARTIAL DAY P&A VEHICLES							ROUTE					
	PARTIAL COUNT * FACTOR * SEASONAL FACTOR = 24 HR P&A												
SOUTH LEG	Indianola A	*FC =*	4		northbound		APROACH	DEPART					
				LT	**THRU**	**RT**	TOTAL	TOTAL		**SOUTH LEG**		**APROACH**	**DEPART**
	LT	THRU	RT	229	1983	518	2730	2334	**LT**	**THRU**	**RT**	**TOTAL**	**TOTAL**
P&A FACTOR	1.831	1.831	1.831	419.3	3630.9	948.46	4998.6	4273.6	420	3630	950	5000	4280
SEASONAL FACTOR	1.000	1.000	1.000	419.3	3630.9	948.46	4998.6	4273.6	***420***	***3630***	***950***	***5000***	***4280***
WEST LEG	Weber Rd	FC =	4		eastbound		APROACH	DEPART					
	FACTOR			**LT**	**THRU**	**RT**	TOTAL	TOTAL		**WEST LEG**		**APROACH**	**DEPART**
	LT	THRU	RT	356	1513	173	2042	1925	**LT**	**THRU**	**RT**	**TOTAL**	**TOTAL**
P&A FACTOR	1.831	1.831	1.831	651.84	2770.3	316.76	3738.9	3524.7	650	2770	320	3740	3520
SEASONAL F	1.000	1.000	1.000	651.84	2770.3	316.76	3738.9	3524.7	***650***	***2770***	***320***	***3740***	***3520***
NORTH LEG	Indianola A	FC =	4		southbound		APROACH	DEPART					
	FACTOR			**LT**	**THRU**	**RT**	TOTAL	TOTAL		**NORTH LEG**		**APROACH**	**DEPART**
	LT	THRU	RT	203	1714	356	2273	2625	**LT**	**THRU**	**RT**	**TOTAL**	**TOTAL**
P&A FACTOR	1.831	1.831	1.831	371.69	3138.3	651.84	4161.9	4806.4	370	3140	650	4160	4800
SEASONAL F	1.000	1.000	1.000	371.69	3138.3	651.84	4161.9	4806.4	***370***	***3140***	***650***	***4160***	***4800***
EAST LEG	Weber Rd	FC =	4		westbound		APROACH	DEPART					
	FACTOR			**LT**	**THRU**	**RT**	TOTAL	TOTAL		**EAST LEG**		**APROACH**	**DEPART**
	LT	THRU	RT	447	1340	286	2073	2234	**LT**	**THRU**	**RT**	**TOTAL**	**TOTAL**
P&A FACTOR	1.831	1.831	1.831	818.46	2453.5	523.67	3795.7	4090.5	820	2450	520	3790	4090
SEASONAL F	1.000	1.000	1.000	818.46	2453.5	523.67	3795.7	4090.5	***820***	***2450***	***520***	***3790***	***4090***

PART 2:	INPUT PARTIAL DAY B&C VEHICLES							ROUTE					
	PARTIAL COUNT * FACTOR = 24 HR B&C												
SOUTH LEG	Indianola A	*FC =*	4		northbound		APROACH	DEPART					
	FACTOR			**LT**	**THRU**	**RT**	TOTAL	TOTAL		**SOUTH LEG**		**APROACH**	**DEPART**
	LT	THRU	RT				0	0	**LT**	**THRU**	**RT**	**TOTAL**	**TOTAL**
B&C FACTOR				0	0	0	0	0	0	0	0	0	0
SEASONAL FACTOR				0	0	0	0	0	***0***	***0***	***0***	***0***	***0***
WEST LEG	Weber Rd	FC =	4		eastbound		APROACH	DEPART					
	FACTOR			**LT**	**THRU**	**RT**	TOTAL	TOTAL		**WEST LEG**		**APROACH**	**DEPART**
	LT	THRU	RT				0	0	**LT**	**THRU**	**RT**	**TOTAL**	**TOTAL**
B&C FACTOR				0	0	0	0	0	0	0	0	0	0
SEASONAL FACTOR				0	0	0	0	0	***0***	***0***	***0***	***0***	***0***
NORTH LEG	Indianola A	FC =	4		southbound		APROACH	DEPART					
	FACTOR			**LT**	**THRU**	**RT**	TOTAL	TOTAL		**NORTH LEG**		**APROACH**	**DEPART**
	LT	THRU	RT				0	0	**LT**	**THRU**	**RT**	**TOTAL**	**TOTAL**
B&C FACTOR				0	0	0	0	0	0	0	0	0	0
SEASONAL FACTOR				0	0	0	0	0	***0***	***0***	***0***	***0***	***0***
EAST LEG	Weber Rd	FC =	4		westbound		APROACH	DEPART					
	FACTOR			**LT**	**THRU**	**RT**	TOTAL	TOTAL		**EAST LEG**		**APROACH**	**DEPART**
	LT	THRU	RT				0	0	**LT**	**THRU**	**RT**	**TOTAL**	**TOTAL**
B&C FACTOR				0	0	0	0	0	0	0	0	0	0
SEASONAL FACTOR				0	0	0	0	0	***0***	***0***	***0***	***0***	***0***

P&A 24 HR

Indianola Ave
↓ 8960 ↑
4160 4800
650 3140 370
↵ ↓ ↳
↰ 520 Weber Rd
← 3520 ← 2450 3790 ←
7260 650 ↗ ↱ 820 7880
→ 3740 2770 →
Weber Rd 320 ↘ ↰ ↑ ↱ 4090 →
420 3630 950
4280 5000
↑ 9280 ↓
Indianola Ave

B&C 24 HR

Indianola Ave
↓ 0 ↑
0 0
0 0 0
↵ ↓ ↳
↰ 0 Weber Rd
← 0 ← 0 0 ←
0 0 ↗ ↱ 0 0
→ 0 0 →
Weber Rd 0 ↘ ↰ ↑ ↱ 0 →
0 0 0
0 0
↑ 0 ↓
Indianola Ave

TOTAL AADT

Indianola Ave
↓ 8960 ↑
4160 4800
650 3140 370
↵ ↓ ↳
↰ 520 Weber Rd
← 3520 ← 2450 3790 ←
7260 650 ↗ ↱ 820 7880
→ 3740 2770 →
Weber Rd 320 ↘ ↰ ↑ ↱ 4090 →
420 3630 950
4280 5000
↑ 9280 ↓
Indianola Ave

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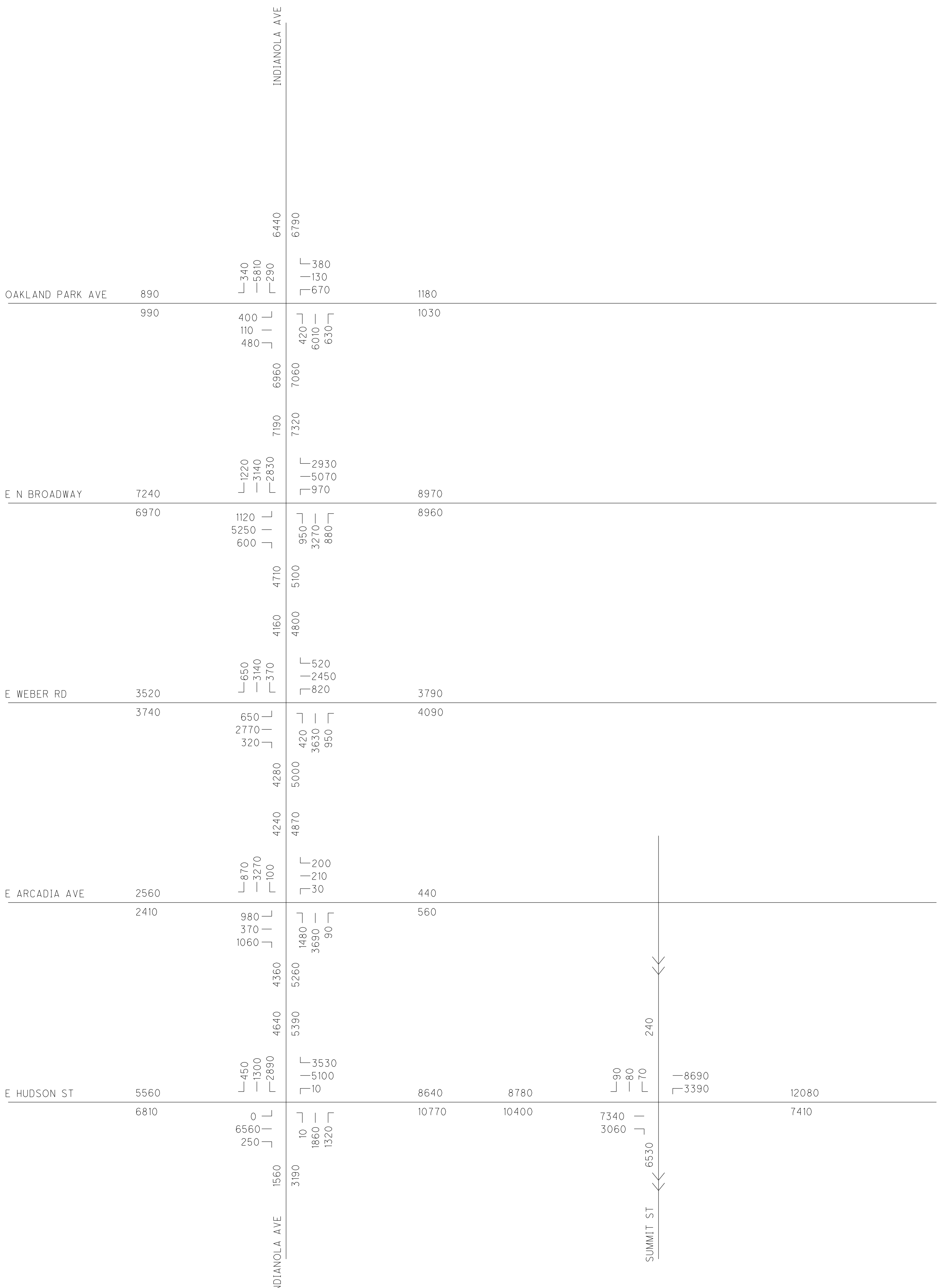
We Make a Difference

Attachment H:

Scaled 2020 AADT Plate



INDIANOLA AVENUE ROAD DIET STUDY

COVID 2020 SCALED AADT

ADJUSTED AADT

APRIL 9, 2021 | NOT TO SCALE

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Attachment I:

TD and T24 Percentages

Intersection	Movement	Total Vehicles	Heavy Vehicles	Truck %
Indianola Ave & Oakland Park Ave	NB Left	232	1	0%
	NB Thru	3282	97	3%
	NB Right	343	15	4%
	SB Left	161	2	1%
	SB Thru	3171	89	3%
	SB Right	188	3	2%
	EB Left	218	0	0%
	EB Thru	62	1	2%
	EB Right	263	3	1%
	WB Left	364	8	2%
	WB Thru	73	2	3%
	WB Right	206	7	3%
Indianola Ave & North Broadway	NB Left	520	7	1%
	NB Thru	1785	55	3%
	NB Right	481	10	2%
	SB Left	1543	45	3%
	SB Thru	1715	39	2%
	SB Right	666	22	3%
	EB Left	613	24	4%
	EB Thru	2866	86	3%
	EB Right	326	6	2%
	WB Left	531	15	3%
	WB Thru	2768	68	2%
	WB Right	1598	37	2%
Indianola Ave & Weber Rd	NB Left	229	2	1%
	NB Thru	1983	49	2%
	NB Right	518	10	2%
	SB Left	203	4	2%
	SB Thru	1714	34	2%
	SB Right	356	9	3%
	EB Left	356	19	5%
	EB Thru	1513	29	2%
	EB Right	173	8	5%
	WB Left	447	11	2%
	WB Thru	1340	21	2%
	WB Right	286	5	2%

Intersection	Movement	Total Vehicles	Heavy Vehicles	Truck %
Indianola Ave & Arcadia Ave	NB Left	809	23	3%
	NB Thru	2017	42	2%
	NB Right	47	3	6%
	SB Left	54	5	9%
	SB Thru	1781	34	2%
	SB Right	475	12	3%
	EB Left	536	13	2%
	EB Thru	203	1	0%
	EB Right	578	20	3%
	WB Left	16	0	0%
	WB Thru	116	0	0%
	WB Right	107	4	4%
Indianola Ave & Hudson St	NB Left	6	0	0%
	NB Thru	1014	11	1%
	NB Right	720	2	0%
	SB Left	1578	38	2%
	SB Thru	711	6	1%
	SB Right	245	6	2%
	EB Left	2	0	0%
	EB Thru	3581	55	2%
	EB Right	138	0	0%
	WB Left	4	0	0%
	WB Thru	2786	60	2%
	WB Right	1926	58	3%
Hudson St & Summit St	NB Left	-	-	-
	NB Thru	-	-	-
	NB Right	-	-	-
	SB Left	39	0	0%
	SB Thru	42	2	5%
	SB Right	51	3	6%
	EB Left	-	-	-
	EB Thru	4009	79	2%
	EB Right	1672	45	3%
	WB Left	1851	18	1%
	WB Thru	4746	111	2%
	WB Right	-	-	-

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We Make a Difference

Attachment J:

Scaled September 2020 Counts Adjusted to Model Timeframe

Hudson & Summit		NB Left	NB Thru	NB Right	SB Left	SB Thru	SB Right	EB Left	EB Thru	EB Right	WB Left	WB Thru	WB Right
	7:30-9:30 AM	0	0	0	16	16	12	0	751	297	302	818	0
	3:00-6:30 PM	0	0	0	13	16	26	0	1984	865	989	2465	0
	AM COVID Adjustment Factor	1.71	1.71	1.71	1.71	1.71	1.71	1.71	1.71	1.71	1.71	1.71	1.71
	PM COVID Adjustment Factor	1.33	1.33	1.33	1.33	1.33	1.33	1.33	1.33	1.33	1.33	1.33	1.33
	AM Time of Day Adjustment Factor	1.303	1.303	1.303	1.617	1.617	1.617	1.303	1.460	1.617	1.617	1.460	1.303
	PM Time of Day Adjustment Factor	1.087	1.087	1.087	1.124	1.124	1.124	1.087	1.106	1.124	1.124	1.106	1.087
	TMC Adjusted to 6:00-9:00 AM	0	0	0	44	44	33	0	1875	821	835	2042	0
	TMC Adjusted to 3:00-7:00 PM	0	0	0	19	24	39	0	2917	1293	1478	3625	0
	AM Two Way Volume		South Leg	1700		North Leg	121		West Leg	4771		East Leg	4796
	PM Two Way Volume		South Leg	2795		North Leg	82		West Leg	7874		East Leg	8039

Indianola & Hudson		NB Left	NB Thru	NB Right	SB Left	SB Thru	SB Right	EB Left	EB Thru	EB Right	WB Left	WB Thru	WB Right
	7:30-9:30 AM	0	143	116	331	130	56	0	590	16	1	540	283
	3:00-6:30 PM	3	578	377	760	359	103	1	1865	72	2	1365	979
	AM COVID Adjustment Factor	1.71	1.71	1.71	1.71	1.71	1.71	1.71	1.71	1.71	1.71	1.71	1.71
	PM COVID Adjustment Factor	1.33	1.33	1.33	1.33	1.33	1.33	1.33	1.33	1.33	1.33	1.33	1.33
	AM Time of Day Adjustment Factor	1.303	1.303	1.303	1.617	1.617	1.617	1.303	1.460	1.617	1.617	1.460	1.303
	PM Time of Day Adjustment Factor	1.087	1.087	1.087	1.124	1.124	1.124	1.087	1.106	1.124	1.124	1.106	1.087
	TMC Adjusted to 6:00-9:00 AM	0	319	258	915	359	155	0	1473	44	3	1348	630
	TMC Adjusted to 3:00-7:00 PM	4	836	545	1136	537	154	1	2742	108	3	2007	1416
	AM Two Way Volume		South Leg	983		North Leg	2378		West Leg	3020		East Leg	4627
	PM Two Way Volume		South Leg	2033		North Leg	4080		West Leg	5016		East Leg	7849

Indianola & Arcadia		NB Left	NB Thru	NB Right	SB Left	SB Thru	SB Right	EB Left	EB Thru	EB Right	WB Left	WB Thru	WB Right
	7:30-9:30 AM	127	280	7	8	373	102	77	35	123	5	34	16
	3:00-6:30 PM	446	1038	26	22	852	231	308	112	284	7	53	51
	AM COVID Adjustment Factor	1.71	1.71	1.71	1.71	1.71	1.71	1.71	1.71	1.71	1.71	1.71	1.71
	PM COVID Adjustment Factor	1.33	1.33	1.33	1.33	1.33	1.33	1.33	1.33	1.33	1.33	1.33	1.33
	AM Time of Day Adjustment Factor	1.303	1.303	1.303	1.617	1.617	1.617	1.303	1.460	1.617	1.617	1.460	1.303
	PM Time of Day Adjustment Factor	1.087	1.087	1.087	1.124	1.124	1.124	1.087	1.106	1.124	1.124	1.106	1.087
	TMC Adjusted to 6:00-9:00 AM	283	624	16	22	1031	282	172	87	340	14	85	36
	TMC Adjusted to 3:00-7:00 PM	645	1501	38	33	1274	345	445	165	425	10	78	74
	AM Two Way Volume		South Leg	2308		North Leg	2167		West Leg	1249		East Leg	260
	PM Two Way Volume		South Leg	3893		North Leg	3672		West Leg	2103		East Leg	398

		NB Left	NB Thru	NB Right	SB Left	SB Thru	SB Right	EB Left	EB Thru	EB Right	WB Left	WB Thru	WB Right
Indianola & Weber	7:30-9:30 AM	32	303	83	27	323	66	57	303	27	90	237	50
	3:00-6:30 PM	129	1014	263	115	864	196	197	766	90	225	721	138
	AM COVID Adjustment Factor	1.71	1.71	1.71	1.71	1.71	1.71	1.71	1.71	1.71	1.71	1.71	1.71
	PM COVID Adjustment Factor	1.33	1.33	1.33	1.33	1.33	1.33	1.33	1.33	1.33	1.33	1.33	1.33
	AM Time of Day Adjustment Factor	1.303	1.303	1.303	1.617	1.617	1.617	1.303	1.460	1.617	1.617	1.460	1.303
	PM Time of Day Adjustment Factor	1.087	1.087	1.087	1.124	1.124	1.124	1.087	1.106	1.124	1.124	1.106	1.087
	TMC Adjusted to 6:00-9:00 AM	71	675	185	75	893	182	127	756	75	249	592	111
	TMC Adjusted to 3:00-7:00 PM	187	1466	380	172	1291	293	285	1126	135	336	1060	200
	AM Two Way Volume		South Leg	2148		North Leg	2063		West Leg	1803		East Leg	1968
	PM Two Way Volume		South Leg	3795		North Leg	3707		West Leg	3086		East Leg	3274

		NB Left	NB Thru	NB Right	SB Left	SB Thru	SB Right	EB Left	EB Thru	EB Right	WB Left	WB Thru	WB Right
Indianola & Broadway	7:30-9:30 AM	111	294	119	359	296	137	98	518	33	114	652	333
	3:00-6:30 PM	222	909	231	715	894	299	308	1471	187	273	1303	783
	AM COVID Adjustment Factor	1.71	1.71	1.71	1.71	1.71	1.71	1.71	1.71	1.71	1.71	1.71	1.71
	PM COVID Adjustment Factor	1.33	1.33	1.33	1.33	1.33	1.33	1.33	1.33	1.33	1.33	1.33	1.33
	AM Time of Day Adjustment Factor	1.303	1.303	1.303	1.617	1.617	1.617	1.303	1.460	1.617	1.617	1.460	1.303
	PM Time of Day Adjustment Factor	1.087	1.087	1.087	1.124	1.124	1.124	1.087	1.106	1.124	1.124	1.106	1.087
	TMC Adjusted to 6:00-9:00 AM	247	655	265	992	818	379	218	1293	91	315	1628	742
	TMC Adjusted to 3:00-7:00 PM	321	1315	334	1069	1336	447	445	2163	280	408	1916	1132
	AM Two Way Volume		South Leg	2391		North Leg	3804		West Leg	3856		East Leg	5235
	PM Two Way Volume		South Leg	3994		North Leg	5744		West Leg	5572		East Leg	7022

		NB Left	NB Thru	NB Right	SB Left	SB Thru	SB Right	EB Left	EB Thru	EB Right	WB Left	WB Thru	WB Right
Indianola & Oakland	7:30-9:30 AM	49	577	70	35	645	37	41	10	69	68	8	28
	3:00-6:30 PM	102	1673	168	89	1522	104	102	34	116	177	39	125
	AM COVID Adjustment Factor	1.71	1.71	1.71	1.71	1.71	1.71	1.71	1.71	1.71	1.71	1.71	1.71
	PM COVID Adjustment Factor	1.33	1.33	1.33	1.33	1.33	1.33	1.33	1.33	1.33	1.33	1.33	1.33
	AM Time of Day Adjustment Factor	1.303	1.303	1.303	1.617	1.617	1.617	1.303	1.460	1.617	1.617	1.460	1.303
	PM Time of Day Adjustment Factor	1.087	1.087	1.087	1.124	1.124	1.124	1.087	1.106	1.124	1.124	1.106	1.087
	TMC Adjusted to 6:00-9:00 AM	109	1285	156	97	1783	102	91	25	191	188	20	62
	TMC Adjusted to 3:00-7:00 PM	148	2419	243	133	2275	155	148	50	173	265	57	181
	AM Two Way Volume		South Leg	3712		North Leg	3420		West Leg	538		East Leg	548
	PM Two Way Volume		South Leg	5523		North Leg	5311		West Leg	731		East Leg	929

Michael Baker INTERNATIONAL

We Make a Difference

Attachment K1:

NCHRP Spreadsheet No Build - AADT

WARNING: HIGH GROWTH LINKS

USER INPUT
OPTIONAL INPUT
FINAL REFINED FORECAST

NCHRP255 adjustment process — *Interpolate opening & design year & adjust for more recent count*

	COL 1	COL 2	COL 3	COL 4	COL 4	COL 5	COL 6	COL 7	COL 8	COL 8.5	COL 9	COL 10	COL 10.5	COL 11	COL 12	COL 13	COL 14	COL 15	COL 16	COL 17	COL 18	COL 19	COL 20	COL 21
					near base model		2025		2045						Selected	Selected	most recent	most recent	recent count	2024	2044	growth factors		annual growth
	Road/Link	in Di	ax R	se S	count year	count data	Ab	Ab interpolate	Af-D	SLRATIO	RATIO	DIFF	MRATIO	RAf	Adjustment	Volume	count year	count data	delta	opening year	design yr	opening yr	design year	check
(east leg)	Arcadia Ave	0.5	2	Disa	2020	1000	2519	2176	3891	6888	1788	2715	2197	2456	**MRATIO**	**2197**			0	1192	2149	1.192	2.149	4.01%
(north leg)	Indianola Ave	0.5	2	Disa	2020	9110	4583	4275	5817	10297	12396	10652	11934	11293	**DIFF**	**10652**			0	9357	10590	1.027	1.163	0.66%
(west leg)	Arcadia Ave	0.5	2	Disa	2020	4970	4461	4160	5666	10030	6769	6476	6691	6584	**RAf**	**6584**			0	5228	6519	1.052	1.312	1.23%
(south leg)	Indianola Ave	0.5	2	Disa	2020	9620	3733	3342	5299	9380	15253	11577	13895	12736	**DIFF**	**11577**			0	9933	11499	1.033	1.195	0.79%
Total						**24700**		**13953**																

There are hidden rows if you want more roads in your intersection/screenline

There are hidden columns for opening year model results if you have them

Optional Capacity Adjuster
Use this for screenlines, not intersection approaches

	delta		revised volume		growth factors	
Capacity	opening yr	design year	opening yr	design year	opening yr	design year
	-1192	-2149	1192	2149	1.192	2.149
	-9357	-10590	9357	10590	1.027	1.163
	-5228	-6519	5228	6519	1.052	1.312
	-9933	-11499	9933	11499	1.033	1.195
0	**0**	**0**				
	-25710	**-30757**				

	Year	
Model Base	2025	
Model Opening (opt)		if Yo=Yb then also must = Yc (col4)
Model Forecast	2045	must be > Yb
Project Opening	2024	
Project Design	2044	

General Notes

General rule: if MR<1 then if ***RATIO*** *<= 1.0 then use R*
OR if RATIO >= 2 then use DIFF else use Raf ,
if MR>1 then if RATIO <=0.5 then use MRATIO, OR
if RATIO >=2 then use DIFF, else use Raf(based on MRA
Which you can change if it makes sense,
make both of columns 2-3 very large to force ratios,
make them 0 to force differences

Make sure model opening year (if used)
is greater existing and less than forecast
EXCEPT…
If you want to use a base year build run
to establish trends, set Af-ON=Ab
set model open year=base year=count year
Place build run in Af-OB
Do not use cols 14-15 in this case

If you have a non-model forecast you
want to enter to interpolate and calculate
growth rate, put it in column 8 (Af) then copy
column 5 to column 6 and set model base
to count year (Type toggle does this for you on TM sheet)

Design year no build is a separate alternative
create a new sheet for it

You can omit open year model, have just an
open year no build or both no build and
build, but don't have a build without
a no build unless it's a new link.

If you have a new link it will get a growth rate of 1.0
To get forecast turn movements for new links you must
enter the model turns in section 2 of the turn movement sheets.

A value of zero in a field usually means zero, leave fields blank if you want them
ignored. If link doesn't exist in base, count=Ab=blank. If link doesn't exist in build,
make zero, not blank in this case (Af-OB actually controls this).

There is no guarantee a forecast volume of zero will
be respected as zero by the 255 adjustments.

If you have an existing intersection link that wasn't in the model
enter its counts in the appropriate places here and on the
TM sheets. You will need to over-ride columns 19-20
of this sheet with an exogenously supplied growth rate.

If you have a new intersection on an existing road you can
enter the main line counts/model volumes (Ab and Af-ON)
here and on the TM sheets (as Thru movements) and then
the full set of volumes/turns for Af-OB and Af-D
You may want to disable screenlines in this case.

Field Definiations

COLUMN	VARIABLE	DEFINITION
1	Road/Link	The name/route number of each facility bisected by the screenline and/or the link (node) numbers from the network.
2	Min Diff	Minimum Count/Model Ratio for using differences, below this use ratios alone
3	Max Rat	Maximum Count/Model Ratio for using ratios, above this use differences alone
3.5	Use SL	Set to "Enable" to allow use of screen line adjustments for this leg if no count available, set to "Disable" to disable giving no adjustment of model result, set to "Force" to force SL adjustment
4	COUNT year	year of the actual base year traffic count
5	COUNT	actual base year traffic count
6	Ab	base year traffic assignment - user to input year:
7	Ab interpolate	interpolation between base and future year assignment -- used when year of count data differs from base year assignment, will use open-nobuild to base interp if open nobuild exists, otherwise will use design to base interp
7.1	R	Calculated Ratio **(COUNT/Ab)**
7.2	D	Calculated Difference **(COUNT-Ab)**
7.3	MR	Model Ratio **(AfD/Ab)**
7.4	SLR	Screenline Ratio **(ΣCount/ΣAb)**
* 8	Af	future year traffic assignment - Af-D= (near) design yr model run, Af-ON=optional (near) opening year no build model run, Af-OB=optional (near) opening year build model run
* 8.5	SLRATIO	adjusted future year traffic forecast (ΣCount/ΣAb)*Af
* 9	RATIO	adjusted future year traffic forecast (**COUNT**/**Ab**) * **Af**
* 10	DIFF	adjusted future year traffic forecast (**COUNT** - **Ab**) + **Af**
* 10.5	MRATIO	adjusted future year traffic forecast modified "ratio method" to weight towards DIFF method for large model increases: if MR<1 = RATIO else = ((MR-1)*DIFF + RATIO)/MR
* 11	RAf	adjusted future year traffic forecast (AVERAGE(M**RATIO**, **DIFF**))
* 12	lected Adjustme	Selects the type of future year adjustment based on the ratio of actual base year traffic count to interpolated base year traffic assignment *general rule: if MR<1 then if RATIO <= 1.0 then use RATIO, OR if RATIO >= 2 then use DIFF else use Raf , if MR>1 then if RATIO <=0.5 then use MRATIO, OR if RATIO >=2 then use DIFF, else use Raf(based on MRATIO)*
* 13	Selected Volume	The selected adjusted forecast year model volume
14	most recent cou	year of the most recently available actual count data (should be <Yo, if Yo=Yb generally won't use)
15	most recent cou	most recently available actual count data for the facility
16	ecent Count Del	Forecast adjustment based on difference of more recent count from interpolation resulting from base count and first forecast year
17	opening year	final refined forecast for the opening year - user to input year
18	design year	final refined forecast for the design year - user to input year
19	growth factorop	growth factor to apply to most recent count to obtain opening year (SET to 1.0 if no count given)
20	growth factorde	growth factor to apply to most recent count to obtain design year (SET to 1.0 if no count given)

* Columns 8-13 repeated for open year build and nobuild (hidden)

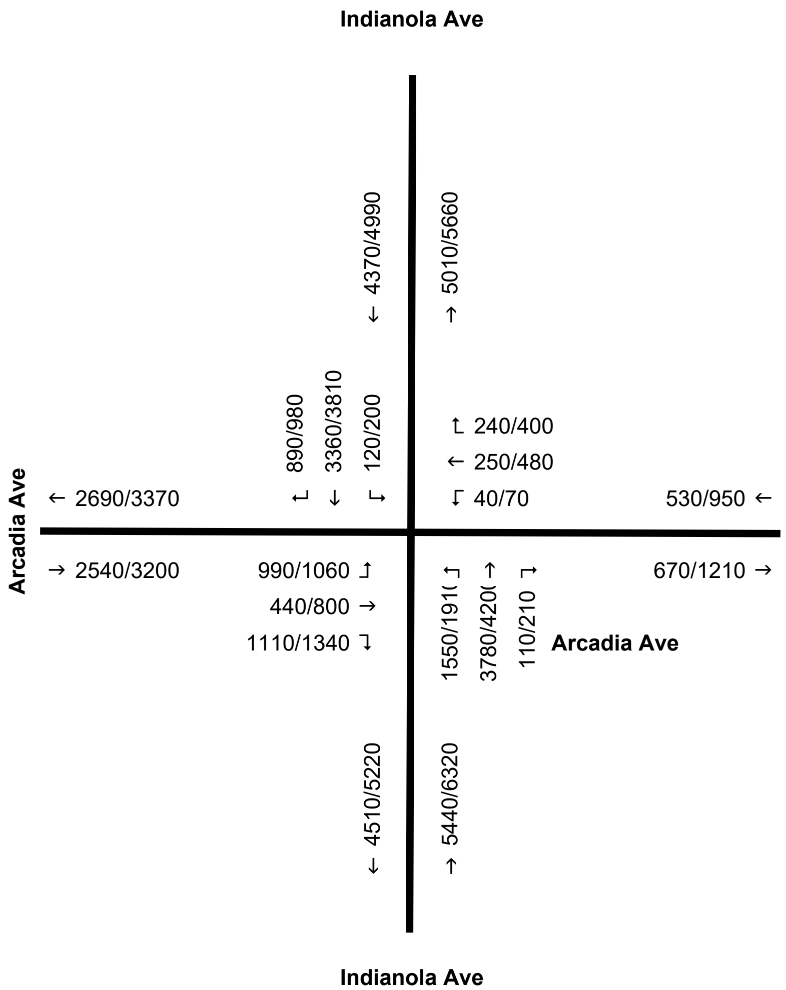
Four Interpolation Cases

1. Have base count and open yr model run and interp year<model open yr THUS interpolate btwn base count and adj open yr model run except for open yr<model open yr which uses case 2
2. Have open yr model run and interp yr> open model yr (or interpolating any opening year) THUS interopolate btwn adj open yr and adj design yr model runs
3. (standard) Have base count and NO open yr model run THUS interpolate btwn count and adj design yr model run
4. Have no base count THUS interpolate calculate growth from Unadj base and design yr model runs and apply growth rate to number of years different from model design yr

Screenline Options (see field 3.5 description)
Enable
Disable
Force

POR-43-10.26
PID93442
PLATE 1 OF 1

2024/2044 ADT



POR-43-10.26	PID93442
2024/2044 ADT, AM DHV, PM DHV	
OHIO DEPARTMENT OF TRANSPORATION	
FEBRUARY 25, 2015	NOT TO SCALE

USER INPUT
OPTIONAL INPUT
FINAL REFINED FORECAST

NCHRP255 adjustment process / *Interpolate opening & design year & adjust for more recent count*

	COL 1 Road/Link	COL 2 in Di	COL 3 ax R	COL 4 se S	COL 4 near base model count year	COL 5 count data	COL 6 2025 Ab	COL 7 Ab interpolate	COL 8 2045 Af-D	COL 8.5 SLRATIO	COL 9 RATIO	COL 10 DIFF	COL 10.5 MRATIO	COL 11 RAf	COL 12 Selected Adjustment	COL 13 Selected Volume	COL 14 most recent count year	COL 15 most recent count data	COL 16 recent count delta	COL 17 2024 opening year	COL 18 2044 design yr	COL 19 growth factors opening yr	COL 20 growth factors design year	COL 21 annual growth check
(east leg)	E North Broadway	0.5	2	Disa	2020	17930	26707	25702	30727	31669	21435	22955	21684	22320	**RAf**	**22320**			0	18632	22144	1.039	1.235	0.94%
(north leg)	Indianola Ave	0.5	2	Disa	2020	14510	6346	5871	8247	8500	20382	16886	19375	18131	**DIFF**	**16886**			0	14890	16791	1.026	1.157	0.64%
(west leg)	E North Broadway	0.5	2	Disa	2020	14210	21239	20570	23914	24647	16520	17554	16665	17110	**RAf**	**17110**			0	14674	16994	1.033	1.196	0.79%
(south leg)	Indianola Ave	0.5	2	Disa	2020	9810	2824	2638	3568	3677	13268	10740	12609	11675	**DIFF**	**10740**			0	9959	10703	1.015	1.091	0.37%
Total						**56460**		**54781**																

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There are hidden columns for opening year model results if you have them

Optional Capacity Adjuster
Use this for screenlines, not intersection approaches

Capacity	delta opening yr	delta design year	revised volume opening yr	revised volume design year	growth factors opening yr	growth factors design year
	-18632	-22144	18632	22144	1.039	1.235
	-14890	-16791	14890	16791	1.026	1.157
	-14674	-16994	14674	16994	1.033	1.196
	-9959	-10703	9959	10703	1.015	1.091
0	**0**	**0**				
	-58155	**-66632**				

	Year	
Model Base	2025	
Model Opening (opt)		if Yo=Yb then also must = Yc (col4)
Model Forecast	2045	must be > Yb
Project Opening	2024	
Project Design	2044	

General Notes

General rule: if MR<1 then if ***RATIO*** *<= 1.0 then use R*
OR if RATIO >= 2 then use DIFF else use Raf ,
if MR>1 then if RATIO <=0.5 then use MRATIO, OR
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Make sure model opening year (if used)
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Place build run in Af-OB
Do not use cols 14-15 in this case

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You can omit open year model, have just an
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If you have a new link it will get a growth rate of 1.0
To get forecast turn movements for new links you must
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	7.3	MR	Model Ratio **(AfD/Ab)**
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*	8	Af	future year traffic assignment - Af-D= (near) design yr model run, Af-ON=optional (near) opening year no build model run, Af-OB=optional (near) opening year build model run
*	8.5	SLRATIO	adjusted future year traffic forecast (ΣCount/ΣAb)*Af
*	9	RATIO	adjusted future year traffic forecast (**COUNT/Ab**) * **Af**
*	10	DIFF	adjusted future year traffic forecast (**COUNT - Ab**) + **Af**
*	10.5	MRATIO	adjusted future year traffic forecast modified "ratio method" to weight towards DIFF method for large model increases: if MR<1 = RATIO else = ((MR-1)*DIFF + RATIO)/MR
*	11	RAf	adjusted future year traffic forecast (AVERAGE(M**RATIO**, **DIFF**))
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*	13	Selected Volume	The selected adjusted forecast year model volume
	14	most recent cou	year of the most recently available actual count data (should be <Yo, if Yo=Yb generally won't use)
	15	most recent cou	most recently available actual count data for the facility
	16	ecent Count Del	Forecast adjustment based on difference of more recent count from interpolation resulting from base count and first forecast year
	17	opening year	final refined forecast for the opening year - user to input year
	18	design year	final refined forecast for the design year - user to input year
	19	growth factorop	growth factor to apply to most recent count to obtain opening year (SET to 1.0 if no count given)
	20	growth factorde	growth factor to apply to most recent count to obtain design year (SET to 1.0 if no count given)

* Columns 8-13 repeated for open year build and nobuild (hidden)

Four Interpolation Cases

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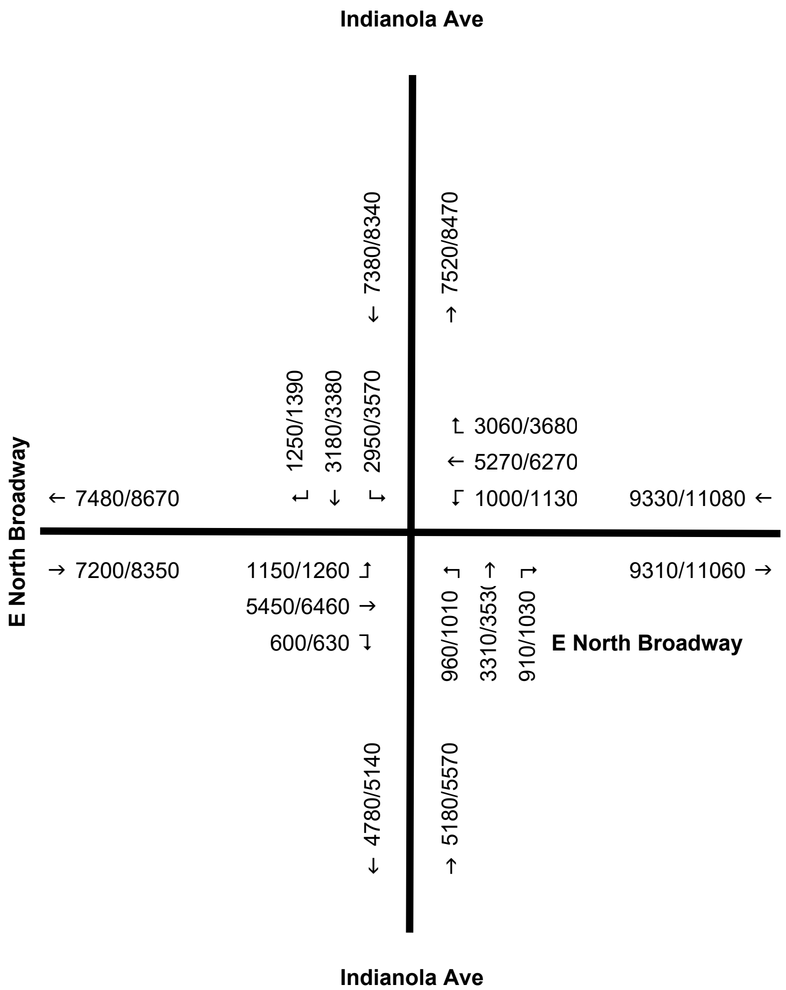
3. (standard) Have base count and NO open yr model run THUS interpolate btwn count and adj design yr model run
4. Have no base count THUS interpolate calculate growth from Unadj base and design yr model runs and apply growth rate to number of years different from model design yr

Screenline Options (see field 3.5 description)
Enable
Disable
Force

POR-43-10.26
PID93442
PLATE 1 OF 1

2024/2044 ADT



POR-43-10.26	PID93442
2024/2044 ADT, AM DHV, PM DHV	
OHIO DEPARTMENT OF TRANSPORATION	
FEBRUARY 25, 2015	NOT TO SCALE

WARNING: HIGH GROWTH LINKS

USER INPUT
OPTIONAL INPUT
FINAL REFINED FORECAST

NCHRP255 adjustment process

	COL 1	COL 2	COL 3	COL 4	COL 4	COL 5	COL 6	COL 7	COL 8	COL 8.5	COL 9	COL 10	COL 10.5	COL 11	COL 12	COL 13
					near base model		2025		2045						Selected	Selected
	Road/Link	in Di	ax R	se S	count year	count data	Ab	Ab^{interpolate}	Af-D	SLRATIO	RATIO	DIFF	MRATIO	RAf	Adjustment	Volume
(east leg)	E Hudson St	0.5	2	Disa	2020	19490	23289	23141	23882	22270	20114	20231	20118	20175	RAf	**20175**
(north leg)	Summit St	0.5	2	Disa	2020	240	217	147	496	463	810	589	654	622	RAf	**622**
(west leg)	E Hudson St	0.5	2	Disa	2020	19180	18950	18606	20328	18956	20955	20902	20951	20927	RAf	**20927**
(south leg)	Summit St	0.5	2	Disa	2020	6530	6895	6835	7134	6652	6816	6829	6817	6823	RAf	**6823**
Total						**45440**		**48729**								

Interpolate opening & design year & adjust for more recent count

	COL 14	COL 15	COL 16	COL 17	COL 18	COL 19	COL 20	COL 21
	most recent	most recent	recent count	2024	2044	growth factors		annual growth
	count year	count data	delta	opening year	design yr	opening yr	design year	check
(east leg)			0	19600	20148	1.006	1.034	0.14%
(north leg)			0	301	607	1.254	2.529	5.08%
(west leg)			0	19460	20857	1.015	1.087	0.36%
(south leg)			0	6577	6811	1.007	1.043	0.18%

Optional Capacity Adjuster
Use this for screenlines, not intersection approaches

	delta		revised volume		growth factors	
Capacity	opening yr	design yea	opening yr	design yea	opening yr	design year
	-19600	-20148	19600	20148	1.006	1.034
	-301	-607	301	607	1.254	2.529
	-19460	-20857	19460	20857	1.015	1.087
	-6577	-6811	6577	6811	1.007	1.043
0	**0**	**0**				
	-45938	**-48423**				

There are hidden rows if you want more roads in your intersection/screenline

There are hidden columns for opening year model results if you have them

	Year	
Model Base	2025	
Model Opening (opt)		if Yo=Yb then also must = Yc (col4)
Model Forecast	2045	must be > Yb
Project Opening	2024	
Project Design	2044	

General Notes

General rule: if MR<1 then if RATIO <= 1.0 then use R
OR if RATIO >= 2 then use DIFF else use Raf ,
if MR>1 then if RATIO <=0.5 then use MRATIO, OR
if RATIO >=2 then use DIFF, else use Raf(based on MRA
Which you can change if it makes sense,
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COLUMN	VARIABLE	DEFINITION
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2	Min Diff	Minimum Count/Model Ratio for using differences, below this use ratios alone
3	Max Rat	Maximum Count/Model Ratio for using ratios, above this use differences alone
3.5	Use SL	Set to "Enable" to allow use of screen line adjustments for this leg if no count available, set to "Disable" to disable giving no adjustment of model result, set to "Force" to force SL adjustment
4	COUNT year	year of the actual base year traffic count
5	COUNT	actual base year traffic count
6	Ab	base year traffic assignment - user to input year:
7	Ab^{interpolate}	interpolation between base and future year assignment -- used when year of count data differs from base year assignment, will use open-nobuild to base interp if open nobuild exists, otherwise will use design to base interp
7.1	R	Calculated Ratio **(COUNT/Ab)**
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* 9	RATIO	adjusted future year traffic forecast (**COUNT/Ab**) * **Af**
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* 11	RAf	adjusted future year traffic forecast (AVERAGE(M**RATIO**, **DIFF**))
* 12	lected Adjustme	Selects the type of future year adjustment based on the ratio of actual base year traffic count to interpolated base year traffic assignment *general rule: if MR<1 then if RATIO <= 1.0 then use RATIO, OR if RATIO >= 2 then use DIFF else use Raf , if MR>1 then if RATIO <=0.5 then use MRATIO, OR if RATIO >=2 then use DIFF, else use Raf(based on MRATIO)*
* 13	Selected Volume	The selected adjusted forecast year model volume
14	most recent cou	year of the most recently available actual count data (should be <Yo, if Yo=Yb generally won't use)
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17	opening year	final refined forecast for the opening year - user to input year
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Screenline Options (see field 3.5 description)
Enable
Disable
Force

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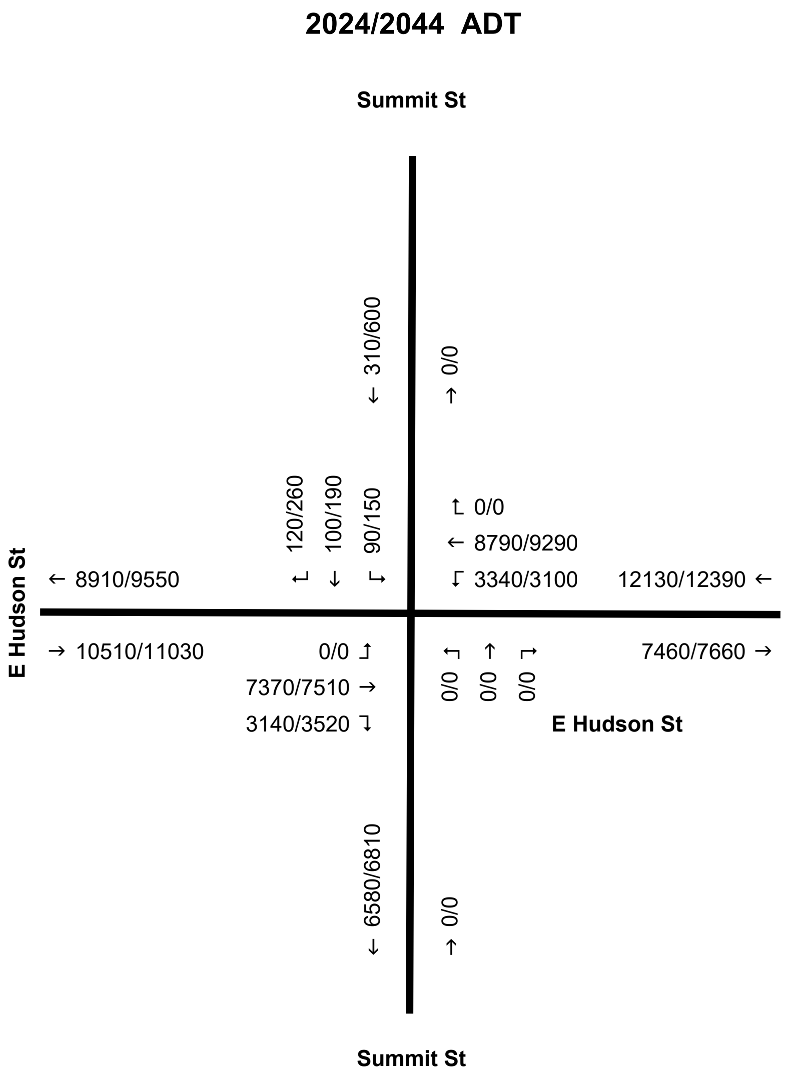
PID93442
PLATE 1 OF 1



POR-43-10.26	PID93442
2024/2044 ADT, AM DHV, PM DHV	
OHIO DEPARTMENT OF TRANSPORATION	
FEBRUARY 25, 2015	NOT TO SCALE

USER INPUT
OPTIONAL INPUT
FINAL REFINED FORECAST

NCHRP255 adjustment process

	COL 1	COL 2	COL 3	COL 4	COL 4	COL 5	COL 6	COL 7	COL 8	COL 8.5	COL 9	COL 10	COL 10.5	COL 11	COL 12	COL 13
					near base model		2025		2045						Selected	Selected
	Road/Link	in Di	ax R	se S	count year	count data	Ab	Ab interpolate	Af-D	SLRATIO	RATIO	DIFF	MRATIO	RAf	Adjustment	Volume
(east leg)	Hudson St	0.5	2	Disa	2020	19410	18950	18606	20328	22083	21206	21132	21200	21166	**RAf**	**21166**
(north leg)	Indianola Ave	0.5	2	Disa	2020	10030	3733	3342	5299	5757	15903	11987	14457	13222	**DIFF**	**11987**
(west leg)	Hudson St	0.5	2	Disa	2020	12370	14473	14239	15410	16741	13387	13541	13399	13470	**RAf**	**13470**
(south leg)	Indianola Ave	0.5	2	Disa	2020	4750	6938	6672	8004	8695	5698	6082	5762	5922	**RAf**	**5922**
Total						**46560**		**42859**								

Interpolate opening & design year & adjust for more recent count

	COL 14	COL 15	COL 16	COL 17	COL 18	COL 19	COL 20	COL 21
	most recent	most recent	recent count	2024	2044	growth factors		annual growth
	count year	count data	delta	opening year	design yr	opening yr	design year	check
(east leg)			0	19691	21096	1.015	1.087	0.36%
(north leg)			0	10343	11909	1.031	1.187	0.76%
(west leg)			0	12546	13426	1.014	1.085	0.35%
(south leg)			0	4938	5875	1.040	1.237	0.95%

Optional Capacity Adjuster
Use this for screenlines, not intersection approaches

		delta		revised volume		growth factors	
	Capacity	opening yr	design yea	opening yr	design yea	opening yr	design year
(east leg)		-19691	-21096	19691	21096	1.015	1.087
(north leg)		-10343	-11909	10343	11909	1.031	1.187
(west leg)		-12546	-13426	12546	13426	1.014	1.085
(south leg)		-4938	-5875	4938	5875	1.040	1.237
	0	**0**	**0**				
		-47518	**-52306**				

There are hidden rows if you want more roads in your intersection/screenline

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	Year	
Model Base	2025	
Model Opening (opt)		if Yo=Yb then also must = Yc (col4)
Model Forecast	2045	must be > Yb
Project Opening	2024	
Project Design	2044	

General Notes

General rule: if MR<1 then if ***RATIO*** *<= 1.0 then use R*
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Enable
Disable
Force

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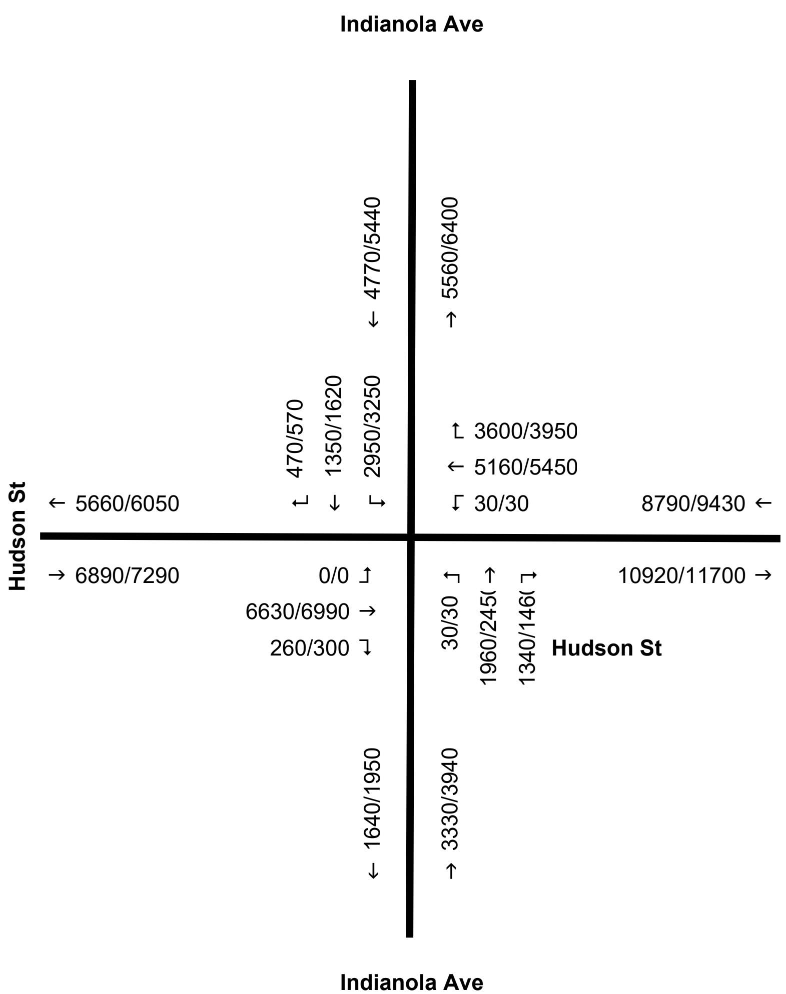
PID93442
PLATE 1 OF 1

2024/2044 ADT



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2024/2044 ADT, AM DHV, PM DHV	
OHIO DEPARTMENT OF TRANSPORATION	
FEBRUARY 25, 2015	NOT TO SCALE

USER INPUT
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NCHRP255 adjustment process | ***Interpolate opening & design year & adjust for more recent count***

	COL 1	COL 2	COL 3	COL 4	COL 4	COL 5	COL 6	COL 7	COL 8	COL 8.5	COL 9	COL 10	COL 10.5	COL 11	COL 12	COL 13	COL 14	COL 15	COL 16	COL 17	COL 18	COL 19	COL 20	COL 21
					near base model		2025		2045						Selected	Selected	most recent	most recent	recent count	2024	2044	growth factors		annual growth
	Road/Link	in Di	ax R	se S	count year	count data	Ab	Ab interpolate	Af-D	SLRATIO	RATIO	DIFF	MRATIO	RAf	Adjustment	Volume	count year	count data	delta	opening year	design yr	opening yr	design year	check
(east leg)	Oakland Park Ave	0.5	2	Disa	2020	2210	2210	2210	2210	4375	2210	2210	2210	2210	**RATIO**	**2210**			0	2210	2210	1.000	1.000	0.00%
(north leg)	Indianola Ave	0.5	2	Disa	2020	13230	6346	5871	8247	16325	18584	15606	17726	16666	**DIFF**	**15606**			0	13610	15511	1.029	1.172	0.70%
(west leg)	Oakland Park Ave	0.5	2	Disa	2020	1880	1880	1880	1880	3722	1880	1880	1880	1880	**RATIO**	**1880**			0	1880	1880	1.000	1.000	0.00%
(south leg)	Indianola Ave	0.5	2	Disa	2020	14020	6346	5871	8247	16325	19694	16396	18744	17570	**DIFF**	**16396**			0	14400	16301	1.027	1.163	0.66%
Total						**31340**		**15832**																

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Optional Capacity Adjuster
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	delta		revised volume		growth factors	
Capacity	**opening yr**	**design yea**	**opening yr**	**design yea**	**opening yr**	**design year**
	-2210	-2210	2210	2210	1.000	1.000
	-13610	-15511	13610	15511	1.029	1.172
	-1880	-1880	1880	1880	1.000	1.000
	-14400	-16301	14400	16301	1.027	1.163
0	**0**	**0**				
	-32100	**-35902**				

	Year	
Model Base	2025	
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POR-43-10.26
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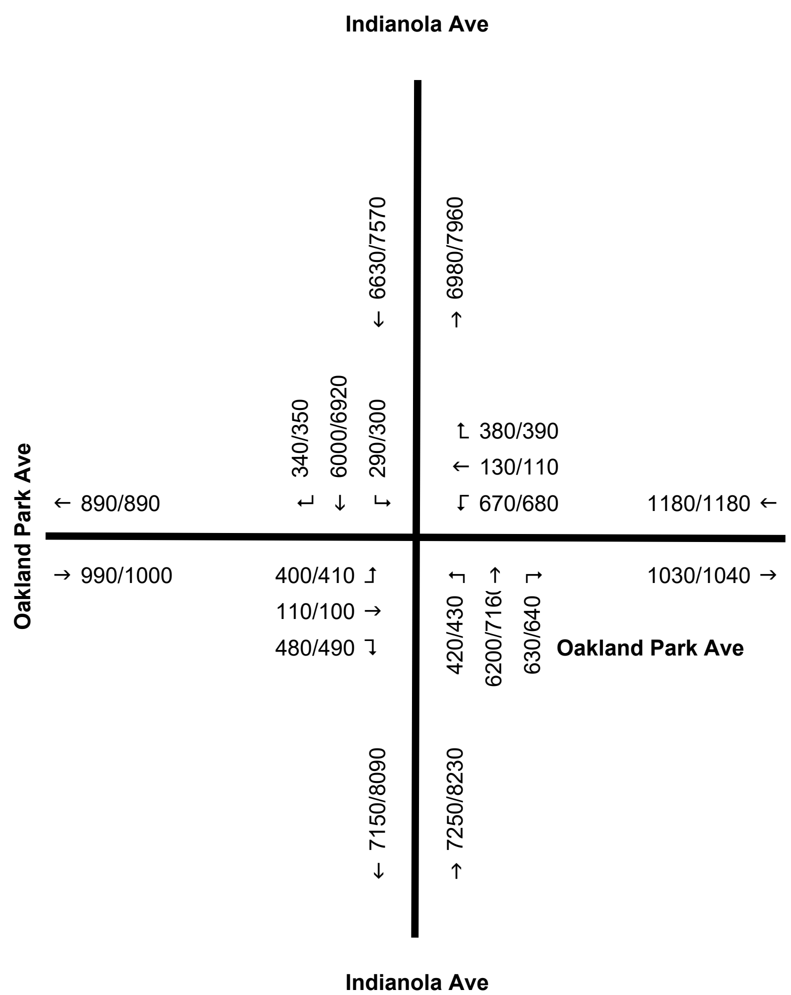
PLATE 1 OF 1

2024/2044 ADT



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OHIO DEPARTMENT OF TRANSPORATION	
FEBRUARY 25, 2015	NOT TO SCALE

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NCHRP255 adjustment process / **Interpolate opening & design year & adjust for more recent count**

	COL 1	COL 2	COL 3	COL 4	COL 4	COL 5	COL 6	COL 7	COL 8	COL 8.5	COL 9	COL 10	COL 10.5	COL 11	COL 12	COL 13	COL 14	COL 15	COL 16	COL 17	COL 18	COL 19	COL 20	COL 21
					near base model		2025		2045						Selected	Selected	most recent	most recent	recent count	2024	2044	growth factors		annual growth
	Road/Link	in Di	ax R	se S	count year	count data	Ab	Ab interpolate	Af-D	SLRATIO	RATIO	DIFF	MRATIO	RAf	Adjustment	Volume	count year	count data	delta	opening year	design yr	opening yr	design year	check
(east leg)	E Weber Rd	0.5	2	Disa	2020	7880	20992	20268	23888	18831	9287	11500	9622	10561	**MRATIO**	**9622**			0	8159	9552	1.035	1.212	0.85%
(north leg)	Indianola Ave	0.5	2	Disa	2020	8960	2046	1899	2636	2078	12437	9697	11671	10684	**DIFF**	**9697**			0	9078	9668	1.013	1.079	0.32%
(west leg)	E Weber Rd	0.5	2	Disa	2020	7260	17303	16688	19764	15580	8598	10336	8868	9602	**MRATIO**	**8868**			0	7517	8804	1.035	1.213	0.86%
(south leg)	Indianola Ave	0.5	2	Disa	2020	9280	3731	3488	4705	3709	12518	10497	11995	11246	**DIFF**	**10497**			0	9475	10448	1.021	1.126	0.51%
Total						**33380**		**42343**																

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	delta		revised volume		growth factors	
Capacity	opening yr	design year	opening yr	design year	opening yr	design year
	-8159	-9552	8159	9552	1.035	1.212
	-9078	-9668	9078	9668	1.013	1.079
	-7517	-8804	7517	8804	1.035	1.213
	-9475	-10448	9475	10448	1.021	1.126
0	**0**	**0**				
	-34229	**-38472**				

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	Year	
Model Base	2025	
Model Opening (opt)		if Yo=Yb then also must = Yc (col4)
Model Forecast	2045	must be > Yb
Project Opening	2024	
Project Design	2044	

General Notes

General rule: if MR<1 then if RATIO <= 1.0 then use R
OR if RATIO >= 2 then use DIFF else use Raf ,
if MR>1 then if RATIO <=0.5 then use MRATIO, OR
if RATIO >=2 then use DIFF, else use Raf(based on MRA
Which you can change if it makes sense,
make both of columns 2-3 very large to force ratios,
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Make sure model opening year (if used)
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EXCEPT…
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set model open year=base year=count year
Place build run in Af-OB
Do not use cols 14-15 in this case

If you have a non-model forecast you
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growth rate, put it in column 8 (Af) then copy
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create a new sheet for it

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be respected as zero by the 255 adjustments.

If you have an existing intersection link that wasn't in the model
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here and on the TM sheets (as Thru movements) and then
the full set of volumes/turns for Af-OB and Af-D
You may want to disable screenlines in this case.

Field Definiations

	COLUMN	VARIABLE	DEFINITION
	1	Road/Link	The name/route number of each facility bisected by the screenline and/or the link (node) numbers from the network.
	2	Min Diff	Minimum Count/Model Ratio for using differences, below this use ratios alone
	3	Max Rat	Maximum Count/Model Ratio for using ratios, above this use differences alone
	3.5	Use SL	Set to "Enable" to allow use of screen line adjustments for this leg if no count available, set to "Disable" to disable giving no adjustment of model result, set to "Force" to force SL adjustment
	4	COUNT year	year of the actual base year traffic count
	5	COUNT	actual base year traffic count
	6	Ab	base year traffic assignment - user to input year:
	7	Ab interpolate	interpolation between base and future year assignment -- used when year of count data differs from base year assignment, will use open-nobuild to base interp if open nobuild exists, otherwise will use design to base interp
	7.1	R	Calculated Ratio **(COUNT/Ab)**
	7.2	D	Calculated Difference **(COUNT-Ab)**
	7.3	MR	Model Ratio **(AfD/Ab)**
	7.4	SLR	Screenline Ratio **(ΣCount/ΣAb)**
*	8	Af	future year traffic assignment - Af-D= (near) design yr model run, Af-ON=optional (near) opening year no build model run, Af-OB=optional (near) opening year build model run
*	8.5	SLRATIO	adjusted future year traffic forecast (ΣCount/ΣAb)*Af
*	9	RATIO	adjusted future year traffic forecast (**COUNT/Ab**) * **Af**
*	10	DIFF	adjusted future year traffic forecast (**COUNT - Ab**) + **Af**
*	10.5	MRATIO	adjusted future year traffic forecast modified "ratio method" to weight towards DIFF method for large model increases: if MR<1 = RATIO else = ((MR-1)*DIFF + RATIO)/MR
*	11	RAf	adjusted future year traffic forecast (AVERAGE(M**RATIO**, **DIFF**))
*	12	lected Adjustme	Selects the type of future year adjustment based on the ratio of actual base year traffic count to interpolated base year traffic assignment *general rule: if MR<1 then if RATIO <= 1.0 then use RATIO, OR if RATIO >= 2 then use DIFF else use Raf , if MR>1 then if RATIO <=0.5 then use MRATIO, OR if RATIO >=2 then use DIFF, else use Raf(based on MRATIO)*
*	13	Selected Volume	The selected adjusted forecast year model volume
	14	most recent cou	year of the most recently available actual count data (should be <Yo, if Yo=Yb generally won't use)
	15	most recent cou	most recently available actual count data for the facility
	16	ecent Count Delt	Forecast adjustment based on difference of more recent count from interpolation resulting from base count and first forecast year
	17	opening year	final refined forecast for the opening year - user to input year
	18	design year	final refined forecast for the design year - user to input year
	19	growth factorop	growth factor to apply to most recent count to obtain opening year (SET to 1.0 if no count given)
	20	growth factorde	growth factor to apply to most recent count to obtain design year (SET to 1.0 if no count given)

* Columns 8-13 repeated for open year build and nobuild (hidden)

Four Interpolation Cases

1. Have base count and open yr model run and interp year<model open yr THUS interpolate btwn base count and adj open yr model run except for open yr<model open yr which uses case 2
2. Have open yr model run and interp yr> open model yr (or interpolating any opening year) THUS interopolate btwn adj open yr and adj design yr model runs
3. (standard) Have base count and NO open yr model run THUS interpolate btwn count and adj design yr model run
4. Have no base count THUS interpolate calculate growth from Unadj base and design yr model runs and apply growth rate to number of years different from model design yr

Screenline Options (see field 3.5 description)
Enable
Disable
Force

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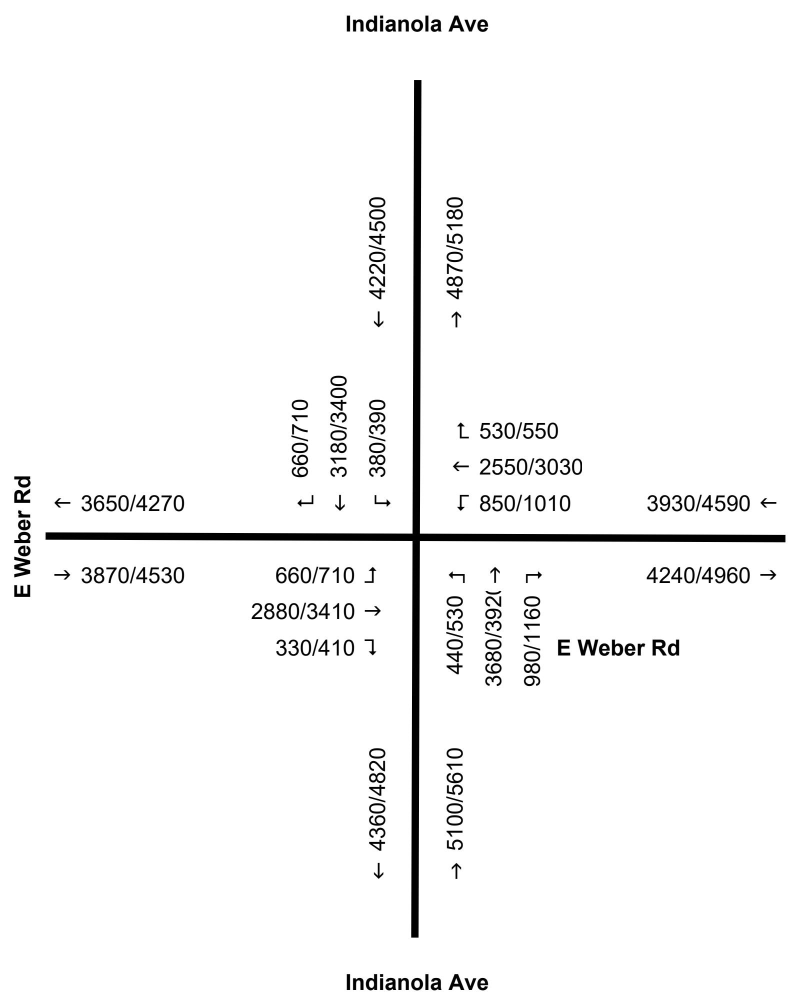
PID93442
PLATE 1 OF 1

2024/2044 ADT



POR-43-10.26	PID93442
2024/2044 ADT, AM DHV, PM DHV	
OHIO DEPARTMENT OF TRANSPORATION	
FEBRUARY 25, 2015	NOT TO SCALE

Michael Baker
INTERNATIONAL

We Make a Difference

Attachment K2:

NCHRP Spreadsheet No Build – AM Peak Period

WARNING: HIGH GROWTH LINKS

USER INPUT
OPTIONAL INPUT
FINAL REFINED FORECAST

NCHRP255 adjustment process — ***Interpolate opening & design year & adjust for more recent count***

	COL 1 Road/Link	COL 2 in Di	COL 3 ax R	COL 4 se S	COL 4 near base model count year	COL 5 count data	COL 6 2025 Ab	COL 7 $Ab^{interpolate}$	COL 8 2045 Af-D	COL 8.5 SLRATIO	COL 9 RATIO	COL 10 DIFF	COL 10.5 MRATIO	COL 11 RAf	COL 12 Selected Adjustment	COL 13 Selected Volume	COL 14 most recent count year	COL 15 most recent count data	COL 16 recent count delta	COL 17 2024 opening year	COL 18 2044 design yr	COL 19 growth factors opening yr	COL 20 growth factors design year	COL 21 annual growth check
(east leg)	Arcadia Ave	0.5	2	Disa	2020	260	544	415	1059	2162	663	904	810	857	**RAf**	**857**			0	356	833	1.369	3.204	6.70%
(north leg)	Indianola Ave	0.5	2	Disa	2020	2167	1035	951	1370	2797	3122	2586	2958	2772	**DIFF**	**2586**			0	2234	2569	1.031	1.186	0.75%
(west leg)	Arcadia Ave	0.5	2	Disa	2020	1249	915	814	1320	2695	2025	1755	1922	1839	**RAf**	**1839**			0	1343	1815	1.075	1.453	1.76%
(south leg)	Indianola Ave	0.5	2	Disa	2020	2308	826	751	1127	2301	3464	2684	3204	2944	**DIFF**	**2684**			0	2368	2669	1.026	1.156	0.64%
Total						**5984**		**2931**																

There are hidden rows if you want more roads in your intersection/screenline

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Optional Capacity Adjuster
Use this for screenlines, not intersection approaches

Capacity	delta opening yr	delta design year	revised volume opening yr	revised volume design year	growth factors opening yr	growth factors design year
	-356	-833	356	833	1.369	3.204
	-2234	-2569	2234	2569	1.031	1.186
	-1343	-1815	1343	1815	1.075	1.453
	-2368	-2669	2368	2669	1.026	1.156
0	**0**	**0**				
	-6301	**-7886**				

	Year	
Model Base	2025	
Model Opening (opt)		if Yo=Yb then also must = Yc (col4)
Model Forecast	2045	must be > Yb
Project Opening	2024	
Project Design	2044	

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Make sure model opening year (if used)
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Place build run in Af-OB
Do not use cols 14-15 in this case

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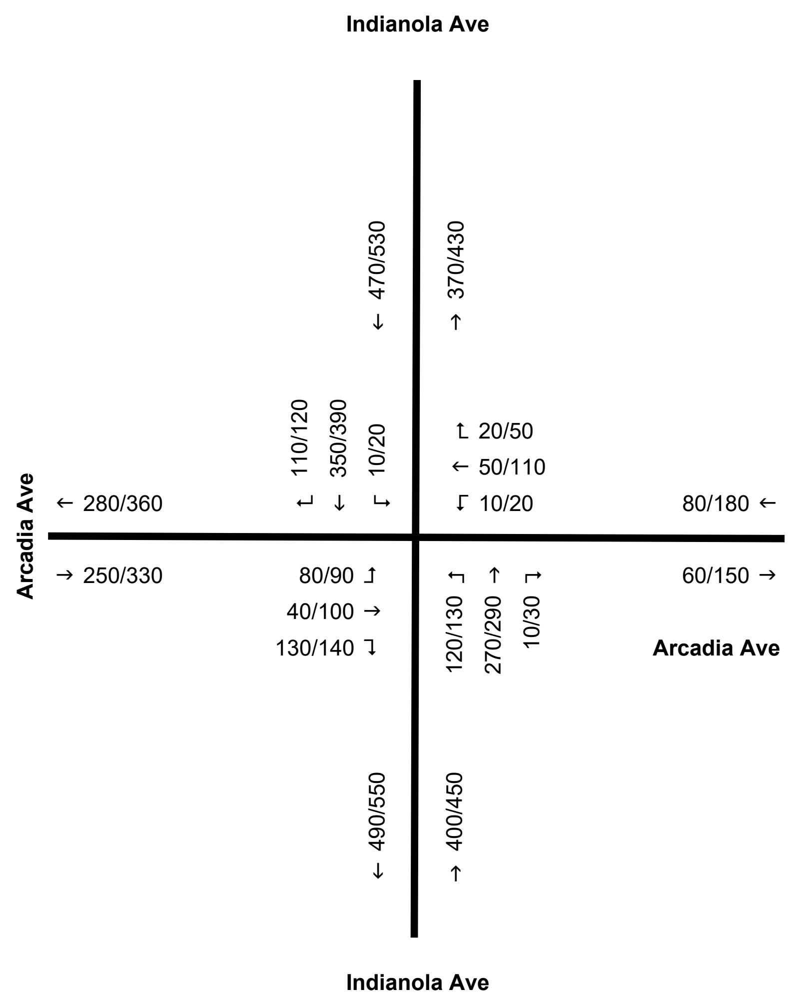
Screenline Options (see field 3.5 description)
Enable
Disable
Force

POR-43-10.26
PID93442
PLATE 1 OF 1

2024/2044 A.M. DHV



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POR-43-10.26	PID93442
2024/2044 ADT, AM DHV, PM DHV	
OHIO DEPARTMENT OF TRANSPORATION	
FEBRUARY 25, 2015	NOT TO SCALE

USER INPUT
OPTIONAL INPUT
FINAL REFINED FORECAST

NCHRP255 adjustment process / **Interpolate opening & design year & adjust for more recent count**

	COL 1 Road/Link	COL 2 in Di	COL 3 ax R	COL 4 se S	COL 4 near base model count year	COL 5 count data	COL 6 2025 Ab	COL 7 Ab^interpolate	COL 8 2045 Af-D	COL 8.5 SLRATIO	COL 9 RATIO	COL 10 DIFF	COL 10.5 MRATIO	COL 11 RAf	COL 12 Selected Adjustment	COL 13 Selected Volume
(east leg)	E North Broadway	0.5	2	Disa	2020	5235	5042	4846	5825	8530	6293	6214	6280	6247	RAf	6247
(north leg)	Indianola Ave	0.5	2	Disa	2020	3804	1511	1455	1734	2539	4533	4083	4461	4272	DIFF	4083
(west leg)	E North Broadway	0.5	2	Disa	2020	3856	3718	3567	4321	6328	4671	4610	4660	4635	RAf	4635
(south leg)	Indianola Ave	0.5	2	Disa	2020	2391	634	570	891	1305	3738	2712	3368	3040	DIFF	2712
Total						15286		10438								

	COL 14 most recent count year	COL 15 most recent count data	COL 16 recent count delta	COL 17 2024 opening year	COL 18 2044 design yr	COL 19 growth factors opening yr	COL 20 growth factors design year	COL 21 annual growth check
(east leg)			0	5397	6207	1.031	1.186	0.75%
(north leg)			0	3849	4072	1.012	1.071	0.29%
(west leg)			0	3981	4604	1.032	1.194	0.78%
(south leg)			0	2442	2699	1.021	1.129	0.53%

Optional Capacity Adjuster
Use this for screenlines, not intersection approaches

Capacity	delta opening yr	delta design year	revised volume opening yr	revised volume design year	growth factors opening yr	growth factors design year
	-5397	-6207	5397	6207	1.031	1.186
	-3849	-4072	3849	4072	1.012	1.071
	-3981	-4604	3981	4604	1.032	1.194
	-2442	-2699	2442	2699	1.021	1.129
0	0	0				
	-15669	-17582				

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	Year
Model Base	2025
Model Opening (opt)	
Model Forecast	2045
Project Opening	2024
Project Design	2044

if Yo=Yb then also must = Yc (col4)
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General Notes

General rule: if MR<1 then if ***RATIO*** *<= 1.0 then use R*
OR if RATIO >= 2 then use DIFF else use Raf ,
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is greater existing and less than forecast
EXCEPT…
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Screenline Options (see field 3.5 description)
Enable
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Force

POR-43-10.26
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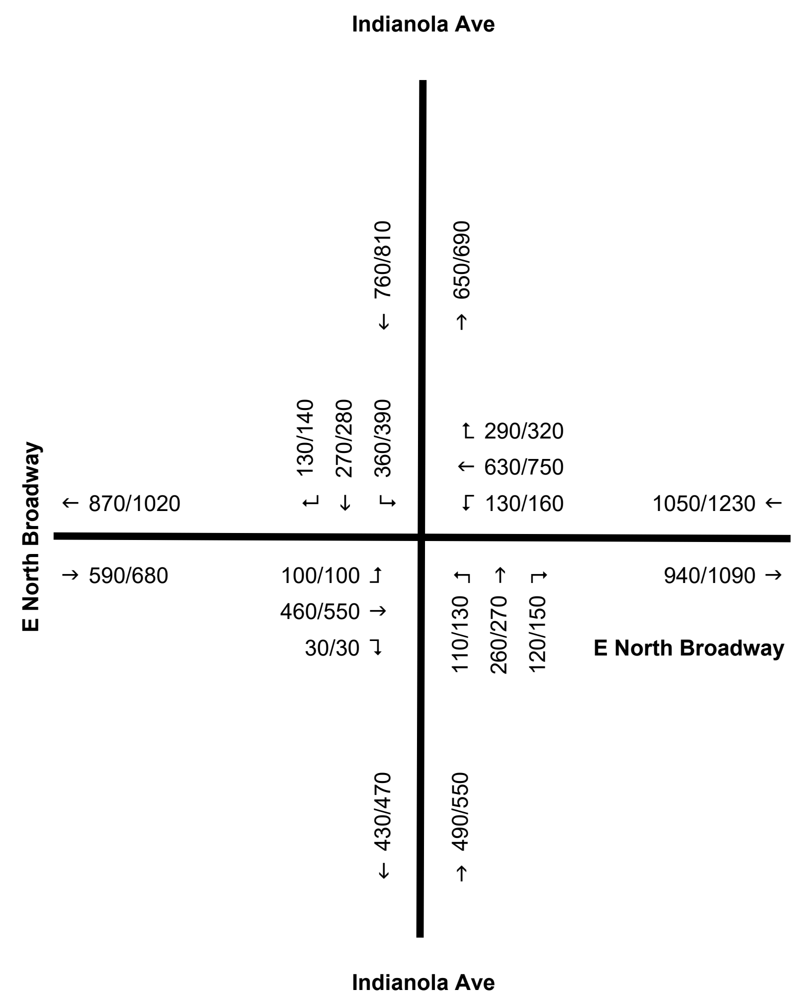
PLATE 1 OF 1

2024/2044 A.M. DHV



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WARNING: HIGH GROWTH LINKS

USER INPUT
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FINAL REFINED FORECAST

NCHRP255 adjustment process — *Interpolate opening & design year & adjust for more recent count*

	COL 1	COL 2	COL 3	COL 4	COL 4	COL 5	COL 6	COL 7	COL 8	COL 8.5	COL 9	COL 10	COL 10.5	COL 11	COL 12	COL 13	COL 14	COL 15	COL 16	COL 17	COL 18	COL 19	COL 20	COL 21
					near base model		2025		2045						Selected	Selected	most recent	most recent	recent count	2024	2044	growth factors		annual growth
	Road/Link	in Di	ax R	se S	count year	count data	Ab	Ab interpolate	Af-D	SLRATIO	RATIO	DIFF	MRATIO	RAf	Adjustment	Volume	count year	count data	delta	opening year	design yr	opening yr	design year	check
(east leg)	E Hudson St	0.5	2	Disa	2020	4796	4197	4246	4000	5046	4518	4550	4518	4534	RAf	**4534**			0	4754	4544	0.991	0.948	-0.22%
(north leg)	Summit St	0.5	2	Disa	2020	121	78	37	242	305	791	326	397	362	DIFF	**326**			0	154	318	1.273	2.628	5.32%
(west leg)	E Hudson St	0.5	2	Disa	2020	4771	3490	3462	3603	4545	4965	4912	4963	4938	RAf	**4938**			0	4798	4931	1.006	1.034	0.14%
(south leg)	Summit St	0.5	2	Disa	2020	1700	1322	1282	1484	1872	1968	1902	1959	1931	RAf	**1931**			0	1737	1922	1.022	1.131	0.53%
Total						**11388**		**9027**																

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Optional Capacity Adjuster
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Capacity	delta opening yr	delta design year	revised volume opening yr	revised volume design year	growth factors opening yr	growth factors design year
	-4754	-4544	4754	4544	0.991	0.948
	-154	-318	154	318	1.273	2.628
	-4798	-4931	4798	4931	1.006	1.034
	-1737	-1922	1737	1922	1.022	1.131
0	**0**	**0**				
	-11443	**-11715**				

	Year	
Model Base	2025	
Model Opening (opt)		if Yo=Yb then also must = Yc (col4)
Model Forecast	2045	must be > Yb
Project Opening	2024	
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3	Max Rat	Maximum Count/Model Ratio for using ratios, above this use differences alone
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5	COUNT	actual base year traffic count
6	Ab	base year traffic assignment - user to input year:
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* 11	RAf	adjusted future year traffic forecast (AVERAGE(M**RATIO**, **DIFF**))
* 12	lected Adjustme	Selects the type of future year adjustment based on the ratio of actual base year traffic count to interpolated base year traffic assignment *general rule: if MR<1 then if RATIO <= 1.0 then use RATIO, OR if RATIO >= 2 then use DIFF else use Raf , if MR>1 then if RATIO <=0.5 then use MRATIO, OR if RATIO >=2 then use DIFF, else use Raf(based on MRATIO)*
* 13	Selected Volume	The selected adjusted forecast year model volume
14	most recent cou	year of the most recently available actual count data (should be <Yo, if Yo=Yb generally won't use)
15	most recent cou	most recently available actual count data for the facility
16	ecent Count Del	Forecast adjustment based on difference of more recent count from interpolation resulting from base count and first forecast year
17	opening year	final refined forecast for the opening year - user to input year
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19	growth factorop	growth factor to apply to most recent count to obtain opening year (SET to 1.0 if no count given)
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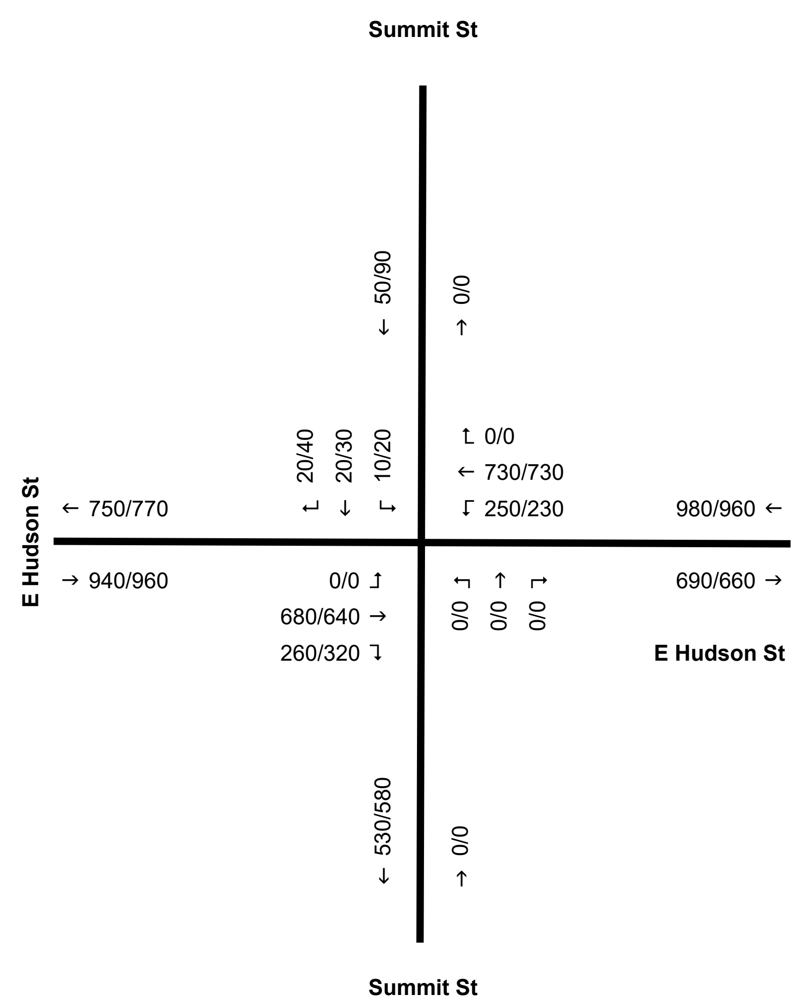
Screenline Options (see field 3.5 description)
Enable
Disable
Force

POR-43-10.26
PID93442
PLATE 1 OF 1

2024/2044 A.M. DHV



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POR-43-10.26	PID93442
2024/2044 ADT, AM DHV, PM DHV	
OHIO DEPARTMENT OF TRANSPORATION	
FEBRUARY 25, 2015	NOT TO SCALE

USER INPUT

OPTIONAL INPUT

FINAL REFINED FORECAST

NCHRP255 adjustment process / **Interpolate opening & design year & adjust for more recent count**

	COL 1	COL 2	COL 3	COL 4	COL 4	COL 5	COL 6	COL 7	COL 8	COL 8.5	COL 9	COL 10	COL 10.5	COL 11	COL 12	COL 13	COL 14	COL 15	COL 16	COL 17	COL 18	COL 19	COL 20	COL 21
					near base model		2025		2045						Selected	Selected	most recent	most recent	recent count	2024	2044	growth factors		annual growth
	Road/Link	in Di	ax R	se S	count year	count data	Ab	Ab interpolate	Af-D	SLRATIO	RATIO	DIFF	MRATIO	RAf	Adjustment	Volume	count year	count data	delta	opening year	design yr	opening yr	design year	check
(east leg)	Hudson St	0.5	2	Disa	2020	4627	3490	3462	3603	4939	4815	4768	4813	4791	**RAf**	**4791**			0	4653	4784	1.006	1.034	0.14%
(north leg)	Indianola Ave	0.5	2	Disa	2020	2378	826	751	1127	1545	3569	2754	3297	3026	**DIFF**	**2754**			0	2438	2739	1.025	1.152	0.62%
(west leg)	Hudson St	0.5	2	Disa	2020	3020	2672	2667	2691	3689	3047	3044	3047	3046	**RAf**	**3046**			0	3024	3045	1.001	1.008	0.03%
(south leg)	Indianola Ave	0.5	2	Disa	2020	983	1204	1150	1421	1948	1215	1254	1222	1238	**RAf**	**1238**			0	1024	1228	1.042	1.249	1.00%
Total						**11008**		**8030**																

Optional Capacity Adjuster

Use this for screenlines, not intersection approaches

	delta		revised volume		growth factors	
Capacity	opening yr	design year	opening yr	design year	opening yr	design year
	-4653	-4784	4653	4784	1.006	1.034
	-2438	-2739	2438	2739	1.025	1.152
	-3024	-3045	3024	3045	1.001	1.008
	-1024	-1228	1024	1228	1.042	1.249
0	**0**	**0**				
	-11139	**-11796**				

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	Year	
Model Base	2025	
Model Opening (opt)		if Yo=Yb then also must = Yc (col4)
Model Forecast	2045	must be > Yb
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Project Design	2044	

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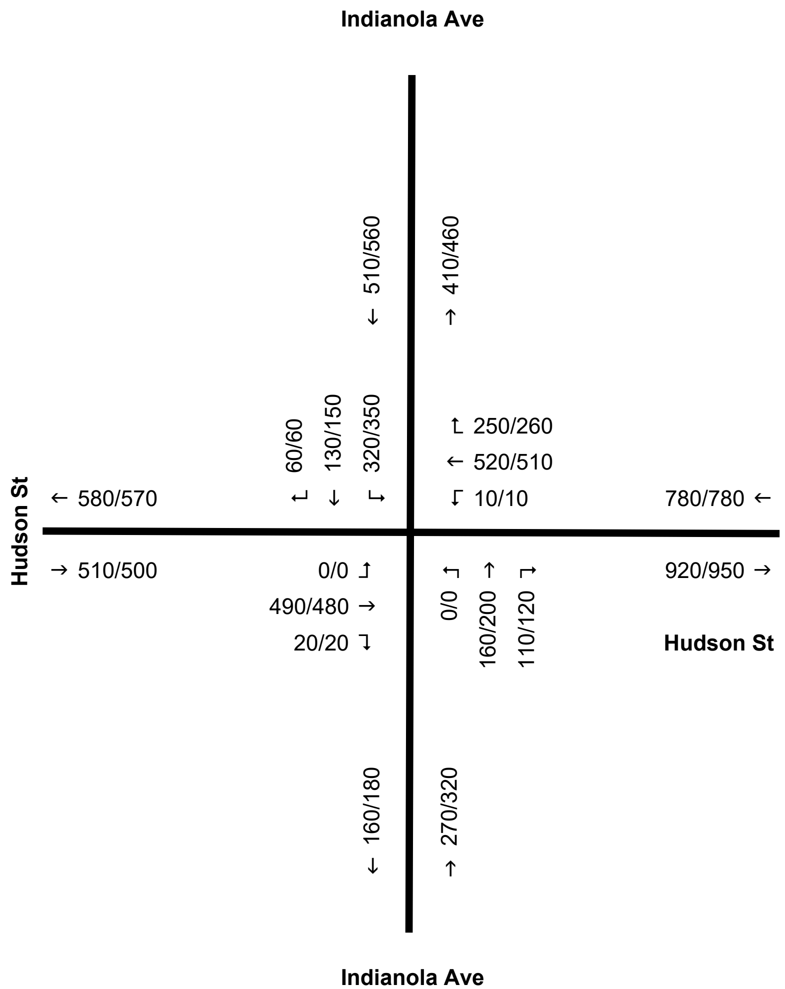
POR-43-10.26
PID93442
PLATE 1 OF 1

2024/2044 A.M. DHV



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2024/2044 ADT, AM DHV, PM DHV	
OHIO DEPARTMENT OF TRANSPORATION	
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USER INPUT
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NCHRP255 adjustment process — ***Interpolate opening & design year & adjust for more recent count***

	COL 1 Road/Link	COL 2 in Di	COL 3 ax	COL 4 Rse S	COL 4 near base model count year	COL 5 count data	COL 6 2025 Ab	COL 7 Ab interpolate	COL 8 2045 Af-D	COL 8.5 SLRATIO	COL 9 RATIO	COL 10 DIFF	COL 10.5 MRATIO	COL 11 RAf	COL 12 Selected Adjustment	COL 13 Selected Volume	COL 14 most recent count year	COL 15 most recent count data	COL 16 recent count delta	COL 17 2024 opening year	COL 18 2044 design yr	COL 19 growth factors opening yr	COL 20 growth factors design year	COL 21 annual growth check
(east leg)	Oakland Park Ave	0.5	2	Disa	2020	548	548	548	548	1127	548	548	548	548	**RATIO**	**548**			0	548	548	1.000	1.000	0.00%
(north leg)	Indianola Ave	0.5	2	Disa	2020	3420	1511	1455	1734	3566	4076	3699	4015	3857	**DIFF**	**3699**			0	3465	3688	1.013	1.078	0.32%
(west leg)	Oakland Park Ave	0.5	2	Disa	2020	538	538	538	538	1106	538	538	538	538	**RATIO**	**538**			0	538	538	1.000	1.000	0.00%
(south leg)	Indianola Ave	0.5	2	Disa	2020	3712	1511	1455	1734	3566	4424	3991	4354	4173	**DIFF**	**3991**			0	3757	3980	1.012	1.072	0.30%
Total						**8218**		**3996**																

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Optional Capacity Adjuster
Use this for screenlines, not intersection approaches

Capacity	delta opening yr	delta design year	revised volume opening yr	revised volume design year	growth factors opening yr	growth factors design year
	-548	-548	548	548	1.000	1.000
	-3465	-3688	3465	3688	1.013	1.078
	-538	-538	538	538	1.000	1.000
	-3757	-3980	3757	3980	1.012	1.072
0	**0**	**0**				
	-8308	**-8754**				

	Year	
Model Base	2025	
Model Opening (opt)		if Yo=Yb then also must = Yc (col4)
Model Forecast	2045	must be > Yb
Project Opening	2024	
Project Design	2044	

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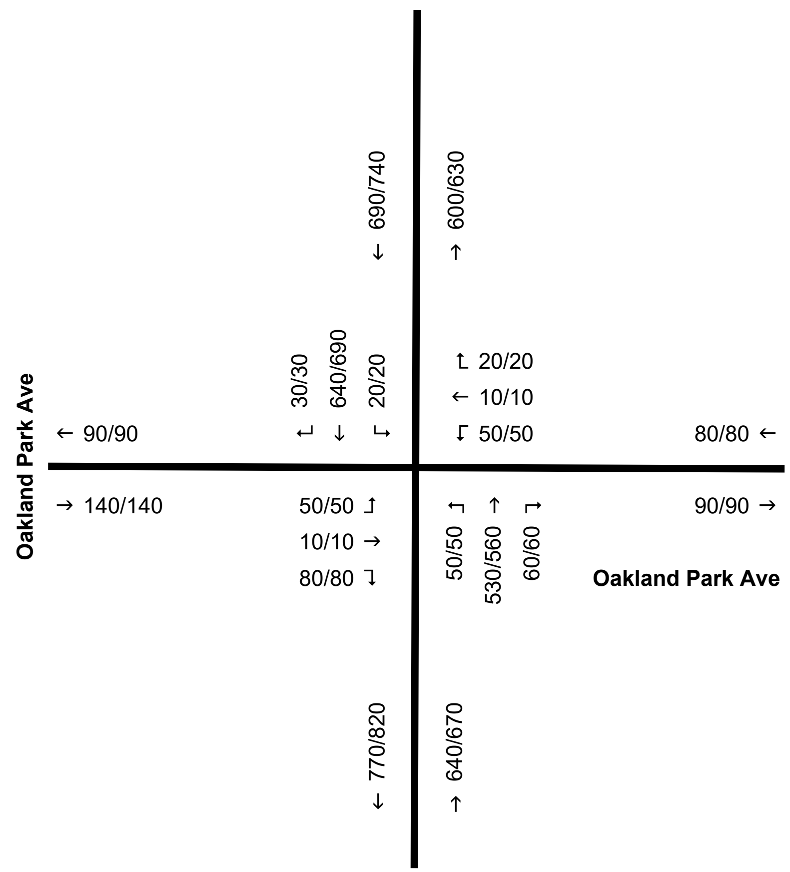
2024/2044 A.M. DHV



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NCHRP255 adjustment process / **Interpolate opening & design year & adjust for more recent count**

	COL 1	COL 2	COL 3	COL 4	COL 4	COL 5	COL 6	COL 7	COL 8
					near base model		2025		2045
	Road/Link	in Di	ax R	se S	count year	count data	Ab	Ab interpolate	Af-D
(east leg)	E Weber Rd	0.5	2	Disa	2020	1968	4184	4048	4727
(north leg)	Indianola Ave	0.5	2	Disa	2020	2063	415	386	531
(west leg)	E Weber Rd	0.5	2	Disa	2020	1803	3512	3381	4037
(south leg)	Indianola Ave	0.5	2	Disa	2020	2148	796	730	1060
Total						**7982**		**8545**	

	COL 8.5	COL 9	COL 10	COL 10.5	COL 11	COL 12	COL 13	COL 14	COL 15	COL 16	COL 17	COL 18	COL 19	COL 20	COL 21
						Selected	Selected	most recent	most recent	recent count	2024	2044	growth factors		annual growth
	SLRATIO	RATIO	DIFF	MRATIO	RAf	Adjustment	Volume	count year	count data	delta	opening year	design yr	opening yr	design year	check
(east leg)	4416	2298	2647	2348	2498	**MRATIO**	**2348**			0	2029	2333	1.031	1.186	0.75%
(north leg)	496	2838	2208	2666	2437	**DIFF**	**2208**			0	2086	2202	1.011	1.067	0.28%
(west leg)	3771	2153	2459	2203	2331	**RAf**	**2331**			0	1887	2310	1.047	1.281	1.12%
(south leg)	990	3119	2478	2919	2699	**DIFF**	**2478**			0	2201	2465	1.025	1.148	0.60%

Optional Capacity Adjuster
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		delta		revised volume		growth factors	
	Capacity	opening yr	design year	opening yr	design year	opening yr	design year
(east leg)		-2029	-2333	2029	2333	1.031	1.186
(north leg)		-2086	-2202	2086	2202	1.011	1.067
(west leg)		-1887	-2310	1887	2310	1.047	1.281
(south leg)		-2201	-2465	2201	2465	1.025	1.148
	0	**0**	**0**				
		-8203	**-9310**				

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to count year (Type toggle does this for you on TM sheet)

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create a new sheet for it

You can omit open year model, have just an
open year no build or both no build and
build, but don't have a build without
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If you have a new link it will get a growth rate of 1.0
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be respected as zero by the 255 adjustments.

If you have an existing intersection link that wasn't in the model
enter its counts in the appropriate places here and on the
TM sheets. You will need to over-ride columns 19-20
of this sheet with an exogenously supplied growth rate.

If you have a new intersection on an existing road you can
enter the main line counts/model volumes (Ab and Af-ON)
here and on the TM sheets (as Thru movements) and then
the full set of volumes/turns for Af-OB and Af-D
You may want to disable screenlines in this case.

Field Definiations

	COLUMN	VARIABLE	DEFINITION
	1	Road/Link	The name/route number of each facility bisected by the screenline and/or the link (node) numbers from the network.
	2	Min Diff	Minimum Count/Model Ratio for using differences, below this use ratios alone
	3	Max Rat	Maximum Count/Model Ratio for using ratios, above this use differences alone
	3.5	Use SL	Set to "Enable" to allow use of screen line adjustments for this leg if no count available, set to "Disable" to disable giving no adjustment of model result, set to "Force" to force SL adjustment
	4	COUNT year	year of the actual base year traffic count
	5	COUNT	actual base year traffic count
	6	Ab	base year traffic assignment - user to input year:
	7	Ab interpolate	interpolation between base and future year assignment -- used when year of count data differs from base year assignment, will use open-nobuild to base interp if open nobuild exists, otherwise will use design to base interp
	7.1	R	Calculated Ratio **(COUNT/Ab)**
	7.2	D	Calculated Difference **(COUNT-Ab)**
	7.3	MR	Model Ratio **(AfD/Ab)**
	7.4	SLR	Screenline Ratio **(ΣCount/ΣAb)**
*	8	Af	future year traffic assignment - Af-D= (near) design yr model run, Af-ON=optional (near) opening year no build model run, Af-OB=optional (near) opening year build model run
*	8.5	SLRATIO	adjusted future year traffic forecast (ΣCount/ΣAb)*Af
*	9	RATIO	adjusted future year traffic forecast **(COUNT/Ab) * Af**
*	10	DIFF	adjusted future year traffic forecast **(COUNT - Ab) + Af**
*	10.5	MRATIO	adjusted future year traffic forecast modified "ratio method" to weight towards DIFF method for large model increases: if MR<1 = RATIO else = ((MR-1)*DIFF + RATIO)/MR
*	11	RAf	adjusted future year traffic forecast (AVERAGE(**MRATIO**, **DIFF**))
*	12	lected Adjustme	Selects the type of future year adjustment based on the ratio of actual base year traffic count to interpolated base year traffic assignment *general rule: if MR<1 then if RATIO <= 1.0 then use RATIO, OR if RATIO >= 2 then use DIFF else use Raf , if MR>1 then if RATIO <=0.5 then use MRATIO, OR if RATIO >=2 then use DIFF, else use Raf(based on MRATIO)*
*	13	Selected Volume	The selected adjusted forecast year model volume
	14	most recent cou	year of the most recently available actual count data (should be <Yo, if Yo=Yb generally won't use)
	15	most recent cou	most recently available actual count data for the facility
	16	ecent Count Del	Forecast adjustment based on difference of more recent count from interpolation resulting from base count and first forecast year
	17	opening year	final refined forecast for the opening year - user to input year
	18	design year	final refined forecast for the design year - user to input year
	19	growth factorop	growth factor to apply to most recent count to obtain opening year (SET to 1.0 if no count given)
	20	growth factorde	growth factor to apply to most recent count to obtain design year (SET to 1.0 if no count given)

* Columns 8-13 repeated for open year build and nobuild (hidden)

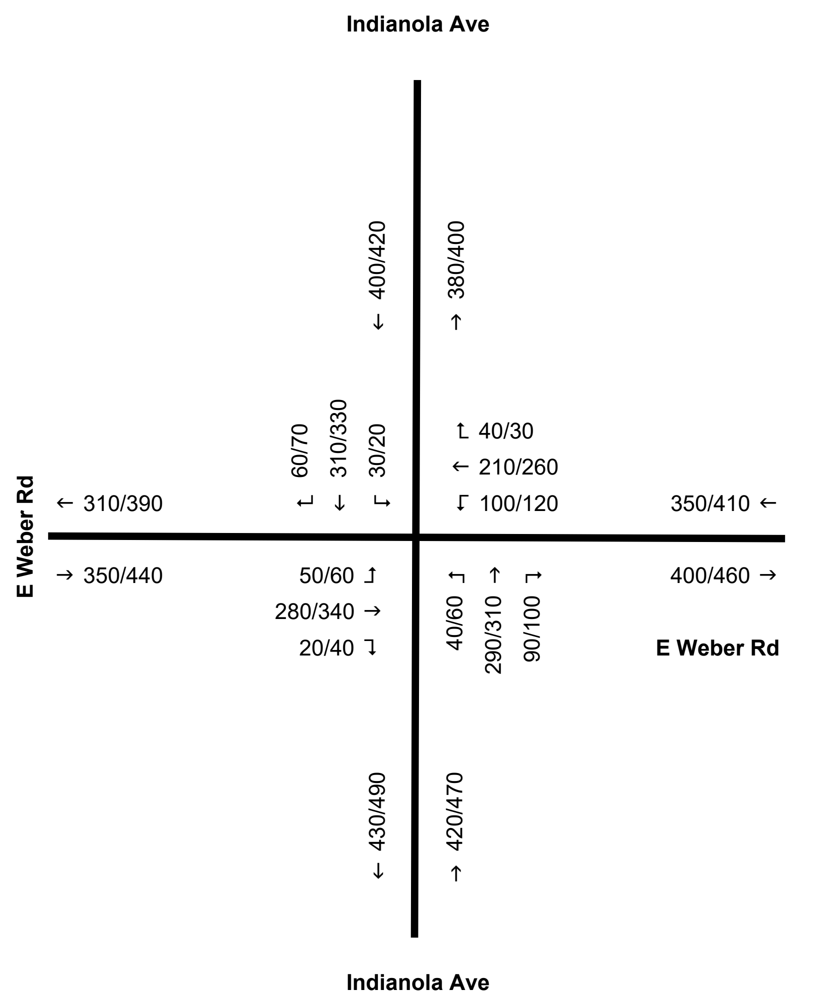
Four Interpolation Cases

1. Have base count and open yr model run and interp year<model open yr THUS interpolate btwn base count and adj open yr model run except for open yr<model open yr which uses case 2
2. Have open yr model run and interp yr> open model yr (or interpolating any opening year) THUS interopolate btwn adj open yr and adj design yr model runs
3. (standard) Have base count and NO open yr model run THUS interpolate btwn count and adj design yr model run
4. Have no base count THUS interpolate calculate growth from Unadj base and design yr model runs and apply growth rate to number of years different from model design yr

Screenline Options (see field 3.5 description)
Enable
Disable
Force

POR-43-10.26
PID93442
PLATE 1 OF 1

2024/2044 A.M. DHV



POR-43-10.26	PID93442
2024/2044 ADT, AM DHV, PM DHV	
OHIO DEPARTMENT OF TRANSPORATION	
FEBRUARY 25, 2015	NOT TO SCALE

We Make a Difference

Attachment K3:

NCHRP Spreadsheet No Build – PM Peak Period

USER INPUT
OPTIONAL INPUT
FINAL REFINED FORECAST

NCHRP255 adjustment process | ***Interpolate opening & design year & adjust for more recent count***

	COL 1	COL 2	COL 3	COL 4	COL 4	COL 5	COL 6	COL 7	COL 8	COL 8.5	COL 9	COL 10	COL 10.5	COL 11	COL 12	COL 13	COL 14	COL 15	COL 16	COL 17	COL 18	COL 19	COL 20	COL 21
					near base model		2025		2045						Selected	Selected	most recent	most recent	recent count	2024	2044	growth factors		annual growth
	Road/Link	in Di	ax R	se S	count year	count data	Ab	Ab interpolate	Af-D	SLRATIO	RATIO	DIFF	MRATIO	RAf	Adjustment	Volume	count year	count data	delta	opening year	design yr	opening yr	design year	check
(east leg)	Arcadia Ave	0.5	2	Disa	2020	398	923	874	1118	2591	509	642	538	590	**MRATIO**	**538**			0	420	532	1.055	1.337	1.33%
(north leg)	Indianola Ave	0.5	2	Disa	2020	3672	1307	1185	1796	4163	5565	4283	5129	4706	**DIFF**	**4283**			0	3770	4259	1.027	1.160	0.65%
(west leg)	Arcadia Ave	0.5	2	Disa	2020	2103	1456	1421	1596	3699	2362	2278	2353	2316	**RAf**	**2316**			0	2137	2307	1.016	1.097	0.40%
(south leg)	Indianola Ave	0.5	2	Disa	2020	3893	1048	863	1789	4146	8070	4819	6387	5603	**DIFF**	**4819**			0	4041	4782	1.038	1.228	0.92%
Total						**10066**		**4343**																

There are hidden rows if you want more roads in your intersection/screenline

There are hidden columns for opening year model results if you have them

Optional Capacity Adjuster
Use this for screenlines, not intersection approaches

	delta		revised volume		growth factors	
Capacity	**opening yr**	**design yea**	**opening yr**	**design yea**	**opening yr**	**design year**
	-420	-532	420	532	1.055	1.337
	-3770	-4259	3770	4259	1.027	1.160
	-2137	-2307	2137	2307	1.016	1.097
	-4041	-4782	4041	4782	1.038	1.228
0	**0**	**0**				
	-10368	**-11880**				

	Year	
Model Base	2025	
Model Opening (opt)		if Yo=Yb then also must = Yc (col4)
Model Forecast	2045	must be > Yb
Project Opening	2024	
Project Design	2044	

General Notes

General rule: if MR<1 then if ***RATIO*** *<= 1.0 then use R*
OR if RATIO >= 2 then use DIFF else use Raf ,
if MR>1 then if RATIO <=0.5 then use MRATIO, OR
if RATIO >=2 then use DIFF, else use Raf(based on MRA
Which you can change if it makes sense,
make both of columns 2-3 very large to force ratios,
make them 0 to force differences

Make sure model opening year (if used)
is greater existing and less than forecast
EXCEPT…
If you want to use a base year build run
to establish trends, set Af-ON=Ab
set model open year=base year=count year
Place build run in Af-OB
Do not use cols 14-15 in this case

If you have a non-model forecast you
want to enter to interpolate and calculate
growth rate, put it in column 8 (Af) then copy
column 5 to column 6 and set model base
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* 13	Selected Volume	The selected adjusted forecast year model volume
14	most recent cou	year of the most recently available actual count data (should be <Yo, if Yo=Yb generally won't use)
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17	opening year	final refined forecast for the opening year - user to input year
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19	growth factorop	growth factor to apply to most recent count to obtain opening year (SET to 1.0 if no count given)
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* Columns 8-13 repeated for open year build and nobuild (hidden)

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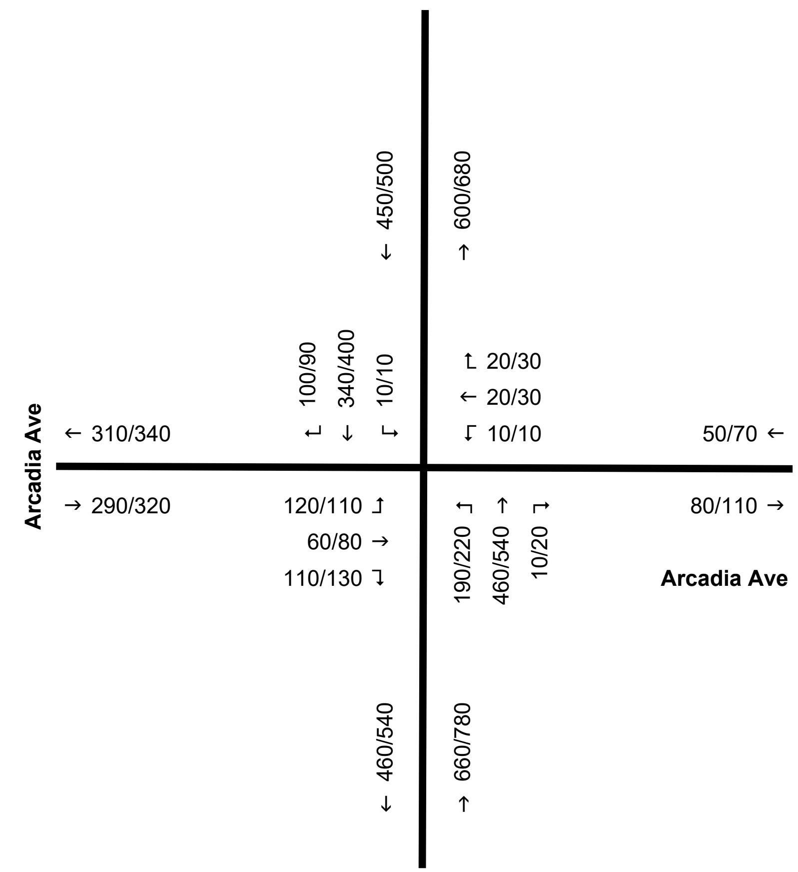
Screenline Options (see field 3.5 description)
Enable
Disable
Force

POR-43-10.26
PID93442
PLATE 1 OF 1

2024/2044 P.M. DHV



POR-43-10.26	PID93442
2024/2044 ADT, AM DHV, PM DHV	
OHIO DEPARTMENT OF TRANSPORATION	
FEBRUARY 25, 2015	NOT TO SCALE

USER INPUT
OPTIONAL INPUT
FINAL REFINED FORECAST

NCHRP255 adjustment process — **Interpolate opening & design year & adjust for more recent count**

	COL 1 Road/Link	COL 2 in Di	COL 3 ax R	COL 4 se S	COL 4 near base model count year	COL 5 count data	COL 6 2025 Ab	COL 7 $Ab^{interpolate}$	COL 8 2045 Af-D	COL 8.5 SLRATIO	COL 9 RATIO	COL 10 DIFF	COL 10.5 MRATIO	COL 11 RAf	COL 12 Selected Adjustment	COL 13 Selected Volume
(east leg)	E North Broadway	0.5	2	Disa	2020	7022	7511	7243	8584	12456	8322	8363	8328	8346	RAf	8346
(north leg)	Indianola Ave	0.5	2	Disa	2020	5744	1688	1547	2252	3268	8362	6449	7763	7106	DIFF	6449
(west leg)	E North Broadway	0.5	2	Disa	2020	5572	6032	5829	6846	9934	6544	6589	6551	6570	RAf	6570
(south leg)	Indianola Ave	0.5	2	Disa	2020	3994	824	771	1037	1505	5372	4260	5087	4674	DIFF	4260
Total						22332		15390								

	COL 13 Selected Volume	COL 14 most recent count year	COL 15 most recent count data	COL 16 recent count delta	COL 17 2024 opening year	COL 18 2044 design yr	COL 19 growth factors opening yr	COL 20 growth factors design year	COL 21 annual growth check
(east leg)	8346			0	7234	8293	1.030	1.181	0.73%
(north leg)	6449			0	5857	6421	1.020	1.118	0.48%
(west leg)	6570			0	5732	6530	1.029	1.172	0.70%
(south leg)	4260			0	4037	4249	1.011	1.064	0.26%

Optional Capacity Adjuster
Use this for screenlines, not intersection approaches

	Capacity	delta opening yr	delta design year	revised volume opening yr	revised volume design year	growth factors opening yr	growth factors design year
(east leg)		-7234	-8293	7234	8293	1.030	1.181
(north leg)		-5857	-6421	5857	6421	1.020	1.118
(west leg)		-5732	-6530	5732	6530	1.029	1.172
(south leg)		-4037	-4249	4037	4249	1.011	1.064
	0	0	0				
		-22860	-25493				

There are hidden rows if you want more roads in your intersection/screenline

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	Year	
Model Base	2025	
Model Opening (opt)		if Yo=Yb then also must = Yc (col4)
Model Forecast	2045	must be > Yb
Project Opening	2024	
Project Design	2044	

General Notes

*General rule: if MR<1 then if **RATIO** <= 1.0 then use R*
OR if RATIO >= 2 then use DIFF else use Raf ,
if MR>1 then if RATIO <=0.5 then use MRATIO, OR
if RATIO >=2 then use DIFF, else use Raf(based on MRA
Which you can change if it makes sense,
make both of columns 2-3 very large to force ratios,
make them 0 to force differences

Make sure model opening year (if used)
is greater existing and less than forecast
EXCEPT…
If you want to use a base year build run
to establish trends, set Af-ON=Ab
set model open year=base year=count year
Place build run in Af-OB
Do not use cols 14-15 in this case

If you have a non-model forecast you
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Enable
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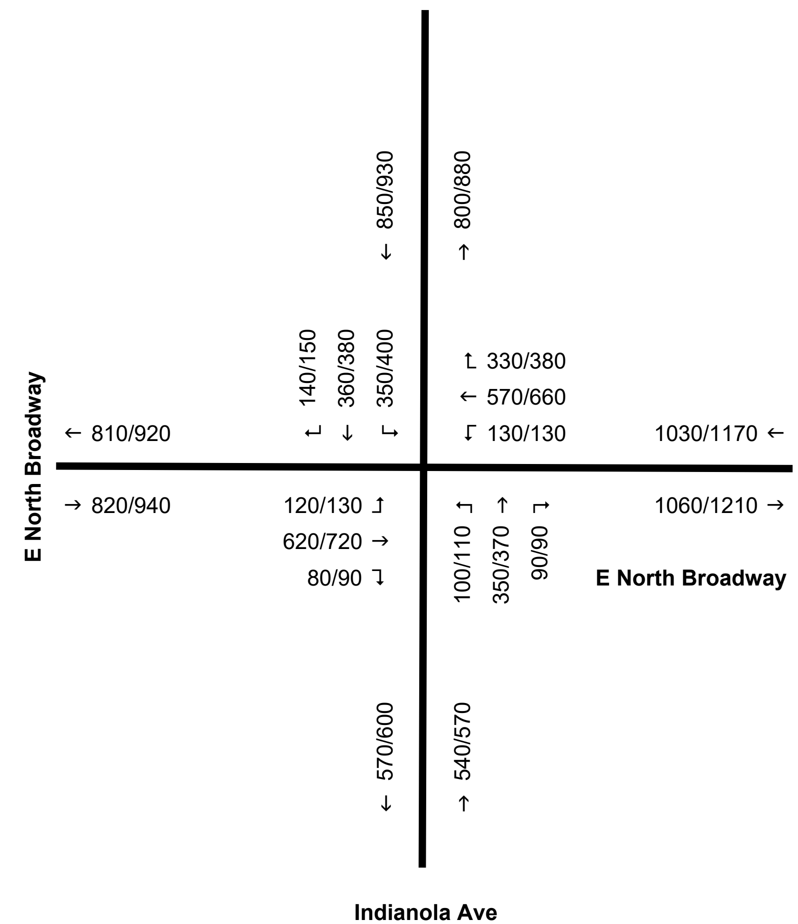
Force

POR-43-10.26
PID93442
PLATE 1 OF 1

2024/2044 P.M. DHV



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OHIO DEPARTMENT OF TRANSPORATION	
FEBRUARY 25, 2015	NOT TO SCALE

WARNING: HIGH GROWTH LINKS

USER INPUT
OPTIONAL INPUT
FINAL REFINED FORECAST

NCHRP255 adjustment process / *Interpolate opening & design year & adjust for more recent count*

	COL 1 Road/Link	COL 2 in Di	COL 3 ax R	COL 4 se S	COL 4 near base model count year	COL 5 count data	COL 6 2025 Ab	COL 7 Ab interpolate	COL 8 2045 Af-D	COL 8.5 SLRATIO	COL 9 RATIO	COL 10 DIFF	COL 10.5 MRATIO	COL 11 RAf	COL 12 Selected Adjustment	COL 13 Selected Volume	COL 14 most recent count year	COL 15 most recent count data	COL 16 recent count delta	COL 17 2024 opening year	COL 18 2044 design yr	COL 19 growth factors opening yr	COL 20 growth factors design year	COL 21 annual growth check
(east leg)	E Hudson St	0.5	2	Disa	2020	8039	5824	5769	6043	9301	8421	8313	8416	8365	RAf	**8365**			0	8091	8352	1.007	1.039	0.16%
(north leg)	Summit St	0.5	2	Disa	2020	82	67	51	131	202	211	162	181	172	RAf	**172**			0	96	168	1.171	2.049	3.75%
(west leg)	E Hudson St	0.5	2	Disa	2020	7874	4960	4867	5333	8208	8628	8340	8603	8472	RAf	**8472**			0	7970	8448	1.012	1.073	0.30%
(south leg)	Summit St	0.5	2	Disa	2020	2795	1537	1521	1602	2466	2944	2876	2941	2909	RAf	**2909**			0	2813	2904	1.006	1.039	0.16%
Total						**18790**		**12208**																

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Optional Capacity Adjuster
Use this for screenlines, not intersection approaches

Capacity	delta opening yr	delta design yea	revised volume opening yr	revised volume design yea	growth factors opening yr	growth factors design year
	-8091	-8352	8091	8352	1.007	1.039
	-96	-168	96	168	1.171	2.049
	-7970	-8448	7970	8448	1.012	1.073
	-2813	-2904	2813	2904	1.006	1.039
0	**0**	**0**				
	-18970	**-19872**				

	Year	
Model Base	2025	
Model Opening (opt)		if Yo=Yb then also must = Yc (col4)
Model Forecast	2045	must be > Yb
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Make sure model opening year (if used)
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of this sheet with an exogenously supplied growth rate.

If you have a new intersection on an existing road you can
enter the main line counts/model volumes (Ab and Af-ON)
here and on the TM sheets (as Thru movements) and then
the full set of volumes/turns for Af-OB and Af-D
You may want to disable screenlines in this case.

Field Definiations

COLUMN	VARIABLE	DEFINITION
1	Road/Link	The name/route number of each facility bisected by the screenline and/or the link (node) numbers from the network.
2	Min Diff	Minimum Count/Model Ratio for using differences, below this use ratios alone
3	Max Rat	Maximum Count/Model Ratio for using ratios, above this use differences alone
3.5	Use SL	Set to "Enable" to allow use of screen line adjustments for this leg if no count available, set to "Disable" to disable giving no adjustment of model result, set to "Force" to force SL adjustment
4	COUNT year	year of the actual base year traffic count
5	COUNT	actual base year traffic count
6	Ab	base year traffic assignment - user to input year:
7	Ab interpolate	interpolation between base and future year assignment -- used when year of count data differs from base year assignment, will use open-nobuild to base interp if open nobuild exists, otherwise will use design to base interp
7.1	R	Calculated Ratio **(COUNT/Ab)**
7.2	D	Calculated Difference **(COUNT-Ab)**
7.3	MR	Model Ratio **(AfD/Ab)**
7.4	SLR	Screenline Ratio **(ΣCount/ΣAb)**
* 8	Af	future year traffic assignment - Af-D= (near) design yr model run, Af-ON=optional (near) opening year no build model run, Af-OB=optional (near) opening year build model run
* 8.5	SLRATIO	adjusted future year traffic forecast (ΣCount/ΣAb)*Af
* 9	RATIO	adjusted future year traffic forecast (**COUNT/Ab**) * **Af**
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* 10.5	MRATIO	adjusted future year traffic forecast modified "ratio method" to weight towards DIFF method for large model increases: if MR<1 = RATIO else = ((MR-1)*DIFF + RATIO)/MR
* 11	RAf	adjusted future year traffic forecast (AVERAGE(M**RATIO**, **DIFF**))
* 12	lected Adjustme	Selects the type of future year adjustment based on the ratio of actual base year traffic count to interpolated base year traffic assignment *general rule: if MR<1 then if RATIO <= 1.0 then use RATIO, OR if RATIO >= 2 then use DIFF else use Raf , if MR>1 then if RATIO <=0.5 then use MRATIO, OR if RATIO >=2 then use DIFF, else use Raf(based on MRATIO)*
* 13	Selected Volume	The selected adjusted forecast year model volume
14	most recent cou	year of the most recently available actual count data (should be <Yo, if Yo=Yb generally won't use)
15	most recent cou	most recently available actual count data for the facility
16	ecent Count Del	Forecast adjustment based on difference of more recent count from interpolation resulting from base count and first forecast year
17	opening year	final refined forecast for the opening year - user to input year
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19	growth factorop	growth factor to apply to most recent count to obtain opening year (SET to 1.0 if no count given)
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* Columns 8-13 repeated for open year build and nobuild (hidden)

Four Interpolation Cases

1. Have base count and open yr model run and interp year<model open yr THUS interpolate btwn base count and adj open yr model run except for open yr<model open yr which uses case 2
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3. (standard) Have base count and NO open yr model run THUS interpolate btwn count and adj design yr model run
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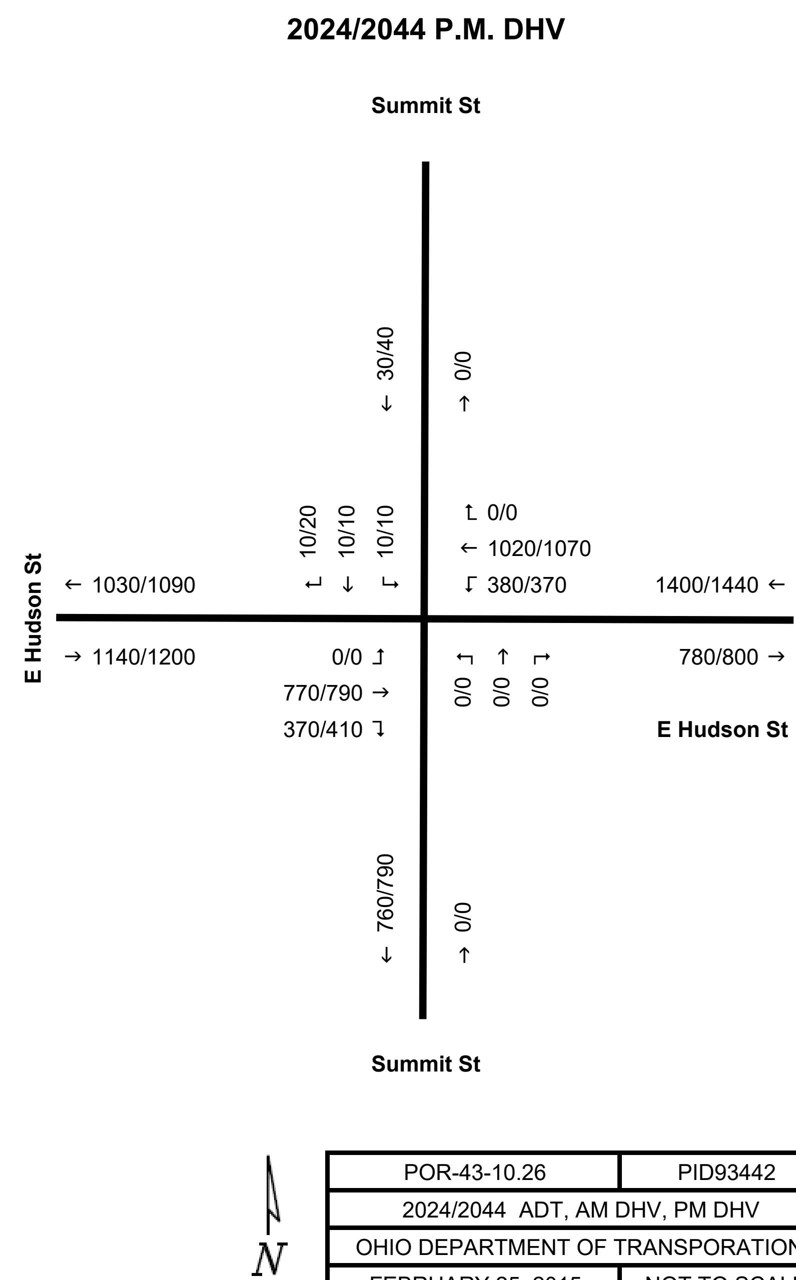
Screenline Options (see field 3.5 description)
Enable
Disable
Force

POR-43-10.26
PID93442
PLATE 1 OF 1



POR-43-10.26	PID93442
2024/2044 ADT, AM DHV, PM DHV	
OHIO DEPARTMENT OF TRANSPORATION	
FEBRUARY 25, 2015	NOT TO SCALE

USER INPUT
OPTIONAL INPUT
FINAL REFINED FORECAST

NCHRP255 adjustment process — ***Interpolate opening & design year & adjust for more recent count***

	COL 1	COL 2	COL 3	COL 4	COL 4	COL 5	COL 6	COL 7	COL 8	COL 8.5	COL 9	COL 10	COL 10.5	COL 11	COL 12	COL 13	COL 14	COL 15	COL 16	COL 17	COL 18	COL 19	COL 20	COL 21
					near base model		2025		2045						Selected	Selected	most recent	most recent	recent count	2024	2044	growth factors		annual growth
	Road/Link	in Di	ax R	se S	count year	count data	Ab	Ab interpolate	Af-D	SLRATIO	RATIO	DIFF	MRATIO	RAf	Adjustment	Volume	count year	count data	delta	opening year	design yr	opening yr	design year	check
(east leg)	Hudson St	0.5	2	Disa	2020	7849	4960	4867	5333	8949	8601	8315	8576	8446	RAf	**8446**			0	7945	8422	1.012	1.073	0.30%
(north leg)	Indianola Ave	0.5	2	Disa	2020	4080	1048	863	1789	3002	8458	5006	6671	5839	DIFF	**5006**			0	4228	4969	1.036	1.218	0.88%
(west leg)	Hudson St	0.5	2	Disa	2020	5016	4076	4025	4282	7185	5336	5273	5332	5303	RAf	**5303**			0	5062	5292	1.009	1.055	0.23%
(south leg)	Indianola Ave	0.5	2	Disa	2020	2033	1670	1555	2131	3576	2786	2609	2738	2674	RAf	**2674**			0	2136	2648	1.051	1.303	1.20%
Total						**18978**		**11310**																

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Optional Capacity Adjuster
Use this for screenlines, not intersection approaches

	delta		revised volume		growth factors	
Capacity	**opening yr**	**design year**	**opening yr**	**design year**	**opening yr**	**design year**
	-7945	-8422	7945	8422	1.012	1.073
	-4228	-4969	4228	4969	1.036	1.218
	-5062	-5292	5062	5292	1.009	1.055
	-2136	-2648	2136	2648	1.051	1.303
0	**0**	**0**				
	-19371	**-21331**				

	Year	
Model Base	2025	
Model Opening (opt)		if Yo=Yb then also must = Yc (col4)
Model Forecast	2045	must be > Yb
Project Opening	2024	
Project Design	2044	

General Notes

General rule: if MR<1 then if ***RATIO*** *<= 1.0 then use R*
OR if RATIO >= 2 then use DIFF else use Raf ,
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Which you can change if it makes sense,
make both of columns 2-3 very large to force ratios,
make them 0 to force differences

Make sure model opening year (if used)
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Do not use cols 14-15 in this case

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want to enter to interpolate and calculate
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Screenline Options (see field 3.5 description)
Enable
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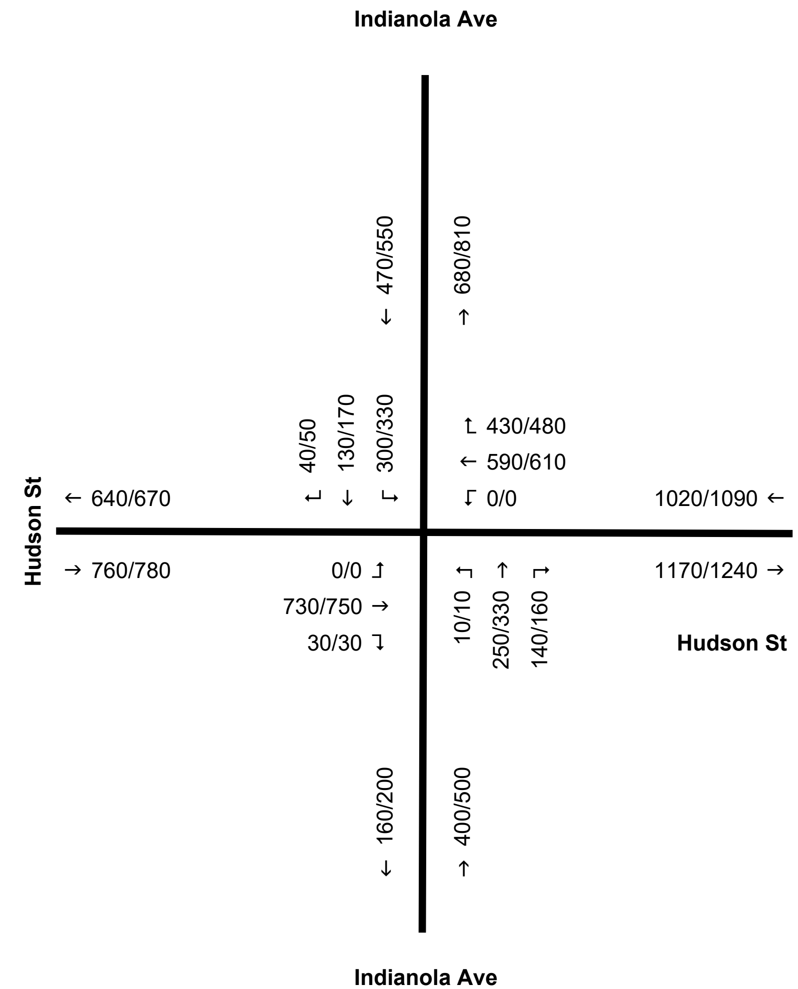
Force

POR-43-10.26
PID93442
PLATE 1 OF 1

2024/2044 P.M. DHV



POR-43-10.26	PID93442
2024/2044 ADT, AM DHV, PM DHV	
OHIO DEPARTMENT OF TRANSPORATION	
FEBRUARY 25, 2015	NOT TO SCALE

USER INPUT
OPTIONAL INPUT
FINAL REFINED FORECAST

NCHRP255 adjustment process / ***Interpolate opening & design year & adjust for more recent count***

	COL 1	COL 2	COL 3	COL 4	COL 4	COL 5	COL 6	COL 7	COL 8	COL 8.5	COL 9	COL 10	COL 10.5	COL 11
					near base model		2025		2045					
	Road/Link	**in Di**	**ax Rse**	**S**	**count year**	**count data**	**Ab**	**Ab interpolate**	**Af-D**	**SLRATIO**	**RATIO**	**DIFF**	**MRATIO**	**RAf**
(east leg)	Oakland Park Ave	0.5	2	Disa	2020	929	929	929	929	2442	929	929	929	929
(north leg)	Indianola Ave	0.5	2	Disa	2020	5311	1688	1547	2252	5918	7731	6016	7194	6605
(west leg)	Oakland Park Ave	0.5	2	Disa	2020	731	731	731	731	1921	731	731	731	731
(south leg)	Indianola Ave	0.5	2	Disa	2020	5523	1688	1547	2252	5918	8040	6228	7473	6851
Total						**12494**		**4754**						

	COL 12	COL 13	COL 14	COL 15	COL 16	COL 17	COL 18	COL 19	COL 20	COL 21
	Selected	Selected	most recent	most recent	recent count	2024	2044	growth factors		annual growth
	Adjustment	**Volume**	**count year**	**count data**	**delta**	opening year	**design yr**	**opening yr**	**design year**	**check**
(east leg)	**RATIO**	**929**			0	929	929	1.000	1.000	0.00%
(north leg)	**DIFF**	**6016**			0	5424	5988	1.021	1.128	0.52%
(west leg)	**RATIO**	**731**			0	731	731	1.000	1.000	0.00%
(south leg)	**DIFF**	**6228**			0	5636	6200	1.021	1.123	0.50%

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Optional Capacity Adjuster
Use this for screenlines, not intersection approaches

		delta		revised volume		growth factors	
	Capacity	**opening yr**	**design yea**	**opening yr**	**design yea**	**opening yr**	**design year**
(east leg)		-929	-929	929	929	1.000	1.000
(north leg)		-5424	-5988	5424	5988	1.021	1.128
(west leg)		-731	-731	731	731	1.000	1.000
(south leg)		-5636	-6200	5636	6200	1.021	1.123
	0	**0**	**0**				
		-12720	**-13848**				

	Year
Model Base	2025
Model Opening (opt)	
Model Forecast	2045
Project Opening	2024
Project Design	2044

if Yo=Yb then also must = Yc (col4)
must be > Yb

General Notes

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OR if RATIO >= 2 then use DIFF else use Raf ,
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POR-43-10.26
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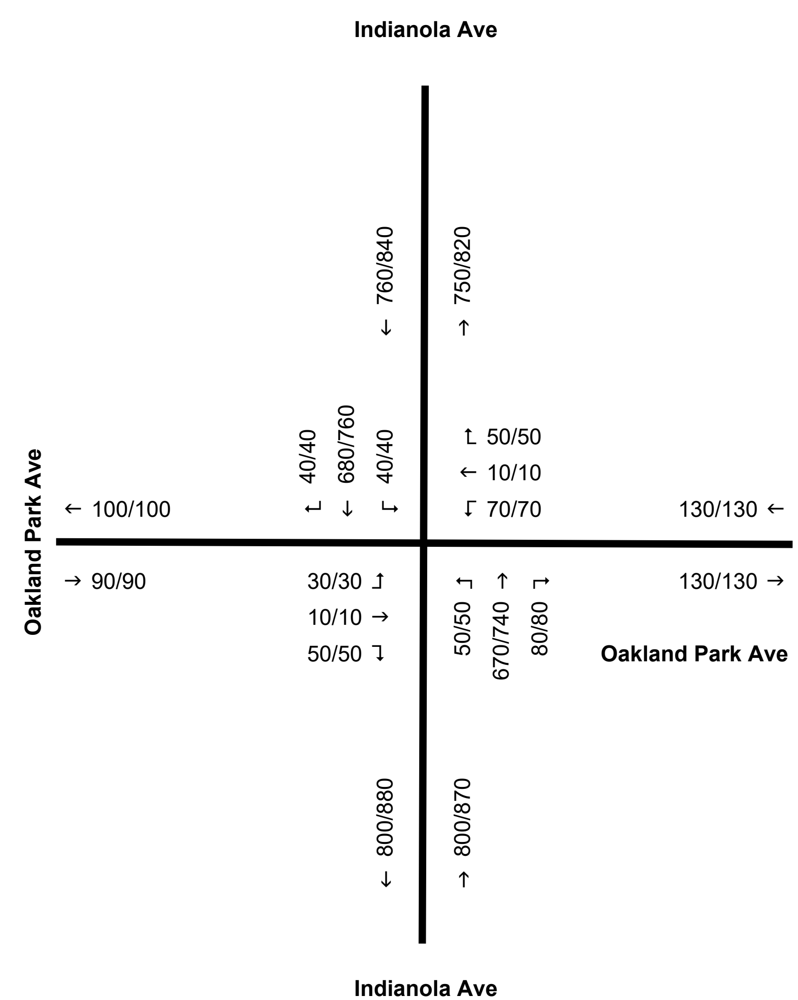
PLATE 1 OF 1

2024/2044 P.M. DHV



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OHIO DEPARTMENT OF TRANSPORATION	
FEBRUARY 25, 2015	NOT TO SCALE

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NCHRP255 adjustment process — *Interpolate opening & design year & adjust for more recent count*

	COL 1	COL 2	COL 3	COL 4	COL 4	COL 5	COL 6	COL 7	COL 8	COL 8.5	COL 9	COL 10	COL 10.5	COL 11	COL 12	COL 13	COL 14	COL 15	COL 16	COL 17	COL 18	COL 19	COL 20	COL 21
					near base model		2025		2045						Selected	Selected	most recent	most recent	recent count	2024	2044	growth factors		annual growth
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(east leg)	E Weber Rd	0.5	2	Disa	2020	3274	5775	5508	6843	8246	4068	4609	4174	4392	**RAf**	**4392**			0	3453	4347	1.055	1.328	1.29%
(north leg)	Indianola Ave	0.5	2	Disa	2020	3707	668	608	910	1097	5548	4009	5037	4523	**DIFF**	**4009**			0	3755	3997	1.013	1.078	0.32%
(west leg)	E Weber Rd	0.5	2	Disa	2020	3086	4697	4485	5546	6683	3816	4147	3879	4013	**RAf**	**4013**			0	3234	3976	1.048	1.288	1.15%
(south leg)	Indianola Ave	0.5	2	Disa	2020	3795	1003	903	1405	1693	5905	4297	5330	4814	**DIFF**	**4297**			0	3875	4277	1.021	1.127	0.52%
Total						**13862**		**11504**																

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Use this for screenlines, not intersection approaches

	delta		revised volume		growth factors	
Capacity	opening yr	design year	opening yr	design year	opening yr	design year
	-3453	-4347	3453	4347	1.055	1.328
	-3755	-3997	3755	3997	1.013	1.078
	-3234	-3976	3234	3976	1.048	1.288
	-3875	-4277	3875	4277	1.021	1.127
0	**0**	**0**				
	-14317	**-16597**				

	Year	
Model Base	2025	
Model Opening (opt)		if Yo=Yb then also must = Yc (col4)
Model Forecast	2045	must be > Yb
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a no build unless it's a new link.

If you have a new link it will get a growth rate of 1.0
To get forecast turn movements for new links you must
enter the model turns in section 2 of the turn movement sheets.

A value of zero in a field usually means zero, leave fields blank if you want them
ignored. If link doesn't exist in base, count=Ab=blank. If link doesn't exist in build,
make zero, not blank in this case (Af-OB actually controls this).

There is no guarantee a forecast volume of zero will
be respected as zero by the 255 adjustments.

If you have an existing intersection link that wasn't in the model
enter its counts in the appropriate places here and on the
TM sheets. You will need to over-ride columns 19-20
of this sheet with an exogenously supplied growth rate.

If you have a new intersection on an existing road you can
enter the main line counts/model volumes (Ab and Af-ON)
here and on the TM sheets (as Thru movements) and then
the full set of volumes/turns for Af-OB and Af-D
You may want to disable screenlines in this case.

Field Definiations

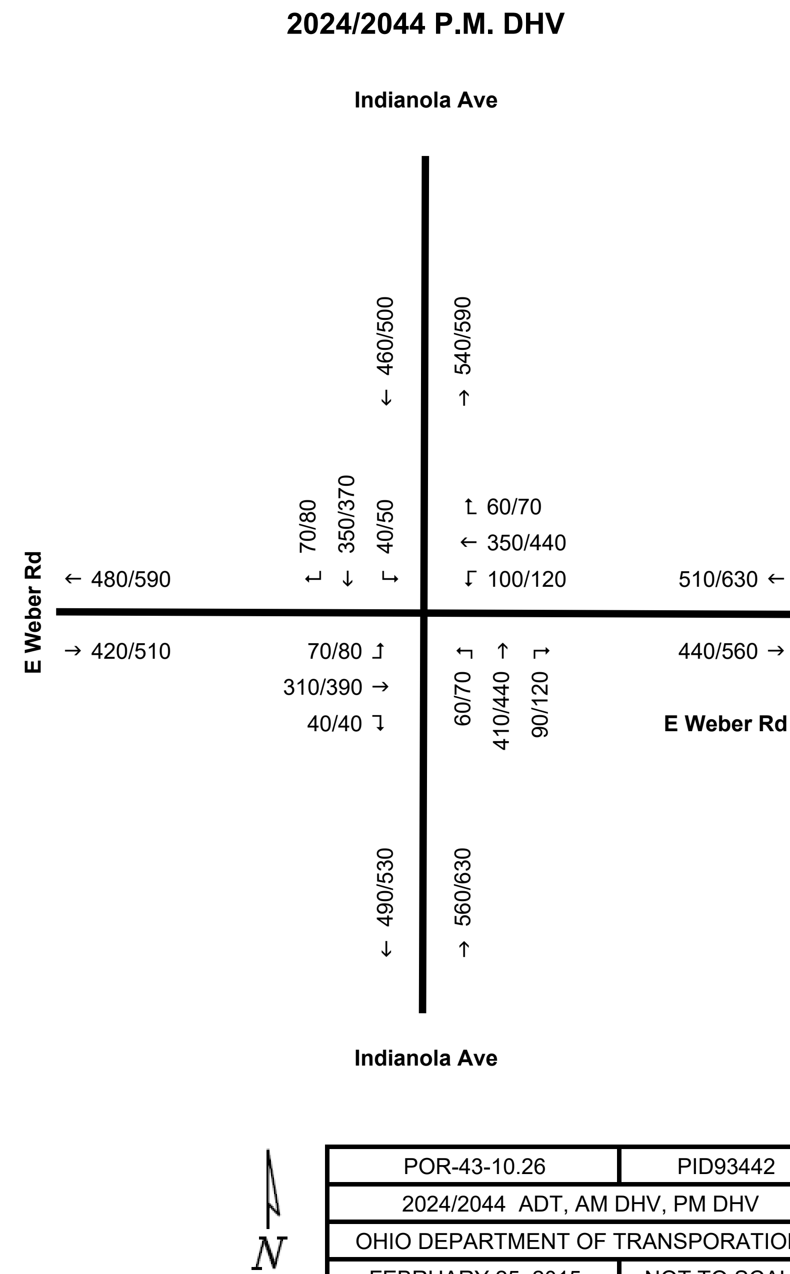
COLUMN	VARIABLE	DEFINITION
1	Road/Link	The name/route number of each facility bisected by the screenline and/or the link (node) numbers from the network.
2	Min Diff	Minimum Count/Model Ratio for using differences, below this use ratios alone
3	Max Rat	Maximum Count/Model Ratio for using ratios, above this use differences alone
3.5	Use SL	Set to "Enable" to allow use of screen line adjustments for this leg if no count available, set to "Disable" to disable giving no adjustment of model result, set to "Force" to force SL adjustment
4	COUNT year	year of the actual base year traffic count
5	COUNT	actual base year traffic count
6	Ab	base year traffic assignment - user to input year:
7	Ab interpolate	interpolation between base and future year assignment -- used when year of count data differs from base year assignment, will use open-nobuild to base interp if open nobuild exists, otherwise will use design to base interp
7.1	R	Calculated Ratio **(COUNT/Ab)**
7.2	D	Calculated Difference **(COUNT-Ab)**
7.3	MR	Model Ratio **(AfD/Ab)**
7.4	SLR	Screenline Ratio **(ΣCount/ΣAb)**
* 8	Af	future year traffic assignment - Af-D= (near) design yr model run, Af-ON=optional (near) opening year no build model run, Af-OB=optional (near) opening year build model run
* 8.5	SLRATIO	adjusted future year traffic forecast (ΣCount/ΣAb)*Af
* 9	RATIO	adjusted future year traffic forecast (**COUNT/Ab**) * **Af**
* 10	DIFF	adjusted future year traffic forecast (**COUNT - Ab**) + **Af**
* 10.5	MRATIO	adjusted future year traffic forecast modified "ratio method" to weight towards DIFF method for large model increases: if MR<1 = RATIO else = ((MR-1)*DIFF + RATIO)/MR
* 11	RAf	adjusted future year traffic forecast (AVERAGE(M**RATIO**, **DIFF**))
* 12	lected Adjustme	Selects the type of future year adjustment based on the ratio of actual base year traffic count to interpolated base year traffic assignment *general rule: if MR<1 then if RATIO <= 1.0 then use RATIO, OR if RATIO >= 2 then use DIFF else use Raf , if MR>1 then if RATIO <=0.5 then use MRATIO, OR if RATIO >=2 then use DIFF, else use Raf(based on MRATIO)*
* 13	Selected Volume	The selected adjusted forecast year model volume
14	most recent cou	year of the most recently available actual count data (should be <Yo, if Yo=Yb generally won't use)
15	most recent cou	most recently available actual count data for the facility
16	ecent Count Del	Forecast adjustment based on difference of more recent count from interpolation resulting from base count and first forecast year
17	opening year	final refined forecast for the opening year - user to input year
18	design year	final refined forecast for the design year - user to input year
19	growth factorop	growth factor to apply to most recent count to obtain opening year (SET to 1.0 if no count given)
20	growth factorde	growth factor to apply to most recent count to obtain design year (SET to 1.0 if no count given)

* Columns 8-13 repeated for open year build and nobuild (hidden)

Four Interpolation Cases
1. Have base count and open yr model run and interp year<model open yr THUS interpolate btwn base count and adj open yr model run except for open yr<model open yr which uses case 2
2. Have open yr model run and interp yr> open model yr (or interpolating any opening year) THUS interopolate btwn adj open yr and adj design yr model runs
3. (standard) Have base count and NO open yr model run THUS interpolate btwn count and adj design yr model run
4. Have no base count THUS interpolate calculate growth from Unadj base and design yr model runs and apply growth rate to number of years different from model design yr

Screenline Options (see field 3.5 description)
Enable
Disable
Force

POR-43-10.26
PID93442
PLATE 1 OF 1



POR-43-10.26	PID93442
2024/2044 ADT, AM DHV, PM DHV	
OHIO DEPARTMENT OF TRANSPORATION	
FEBRUARY 25, 2015	NOT TO SCALE

Michael Baker INTERNATIONAL

We Make a Difference

Attachment K4:

NCHRP Spreadsheet Build - AADT

USER INPUT
OPTIONAL INPUT
FINAL REFINED FORECAST

NCHRP255 adjustment process / ***Interpolate opening & design year & adjust for more recent count***

	COL 1 Road/Link	COL 2 in Di	COL 3 ax R	COL 4 se S	COL 4 near base model count year	COL 5 count data	COL 6 2025 Ab	COL 7 Ab interpolate	COL 8 2045 Af-D	COL 8.5 SLRATIO	COL 9 RATIO	COL 10 DIFF	COL 10.5 MRATIO	COL 11 RAf	COL 12 Selected Adjustment	COL 13 Selected Volume	COL 14 most recent count year	COL 15 most recent count data	COL 16 recent count delta	COL 17 2024 opening year	COL 18 2044 design yr	COL 19 growth factors opening yr	COL 20 design year	COL 21 annual growth check
(east leg)	Arcadia Ave	0.5	2	Disa	2020	1000	899	813	1244	2140	1530	1431	1496	1464	**RAf**	**1464**			0	1074	1445	1.074	1.445	1.73%
(north leg)	Indianola Ave	0.5	2	Disa	2020	9110	4839	4467	6327	10886	12903	10970	12335	11653	**DIFF**	**10970**			0	9408	10896	1.033	1.196	0.79%
(west leg)	Arcadia Ave	0.5	2	Disa	2020	4970	4536	4263	5629	9685	6563	6336	6508	6422	**RAf**	**6422**			0	5202	6364	1.047	1.281	1.12%
(south leg)	Indianola Ave	0.5	2	Disa	2020	9620	5436	4813	7927	13639	15844	12734	14622	13678	**RAf**	**13678**			0	10269	13516	1.068	1.405	1.58%
Total						**24700**		**14356**																

There are hidden rows if you want more roads in your intersection/screenline

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Optional Capacity Adjuster
Use this for screenlines, not intersection approaches

Capacity	delta opening yr	delta design year	revised volume opening yr	revised volume design year	growth factors opening yr	growth factors design year
	-1074	-1445	1074	1445	1.074	1.445
	-9408	-10896	9408	10896	1.033	1.196
	-5202	-6364	5202	6364	1.047	1.281
	-10269	-13516	10269	13516	1.068	1.405
0	**0**	**0**				
	-25953	**-32221**				

	Year	
Model Base	2025	
Model Opening (opt)		if Yo=Yb then also must = Yc (col4)
Model Forecast	2045	must be > Yb
Project Opening	2024	
Project Design	2044	

General Notes

General rule: if MR<1 then if ***RATIO*** *<= 1.0 then use R*
OR if RATIO >= 2 then use DIFF else use Raf ,
if MR>1 then if RATIO <=0.5 then use MRATIO, OR
if RATIO >=2 then use DIFF, else use Raf(based on MRA
Which you can change if it makes sense,
make both of columns 2-3 very large to force ratios,
make them 0 to force differences

Make sure model opening year (if used)
is greater existing and less than forecast
EXCEPT…
If you want to use a base year build run
to establish trends, set Af-ON=Ab
set model open year=base year=count year
Place build run in Af-OB
Do not use cols 14-15 in this case

If you have a non-model forecast you
want to enter to interpolate and calculate
growth rate, put it in column 8 (Af) then copy
column 5 to column 6 and set model base
to count year (Type toggle does this for you on TM sheet)

Design year no build is a separate alternative
create a new sheet for it

You can omit open year model, have just an
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* **11**	**RAf**	adjusted future year traffic forecast (AVERAGE(M**RATIO**, **DIFF**))
* **12**	**lected Adjustme**	Selects the type of future year adjustment based on the ratio of actual base year traffic count to interpolated base year traffic assignment *general rule: if MR<1 then if RATIO <= 1.0 then use RATIO, OR if RATIO >= 2 then use DIFF else use Raf , if MR>1 then if RATIO <=0.5 then use MRATIO, OR if RATIO >=2 then use DIFF, else use Raf(based on MRATIO)*
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14	**most recent cou**	year of the most recently available actual count data (should be <Yo, if Yo=Yb generally won't use)
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19	**growth factorop**	growth factor to apply to most recent count to obtain opening year (SET to 1.0 if no count given)
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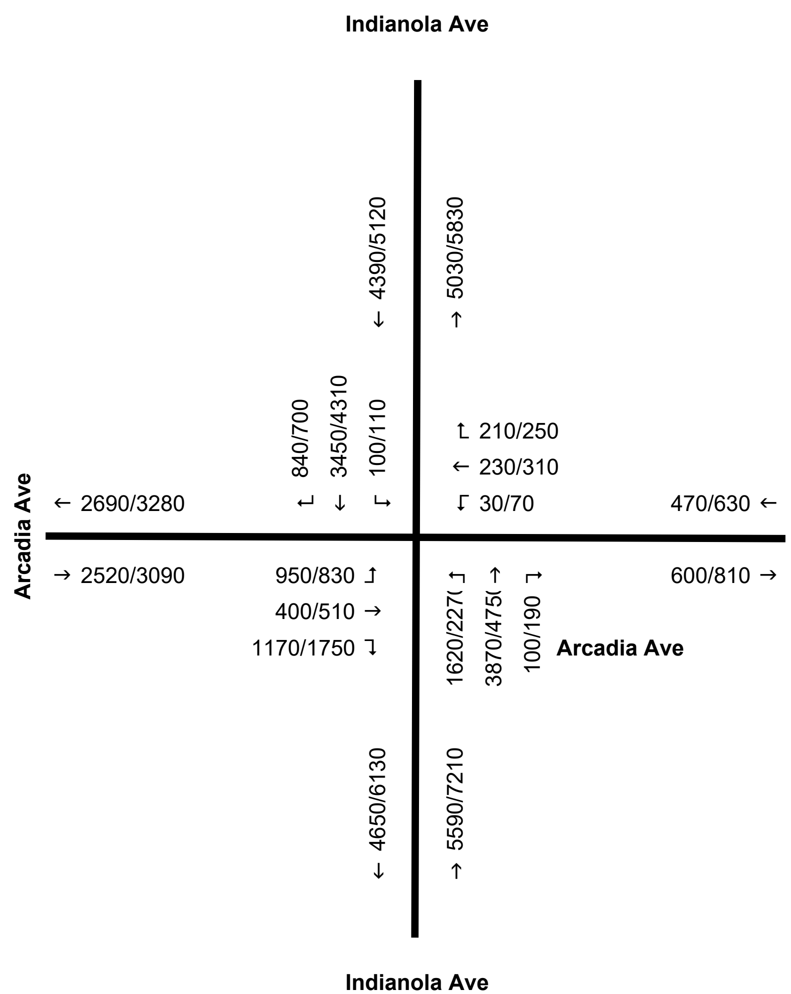
Screenline Options (see field 3.5 description)
Enable
Disable
Force

POR-43-10.26
PID93442
PLATE 1 OF 1

2024/2044 ADT



POR-43-10.26	PID93442
2024/2044 ADT, AM DHV, PM DHV	
OHIO DEPARTMENT OF TRANSPORATION	
FEBRUARY 25, 2015	NOT TO SCALE

USER INPUT
OPTIONAL INPUT
FINAL REFINED FORECAST

NCHRP255 adjustment process | ***Interpolate opening & design year & adjust for more recent count***

	COL 1	COL 2	COL 3	COL 4	COL 4	COL 5	COL 6	COL 7	COL 8	COL 8.5	COL 9	COL 10	COL 10.5	COL 11	COL 12	COL 13	COL 14	COL 15	COL 16	COL 17	COL 18	COL 19	COL 20	COL 21
					near base model		2025		2045						Selected	Selected	most recent	most recent	recent count	2024	2044	growth factors		annual growth
	Road/Link	in Di	ax R	se S	count year	count data	Ab	Ab interpolate	Af-D	SLRATIO	RATIO	DIFF	MRATIO	RAf	Adjustment	Volume	count year	count data	delta	opening year	design yr	opening yr	design year	check
(east leg)	E North Broadway	0.5	2	Disa	2020	17930	26445	25470	30345	31543	21362	22805	21594	22200	**RAf**	**22200**			0	18613	22029	1.038	1.229	0.92%
(north leg)	Indianola Ave	0.5	2	Disa	2020	14510	5933	5254	8651	8992	23892	17907	21542	19725	**DIFF**	**17907**			0	15054	17771	1.038	1.225	0.90%
(west leg)	E North Broadway	0.5	2	Disa	2020	14210	21545	21039	23571	24501	15920	16742	16008	16375	**RAf**	**16375**			0	14556	16288	1.024	1.146	0.59%
(south leg)	Indianola Ave	0.5	2	Disa	2020	9810	2748	2553	3527	3666	13553	10784	12788	11786	**DIFF**	**10784**			0	9966	10745	1.016	1.095	0.39%
Total						**56460**		**54316**																

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There are hidden columns for opening year model results if you have them

Optional Capacity Adjuster
Use this for screenlines, not intersection approaches

	delta		revised volume		growth factors	
Capacity	**opening yr**	**design yea**	**opening yr**	**design yea**	**opening yr**	**design year**
	-18613	-22029	18613	22029	1.038	1.229
	-15054	-17771	15054	17771	1.038	1.225
	-14556	-16288	14556	16288	1.024	1.146
	-9966	-10745	9966	10745	1.016	1.095
0	**0**	**0**				
	-58189	**-66833**				

	Year	
Model Base	2025	
Model Opening (opt)		if Yo=Yb then also must = Yc (col4)
Model Forecast	2045	must be > Yb
Project Opening	2024	
Project Design	2044	

General Notes

*General rule: if MR<1 then if **RATIO** <= 1.0 then use R*
OR if RATIO >= 2 then use DIFF else use Raf ,
if MR>1 then if RATIO <=0.5 then use MRATIO, OR
if RATIO >=2 then use DIFF, else use Raf(based on MRA
Which you can change if it makes sense,
make both of columns 2-3 very large to force ratios,
make them 0 to force differences

Make sure model opening year (if used)
is greater existing and less than forecast
EXCEPT…
If you want to use a base year build run
to establish trends, set Af-ON=Ab
set model open year=base year=count year
Place build run in Af-OB
Do not use cols 14-15 in this case

If you have a non-model forecast you
want to enter to interpolate and calculate
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4	**COUNT year**	year of the actual base year traffic count
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Screenline Options (see field 3.5 description)
Enable
Disable
Force

POR-43-10.26
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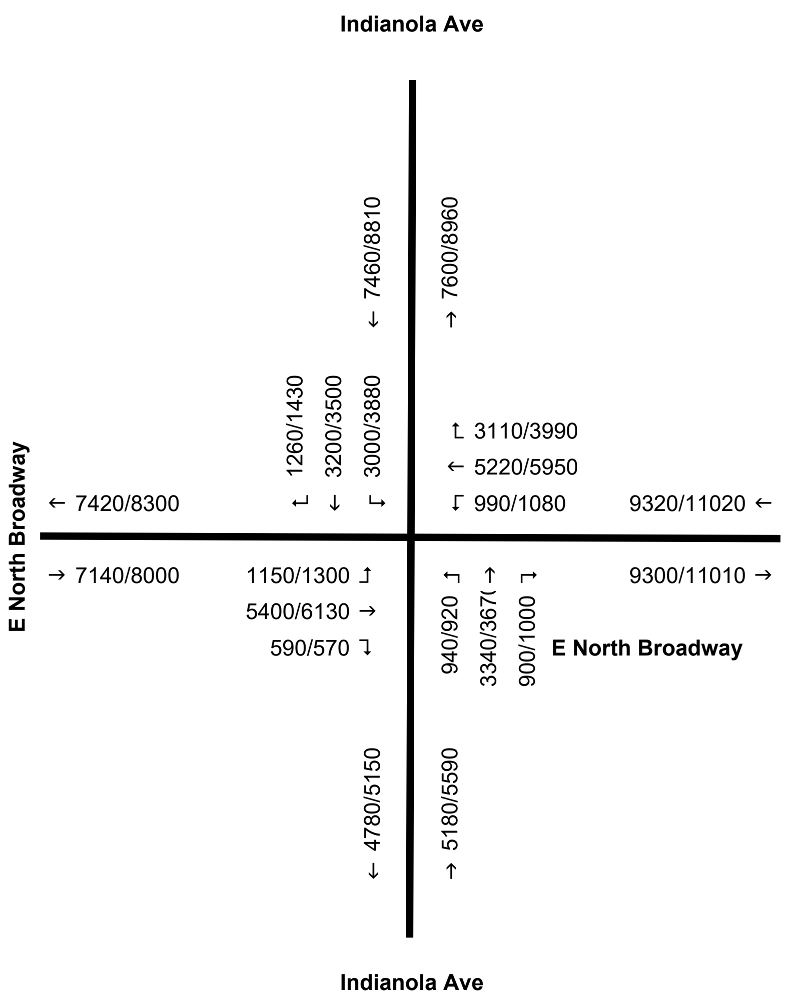
PLATE 1 OF 1

2024/2044 ADT



POR-43-10.26	PID93442
2024/2044 ADT, AM DHV, PM DHV	
OHIO DEPARTMENT OF TRANSPORATION	
FEBRUARY 25, 2015	NOT TO SCALE

WARNING: HIGH GROWTH LINKS

USER INPUT
OPTIONAL INPUT
FINAL REFINED FORECAST

NCHRP255 adjustment process — *Interpolate opening & design year & adjust for more recent count*

	COL 1 Road/Link	COL 2 in Di	COL 3 ax R	COL 4 se S	COL 4 near base model count year	COL 5 count data	COL 6 2025 Ab	COL 7 Ab interpolate	COL 8 2045 Af-D	COL 8.5 SLRATIO	COL 9 RATIO	COL 10 DIFF	COL 10.5 MRATIO	COL 11 RAf
(east leg)	E Hudson St	0.5	2	Disa	2020	19490	24909	24621	26061	22898	20630	20930	20647	20789
(north leg)	Summit St	0.5	2	Disa	2020	240	176	100	482	423	1157	622	733	678
(west leg)	E Hudson St	0.5	2	Disa	2020	19180	20649	20142	22676	19924	21593	21714	21607	21661
(south leg)	Summit St	0.5	2	Disa	2020	6530	6909	6854	7131	6265	6794	6807	6795	6801
Total						**45440**		**51717**						

	COL 12 Selected Adjustment	COL 13 Selected Volume	COL 14 most recent count year	COL 15 most recent count data	COL 16 recent count delta	COL 17 2024 opening year	COL 18 2044 design yr	COL 19 growth factors opening yr	COL 20 growth factors design year	COL 21 annual growth check
(east leg)	**RAf**	**20789**			0	19698	20737	1.011	1.064	0.26%
(north leg)	**DIFF**	**622**			0	301	607	1.254	2.529	5.08%
(west leg)	**RAf**	**21661**			0	19577	21562	1.021	1.124	0.51%
(south leg)	**RAf**	**6801**			0	6573	6790	1.007	1.040	0.17%

Optional Capacity Adjuster
Use this for screenlines, not intersection approaches

	Capacity	delta opening yr	delta design year	revised volume opening yr	revised volume design year	growth factors opening yr	growth factors design year
(east leg)		-19698	-20737	19698	20737	1.011	1.064
(north leg)		-301	-607	301	607	1.254	2.529
(west leg)		-19577	-21562	19577	21562	1.021	1.124
(south leg)		-6573	-6790	6573	6790	1.007	1.040
	0	**0**	**0**				
		-46149	**-49696**				

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You may want to disable screenlines in this case.

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3	Max Rat	Maximum Count/Model Ratio for using ratios, above this use differences alone
3.5	Use SL	Set to "Enable" to allow use of screen line adjustments for this leg if no count available, set to "Disable" to disable giving no adjustment of model result, set to "Force" to force SL adjustment
4	COUNT year	year of the actual base year traffic count
5	COUNT	actual base year traffic count
6	Ab	base year traffic assignment - user to input year:
7	Ab interpolate	interpolation between base and future year assignment -- used when year of count data differs from base year assignment, will use open-nobuild to base interp if open nobuild exists, otherwise will use design to base interp
7.1	R	Calculated Ratio **(COUNT/Ab)**
7.2	D	Calculated Difference **(COUNT-Ab)**
7.3	MR	Model Ratio **(AfD/Ab)**
7.4	SLR	Screenline Ratio **(ΣCount/ΣAb)**
* 8	Af	future year traffic assignment - Af-D= (near) design yr model run, Af-ON=optional (near) opening year no build model run, Af-OB=optional (near) opening year build model run
* 8.5	SLRATIO	adjusted future year traffic forecast (ΣCount/ΣAb)*Af
* 9	RATIO	adjusted future year traffic forecast (**COUNT/Ab**) * **Af**
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* 10.5	MRATIO	adjusted future year traffic forecast modified "ratio method" to weight towards DIFF method for large model increases: if MR<1 = RATIO else = ((MR-1)*DIFF + RATIO)/MR
* 11	RAf	adjusted future year traffic forecast (AVERAGE(M**RATIO**, **DIFF**))
* 12	lected Adjustme	Selects the type of future year adjustment based on the ratio of actual base year traffic count to interpolated base year traffic assignment *general rule: if MR<1 then if RATIO <= 1.0 then use RATIO, OR if RATIO >= 2 then use DIFF else use Raf , if MR>1 then if RATIO <=0.5 then use MRATIO, OR if RATIO >=2 then use DIFF, else use Raf(based on MRATIO)*
* 13	Selected Volume	The selected adjusted forecast year model volume
14	most recent cou	year of the most recently available actual count data (should be <Yo, if Yo=Yb generally won't use)
15	most recent cou	most recently available actual count data for the facility
16	ecent Count Del	Forecast adjustment based on difference of more recent count from interpolation resulting from base count and first forecast year
17	opening year	final refined forecast for the opening year - user to input year
18	design year	final refined forecast for the design year - user to input year
19	growth factorop	growth factor to apply to most recent count to obtain opening year (SET to 1.0 if no count given)
20	growth factorde	growth factor to apply to most recent count to obtain design year (SET to 1.0 if no count given)

* Columns 8-13 repeated for open year build and nobuild (hidden)

Four Interpolation Cases
1. Have base count and open yr model run and interp year<model open yr THUS interpolate btwn base count and adj open yr model run except for open yr<model open yr which uses case 2
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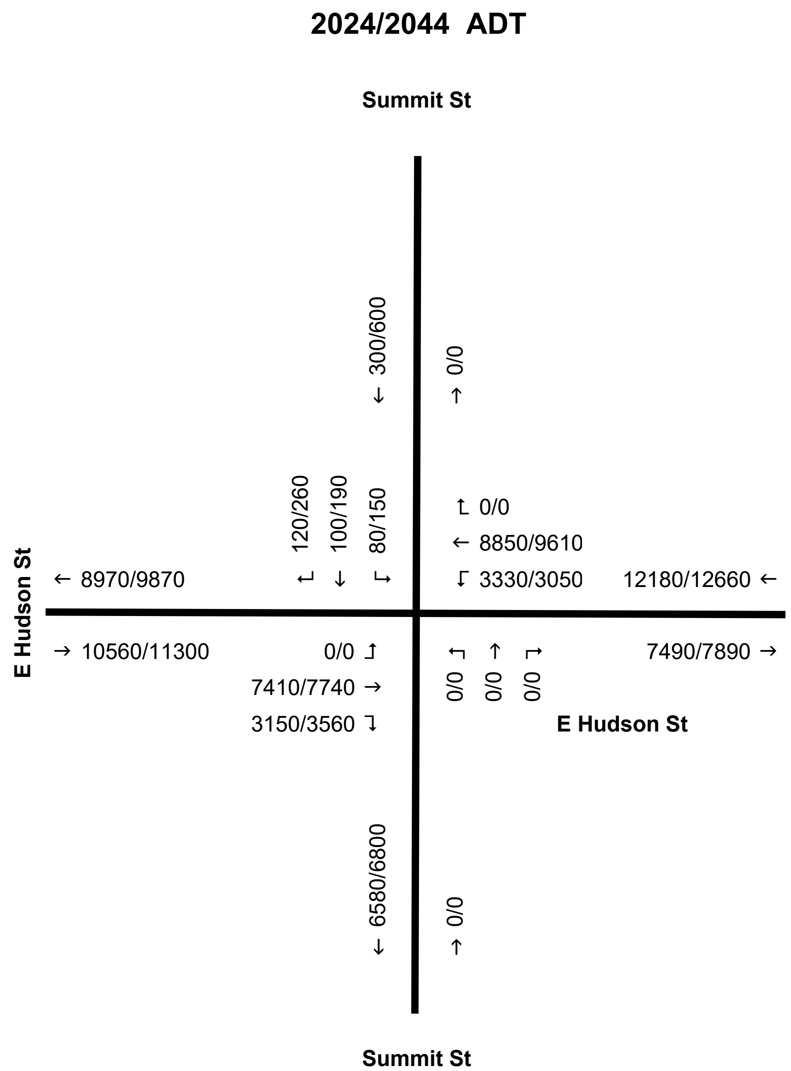
3. (standard) Have base count and NO open yr model run THUS interpolate btwn count and adj design yr model run
4. Have no base count THUS interpolate calculate growth from Unadj base and design yr model runs and apply growth rate to number of years different from model design yr

Screenline Options (see field 3.5 description)
Enable
Disable
Force

POR-43-10.26
PID93442
PLATE 1 OF 1



POR-43-10.26	PID93442
2024/2044 ADT, AM DHV, PM DHV	
OHIO DEPARTMENT OF TRANSPORATION	
FEBRUARY 25, 2015	NOT TO SCALE

USER INPUT
OPTIONAL INPUT
FINAL REFINED FORECAST

NCHRP255 adjustment process / ***Interpolate opening & design year & adjust for more recent count***

	COL 1	COL 2	COL 3	COL 4	COL 4	COL 5	COL 6	COL 7	COL 8	COL 8.5	COL 9	COL 10	COL 10.5	COL 11	COL 12	COL 13	COL 14	COL 15	COL 16	COL 17	COL 18	COL 19	COL 20	COL 21
					near base model		2025		2045						Selected	Selected	most recent	most recent	recent count	2024	2044	growth factors		annual growth
	Road/Link	in Di	ax R	se S	count year	count data	Ab	Ab interpolate	Af-D	SLRATIO	RATIO	DIFF	MRATIO	RAf	Adjustment	Volume	count year	count data	delta	opening year	design yr	opening yr	design year	check
(east leg)	Hudson St	0.5	2	Disa	2020	19410	20649	20142	22676	22950	21852	21944	21862	21903	**RAf**	**21903**			0	19809	21803	1.021	1.123	0.50%
(north leg)	Indianola Ave	0.5	2	Disa	2020	10030	5436	4813	7927	8023	16519	13144	15193	14169	**DIFF**	**13144**			0	10528	13019	1.050	1.298	1.18%
(west leg)	Hudson St	0.5	2	Disa	2020	12370	14680	14495	15420	15606	13159	13295	13167	13231	**RAf**	**13231**			0	12508	13197	1.011	1.067	0.28%
(south leg)	Indianola Ave	0.5	2	Disa	2020	4750	6869	6554	8128	8226	5891	6324	5975	6150	**RAf**	**6150**			0	4974	6094	1.047	1.283	1.13%
Total						**46560**		**46004**																

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Optional Capacity Adjuster
Use this for screenlines, not intersection approaches

Capacity	delta opening yr	delta design year	revised volume opening yr	revised volume design year	growth factors opening yr	growth factors design year
	-19809	-21803	19809	21803	1.021	1.123
	-10528	-13019	10528	13019	1.050	1.298
	-12508	-13197	12508	13197	1.011	1.067
	-4974	-6094	4974	6094	1.047	1.283
0	**0**	**0**				
	-47819	**-54113**				

	Year
Model Base	2025
Model Opening (opt)	
Model Forecast	2045
Project Opening	2024
Project Design	2044

if Yo=Yb then also must = Yc (col4)
must be > Yb

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OR if RATIO >= 2 then use DIFF else use Raf ,
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Which you can change if it makes sense,
make both of columns 2-3 very large to force ratios,
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Make sure model opening year (if used)
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EXCEPT…
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set model open year=base year=count year
Place build run in Af-OB
Do not use cols 14-15 in this case

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growth rate, put it in column 8 (Af) then copy
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Enable
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Force

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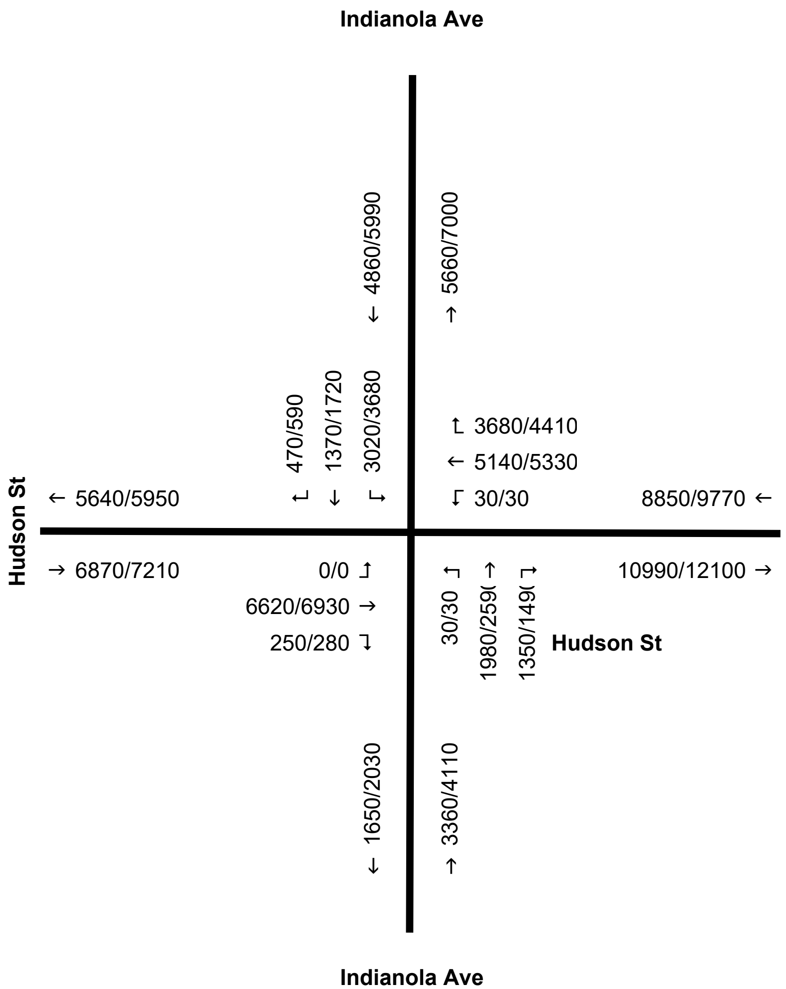
PLATE 1 OF 1

2024/2044 ADT



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POR-43-10.26	PID93442
2024/2044 ADT, AM DHV, PM DHV	
OHIO DEPARTMENT OF TRANSPORATION	
FEBRUARY 25, 2015	NOT TO SCALE

USER INPUT
OPTIONAL INPUT
FINAL REFINED FORECAST

NCHRP255 adjustment process | ***Interpolate opening & design year & adjust for more recent count***

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(east leg)	Oakland Park Ave	0.5	2	Disa	2020	2210	2210	2210	2210	4745	2210	2210	2210	2210	**RATIO**	**2210**			0	2210	2210	1.000	1.000	0.00%
(north leg)	Indianola Ave	0.5	2	Disa	2020	13230	5933	5254	8651	18573	21784	16627	19759	18193	**DIFF**	**16627**			0	13774	16491	1.041	1.247	0.99%
(west leg)	Oakland Park Ave	0.5	2	Disa	2020	1880	1880	1880	1880	4036	1880	1880	1880	1880	**RATIO**	**1880**			0	1880	1880	1.000	1.000	0.00%
(south leg)	Indianola Ave	0.5	2	Disa	2020	14020	5933	5254	8651	18573	23085	17417	20859	19138	**DIFF**	**17417**			0	14564	17281	1.039	1.233	0.93%
Total						**31340**		**14598**																

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Capacity	delta opening yr	delta design year	revised volume opening yr	revised volume design year	growth factors opening yr	growth factors design year
	-2210	-2210	2210	2210	1.000	1.000
	-13774	-16491	13774	16491	1.041	1.247
	-1880	-1880	1880	1880	1.000	1.000
	-14564	-17281	14564	17281	1.039	1.233
0	**0**	**0**				
	-32428	**-37862**				

	Year	
Model Base	2025	
Model Opening (opt)		if Yo=Yb then also must = Yc (col4)
Model Forecast	2045	must be > Yb
Project Opening	2024	
Project Design	2044	

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POR-43-10.26
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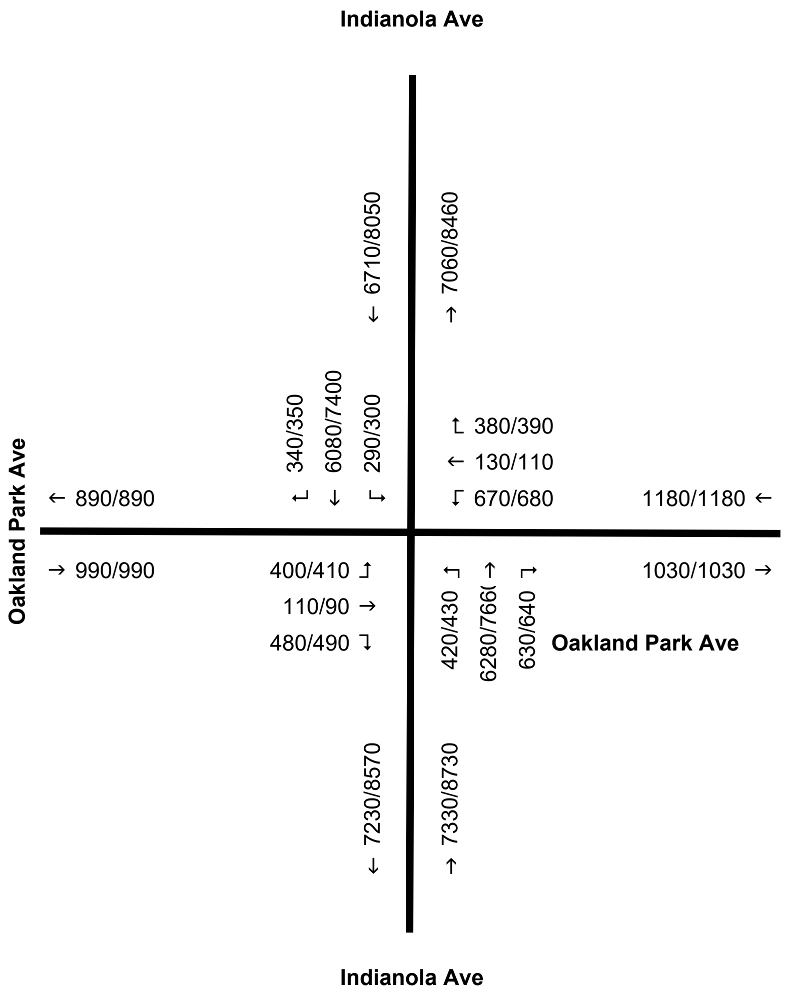
PLATE 1 OF 1

2024/2044 ADT



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NCHRP255 adjustment process — ***Interpolate opening & design year & adjust for more recent count***

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(east leg)	E Weber Rd	0.5	2	Disa	2020	7880	21121	20353	24195	19003	9367	11722	9741	10732	MRATIO	**9741**
(north leg)	Indianola Ave	0.5	2	Disa	2020	8960	1971	1813	2605	2046	12874	9752	11925	10839	DIFF	**9752**
(west leg)	E Weber Rd	0.5	2	Disa	2020	7260	17294	16706	19647	15431	8538	10201	8787	9494	MRATIO	**8787**
(south leg)	Indianola Ave	0.5	2	Disa	2020	9280	3931	3629	5139	4036	13141	10790	12450	11620	DIFF	**10790**
Total						**33380**		**42501**								

	COL 14 most recent count year	COL 15 most recent count data	COL 16 recent count delta	COL 17 2024 opening year	COL 18 2044 design yr	COL 19 growth factors opening yr	COL 20 growth factors design year	COL 21 annual growth check
(east leg)			0	8178	9667	1.038	1.227	0.91%
(north leg)			0	9087	9720	1.014	1.085	0.35%
(west leg)			0	7504	8726	1.034	1.202	0.81%
(south leg)			0	9522	10730	1.026	1.156	0.63%

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	-9087	-9720	9087	9720	1.014	1.085
	-7504	-8726	7504	8726	1.034	1.202
	-9522	-10730	9522	10730	1.026	1.156
0	**0**	**0**				
	-34291	**-38843**				

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be respected as zero by the 255 adjustments.

If you have an existing intersection link that wasn't in the model
enter its counts in the appropriate places here and on the
TM sheets. You will need to over-ride columns 19-20
of this sheet with an exogenously supplied growth rate.

If you have a new intersection on an existing road you can
enter the main line counts/model volumes (Ab and Af-ON)
here and on the TM sheets (as Thru movements) and then
the full set of volumes/turns for Af-OB and Af-D
You may want to disable screenlines in this case.

Field Definiations

COLUMN	VARIABLE	DEFINITION
1	Road/Link	The name/route number of each facility bisected by the screenline and/or the link (node) numbers from the network.
2	Min Diff	Minimum Count/Model Ratio for using differences, below this use ratios alone
3	Max Rat	Maximum Count/Model Ratio for using ratios, above this use differences alone
3.5	Use SL	Set to "Enable" to allow use of screen line adjustments for this leg if no count available, set to "Disable" to disable giving no adjustment of model result, set to "Force" to force SL adjustment
4	COUNT year	year of the actual base year traffic count
5	COUNT	actual base year traffic count
6	Ab	base year traffic assignment - user to input year:
7	Ab[interpolate]	interpolation between base and future year assignment -- used when year of count data differs from base year assignment, will use open-nobuild to base interp if open nobuild exists, otherwise will use design to base interp
7.1	R	Calculated Ratio **(COUNT/Ab)**
7.2	D	Calculated Difference **(COUNT-Ab)**
7.3	MR	Model Ratio **(AfD/Ab)**
7.4	SLR	Screenline Ratio **(ΣCount/ΣAb)**
* 8	Af	future year traffic assignment - Af-D= (near) design yr model run, Af-ON=optional (near) opening year no build model run, Af-OB=optional (near) opening year build model run
* 8.5	SLRATIO	adjusted future year traffic forecast (ΣCount/ΣAb)*Af
* 9	RATIO	adjusted future year traffic forecast **(COUNT/Ab) * Af**
* 10	DIFF	adjusted future year traffic forecast **(COUNT - Ab) + Af**
* 10.5	MRATIO	adjusted future year traffic forecast modified "ratio method" to weight towards DIFF method for large model increases: if MR<1 = RATIO else = ((MR-1)*DIFF + RATIO)/MR
* 11	RAf	adjusted future year traffic forecast (AVERAGE(M**RATIO**, **DIFF**))
* 12	lected Adjustme	Selects the type of future year adjustment based on the ratio of actual base year traffic count to interpolated base year traffic assignment *general rule: if MR<1 then if RATIO <= 1.0 then use RATIO, OR if RATIO >= 2 then use DIFF else use Raf , if MR>1 then if RATIO <=0.5 then use MRATIO, OR if RATIO >=2 then use DIFF, else use Raf(based on MRATIO)*
* 13	Selected Volume	The selected adjusted forecast year model volume
14	most recent cou	year of the most recently available actual count data (should be <Yo, if Yo=Yb generally won't use)
15	most recent cou	most recently available actual count data for the facility
16	ecent Count Delt	Forecast adjustment based on difference of more recent count from interpolation resulting from base count and first forecast year
17	opening year	final refined forecast for the opening year - user to input year
18	design year	final refined forecast for the design year - user to input year
19	growth factorop	growth factor to apply to most recent count to obtain opening year (SET to 1.0 if no count given)
20	growth factorde	growth factor to apply to most recent count to obtain design year (SET to 1.0 if no count given)

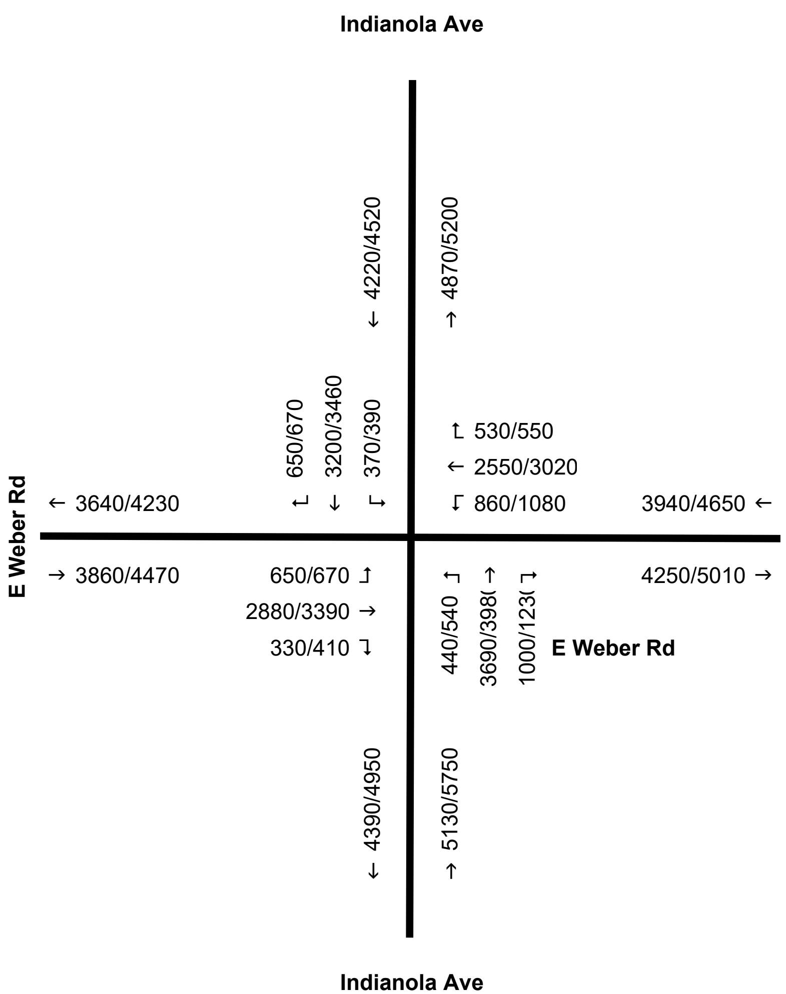
* Columns 8-13 repeated for open year build and nobuild (hidden)

Four Interpolation Cases
1. Have base count and open yr model run and interp year<model open yr THUS interpolate btwn base count and adj open yr model run except for open yr<model open yr which uses case 2
2. Have open yr model run and interp yr> open model yr (or interpolating any opening year) THUS interopolate btwn adj open yr and adj design yr model runs
3. (standard) Have base count and NO open yr model run THUS interpolate btwn count and adj design yr model run
4. Have no base count THUS interpolate calculate growth from Unadj base and design yr model runs and apply growth rate to number of years different from model design yr

Screenline Options (see field 3.5 description)
Enable
Disable
Force

POR-43-10.26
PID93442
PLATE 1 OF 1

2024/2044 ADT



POR-43-10.26	PID93442
2024/2044 ADT, AM DHV, PM DHV	
OHIO DEPARTMENT OF TRANSPORATION	
FEBRUARY 25, 2015	NOT TO SCALE

Michael Baker
INTERNATIONAL

We Make a Difference

Attachment K5:

NCHRP Spreadsheet Build – AM Peak Period

WARNING: HIGH GROWTH LINKS

USER INPUT
OPTIONAL INPUT
FINAL REFINED FORECAST

NCHRP255 adjustment process

	COL 1 Road/Link	COL 2 in Di	COL 3 ax R	COL 4 se S	COL 4 near base model count year	COL 5 count data	COL 6 2025 Ab	COL 7 Ab interpolate	COL 8 2045 Af-D
(east leg)	Arcadia Ave	0.5	2	Disa	2020	260	144	88	369
(north leg)	Indianola Ave	0.5	2	Disa	2020	2167	1062	965	1451
(west leg)	Arcadia Ave	0.5	2	Disa	2020	1249	743	611	1272
(south leg)	Indianola Ave	0.5	2	Disa	2020	2308	1037	845	1806
Total						**5984**		**2509**	

	COL 8.5 SLRATIO	COL 9 RATIO	COL 10 DIFF	COL 10.5 MRATIO	COL 11 RAf	COL 12 Selected Adjustment	COL 13 Selected Volume
(east leg)	880	1090	541	672	607	**DIFF**	**541**
(north leg)	3461	3258	2653	3055	2854	**DIFF**	**2653**
(west leg)	3034	2600	1910	2241	2076	**DIFF**	**1910**
(south leg)	4307	4933	3269	4048	3659	**DIFF**	**3269**

Interpolate opening & design year & adjust for more recent count

	COL 14 most recent count year	COL 15 most recent count data	COL 16 recent count delta	COL 17 2024 opening year	COL 18 2044 design yr	COL 19 growth factors opening yr	COL 20 growth factors design year	COL 21 annual growth check
(east leg)			0	305	530	1.173	2.039	3.69%
(north leg)			0	2245	2634	1.036	1.216	0.87%
(west leg)			0	1355	1884	1.085	1.508	1.95%
(south leg)			0	2462	3231	1.067	1.400	1.56%

There are hidden rows if you want more roads in your intersection/screenline

There are hidden columns for opening year model results if you have them

Optional Capacity Adjuster
Use this for screenlines, not intersection approaches

	Capacity	delta opening yr	delta design year	revised volume opening yr	revised volume design year	growth factors opening yr	growth factors design year
(east leg)		-305	-530	305	530	1.173	2.039
(north leg)		-2245	-2634	2245	2634	1.036	1.216
(west leg)		-1355	-1884	1355	1884	1.085	1.508
(south leg)		-2462	-3231	2462	3231	1.067	1.400
	0	**0**	**0**				
		-6367	**-8279**				

	Year	
Model Base	2025	
Model Opening (opt)		if Yo=Yb then also must = Yc (col4)
Model Forecast	2045	must be > Yb
Project Opening	2024	
Project Design	2044	

General Notes

General rule: if MR<1 then if ***RATIO*** *<= 1.0 then use R*
OR if RATIO >= 2 then use DIFF else use Raf ,
if MR>1 then if RATIO <=0.5 then use MRATIO, OR
if RATIO >=2 then use DIFF, else use Raf(based on MRA
Which you can change if it makes sense,
make both of columns 2-3 very large to force ratios,
make them 0 to force differences

Make sure model opening year (if used)
is greater existing and less than forecast
EXCEPT…
If you want to use a base year build run
to establish trends, set Af-ON=Ab
set model open year=base year=count year
Place build run in Af-OB
Do not use cols 14-15 in this case

If you have a non-model forecast you
want to enter to interpolate and calculate
growth rate, put it in column 8 (Af) then copy
column 5 to column 6 and set model base
to count year (Type toggle does this for you on TM sheet)

Design year no build is a separate alternative
create a new sheet for it

You can omit open year model, have just an
open year no build or both no build and
build, but don't have a build without
a no build unless it's a new link.

If you have a new link it will get a growth rate of 1.0
To get forecast turn movements for new links you must
enter the model turns in section 2 of the turn movement sheets.

A value of zero in a field usually means zero, leave fields blank if you want them
ignored. If link doesn't exist in base, count=Ab=blank. If link doesn't exist in build,
make zero, not blank in this case (Af-OB actually controls this).

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	6	Ab	base year traffic assignment - user to input year:
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*	9	RATIO	adjusted future year traffic forecast (**COUNT**/**Ab**) * **Af**
*	10	DIFF	adjusted future year traffic forecast (**COUNT** - **Ab**) + **Af**
*	10.5	MRATIO	adjusted future year traffic forecast modified "ratio method" to weight towards DIFF method for large model increases: if MR<1 = RATIO else = ((MR-1)*DIFF + RATIO)/MR
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*	13	Selected Volume	The selected adjusted forecast year model volume
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	17	opening year	final refined forecast for the opening year - user to input year
	18	design year	final refined forecast for the design year - user to input year
	19	growth factorop	growth factor to apply to most recent count to obtain opening year (SET to 1.0 if no count given)
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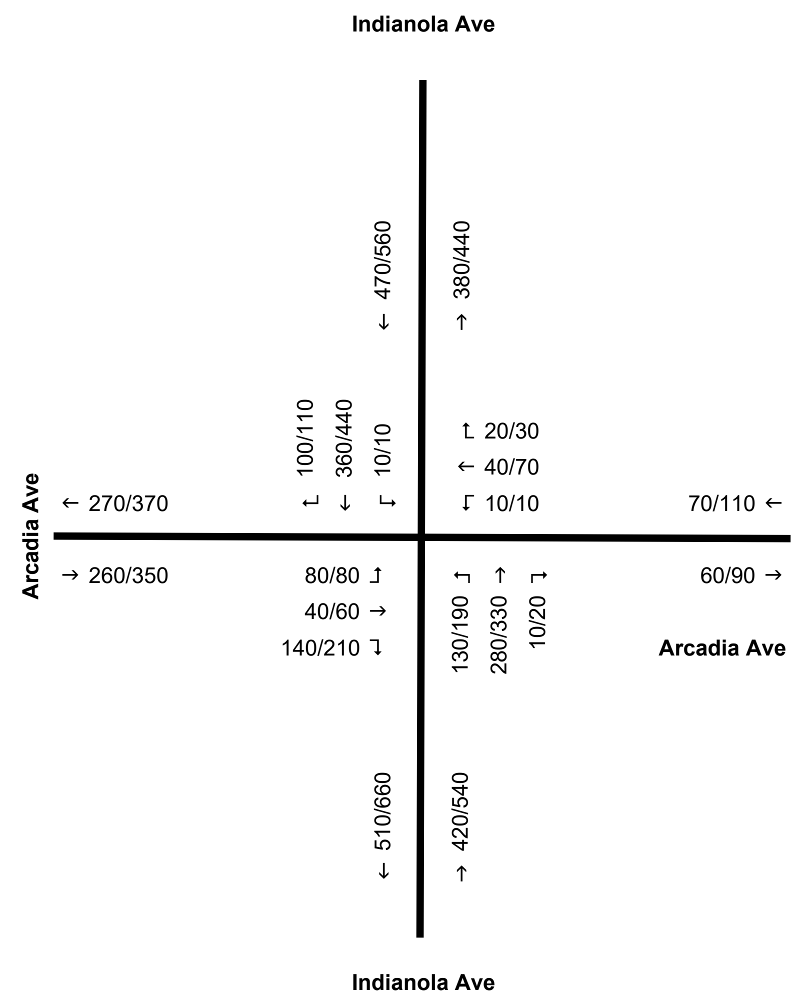
Screenline Options (see field 3.5 description)
Enable
Disable
Force

POR-43-10.26
PID93442
PLATE 1 OF 1

2024/2044 A.M. DHV



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POR-43-10.26	PID93442
2024/2044 ADT, AM DHV, PM DHV	
OHIO DEPARTMENT OF TRANSPORATION	
FEBRUARY 25, 2015	NOT TO SCALE

USER INPUT
OPTIONAL INPUT
FINAL REFINED FORECAST

NCHRP255 adjustment process

	COL 1 Road/Link	COL 2 in Di	COL 3 ax R	COL 4 se S	COL 4 near base model count year	COL 5 count data	COL 6 2025 Ab	COL 7 Ab interpolate	COL 8 2045 Af-D	COL 8.5 SLRATIO	COL 9 RATIO	COL 10 DIFF	COL 10.5 MRATIO	COL 11 RAf	COL 12 Selected Adjustment	COL 13 Selected Volume
(east leg)	E North Broadway	0.5	2	Disa	2020	5235	4899	4716	5630	8445	6250	6149	6234	6192	**RAf**	**6192**
(north leg)	Indianola Ave	0.5	2	Disa	2020	3804	1550	1436	2008	3012	5319	4376	5050	4713	**DIFF**	**4376**
(west leg)	E North Broadway	0.5	2	Disa	2020	3856	3621	3463	4252	6378	4735	4645	4718	4682	**RAf**	**4682**
(south leg)	Indianola Ave	0.5	2	Disa	2020	2391	632	576	855	1282	3549	2670	3262	2966	**DIFF**	**2670**
Total						**15286**		**10191**								

Interpolate opening & design year & adjust for more recent count

	COL 14 most recent count year	COL 15 most recent count data	COL 16 recent count delta	COL 17 2024 opening year	COL 18 2044 design yr	COL 19 growth factors opening yr	COL 20 growth factors design year	COL 21 annual growth check
(east leg)			0	5388	6154	1.029	1.176	0.71%
(north leg)			0	3896	4353	1.024	1.144	0.59%
(west leg)			0	3988	4649	1.034	1.206	0.83%
(south leg)			0	2436	2659	1.019	1.112	0.46%

There are hidden rows if you want more roads in your intersection/screenline

There are hidden columns for opening year model results if you have them

Optional Capacity Adjuster
Use this for screenlines, not intersection approaches

	Capacity	delta opening yr	delta design year	revised volume opening yr	revised volume design year	growth factors opening yr	growth factors design year
(east leg)		-5388	-6154	5388	6154	1.029	1.176
(north leg)		-3896	-4353	3896	4353	1.024	1.144
(west leg)		-3988	-4649	3988	4649	1.034	1.206
(south leg)		-2436	-2659	2436	2659	1.019	1.112
	0	**0**	**0**				
		-15708	**-17815**				

	Year	
Model Base	2025	
Model Opening (opt)		if Yo=Yb then also must = Yc (col4)
Model Forecast	2045	must be > Yb
Project Opening	2024	
Project Design	2044	

General Notes

General rule: if MR<1 then if ***RATIO*** *<= 1.0 then use R*
OR if RATIO >= 2 then use DIFF else use Raf ,
if MR>1 then if RATIO <=0.5 then use MRATIO, OR
if RATIO >=2 then use DIFF, else use Raf(based on MRA
Which you can change if it makes sense,
make both of columns 2-3 very large to force ratios,
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Make sure model opening year (if used)
is greater existing and less than forecast
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If you want to use a base year build run
to establish trends, set Af-ON=Ab
set model open year=base year=count year
Place build run in Af-OB
Do not use cols 14-15 in this case

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Screenline Options (see field 3.5 description)
Enable
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POR-43-10.26
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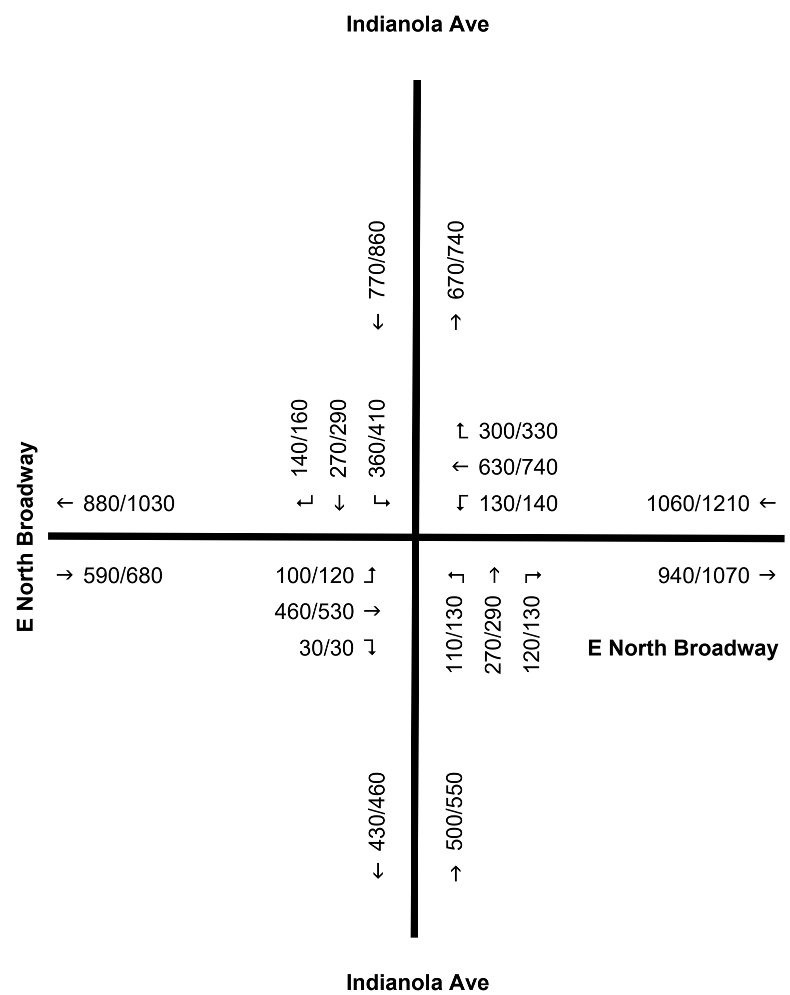
PLATE 1 OF 1

2024/2044 A.M. DHV



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2024/2044 ADT, AM DHV, PM DHV	
OHIO DEPARTMENT OF TRANSPORATION	
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WARNING: HIGH GROWTH LINKS

USER INPUT
OPTIONAL INPUT
FINAL REFINED FORECAST

NCHRP255 adjustment process — *Interpolate opening & design year & adjust for more recent count*

	COL 1 Road/Link	COL 2 in Di	COL 3 ax R	COL 4 se S	COL 4 near base model count year	COL 5 count data	COL 6 2025 Ab	COL 7 Ab interpolate	COL 8 2045 Af-D	COL 8.5 SLRATIO	COL 9 RATIO	COL 10 DIFF	COL 10.5 MRATIO	COL 11 RAf	COL 12 Selected Adjustment	COL 13 Selected Volume	COL 14 most recent count year	COL 15 most recent count data	COL 16 recent count delta	COL 17 2024 opening year	COL 18 2044 design yr	COL 19 growth factors opening yr	COL 20 growth factors design year	COL 21 annual growth check
(east leg)	E Hudson St	0.5	2	Disa	2020	4796	4577	4576	4581	5377	4801	4801	4801	4801	RAf	**4801**			0	4797	4801	1.000	1.001	0.00%
(north leg)	Summit St	0.5	2	Disa	2020	121	58	58	296	347	618	359	410	385	DIFF	**359**			0	159	349	1.314	2.884	5.97%
(west leg)	E Hudson St	0.5	2	Disa	2020	4771	3910	3835	4211	4942	5239	5147	5231	5189	RAf	**5189**			0	4838	5172	1.014	1.084	0.35%
(south leg)	Summit St	0.5	2	Disa	2020	1700	1285	1234	1488	1746	2050	1954	2034	1994	RAf	**1994**			0	1747	1982	1.028	1.166	0.67%
Total						**11388**		**9703**																

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There are hidden columns for opening year model results if you have them

Optional Capacity Adjuster
Use this for screenlines, not intersection approaches

Capacity	delta opening yr	delta design year	revised volume opening yr	revised volume design year	growth factors opening yr	growth factors design year
	-4797	-4801	4797	4801	1.000	1.001
	-159	-349	159	349	1.314	2.884
	-4838	-5172	4838	5172	1.014	1.084
	-1747	-1982	1747	1982	1.028	1.166
0	**0**	**0**				
	-11541	**-12304**				

	Year	
Model Base	2025	
Model Opening (opt)		if Yo=Yb then also must = Yc (col4)
Model Forecast	2045	must be > Yb
Project Opening	2024	
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General Notes

General rule: if MR<1 then if ***RATIO*** *<= 1.0 then use R*
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Make sure model opening year (if used)
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If you want to use a base year build run
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2	Min Diff	Minimum Count/Model Ratio for using differences, below this use ratios alone
3	Max Rat	Maximum Count/Model Ratio for using ratios, above this use differences alone
3.5	Use SL	Set to "Enable" to allow use of screen line adjustments for this leg if no count available, set to "Disable" to disable giving no adjustment of model result, set to "Force" to force SL adjustment
4	COUNT year	year of the actual base year traffic count
5	COUNT	actual base year traffic count
6	Ab	base year traffic assignment - user to input year:
7	Ab interpolate	interpolation between base and future year assignment -- used when year of count data differs from base year assignment, will use open-nobuild to base interp if open nobuild exists, otherwise will use design to base interp
7.1	R	Calculated Ratio **(COUNT/Ab)**
7.2	D	Calculated Difference **(COUNT-Ab)**
7.3	MR	Model Ratio **(AfD/Ab)**
7.4	SLR	Screenline Ratio **(ΣCount/ΣAb)**
* 8	Af	future year traffic assignment - Af-D= (near) design yr model run, Af-ON=optional (near) opening year no build model run, Af-OB=optional (near) opening year build model run
* 8.5	SLRATIO	adjusted future year traffic forecast (ΣCount/ΣAb)*Af
* 9	RATIO	adjusted future year traffic forecast (**COUNT/Ab**) * **Af**
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* 10.5	MRATIO	adjusted future year traffic forecast modified "ratio method" to weight towards DIFF method for large model increases: if MR<1 = RATIO else = ((MR-1)*DIFF + RATIO)/MR
* 11	RAf	adjusted future year traffic forecast (AVERAGE(M**RATIO**, **DIFF**))
* 12	lected Adjustme	Selects the type of future year adjustment based on the ratio of actual base year traffic count to interpolated base year traffic assignment *general rule: if MR<1 then if RATIO <= 1.0 then use RATIO, OR if RATIO >= 2 then use DIFF else use Raf , if MR>1 then if RATIO <=0.5 then use MRATIO, OR if RATIO >=2 then use DIFF, else use Raf(based on MRATIO)*
* 13	Selected Volume	The selected adjusted forecast year model volume
14	most recent cou	year of the most recently available actual count data (should be <Yo, if Yo=Yb generally won't use)
15	most recent cou	most recently available actual count data for the facility
16	ecent Count Del	Forecast adjustment based on difference of more recent count from interpolation resulting from base count and first forecast year
17	opening year	final refined forecast for the opening year - user to input year
18	design year	final refined forecast for the design year - user to input year
19	growth factorop	growth factor to apply to most recent count to obtain opening year (SET to 1.0 if no count given)
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* Columns 8-13 repeated for open year build and nobuild (hidden)

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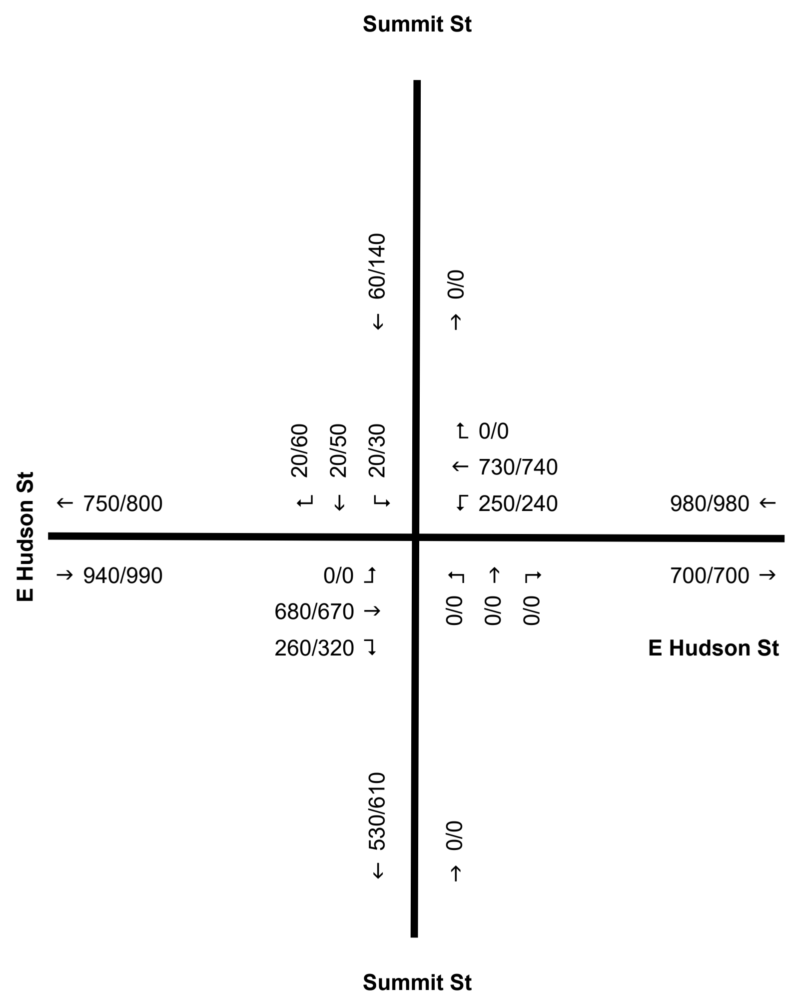
3. (standard) Have base count and NO open yr model run THUS interpolate btwn count and adj design yr model run
4. Have no base count THUS interpolate calculate growth from Unadj base and design yr model runs and apply growth rate to number of years different from model design yr

Screenline Options (see field 3.5 description)
Enable
Disable
Force

POR-43-10.26
PID93442
PLATE 1 OF 1

2024/2044 A.M. DHV



POR-43-10.26	PID93442
2024/2044 ADT, AM DHV, PM DHV	
OHIO DEPARTMENT OF TRANSPORATION	
FEBRUARY 25, 2015	NOT TO SCALE

USER INPUT
OPTIONAL INPUT
FINAL REFINED FORECAST

NCHRP255 adjustment process / **Interpolate opening & design year & adjust for more recent count**

	COL 1 Road/Link	COL 2 in Di	COL 3 ax R	COL 4 se S	COL 4 near base model count year	COL 5 count data	COL 6 2025 Ab	COL 7 Ab interpolate	COL 8 2045 Af-D	COL 8.5 SLRATIO	COL 9 RATIO	COL 10 DIFF	COL 10.5 MRATIO	COL 11 RAf	COL 12 Selected Adjustment	COL 13 Selected Volume
(east leg)	Hudson St	0.5	2	Disa	2020	4627	3910	3835	4211	5335	5081	5003	5074	5039	**RAf**	**5039**
(north leg)	Indianola Ave	0.5	2	Disa	2020	2378	1037	845	1806	2288	5082	3339	4155	3747	**DIFF**	**3339**
(west leg)	Hudson St	0.5	2	Disa	2020	3020	3049	3152	2639	3344	2528	2507	2528	2518	**RATIO**	**2528**
(south leg)	Indianola Ave	0.5	2	Disa	2020	983	980	856	1478	1873	1697	1605	1658	1632	**RAf**	**1632**
Total						**11008**		**8688**								

	COL 14 most recent count year	COL 15 most recent count data	COL 16 recent count delta	COL 17 2024 opening year	COL 18 2044 design yr	COL 19 growth factors opening yr	COL 20 growth factors design year	COL 21 annual growth check
(east leg)			0	4693	5023	1.014	1.086	0.35%
(north leg)			0	2532	3301	1.065	1.388	1.52%
(west leg)			0	2941	2548	0.974	0.844	-0.67%
(south leg)			0	1087	1606	1.106	1.634	2.39%

Optional Capacity Adjuster
Use this for screenlines, not intersection approaches

	Capacity	delta opening yr	delta design year	revised volume opening yr	revised volume design year	growth factors opening yr	growth factors design year
(east leg)		-4693	-5023	4693	5023	1.014	1.086
(north leg)		-2532	-3301	2532	3301	1.065	1.388
(west leg)		-2941	-2548	2941	2548	0.974	0.844
(south leg)		-1087	-1606	1087	1606	1.106	1.634
	0	**0**	**0**				
		-11253	**-12478**				

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There are hidden columns for opening year model results if you have them

	Year	
Model Base	2025	
Model Opening (opt)		if Yo=Yb then also must = Yc (col4)
Model Forecast	2045	must be > Yb
Project Opening	2024	
Project Design	2044	

General Notes

General rule: if MR<1 then if ***RATIO*** *<= 1.0 then use R*
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Which you can change if it makes sense,
make both of columns 2-3 very large to force ratios,
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Make sure model opening year (if used)
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EXCEPT…
If you want to use a base year build run
to establish trends, set Af-ON=Ab
set model open year=base year=count year
Place build run in Af-OB
Do not use cols 14-15 in this case

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column 5 to column 6 and set model base
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Design year no build is a separate alternative
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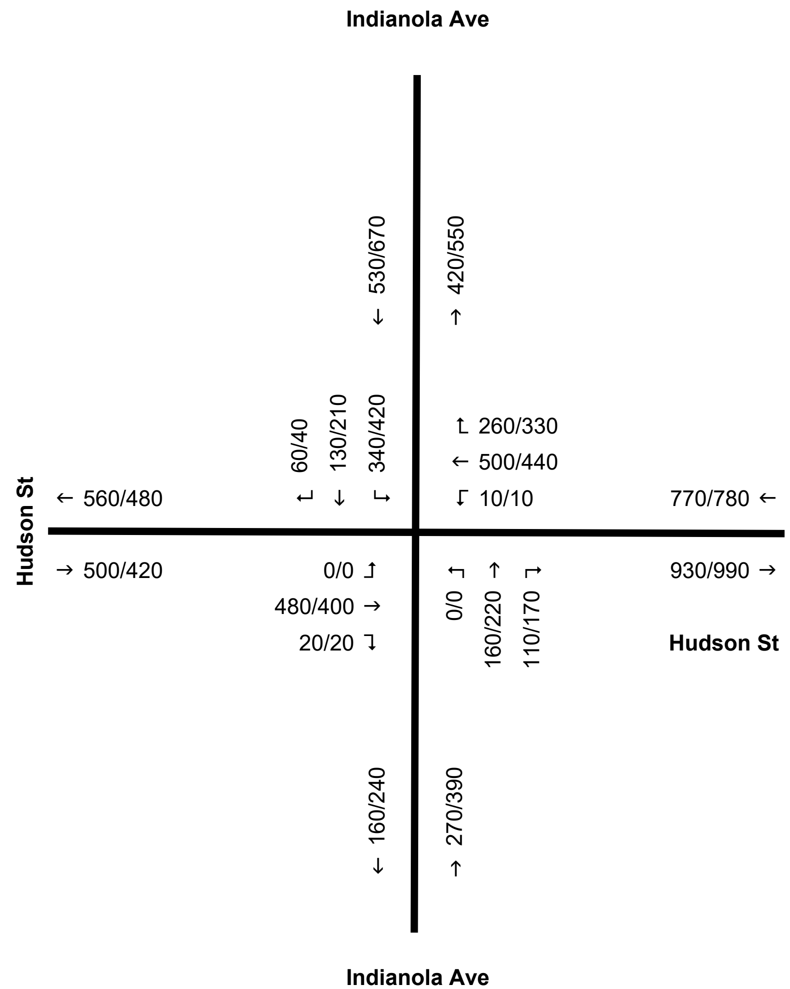
POR-43-10.26
PID93442
PLATE 1 OF 1

2024/2044 A.M. DHV



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2024/2044 ADT, AM DHV, PM DHV	
OHIO DEPARTMENT OF TRANSPORATION	
FEBRUARY 25, 2015	NOT TO SCALE

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NCHRP255 adjustment process — ***Interpolate opening & design year & adjust for more recent count***

	COL 1	COL 2	COL 3	COL 4	COL 4	COL 5	COL 6	COL 7	COL 8	COL 8.5	COL 9	COL 10	COL 10.5	COL 11	COL 12	COL 13	COL 14	COL 15	COL 16	COL 17	COL 18	COL 19	COL 20	COL 21
					near base model		2025		2045						Selected	Selected	most recent	most recent	recent count	2024	2044	growth factors		annual growth
	Road/Link	in Di	ax R	se S	count year	count data	Ab	Ab interpolate	Af-D	SLRATIO	RATIO	DIFF	MRATIO	RAf	Adjustment	Volume	count year	count data	delta	opening year	design yr	opening yr	design year	check
(east leg)	Oakland Park Ave	0.5	2	Disa	2020	548	548	548	548	1138	548	548	548	548	**RATIO**	**548**			0	548	548	1.000	1.000	0.00%
(north leg)	Indianola Ave	0.5	2	Disa	2020	3420	1550	1436	2008	4169	4782	3992	4557	4275	**DIFF**	**3992**			0	3512	3969	1.027	1.161	0.65%
(west leg)	Oakland Park Ave	0.5	2	Disa	2020	538	538	538	538	1117	538	538	538	538	**RATIO**	**538**			0	538	538	1.000	1.000	0.00%
(south leg)	Indianola Ave	0.5	2	Disa	2020	3712	1550	1436	2008	4169	5191	4284	4933	4609	**DIFF**	**4284**			0	3804	4261	1.025	1.148	0.60%
Total						**8218**		**3958**																

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Optional Capacity Adjuster
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	delta		revised volume		growth factors	
Capacity	opening yr	design yea	opening yr	design yea	opening yr	design year
	-548	-548	548	548	1.000	1.000
	-3512	-3969	3512	3969	1.027	1.161
	-538	-538	538	538	1.000	1.000
	-3804	-4261	3804	4261	1.025	1.148
0	**0**	**0**				
	-8402	**-9316**				

	Year	
Model Base	2025	
Model Opening (opt)		if Yo=Yb then also must = Yc (col4)
Model Forecast	2045	must be > Yb
Project Opening	2024	
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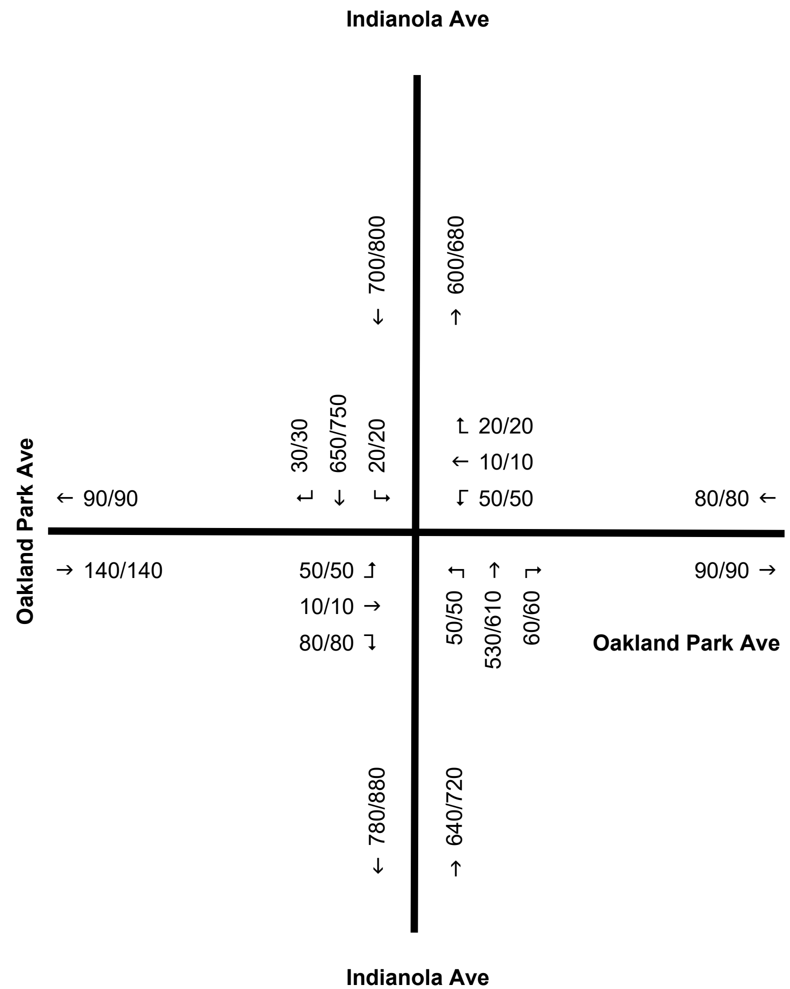
PLATE 1 OF 1

2024/2044 A.M. DHV



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(east leg)	E Weber Rd	0.5	2	Disa	2020	1968	4222	4074	4813	4466	2325	2707	2384	2546
(north leg)	Indianola Ave	0.5	2	Disa	2020	2063	407	383	502	466	2704	2182	2580	2381
(west leg)	E Weber Rd	0.5	2	Disa	2020	1803	3519	3389	4039	3747	2149	2453	2198	2326
(south leg)	Indianola Ave	0.5	2	Disa	2020	2148	824	757	1092	1013	3099	2483	2910	2697
Total						**7982**		**8603**						

	COL 12 Selected Adjustment	COL 13 Selected Volume	COL 14 most recent count year	COL 15 most recent count data	COL 16 recent count delta	COL 17 2024 opening year	COL 18 2044 design yr	COL 19 growth factors opening yr	COL 20 growth factors design year	COL 21 annual growth check
(east leg)	**MRATIO**	**2384**			0	2035	2367	1.034	1.203	0.82%
(north leg)	**DIFF**	**2182**			0	2082	2177	1.009	1.055	0.23%
(west leg)	**RAf**	**2326**			0	1887	2305	1.047	1.278	1.11%
(south leg)	**DIFF**	**2483**			0	2202	2470	1.025	1.150	0.61%

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Capacity	delta opening yr	delta design year	revised volume opening yr	revised volume design year	growth factors opening yr	growth factors design year
	-2035	-2367	2035	2367	1.034	1.203
	-2082	-2177	2082	2177	1.009	1.055
	-1887	-2305	1887	2305	1.047	1.278
	-2202	-2470	2202	2470	1.025	1.150
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3	Max Rat	Maximum Count/Model Ratio for using ratios, above this use differences alone
3.5	Use SL	Set to "Enable" to allow use of screen line adjustments for this leg if no count available, set to "Disable" to disable giving no adjustment of model result, set to "Force" to force SL adjustment
4	COUNT year	year of the actual base year traffic count
5	COUNT	actual base year traffic count
6	Ab	base year traffic assignment - user to input year:
7	Ab interpolate	interpolation between base and future year assignment -- used when year of count data differs from base year assignment, will use open-nobuild to base interp if open nobuild exists, otherwise will use design to base interp
7.1	R	Calculated Ratio **(COUNT/Ab)**
7.2	D	Calculated Difference **(COUNT-Ab)**
7.3	MR	Model Ratio **(AfD/Ab)**
7.4	SLR	Screenline Ratio **(ΣCount/ΣAb)**
* 8	Af	future year traffic assignment - Af-D= (near) design yr model run, Af-ON=optional (near) opening year no build model run, Af-OB=optional (near) opening year build model run
* 8.5	SLRATIO	adjusted future year traffic forecast (ΣCount/ΣAb)*Af
* 9	RATIO	adjusted future year traffic forecast **(COUNT/Ab) * Af**
* 10	DIFF	adjusted future year traffic forecast **(COUNT - Ab) + Af**
* 10.5	MRATIO	adjusted future year traffic forecast modified "ratio method" to weight towards DIFF method for large model increases: if MR<1 = RATIO else = ((MR-1)*DIFF + RATIO)/MR
* 11	RAf	adjusted future year traffic forecast (AVERAGE(M**RATIO**, **DIFF**))
* 12	lected Adjustme	Selects the type of future year adjustment based on the ratio of actual base year traffic count to interpolated base year traffic assignment *general rule: if MR<1 then if RATIO <= 1.0 then use RATIO, OR if RATIO >= 2 then use DIFF else use Raf , if MR>1 then if RATIO <=0.5 then use MRATIO, OR if RATIO >=2 then use DIFF, else use Raf(based on MRATIO)*
* 13	Selected Volume	The selected adjusted forecast year model volume
14	most recent cou	year of the most recently available actual count data (should be <Yo, if Yo=Yb generally won't use)
15	most recent cou	most recently available actual count data for the facility
16	ecent Count Del	Forecast adjustment based on difference of more recent count from interpolation resulting from base count and first forecast year
17	opening year	final refined forecast for the opening year - user to input year
18	design year	final refined forecast for the design year - user to input year
19	growth factorop	growth factor to apply to most recent count to obtain opening year (SET to 1.0 if no count given)
20	growth factorde	growth factor to apply to most recent count to obtain design year (SET to 1.0 if no count given)

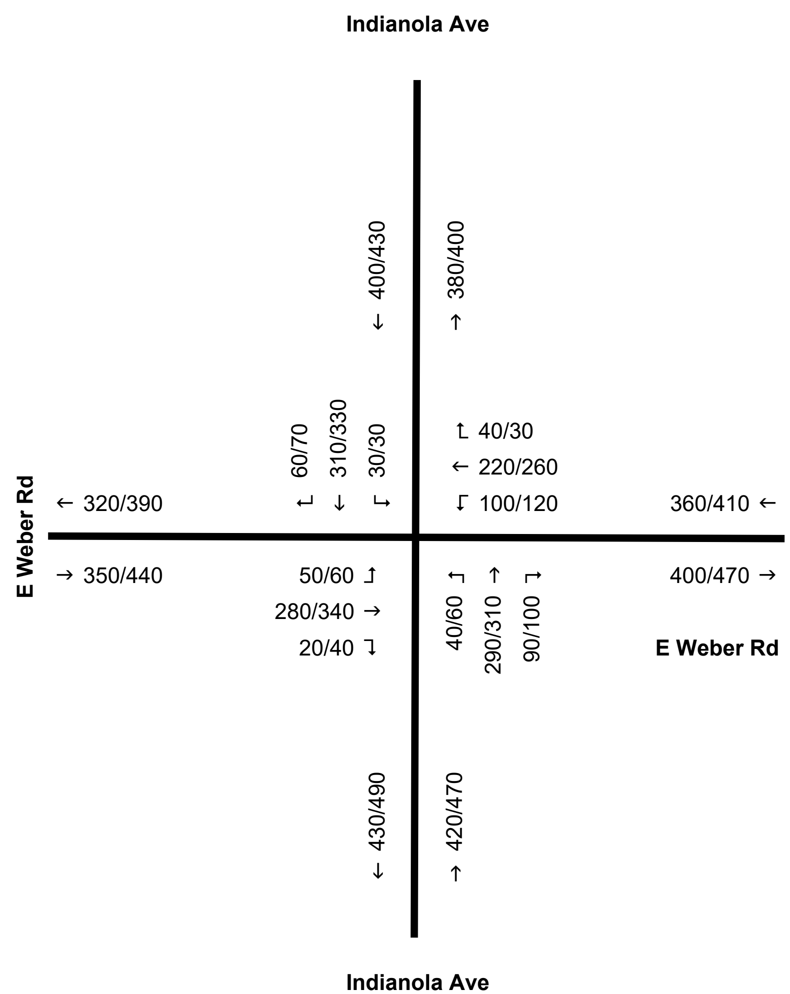
* Columns 8-13 repeated for open year build and nobuild (hidden)

Four Interpolation Cases
1. Have base count and open yr model run and interp year<model open yr THUS interpolate btwn base count and adj open yr model run except for open yr<model open yr which uses case 2
2. Have open yr model run and interp yr> open model yr (or interpolating any opening year) THUS interopolate btwn adj open yr and adj design yr model runs
3. (standard) Have base count and NO open yr model run THUS interpolate btwn count and adj design yr model run
4. Have no base count THUS interpolate calculate growth from Unadj base and design yr model runs and apply growth rate to number of years different from model design yr

Screenline Options (see field 3.5 description)
Enable
Disable
Force

POR-43-10.26
PID93442
PLATE 1 OF 1

2024/2044 A.M. DHV



POR-43-10.26	PID93442
2024/2044 ADT, AM DHV, PM DHV	
OHIO DEPARTMENT OF TRANSPORATION	
FEBRUARY 25, 2015	NOT TO SCALE

Michael Baker INTERNATIONAL

We Make a Difference

Attachment K6:

NCHRP Spreadsheet Build – PM Peak Period

USER INPUT
OPTIONAL INPUT
FINAL REFINED FORECAST

NCHRP255 adjustment process | **Interpolate opening & design year & adjust for more recent count**

	COL 1 Road/Link	COL 2 in Di	COL 3 ax R	COL 4 se S	COL 4 near base model count year	COL 5 count data	COL 6 2025 Ab	COL 7 Ab interpolate	COL 8 2045 Af-D	COL 8.5 SLRATIO	COL 9 RATIO	COL 10 DIFF	COL 10.5 MRATIO	COL 11 RAf	COL 12 Selected Adjustment	COL 13 Selected Volume	COL 14 most recent count year	COL 15 most recent count data	COL 16 recent count delta	COL 17 2024 opening year	COL 18 2044 design yr	COL 19 growth factors opening yr	COL 20 growth factors design year	COL 21 annual growth check
(east leg)	Arcadia Ave	0.5	2	Disa	2020	398	343	310	475	986	610	563	594	579	**RAf**	**579**			0	427	572	1.073	1.437	1.70%
(north leg)	Indianola Ave	0.5	2	Disa	2020	3672	1442	1366	1746	3625	4693	4052	4553	4303	**DIFF**	**4052**			0	3733	4037	1.017	1.099	0.41%
(west leg)	Arcadia Ave	0.5	2	Disa	2020	2103	1598	1612	1541	3199	2010	2032	2010	2021	**RAf**	**2021**			0	2090	2024	0.994	0.962	-0.16%
(south leg)	Indianola Ave	0.5	2	Disa	2020	3893	1709	1561	2300	4775	5736	4632	5381	5007	**DIFF**	**4632**			0	4011	4602	1.030	1.182	0.74%
Total						**10066**		**4849**																

There are hidden rows if you want more roads in your intersection/screenline

There are hidden columns for opening year model results if you have them

Optional Capacity Adjuster
Use this for screenlines, not intersection approaches

Capacity	delta opening yr	delta design year	revised volume opening yr	revised volume design year	growth factors opening yr	growth factors design year
	-427	-572	427	572	1.073	1.437
	-3733	-4037	3733	4037	1.017	1.099
	-2090	-2024	2090	2024	0.994	0.962
	-4011	-4602	4011	4602	1.030	1.182
0	**0**	**0**				
	-10261	**-11235**				

	Year	
Model Base	2025	
Model Opening (opt)		if Yo=Yb then also must = Yc (col4)
Model Forecast	2045	must be > Yb
Project Opening	2024	
Project Design	2044	

General Notes

General rule: if MR<1 then if ***RATIO*** *<= 1.0 then use R*
OR if RATIO >= 2 then use DIFF else use Raf ,
if MR>1 then if RATIO <=0.5 then use MRATIO, OR
if RATIO >=2 then use DIFF, else use Raf(based on MRA
Which you can change if it makes sense,
make both of columns 2-3 very large to force ratios,
make them 0 to force differences

Make sure model opening year (if used)
is greater existing and less than forecast
EXCEPT…
If you want to use a base year build run
to establish trends, set Af-ON=Ab
set model open year=base year=count year
Place build run in Af-OB
Do not use cols 14-15 in this case

If you have a non-model forecast you
want to enter to interpolate and calculate
growth rate, put it in column 8 (Af) then copy
column 5 to column 6 and set model base
to count year (Type toggle does this for you on TM sheet)

Design year no build is a separate alternative
create a new sheet for it

You can omit open year model, have just an
open year no build or both no build and
build, but don't have a build without
a no build unless it's a new link.

If you have a new link it will get a growth rate of 1.0
To get forecast turn movements for new links you must
enter the model turns in section 2 of the turn movement sheets.

A value of zero in a field usually means zero, leave fields blank if you want them
ignored. If link doesn't exist in base, count=Ab=blank. If link doesn't exist in build,
make zero, not blank in this case (Af-OB actually controls this).

There is no guarantee a forecast volume of zero will
be respected as zero by the 255 adjustments.

If you have an existing intersection link that wasn't in the model
enter its counts in the appropriate places here and on the
TM sheets. You will need to over-ride columns 19-20
of this sheet with an exogenously supplied growth rate.

If you have a new intersection on an existing road you can
enter the main line counts/model volumes (Ab and Af-ON)
here and on the TM sheets (as Thru movements) and then
the full set of volumes/turns for Af-OB and Af-D
You may want to disable screenlines in this case.

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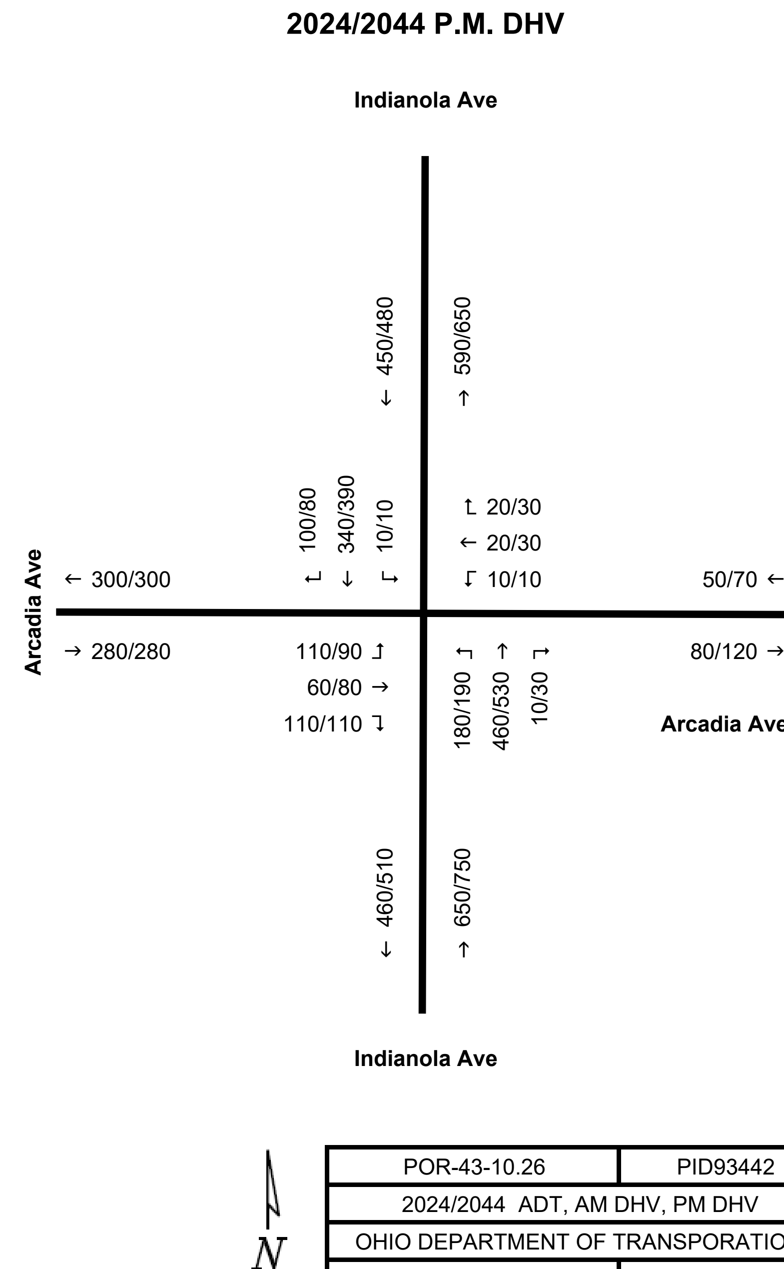
Screenline Options (see field 3.5 description)
Enable
Disable
Force

POR-43-10.26
PID93442
PLATE 1 OF 1



POR-43-10.26	PID93442
2024/2044 ADT, AM DHV, PM DHV	
OHIO DEPARTMENT OF TRANSPORATION	
FEBRUARY 25, 2015	NOT TO SCALE

USER INPUT
OPTIONAL INPUT
FINAL REFINED FORECAST

NCHRP255 adjustment process

	COL 1	COL 2	COL 3	COL 4	COL 4	COL 5	COL 6	COL 7	COL 8	COL 8.5	COL 9	COL 10	COL 10.5	COL 11
					near base model		2025		2045					
	Road/Link	in Di	ax R	se S	count year	count data	Ab	Ab^interpolate	Af-D	SLRATIO	RATIO	DIFF	MRATIO	RAf
(east leg)	E North Broadway	0.5	2	Disa	2020	7022	7533	7302	8458	12149	8134	8178	8140	8159
(north leg)	Indianola Ave	0.5	2	Disa	2020	5744	1613	1493	2094	3008	8056	6345	7565	6955
(west leg)	E North Broadway	0.5	2	Disa	2020	5572	6163	5993	6842	9828	6361	6421	6368	6395
(south leg)	Indianola Ave	0.5	2	Disa	2020	3994	797	759	950	1365	4999	4185	4835	4510
Total						22332		15547						

Interpolate opening & design year & adjust for more recent count

	COL 12	COL 13	COL 14	COL 15	COL 16	COL 17	COL 18	COL 19	COL 20	COL 21
	Selected	Selected	most recent	most recent	recent count	2024	2044	growth factors		annual growth
	Adjustment	Volume	count year	count data	delta	opening year	design yr	opening yr	design year	check
(east leg)	**RAf**	**8159**			0	7204	8114	1.026	1.156	0.63%
(north leg)	**DIFF**	**6345**			0	5840	6321	1.017	1.101	0.41%
(west leg)	**RAf**	**6395**			0	5704	6362	1.024	1.142	0.58%
(south leg)	**DIFF**	**4185**			0	4025	4177	1.008	1.046	0.19%

Optional Capacity Adjuster
Use this for screenlines, not intersection approaches

	Capacity	delta opening yr	delta design year	revised volume opening yr	revised volume design year	growth factors opening yr	growth factors design year
(east leg)		-7204	-8114	7204	8114	1.026	1.156
(north leg)		-5840	-6321	5840	6321	1.017	1.101
(west leg)		-5704	-6362	5704	6362	1.024	1.142
(south leg)		-4025	-4177	4025	4177	1.008	1.046
	0	**0**	**0**				
		-22773	**-24974**				

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	Year	
Model Base	2025	
Model Opening (opt)		if Yo=Yb then also must = Yc (col4)
Model Forecast	2045	must be > Yb
Project Opening	2024	
Project Design	2044	

General Notes

General rule: if MR<1 then if ***RATIO*** *<= 1.0 then use R*
OR if RATIO >= 2 then use DIFF else use Raf ,
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Make sure model opening year (if used)
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to establish trends, set Af-ON=Ab
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Screenline Options (see field 3.5 description)
Enable
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POR-43-10.26
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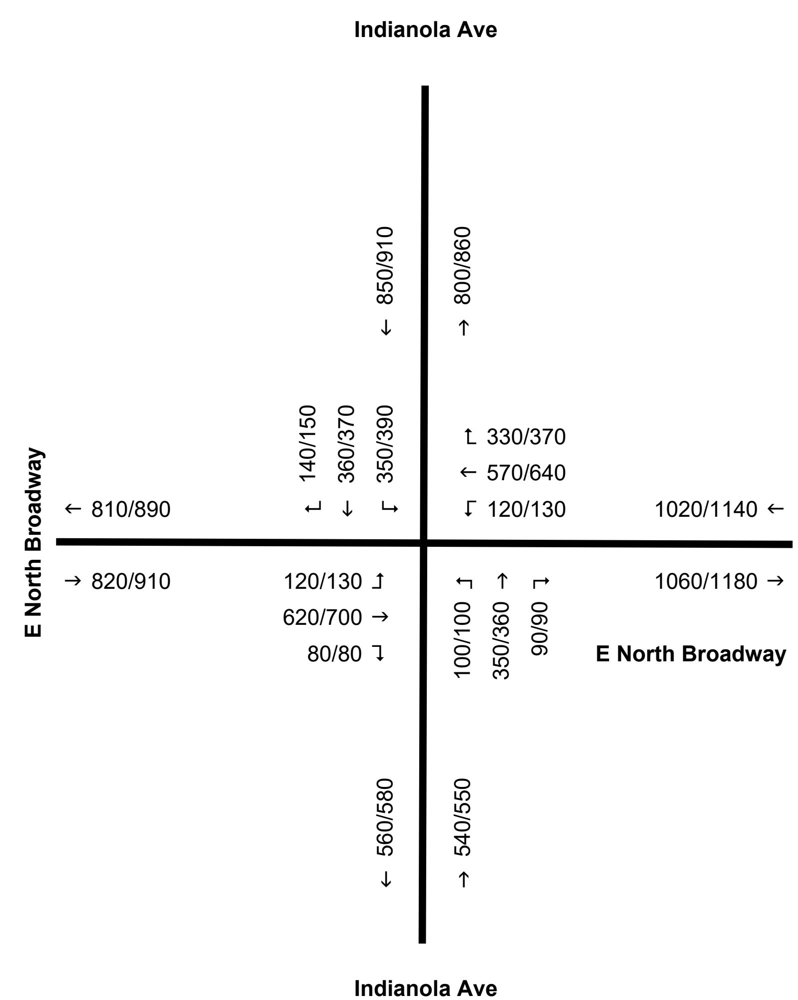
PLATE 1 OF 1

2024/2044 P.M. DHV



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WARNING: HIGH GROWTH LINKS

USER INPUT
OPTIONAL INPUT
FINAL REFINED FORECAST

NCHRP255 adjustment process / **Interpolate opening & design year & adjust for more recent count**

	COL 1	COL 2	COL 3	COL 4	COL 4	COL 5	COL 6	COL 7	COL 8	COL 8.5	COL 9	COL 10	COL 10.5	COL 11	COL 12	COL 13	COL 14	COL 15	COL 16	COL 17	COL 18	COL 19	COL 20	COL 21
					near base model		2025		2045						Selected	Selected	most recent	most recent	recent count	2024	2044	growth factors		annual growth
	Road/Link	in Di	ax R	se S	count year	count data	Ab	Ab interpolate	Af-D	SLRATIO	RATIO	DIFF	MRATIO	RAf	Adjustment	Volume	count year	count data	delta	opening year	design yr	opening yr	design year	check
(east leg)	E Hudson St	0.5	2	Disa	2020	8039	6338	6285	6550	9287	8378	8304	8375	8340	**RAf**	**8340**			0	8087	8328	1.006	1.036	0.15%
(north leg)	Summit St	0.5	2	Disa	2020	82	48	32	111	157	284	161	196	179	**DIFF**	**161**			0	95	158	1.159	1.927	3.32%
(west leg)	E Hudson St	0.5	2	Disa	2020	7874	5519	5431	5871	8324	8512	8314	8497	8406	**RAf**	**8406**			0	7959	8385	1.011	1.065	0.27%
(south leg)	Summit St	0.5	2	Disa	2020	2795	1525	1504	1610	2283	2992	2901	2986	2944	**RAf**	**2944**			0	2819	2938	1.009	1.051	0.21%
Total						**18790**		**13252**																

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Optional Capacity Adjuster
Use this for screenlines, not intersection approaches

	delta		revised volume		growth factors	
Capacity	**opening yr**	**design year**	**opening yr**	**design year**	**opening yr**	**design year**
	-8087	-8328	8087	8328	1.006	1.036
	-95	-158	95	158	1.159	1.927
	-7959	-8385	7959	8385	1.011	1.065
	-2819	-2938	2819	2938	1.009	1.051
0	**0**	**0**				
	-18960	**-19809**				

	Year	
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3.5	Use SL	Set to "Enable" to allow use of screen line adjustments for this leg if no count available, set to "Disable" to disable giving no adjustment of model result, set to "Force" to force SL adjustment
4	COUNT year	year of the actual base year traffic count
5	COUNT	actual base year traffic count
6	Ab	base year traffic assignment - user to input year:
7	Ab interpolate	interpolation between base and future year assignment -- used when year of count data differs from base year assignment, will use open-nobuild to base interp if open nobuild exists, otherwise will use design to base interp
7.1	R	Calculated Ratio **(COUNT/Ab)**
7.2	D	Calculated Difference **(COUNT-Ab)**
7.3	MR	Model Ratio **(AfD/Ab)**
7.4	SLR	Screenline Ratio **(ΣCount/ΣAb)**
* 8	Af	future year traffic assignment - Af-D= (near) design yr model run, Af-ON=optional (near) opening year no build model run, Af-OB=optional (near) opening year build model run
* 8.5	SLRATIO	adjusted future year traffic forecast (ΣCount/ΣAb)*Af
* 9	RATIO	adjusted future year traffic forecast (**COUNT**/**Ab**) * **Af**
* 10	DIFF	adjusted future year traffic forecast (**COUNT** - **Ab**) + **Af**
* 10.5	MRATIO	adjusted future year traffic forecast modified "ratio method" to weight towards DIFF method for large model increases: if MR<1 = RATIO else = ((MR-1)*DIFF + RATIO)/MR
* 11	RAf	adjusted future year traffic forecast (AVERAGE(M**RATIO**, **DIFF**))
* 12	lected Adjustme	Selects the type of future year adjustment based on the ratio of actual base year traffic count to interpolated base year traffic assignment *general rule: if MR<1 then if RATIO <= 1.0 then use RATIO, OR if RATIO >= 2 then use DIFF else use Raf , if MR>1 then if RATIO <=0.5 then use MRATIO, OR if RATIO >=2 then use DIFF, else use Raf(based on MRATIO)*
* 13	Selected Volume	The selected adjusted forecast year model volume
14	most recent cou	year of the most recently available actual count data (should be <Yo, if Yo=Yb generally won't use)
15	most recent cou	most recently available actual count data for the facility
16	ecent Count Del	Forecast adjustment based on difference of more recent count from interpolation resulting from base count and first forecast year
17	opening year	final refined forecast for the opening year - user to input year
18	design year	final refined forecast for the design year - user to input year
19	growth factorop	growth factor to apply to most recent count to obtain opening year (SET to 1.0 if no count given)
20	growth factorde	growth factor to apply to most recent count to obtain design year (SET to 1.0 if no count given)

* Columns 8-13 repeated for open year build and nobuild (hidden)

Four Interpolation Cases

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3. (standard) Have base count and NO open yr model run THUS interpolate btwn count and adj design yr model run
4. Have no base count THUS interpolate calculate growth from Unadj base and design yr model runs and apply growth rate to number of years different from model design yr

Screenline Options (see field 3.5 description)
Enable
Disable
Force

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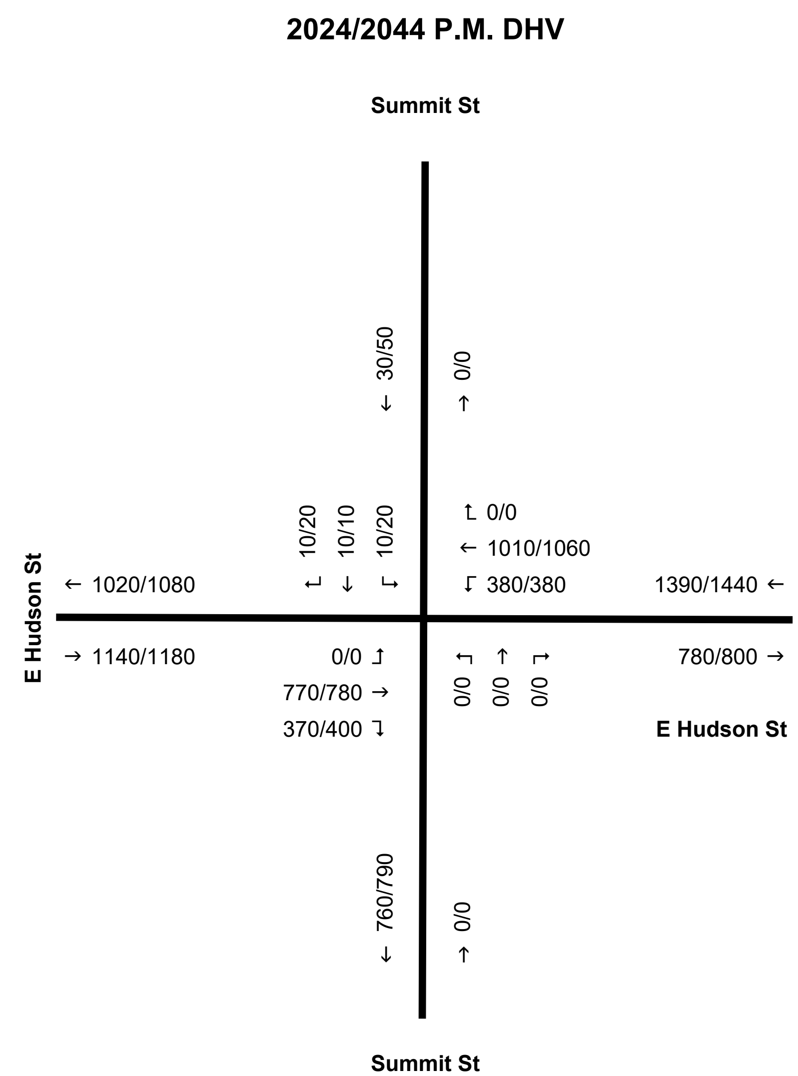
PID93442
PLATE 1 OF 1



POR-43-10.26	PID93442
2024/2044 ADT, AM DHV, PM DHV	
OHIO DEPARTMENT OF TRANSPORATION	
FEBRUARY 25, 2015	NOT TO SCALE

USER INPUT
OPTIONAL INPUT
FINAL REFINED FORECAST

NCHRP255 adjustment process

	COL 1 Road/Link	COL 2 in Di	COL 3 ax R	COL 4 se S	COL 4 near base model count year	COL 5 count data	COL 6 2025 Ab	COL 7 Ab interpolate	COL 8 2045 Af-D	COL 8.5 SLRATIO	COL 9 RATIO	COL 10 DIFF	COL 10.5 MRATIO	COL 11 RAf	COL 12 Selected Adjustment
(east leg)	Hudson St	0.5	2	Disa	2020	7849	5519	5431	5871	8896	8485	8289	8470	8380	RAf
(north leg)	Indianola Ave	0.5	2	Disa	2020	4080	1709	1561	2300	3485	6012	4819	5629	5224	DIFF
(west leg)	Hudson St	0.5	2	Disa	2020	5016	3931	3851	4250	6440	5536	5415	5525	5470	RAf
(south leg)	Indianola Ave	0.5	2	Disa	2020	2033	1770	1682	2121	3214	2564	2472	2545	2509	RAf
Total						**18978**		**12525**							

Interpolate opening & design year & adjust for more recent count

	COL 13 Selected Volume	COL 14 most recent count year	COL 15 most recent count data	COL 16 recent count delta	COL 17 2024 opening year	COL 18 2044 design yr	COL 19 growth factors opening yr	COL 20 growth factors design year	COL 21 annual growth check
(east leg)	**8380**			0	7934	8359	1.011	1.065	0.27%
(north leg)	**4819**			0	4198	4789	1.029	1.174	0.70%
(west leg)	**5470**			0	5089	5452	1.015	1.087	0.36%
(south leg)	**2509**			0	2109	2490	1.037	1.225	0.90%

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There are hidden columns for opening year model results if you have them

Optional Capacity Adjuster
Use this for screenlines, not intersection approaches

Capacity	delta opening yr	delta design year	revised volume opening yr	revised volume design year	growth factors opening yr	growth factors design year
	-7934	-8359	7934	8359	1.011	1.065
	-4198	-4789	4198	4789	1.029	1.174
	-5089	-5452	5089	5452	1.015	1.087
	-2109	-2490	2109	2490	1.037	1.225
0	**0**	**0**				
	-19330	**-21090**				

	Year	
Model Base	2025	
Model Opening (opt)		if Yo=Yb then also must = Yc (col4)
Model Forecast	2045	must be > Yb
Project Opening	2024	
Project Design	2044	

General Notes

General rule: if MR<1 then if ***RATIO*** *<= 1.0 then use R*
OR if RATIO >= 2 then use DIFF else use Raf ,
if MR>1 then if RATIO <=0.5 then use MRATIO, OR
if RATIO >=2 then use DIFF, else use Raf(based on MRA
Which you can change if it makes sense,
make both of columns 2-3 very large to force ratios,
make them 0 to force differences

Make sure model opening year (if used)
is greater existing and less than forecast
EXCEPT…
If you want to use a base year build run
to establish trends, set Af-ON=Ab
set model open year=base year=count year
Place build run in Af-OB
Do not use cols 14-15 in this case

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want to enter to interpolate and calculate
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column 5 to column 6 and set model base
to count year (Type toggle does this for you on TM sheet)

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To get forecast turn movements for new links you must
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A value of zero in a field usually means zero, leave fields blank if you want them
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of this sheet with an exogenously supplied growth rate.

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You may want to disable screenlines in this case.

Field Definiations

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Screenline Options (see field 3.5 description)
Enable
Disable
Force

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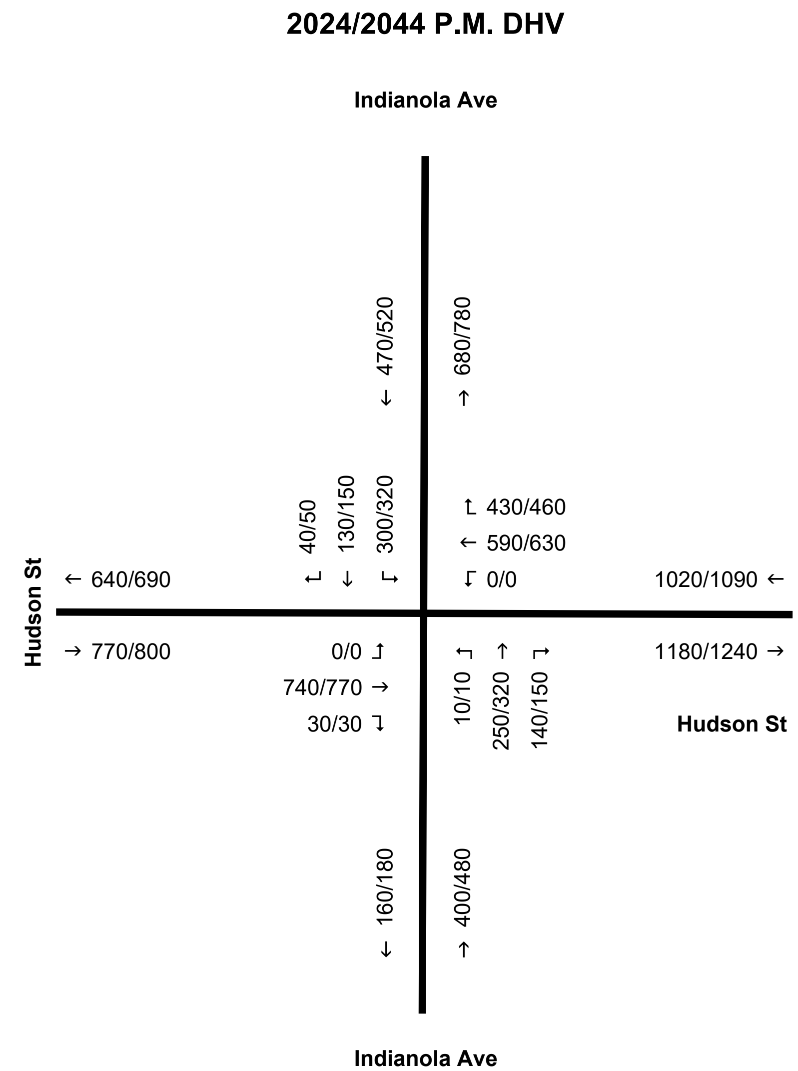
PID93442
PLATE 1 OF 1



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2024/2044 ADT, AM DHV, PM DHV	
OHIO DEPARTMENT OF TRANSPORATION	
FEBRUARY 25, 2015	NOT TO SCALE

USER INPUT
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FINAL REFINED FORECAST

NCHRP255 adjustment process / **Interpolate opening & design year & adjust for more recent count**

	COL 1	COL 2	COL 3	COL 4	COL 4	COL 5	COL 6	COL 7	COL 8	COL 8.5	COL 9	COL 10	COL 10.5	COL 11
					near base model		2025		2045					
	Road/Link	in Di	ax Rs	e S	count year	count data	Ab	Ab interpolate	Af-D	SLRATIO	RATIO	DIFF	MRATIO	RAf
(east leg)	Oakland Park Ave	0.5	2	Disa	2020	929	929	929	929	2498	929	929	929	929
(north leg)	Indianola Ave	0.5	2	Disa	2020	5311	1613	1493	2094	5631	7449	5912	7008	6460
(west leg)	Oakland Park Ave	0.5	2	Disa	2020	731	731	731	731	1966	731	731	731	731
(south leg)	Indianola Ave	0.5	2	Disa	2020	5523	1613	1493	2094	5631	7746	6124	7280	6702
Total						**12494**		**4646**						

	COL 12	COL 13	COL 14	COL 15	COL 16	COL 17	COL 18	COL 19	COL 20	COL 21
	Selected	Selected	most recent	most recent	recent count	2024	2044	growth factors		annual growth
	Adjustment	Volume	count year	count data	delta	opening year	design yr	opening yr	design year	check
(east leg)	**RATIO**	**929**			0	929	929	1.000	1.000	0.00%
(north leg)	**DIFF**	**5912**			0	5407	5888	1.018	1.109	0.44%
(west leg)	**RATIO**	**731**			0	731	731	1.000	1.000	0.00%
(south leg)	**DIFF**	**6124**			0	5619	6100	1.017	1.105	0.43%

Optional Capacity Adjuster
Use this for screenlines, not intersection approaches

	Capacity	delta opening yr	delta design year	revised volume opening yr	revised volume design year	growth factors opening yr	growth factors design year
(east leg)		-929	-929	929	929	1.000	1.000
(north leg)		-5407	-5888	5407	5888	1.018	1.109
(west leg)		-731	-731	731	731	1.000	1.000
(south leg)		-5619	-6100	5619	6100	1.017	1.105
	0	**0**	**0**				
		-12686	**-13648**				

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	Year	
Model Base	2025	
Model Opening (opt)		if Yo=Yb then also must = Yc (col4)
Model Forecast	2045	must be > Yb
Project Opening	2024	
Project Design	2044	

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Enable
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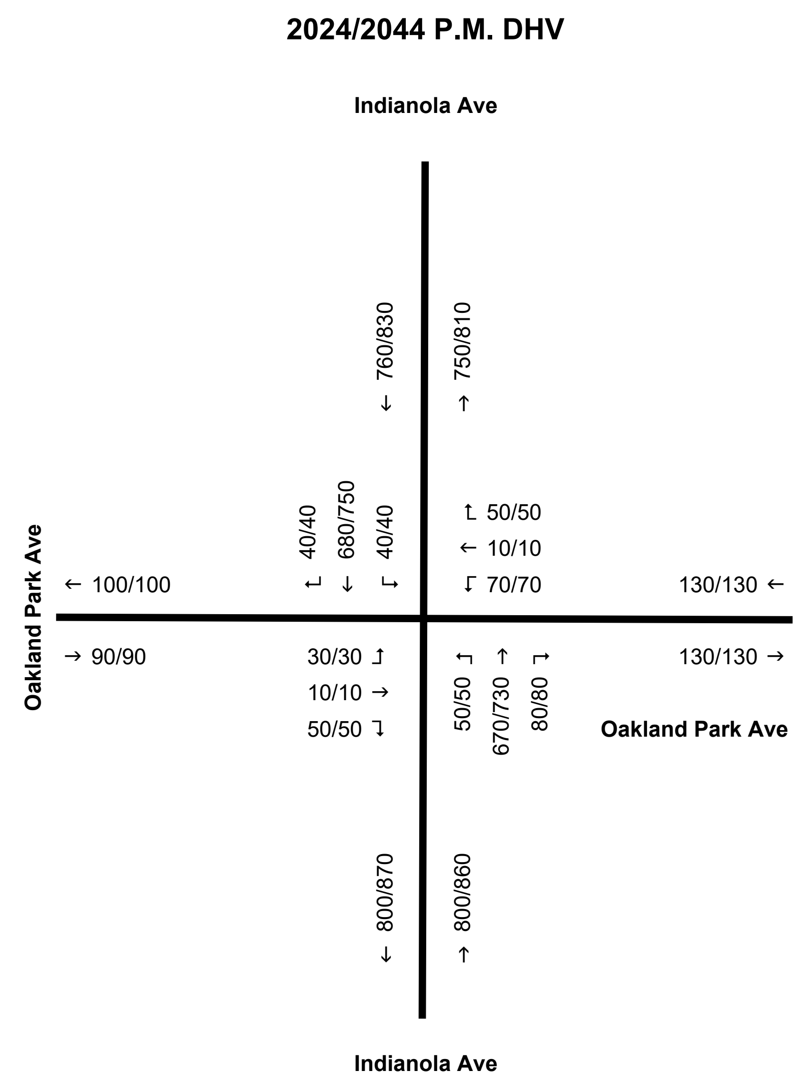
PLATE 1 OF 1



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NCHRP255 adjustment process — *Interpolate opening & design year & adjust for more recent count*

	COL 1	COL 2	COL 3	COL 4	COL 4	COL 5	COL 6	COL 7	COL 8	COL 8.5	COL 9	COL 10	COL 10.5	COL 11	COL 12	COL 13	COL 14	COL 15	COL 16	COL 17	COL 18	COL 19	COL 20	COL 21
					near base model		2025		2045						Selected	Selected	most recent	most recent	recent count	2024	2044	growth factors		annual growth
	Road/Link	in Di	ax R	se S	count year	count data	Ab	Ab interpolate	Af-D	SLRATIO	RATIO	DIFF	MRATIO	RAf	Adjustment	Volume	count year	count data	delta	opening year	design yr	opening yr	design year	check
(east leg)	E Weber Rd	0.5	2	Disa	2020	3274	5859	5597	6908	8194	4041	4585	4144	4365	RAf	**4365**			0	3449	4321	1.054	1.320	1.26%
(north leg)	Indianola Ave	0.5	2	Disa	2020	3707	612	567	794	942	5191	3934	4832	4383	DIFF	**3934**			0	3743	3925	1.010	1.059	0.24%
(west leg)	E Weber Rd	0.5	2	Disa	2020	3086	4697	4453	5674	6730	3932	4307	4013	4160	RAf	**4160**			0	3258	4117	1.056	1.334	1.32%
(south leg)	Indianola Ave	0.5	2	Disa	2020	3795	1128	1070	1359	1612	4820	4084	4663	4374	DIFF	**4084**			0	3841	4072	1.012	1.073	0.30%
Total						**13862**		**11687**																

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Optional Capacity Adjuster
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	delta		revised volume		growth factors	
Capacity	opening yr	design year	opening yr	design year	opening yr	design year
	-3449	-4321	3449	4321	1.054	1.320
	-3743	-3925	3743	3925	1.010	1.059
	-3258	-4117	3258	4117	1.056	1.334
	-3841	-4072	3841	4072	1.012	1.073
0	**0**	**0**				
	-14291	**-16435**				

	Year	
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5	COUNT	actual base year traffic count
6	Ab	base year traffic assignment - user to input year:
7	Ab interpolate	interpolation between base and future year assignment -- used when year of count data differs from base year assignment, will use open-nobuild to base interp if open nobuild exists, otherwise will use design to base interp
7.1	R	Calculated Ratio **(COUNT/Ab)**
7.2	D	Calculated Difference **(COUNT-Ab)**
7.3	MR	Model Ratio **(AfD/Ab)**
7.4	SLR	Screenline Ratio **(ΣCount/ΣAb)**
* 8	Af	future year traffic assignment - Af-D= (near) design yr model run, Af-ON=optional (near) opening year no build model run, Af-OB=optional (near) opening year build model run
* 8.5	SLRATIO	adjusted future year traffic forecast (ΣCount/ΣAb)*Af
* 9	RATIO	adjusted future year traffic forecast (**COUNT/Ab**) * **Af**
* 10	DIFF	adjusted future year traffic forecast (**COUNT - Ab**) + **Af**
* 10.5	MRATIO	adjusted future year traffic forecast modified "ratio method" to weight towards DIFF method for large model increases: if MR<1 = RATIO else = ((MR-1)*DIFF + RATIO)/MR
* 11	RAf	adjusted future year traffic forecast (AVERAGE(M**RATIO**, **DIFF**))
* 12	lected Adjustme	Selects the type of future year adjustment based on the ratio of actual base year traffic count to interpolated base year traffic assignment *general rule: if MR<1 then if RATIO <= 1.0 then use RATIO, OR if RATIO >= 2 then use DIFF else use Raf , if MR>1 then if RATIO <=0.5 then use MRATIO, OR if RATIO >=2 then use DIFF, else use Raf(based on MRATIO)*
* 13	Selected Volume	The selected adjusted forecast year model volume
14	most recent cou	year of the most recently available actual count data (should be <Yo, if Yo=Yb generally won't use)
15	most recent cou	most recently available actual count data for the facility
16	ecent Count Del	Forecast adjustment based on difference of more recent count from interpolation resulting from base count and first forecast year
17	opening year	final refined forecast for the opening year - user to input year
18	design year	final refined forecast for the design year - user to input year
19	growth factorop	growth factor to apply to most recent count to obtain opening year (SET to 1.0 if no count given)
20	growth factorde	growth factor to apply to most recent count to obtain design year (SET to 1.0 if no count given)

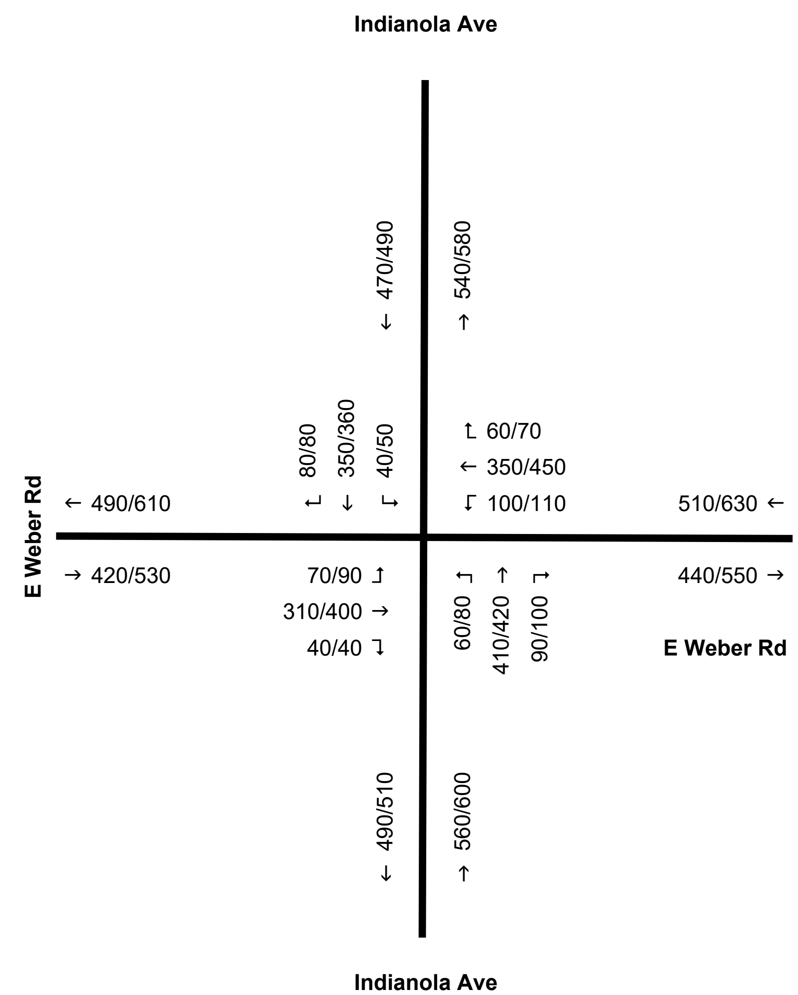
* Columns 8-13 repeated for open year build and nobuild (hidden)

Four Interpolation Cases
1. Have base count and open yr model run and interp year<model open yr THUS interpolate btwn base count and adj open yr model run except for open yr<model open yr which uses case 2
2. Have open yr model run and interp yr> open model yr (or interpolating any opening year) THUS interopolate btwn adj open yr and adj design yr model runs
3. (standard) Have base count and NO open yr model run THUS interpolate btwn count and adj design yr model run
4. Have no base count THUS interpolate calculate growth from Unadj base and design yr model runs and apply growth rate to number of years different from model design yr

Screenline Options (see field 3.5 description)
Enable
Disable
Force

POR-43-10.26
PID93442
PLATE 1 OF 1

2024/2044 P.M. DHV



N

POR-43-10.26	PID93442
2024/2044 ADT, AM DHV, PM DHV	
OHIO DEPARTMENT OF TRANSPORATION	
FEBRUARY 25, 2015	NOT TO SCALE

Michael Baker
INTERNATIONAL

We Make a Difference

Attachment L:

ODOT Provided Model Outputs

Demor, Steven

From:	Bryan.Raderstorf@dot.ohio.gov
Sent:	Thursday, February 18, 2021 10:56 AM
To:	Dickens, Kevin
Cc:	Kogge, Emma; Joshua.Kieselbach@dot.ohio.gov; Greg.Giaimo@dot.ohio.gov; Coates, Angela; Vandenberg, Thomas
Subject:	RE: EXTERNAL: FW: US23/Indianola Model Runs
Attachments:	2025_2045_nobuild24AMPMmodelvolumes_Hudson.png; 2025_2045_nobuild24AMPMmodelvolumes_Nbroadway.png; 2025_2045_nobuild24AMPMmodelvolumes_Webber.png

Good morning Kevin,

The screen shots that you have are the Indianola/23 road diet build. I have attached the no build screen shots for the area. 2025 on left, 2045 on right and 24 volume is black, am is blue, and pm is red. The hours for the am period is 6-9 am and the pm period is 3-7 pm.

Thanks!

Bryan Raderstorf, P.E.
Transportation Engineer
1980 W. Broad St. Mail Stop 3280, Columbus, Ohio 43223
614.752.5736
transportation.ohio.gov

From: Dickens, Kevin <kdickens@mbakerintl.com>
Sent: Wednesday, February 17, 2021 3:03 PM
To: Raderstorf, Bryan <Bryan.Raderstorf@dot.ohio.gov>
Cc: Kogge, Emma <EAKogge@columbus.gov>; Kieselbach, Joshua <Joshua.Kieselbach@dot.ohio.gov>; Giaimo, Gregory <Greg.Giaimo@dot.ohio.gov>; Coates, Angela <Angela.Coates@mbakerintl.com>; Vandenberg, Thomas <Thomas.Vandenberg@mbakerintl.com>
Subject: RE: EXTERNAL: FW: US23/Indianola Model Runs

Hey Bryan,

Just to clarify - the screenshots you provided were for the Indianola Road Diet Build condition, correct? Can you provide the no build results as well?

And, one last question - what hours of the day do the model peak periods represent?

Kevin Dickens, P.E. | Project Manager
250 West Street, Suite 420 | Columbus, OH 43215 | [O] 614-538-7612
kdickens@mbakerintl.com | www.mbakerintl.com

From: Bryan.Raderstorf@dot.ohio.gov <Bryan.Raderstorf@dot.ohio.gov>
Sent: Tuesday, February 16, 2021 10:19 AM
To: Dickens, Kevin <kdickens@mbakerintl.com>
Cc: Kogge, Emma <EAKogge@columbus.gov>; Joshua.Kieselbach@dot.ohio.gov; Greg.Giaimo@dot.ohio.gov; Coates, Angela <Angela.Coates@mbakerintl.com>
Subject: RE: EXTERNAL: FW: US23/Indianola Model Runs

Hi Kevin!

I apologize, attached are screen shots with the 2025 and 2045 AM and PM periods listed. 2025 is on the left and 2045 is on the right. The AM volume is shown in blue and the PM volume is shown in black. Base year is not needed so you can just use the 2025 and 2045 models. If you need anything else, just let me know.

Thanks!

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Transportation Engineer
1980 W. Broad St. Mail Stop 3280, Columbus, Ohio 43223
614.752.5736
transportation.ohio.gov

From: Dickens, Kevin <kdickens@mbakerintl.com>
Sent: Monday, February 15, 2021 1:26 PM
To: Raderstorf, Bryan <Bryan.Raderstorf@dot.ohio.gov>
Cc: Kogge, Emma <EAKogge@columbus.gov>; Kieselbach, Joshua <Joshua.Kieselbach@dot.ohio.gov>; Giaimo, Gregory <Greg.Giaimo@dot.ohio.gov>; Coates, Angela <Angela.Coates@mbakerintl.com>
Subject: RE: EXTERNAL: FW: US23/Indianola Model Runs

Bryan,

Thank you for the included screenshots. In the early coordination call, we discussed using model Am and pm period results. Can you please provide those?

Also, can you please verify that a model base year output is not necessary for this forecast?

Thank you so much in advance for your assistance!

Kevin Dickens, P.E. | Project Manager
250 West Street, Suite 420 | Columbus, OH 43215 | [O] 614-538-7612
kdickens@mbakerintl.com | www.mbakerintl.com

From: Kogge, Emma <EAKogge@columbus.gov>
Sent: Thursday, February 11, 2021 12:46 PM
To: Dickens, Kevin <kdickens@mbakerintl.com>
Subject: EXTERNAL: FW: US23/Indianola Model Runs

Hey Kevin,

I received some screenshots of the model runs from ODOT – did you receive the model output?

Emma Kogge, AICP
TRANSPORTATION PLANNER
DIVISION OF TRAFFIC MANAGEMENT
She | Her | Hers
Direct: 614.545.8571
www.columbus.gov

From: Bryan.Raderstorf@dot.ohio.gov [mailto:Bryan.Raderstorf@dot.ohio.gov]
Sent: Thursday, February 11, 2021 10:25 AM
To: Kogge, Emma <EAKogge@columbus.gov>
Cc: Joshua.Kieselbach@dot.ohio.gov; Greg.Giaimo@dot.ohio.gov
Subject: [EXTERNAL] US23/Indianola Model Runs

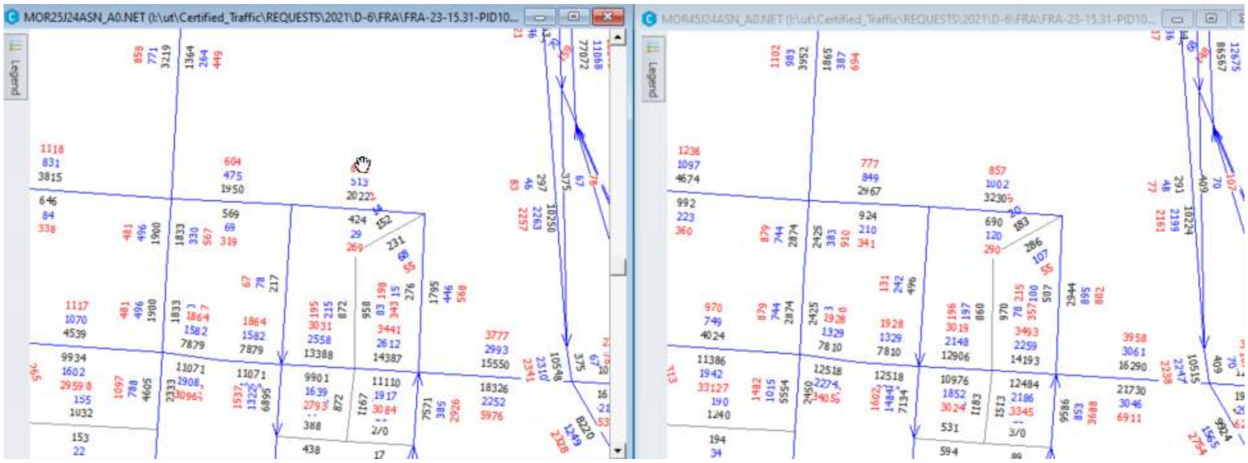
Good morning Emma!

Attached are screen shots of the 2025 and 2045 24 hr volume model runs for the US23/Indianola project (2025 on left, 2045 on right).

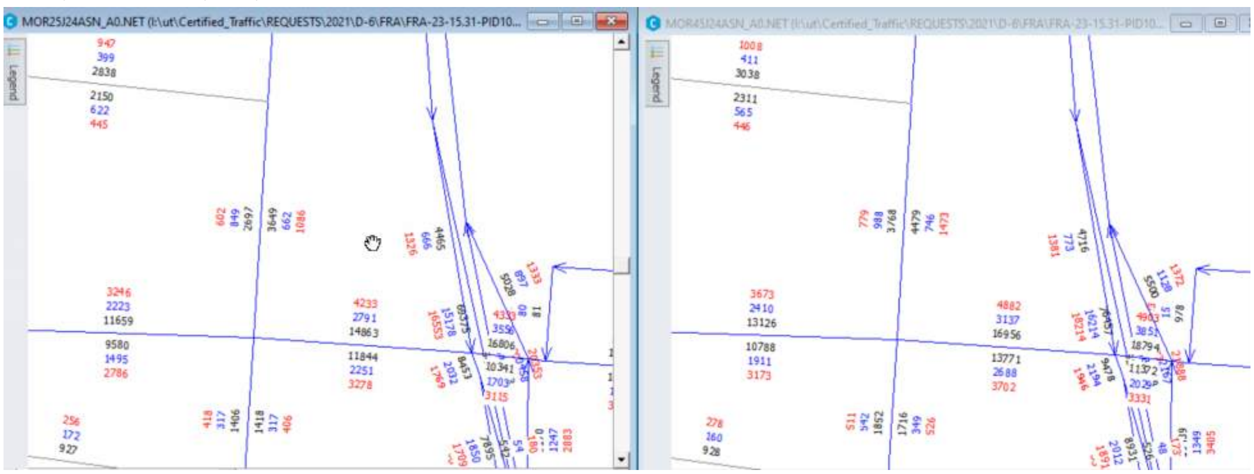
Thanks!

Bryan Raderstorf, P.E.
Transportation Engineer
1980 W. Broad St. Mail Stop 3280, Columbus, Ohio 43223
614.752.5736
transportation.ohio.gov

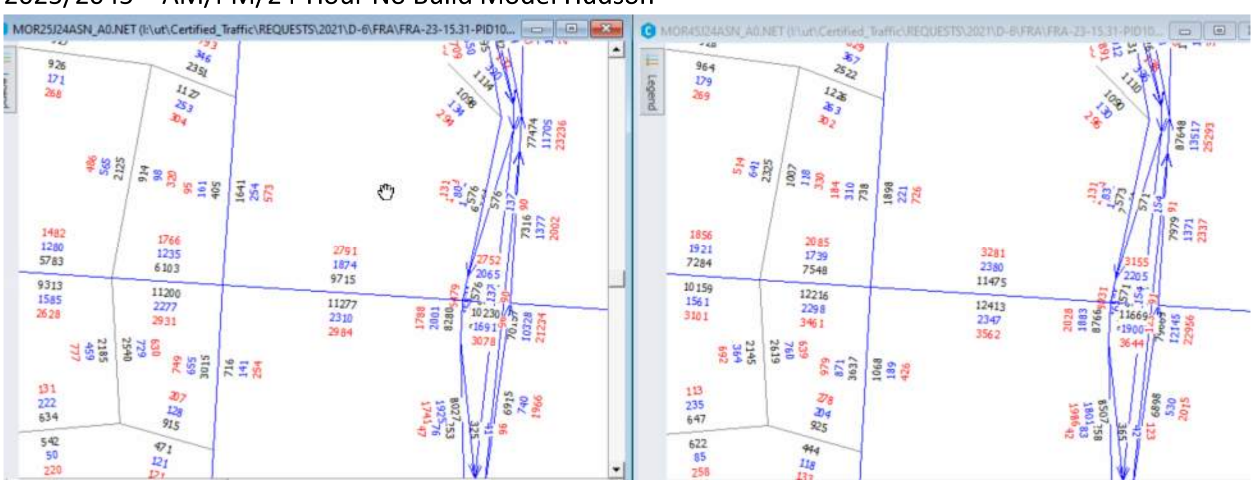
2025/2045 – AM/PM/24-Hour No Build Model Hudson



2025/2045 – AM/PM/24-Hour No Build Model Hudson



2025/2045 – AM/PM/24-Hour No Build Model Hudson



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From:	Bryan.Raderstorf@dot.ohio.gov
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Cc:	Kogge, Emma; Joshua.Kieselbach@dot.ohio.gov; Greg.Giaimo@dot.ohio.gov; Coates, Angela
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Hi Kevin!

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From: Dickens, Kevin <kdickens@mbakerintl.com>
Sent: Monday, February 15, 2021 1:26 PM
To: Raderstorf, Bryan <Bryan.Raderstorf@dot.ohio.gov>
Cc: Kogge, Emma <EAKogge@columbus.gov>; Kieselbach, Joshua <Joshua.Kieselbach@dot.ohio.gov>; Giaimo, Gregory <Greg.Giaimo@dot.ohio.gov>; Coates, Angela <Angela.Coates@mbakerintl.com>
Subject: RE: EXTERNAL: FW: US23/Indianola Model Runs

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Thank you so much in advance for your assistance!

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kdickens@mbakerintl.com | www.mbakerintl.com

Michael Baker INTERNATIONAL 80 YEARS Making a Difference

From: Kogge, Emma <EAKogge@columbus.gov>
Sent: Thursday, February 11, 2021 12:46 PM
To: Dickens, Kevin <kdickens@mbakerintl.com>
Subject: EXTERNAL: FW: US23/Indianola Model Runs

Hey Kevin,
I received some screenshots of the model runs from ODOT – did you receive the model output?

Emma Kogge, AICP
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From: Bryan.Raderstorf@dot.ohio.gov [mailto:Bryan.Raderstorf@dot.ohio.gov]
Sent: Thursday, February 11, 2021 10:25 AM
To: Kogge, Emma <EAKogge@columbus.gov>
Cc: Joshua.Kieselbach@dot.ohio.gov; Greg.Giaimo@dot.ohio.gov
Subject: [EXTERNAL] US23/Indianola Model Runs

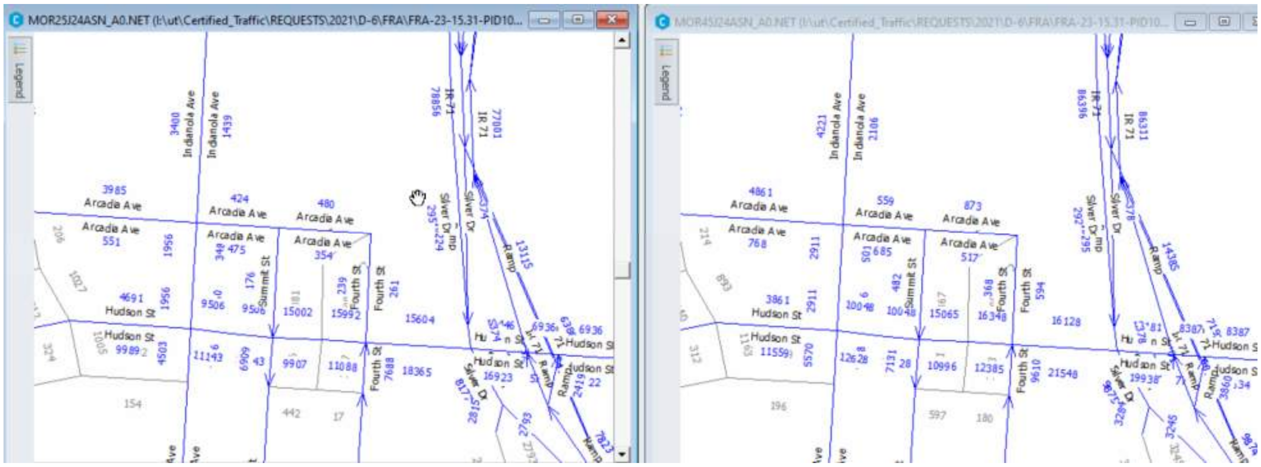
Good morning Emma!

Attached are screen shots of the 2025 and 2045 24 hr volume model runs for the US23/Indianola project (2025 on left, 2045 on right).

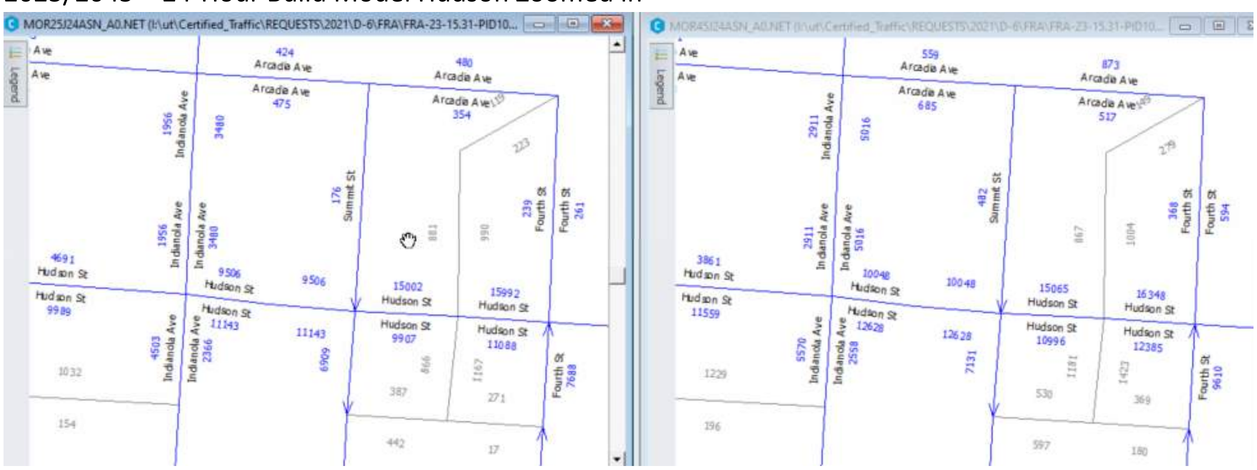
Thanks!

Bryan Raderstorf, P.E.
Transportation Engineer
1980 W. Broad St. Mail Stop 3280, Columbus, Ohio 43223
614.752.5736
transportation.ohio.gov

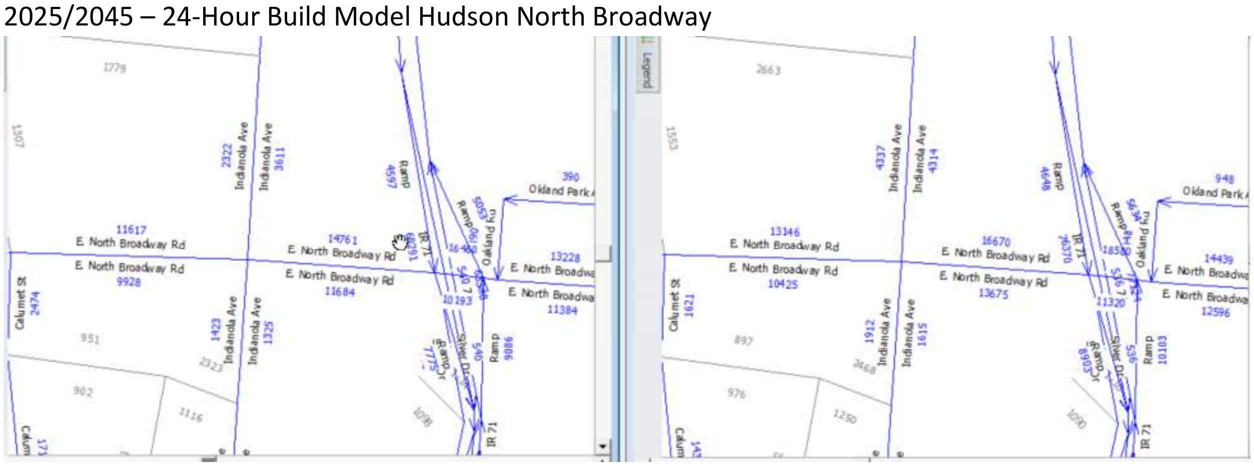
2025/2045 – 24-Hour Build Model Hudson



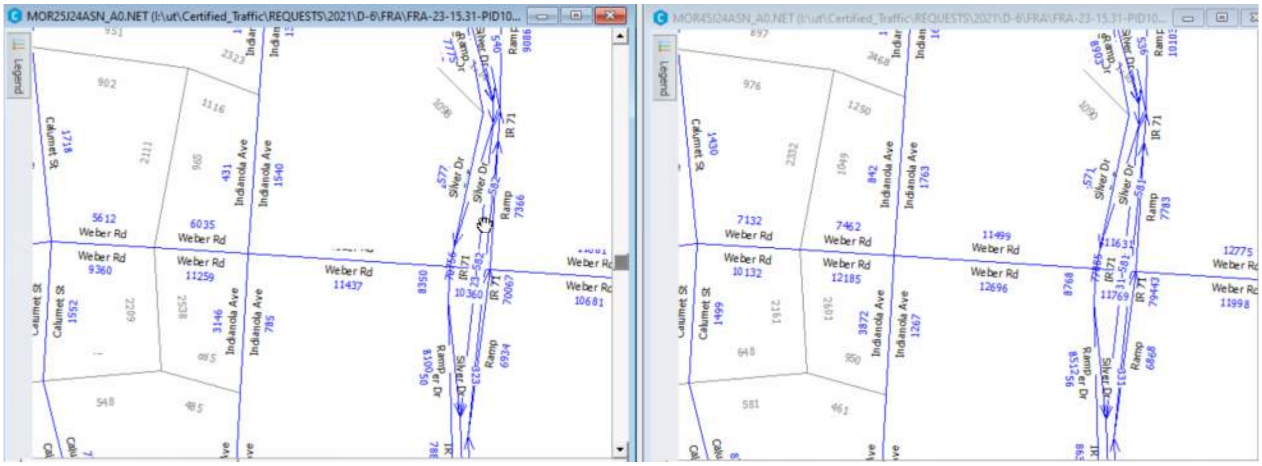
2025/2045 – 24-Hour Build Model Hudson Zoomed in



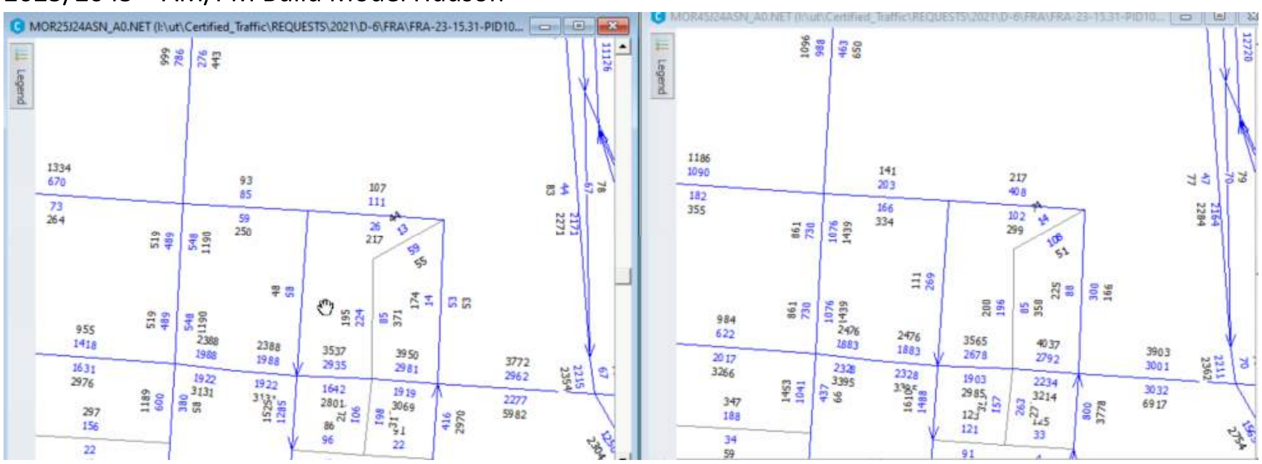
2025/2045 – 24-Hour Build Model Hudson North Broadway



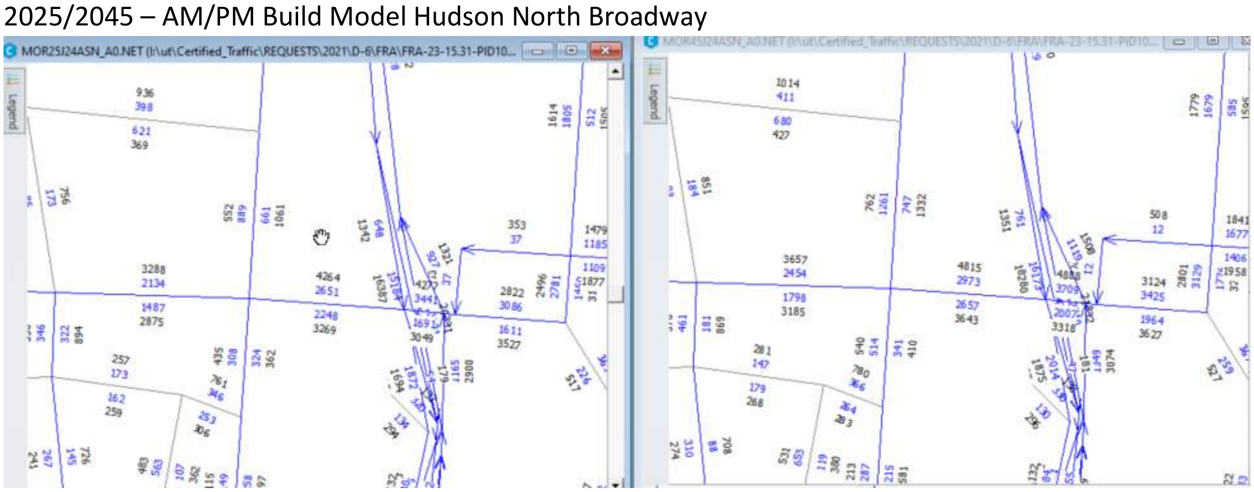
2025/2045 – 24-Hour Build Model Weber



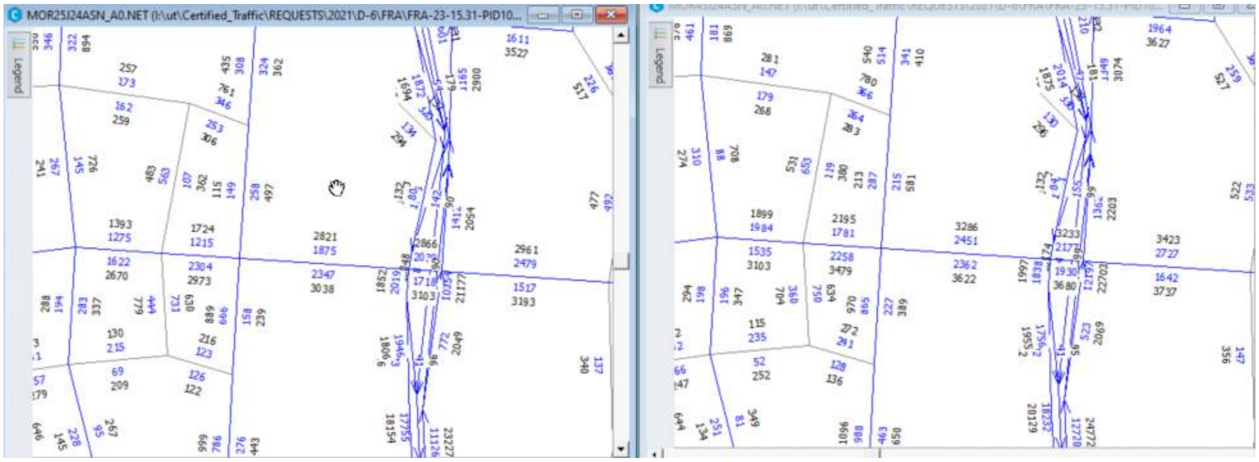
2025/2045 – AM/PM Build Model Hudson



2025/2045 – AM/PM Build Model Hudson North Broadway

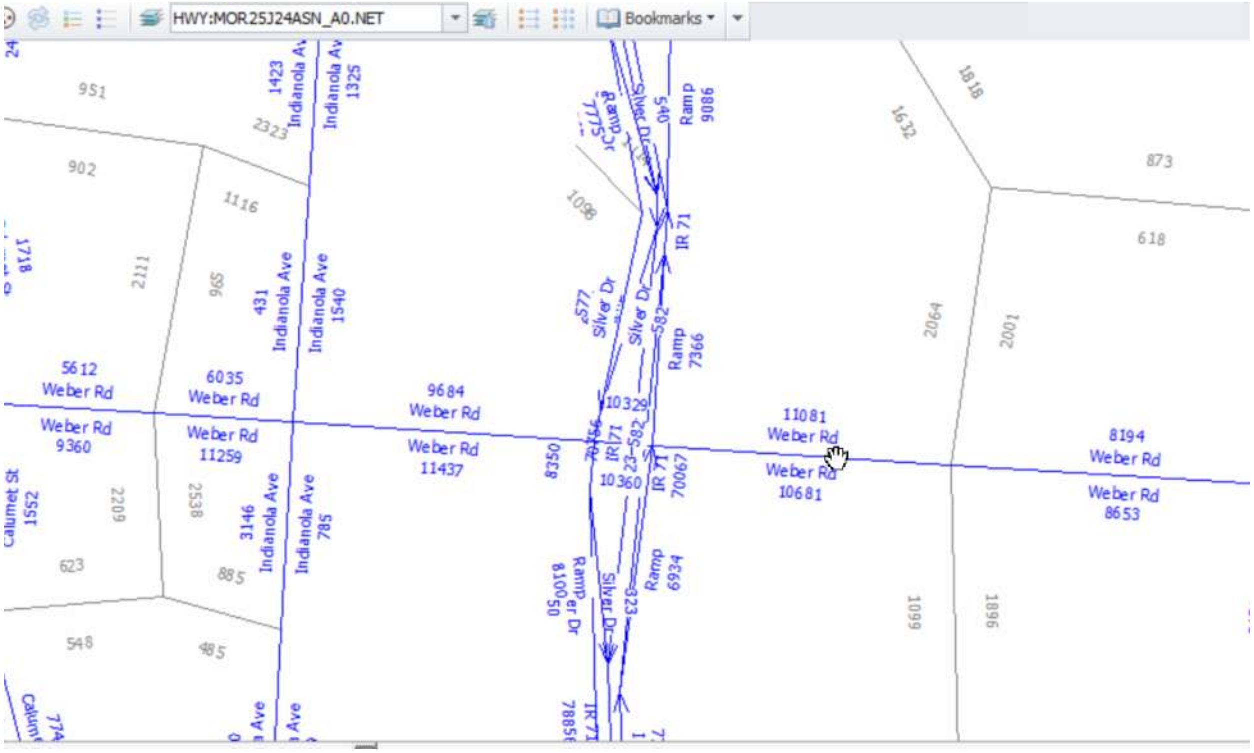


2025/2045 – AM/PM Build Model Weber



2024/2045 – AM/PM/24-Hour Build/No Build South of Hudson

Missing Weber 24-Hour Volume



Michael Baker
INTERNATIONAL

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Appendix B:

HCS Reports

Michael Baker INTERNATIONAL

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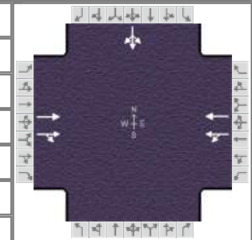
No Build 2024

AM and PM Peak Hours

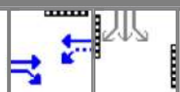
HCS7 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency				Duration, h	1.000
Analyst		Analysis Date	5/27/2021	Area Type	Other
Jurisdiction		Time Period		PHF	1.00
Urban Street		Analysis Year	2024	Analysis Period	1> 7:00
Intersection	Hudson & Summit	File Name	No Build 2024 Hudson AM.xus		
Project Description	2024 No Build AM Peak				

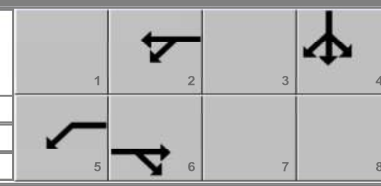


Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h		680	260	252	732					12	20	20

Signal Information			
Cycle, s	60.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	43.9	6.5	0.0	0.0	0.0	0.0
Yellow	3.6	3.6	0.0	0.0	0.0	0.0
Red	1.4	1.0	0.0	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		6	5	2				4
Case Number		8.3	0.0	14.2				12.0
Phase Duration, s		48.9	0.0	48.9				11.1
Change Period, (*Y+R c*), s		5.0	5.0	5.0				4.6
Max Allow Headway (*MAH*), s		0.0	0.0	0.0				3.3
Queue Clearance Time (g_s), s								3.9
Green Extension Time (g_e), s		0.0	0.0	0.0				0.0
Phase Call Probability								0.58
Max Out Probability								0.00

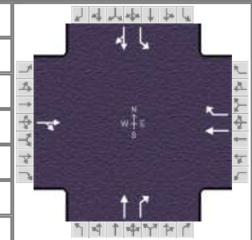
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement		6	16	5	2					7	4	14
Adjusted Flow Rate (*v*), veh/h		497	443	202	378						52	
Adjusted Saturation Flow Rate (*s*), veh/h/ln		1856	1655	529	1615						1514	
Queue Service Time (g_s), s		12.7	5.9	4.1	8.0						1.9	
Cycle Queue Clearance Time (g_c), s		12.7	5.9	4.1	8.0						1.9	
Green Ratio (*g/C*)		0.73	0.73	0.73	0.73						0.11	
Capacity (*c*), veh/h		1358	1211	491	1181						164	
Volume-to-Capacity Ratio (*X*)		0.366	0.366	0.412	0.320						0.317	
Back of Queue (*Q*), ft/ln (95 th percentile)		56.5	50.6	108.3	81.2						31.6	
Back of Queue (*Q*), veh/ln (95 th percentile)		2.2	2.0	4.3	3.2						1.2	
Queue Storage Ratio (*RQ*) (95 th percentile)		0.00	0.00	0.00	0.00						0.00	
Uniform Delay (d_1), s/veh		3.0	3.0	13.8	5.8						24.7	
Incremental Delay (d_2), s/veh		0.8	0.9	1.9	0.5						0.4	
Initial Queue Delay (d_3), s/veh		0.0	0.0	0.0	0.0						0.0	
Control Delay (*d*), s/veh		3.7	3.8	15.7	6.4						25.1	
Level of Service (LOS)		A	A	B	A						C	

	EB		WB		NB		SB	
Approach Delay, s/veh / LOS	3.8	A	9.6	A	0.0		25.1	C
Intersection Delay, s/veh / LOS	6.6				A			

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	1.60	B	1.31	A	2.13	B	2.13	B
Bicycle LOS Score / LOS	1.26	A	1.30	A			0.57	A

HCS7 Signalized Intersection Results Summary

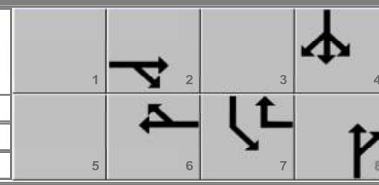
General Information				Intersection Information		
Agency				Duration, h	1.000	
Analyst		Analysis Date	5/27/2021	Area Type	Other	
Jurisdiction		Time Period		PHF	1.00	
Urban Street		Analysis Year	2024	Analysis Period	1> 7:00	
Intersection	Hudson & Indianola	File Name	No Build 2024 Hudson AM.xus			
Project Description	2024 No Build AM Peak					



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h		490	20		520	250		160	110	320	130	60

Signal Information			
Cycle, s	60.0	Reference Phase	2
Offset, s	4	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	24.9	7.6	12.5	0.0	0.0	0.0
Yellow	4.1	3.0	4.1	0.0	0.0	0.0
Red	1.0	1.4	1.4	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		2		6		8	7	4
Case Number		8.0		7.0		7.3	1.0	4.0
Phase Duration, s		30.0		30.0		18.0	12.0	30.0
Change Period, ($Y+R_c$), s		5.1		5.1		5.5	4.4	5.5
Max Allow Headway (*MAH*), s		0.0		0.0		3.2	3.1	3.2
Queue Clearance Time (g_s), s						6.6	9.6	6.3
Green Extension Time (g_e), s		0.0		0.0		0.6	0.0	0.9
Phase Call Probability						1.00	1.00	1.00
Max Out Probability						0.19	1.00	0.00

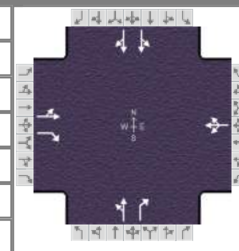
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement		2	12		6	16		8	18	7	4	14
Adjusted Flow Rate (*v*), veh/h		692			520	250		160	110	320	190	
Adjusted Saturation Flow Rate (*s*), veh/h/ln		1855			1870	1589		1810	1515	1781	1751	
Queue Service Time (g_s), s		19.9			13.5	5.1		4.6	3.7	7.6	4.3	
Cycle Queue Clearance Time (g_c), s		19.9			13.5	5.1		4.6	3.7	7.6	4.3	
Green Ratio (*g/C*)		0.42			0.42	0.54		0.21	0.21	0.37	0.41	
Capacity (*c*), veh/h		770			776	863		377	316	507	715	
Volume-to-Capacity Ratio (*X*)		0.899			0.670	0.290		0.424	0.349	0.631	0.266	
Back of Queue (*Q*), ft/ln (95 th percentile)		340.8			247.7	69.5		98.5	67	170.4	73.9	
Back of Queue (*Q*), veh/ln (95 th percentile)		13.4			9.8	2.8		3.9	2.7	6.7	2.9	
Queue Storage Ratio (*RQ*) (95 th percentile)		0.00			0.00	0.00		0.00	0.00	0.00	0.00	
Uniform Delay (d_1), s/veh		12.3			14.2	7.5		20.6	20.3	15.6	11.8	
Incremental Delay (d_2), s/veh		17.8			4.7	0.8		3.5	3.0	6.0	0.9	
Initial Queue Delay (d_3), s/veh		0.0			0.0	0.0		0.0	0.0	0.0	0.0	
Control Delay (*d*), s/veh		30.1			18.9	8.3		24.1	23.3	21.6	12.7	
Level of Service (LOS)		C			B	A		C	C	C	B	
Approach Delay, s/veh / LOS	30.1		C	15.5		B	23.8		C	18.3		B
Intersection Delay, s/veh / LOS	21.6						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	1.89	B	2.08	B	2.11	B	1.67	B
Bicycle LOS Score / LOS	1.33	A	1.76	B	0.93	A	1.33	A

 HCS™ Streets Version 7.9 Generated: 6/29/2021 7:18:38 AM

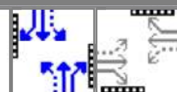
HCS7 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency				Duration, h	1.000
Analyst		Analysis Date	4/30/2021	Area Type	Other
Jurisdiction		Time Period		PHF	1.00
Urban Street		Analysis Year	2021	Analysis Period	1> 7:00
Intersection	Indianola & Arcadia	File Name	No Build 2024 Indianola AM.xus		
Project Description	2024 No Build AM Peak				

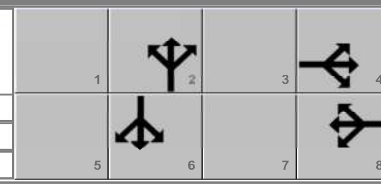


Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	80	40	130	10	50	20	120	720	10	10	350	110

Signal Information			
Cycle, s	60.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	39.2	10.4	0.0	0.0	0.0	0.0
Yellow	4.1	3.4	0.0	0.0	0.0	0.0
Red	1.3	1.6	0.0	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4		8		2		6
Case Number		7.0		8.0		7.0		8.0
Phase Duration, s		15.4		15.4		44.6		44.6
Change Period, (*Y+R* $_c$), s		5.0		5.0		5.4		5.4
Max Allow Headway (*MAH*), s		3.4		3.4		0.0		0.0
Queue Clearance Time (g_s), s		6.5		4.3				
Green Extension Time (g_e), s		0.4		0.5		0.0		0.0
Phase Call Probability		1.00		1.00				
Max Out Probability		0.22		0.05				

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h		120	130		80			840	10	260		196
Adjusted Saturation Flow Rate (*s*), veh/h/ln		1505	1559		1753			1669	1416	1839		1350
Queue Service Time (g_s), s		1.8	4.5		0.0			13.0	0.1	0.0		4.6
Cycle Queue Clearance Time (g_c), s		4.1	4.5		2.3			20.1	0.1	4.8		4.6
Green Ratio (*g/C*)		0.17	0.17		0.17			0.65	0.65	0.65		0.65
Capacity (*c*), veh/h		361	271		372			1158	925	1263		882
Volume-to-Capacity Ratio (*X*)		0.332	0.480		0.215			0.725	0.011	0.206		0.222
Back of Queue (*Q*), ft/ln (95 th percentile)		66.7	74.3		43			238.8	1.5	64.2		53
Back of Queue (*Q*), veh/ln (95 th percentile)		2.6	2.9		1.7			9.3	0.1	2.6		2.1
Queue Storage Ratio (*RQ*) (95 th percentile)		0.00	0.74		0.00			0.00	0.00	0.00		0.00
Uniform Delay (d_1), s/veh		22.1	22.3		21.4			6.9	3.6	6.5		7.0
Incremental Delay (d_2), s/veh		0.2	0.5		0.1			4.1	0.0	0.4		0.6
Initial Queue Delay (d_3), s/veh		0.0	0.0		0.0			0.0	0.0	0.0		0.0
Control Delay (*d*), s/veh		22.3	22.8		21.5			11.0	3.7	6.9		7.5
Level of Service (LOS)		C	C		C			B	A	A		A

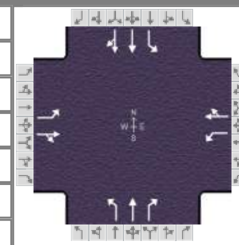
	EB		WB		NB		SB	
Approach Delay, s/veh / LOS	22.6	C	21.5	C	10.9	B	7.2	A
Intersection Delay, s/veh / LOS	12.2				B			

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.11	B	1.92	B	1.62	B	1.85	B
Bicycle LOS Score / LOS	0.90	A	0.62	A	1.89	B	0.88	A

 HCS™ Streets Version 7.9 Generated: 6/29/2021 7:26:25 AM

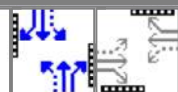
HCS7 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency				Duration, h	1.000
Analyst		Analysis Date	4/30/2021	Area Type	Other
Jurisdiction		Time Period		PHF	1.00
Urban Street		Analysis Year	2021	Analysis Period	1> 7:00
Intersection	Indianola & Weber	File Name	No Build 2024 Indianola AM.xus		
Project Description	2024 No Build AM Peak				

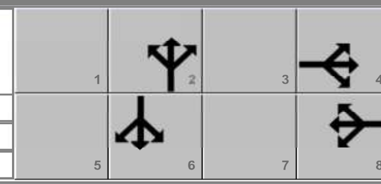


Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h	50	280	20	100	210	40	40	290	90	30	310	60

Signal Information			
Cycle, s	60.0	Reference Phase	2
Offset, s	53	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	32.1	17.4	0.0	0.0	0.0	0.0
Yellow	4.1	4.1	0.0	0.0	0.0	0.0
Red	1.1	1.2	0.0	0.0	0.0	0.0



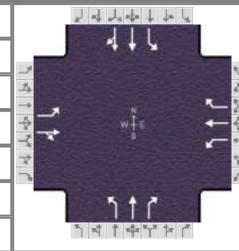
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4		8		2		6
Case Number		6.0		6.0		5.0		6.0
Phase Duration, s		22.7		22.7		37.3		37.3
Change Period, (*Y+R c*), s		5.3		5.3		5.2		5.2
Max Allow Headway (*MAH*), s		3.3		3.3		0.0		0.0
Queue Clearance Time (*g s*), s		11.4		16.0				
Green Extension Time (*g e*), s		1.4		1.4		0.0		0.0
Phase Call Probability		1.00		1.00				
Max Out Probability		0.00		0.01				

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h	50	300		100	250		78	566	176	33	206	195
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1059	1774		1035	1745		990	1870	1415	845	1870	1726
Queue Service Time (*g s*), s	2.5	8.7		5.5	7.1		2.5	11.9	3.7	1.6	3.5	3.6
Cycle Queue Clearance Time (*g c*), s	9.4	8.7		14.0	7.1		6.2	11.9	3.7	13.6	3.5	3.6
Green Ratio (*g/C*)	0.29	0.29		0.29	0.29		0.53	0.53	0.53	0.53	0.53	0.53
Capacity (*c*), veh/h	305	515		274	507		588	1000	756	402	1000	923
Volume-to-Capacity Ratio (*X*)	0.164	0.582		0.365	0.493		0.133	0.566	0.232	0.081	0.206	0.211
Back of Queue (*Q*), ft/ln (95 th percentile)	26.6	146.2		57.1	118		22	170.4	43	14.2	54.6	51.5
Back of Queue (*Q*), veh/ln (95 th percentile)	1.0	5.8		2.2	4.6		0.9	6.7	1.7	0.6	2.2	2.1
Queue Storage Ratio (*RQ*) (95 th percentile)	0.41	0.00		0.95	0.00		0.00	0.00	0.00	0.00	0.00	0.00
Uniform Delay (*d 1*), s/veh	21.5	18.2		24.1	17.6		8.2	8.9	6.8	13.8	7.3	7.3
Incremental Delay (*d 2*), s/veh	0.1	0.4		0.3	0.3		0.3	1.6	0.5	0.4	0.4	0.5
Initial Queue Delay (*d 3*), s/veh	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (*d*), s/veh	21.6	18.6		24.4	17.9		8.6	10.5	7.3	14.2	7.7	7.8
Level of Service (LOS)	C	B		C	B		A	B	A	B	A	A
Approach Delay, s/veh / LOS	19.0	B		19.8	B		9.6	A		8.2	A	
Intersection Delay, s/veh / LOS	12.8						B					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.27	B	2.10	B	1.87	B	1.87	B
Bicycle LOS Score / LOS	1.07	A	1.07	A	1.18	A	0.82	A

 HCS™ Streets Version 7.9 Generated: 6/29/2021 7:26:25 AM

HCS7 Signalized Intersection Results Summary

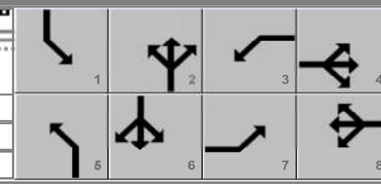


General Information				Intersection Information	
Agency				Duration, h	1.000
Analyst		Analysis Date	4/30/2021	Area Type	Other
Jurisdiction		Time Period		PHF	1.00
Urban Street		Analysis Year	2021	Analysis Period	1> 7:00
Intersection	Indianola & Broadway	File Name	No Build 2024 Indianola AM.xus		
Project Description	2024 No Build AM Peak				

Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	100	460	30	130	570	330	110	260	120	360	270	130

Signal Information			
Cycle, s	102.6	Reference Phase	2
Offset, s	27	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	8.7	5.4	23.1	6.6	0.6	34.1
Yellow	3.0	3.0	4.1	3.0	0.0	4.1
Red	1.4	1.4	1.4	1.1	0.0	1.4

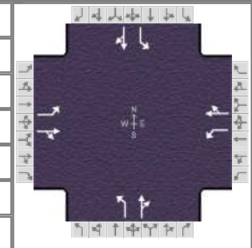


Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	7	4	3	8	5	2	1	6
Case Number	1.1	4.0	1.1	3.0	1.1	3.0	1.1	4.0
Phase Duration, s	10.7	39.6	11.4	40.3	13.1	28.6	22.9	38.5
Change Period, (Y+R_c), s	4.1	5.5	4.3	5.5	4.4	5.5	4.4	5.5
Max Allow Headway (*MAH*), s	3.1	2.8	3.1	2.8	3.1	2.8	3.1	2.8
Queue Clearance Time (g_s), s	5.8	27.2	6.9	32.0	8.4	20.6	17.5	11.6
Green Extension Time (g_e), s	0.2	2.2	0.2	2.2	0.3	1.3	0.7	1.3
Phase Call Probability	0.94	1.00	0.98	1.00	0.99	1.00	1.00	1.00
Max Out Probability	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

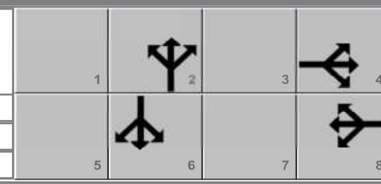
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h	100	490		130	570	330	147	348	161	365	213	192
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1753	1835		1767	1870	1541	1795	1856	1400	1767	1856	1593
Queue Service Time (g_s), s	3.8	25.2		4.9	30.0	18.6	6.4	18.6	10.4	15.5	9.2	9.6
Cycle Queue Clearance Time (g_c), s	3.8	25.2		4.9	30.0	18.6	6.4	18.6	10.4	15.5	9.2	9.6
Green Ratio (*g/C*)	0.40	0.33		0.41	0.34	0.34	0.31	0.23	0.23	0.43	0.32	0.32
Capacity (*c*), veh/h	209	613		275	638	525	434	417	315	435	596	512
Volume-to-Capacity Ratio (*X*)	0.478	0.799		0.474	0.894	0.628	0.339	0.836	0.511	0.839	0.358	0.375
Back of Queue (*Q*), ft/ln (95 th percentile)	71.5	417.6		92.5	491.3	278.9	122.5	326.7	158.3	252.4	173.9	157.1
Back of Queue (*Q*), veh/ln (95 th percentile)	2.8	16.3		3.6	19.3	11.0	4.9	12.8	6.3	9.9	6.8	6.3
Queue Storage Ratio (*RQ*) (95 th percentile)	0.26	0.00		0.28	0.00	0.00	0.70	0.00	0.00	1.01	0.00	0.00
Uniform Delay (d_1), s/veh	25.2	31.4		23.5	32.4	28.7	26.9	38.4	35.2	24.4	27.0	27.2
Incremental Delay (d_2), s/veh	0.6	0.9		0.5	1.9	0.5	0.1	1.5	0.4	1.3	0.1	0.1
Initial Queue Delay (d_3), s/veh	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (*d*), s/veh	25.9	32.3		23.9	34.3	29.1	27.0	39.8	35.6	25.6	27.1	27.3
Level of Service (LOS)	C	C		C	C	C	C	D	D	C	C	C
Approach Delay, s/veh / LOS	31.2	C		31.3	C		35.9	D		26.5	C	
Intersection Delay, s/veh / LOS	31.1						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.28	B	2.11	B	2.29	B	1.92	B
Bicycle LOS Score / LOS	1.46	A	2.19	B	1.30	A	1.11	A

HCS7 Signalized Intersection Results Summary

General Information				Intersection Information		
Agency				Duration, h	1.000	
Analyst		Analysis Date	4/30/2021	Area Type	Other	
Jurisdiction		Time Period		PHF	1.00	
Urban Street		Analysis Year	2021	Analysis Period	1> 7:00	
Intersection	Indianola & Oakland Park	File Name	No Build 2024 Indianola AM.xus			
Project Description	2024 No Build AM Peak					

Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h	50	10	80	50	10	20	50	530	60	20	640	30

Signal Information										
Cycle, s	38.9	Reference Phase	2							
Offset, s	43	Reference Point	End							
Uncoordinated	Yes	Simult. Gap E/W	On	Green	20.0	9.3	0.0	0.0	0.0	0.0
Force Mode	Fixed	Simult. Gap N/S	On	Yellow	3.6	3.6	0.0	0.0	0.0	0.0
				Red	1.1	1.2	0.0	0.0	0.0	0.0

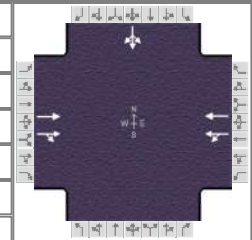
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4		8		2		6
Case Number		6.0		6.0		6.0		6.0
Phase Duration, s		14.1		14.1		24.7		24.7
Change Period, ($Y+R_c$), s		4.8		4.8		4.7		4.7
Max Allow Headway (MAH), s		3.3		3.3		3.2		3.2
Queue Clearance Time (g_s), s		3.7		4.9		15.5		15.1
Green Extension Time (g_e), s		0.4		0.4		2.5		2.6
Phase Call Probability		0.91		0.91		1.00		1.00
Max Out Probability		0.00		0.00		0.43		0.39

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (v), veh/h	50	90		50	30		61	717		20	670	
Adjusted Saturation Flow Rate (s), veh/h/ln	1393	1612		1307	1650		778	1822		740	1816	
Queue Service Time (g_s), s	1.1	1.7		1.2	0.5		2.5	12.2		0.9	11.0	
Cycle Queue Clearance Time (g_c), s	1.5	1.7		2.9	0.5		13.5	12.2		13.1	11.0	
Green Ratio (g/C)	0.24	0.24		0.24	0.24		0.52	0.52		0.52	0.52	
Capacity (c), veh/h	506	387		445	396		366	939		334	936	
Volume-to-Capacity Ratio (X)	0.099	0.232		0.112	0.076		0.166	0.764		0.060	0.716	
Back of Queue (Q), ft/ln (95 th percentile)	12.4	22.7		13.4	7.3		15.6	133		5.3	122.5	
Back of Queue (Q), veh/ln (95 th percentile)	0.5	0.9		0.5	0.3		0.6	5.2		0.2	4.8	
Queue Storage Ratio (RQ) (95 th percentile)	0.07	0.00		0.18	0.00		0.08	0.00		0.13	0.00	
Uniform Delay (d_1), s/veh	12.0	11.9		13.0	11.4		12.4	7.5		12.8	7.2	
Incremental Delay (d_2), s/veh	0.0	0.1		0.0	0.0		0.1	1.5		0.0	1.5	
Initial Queue Delay (d_3), s/veh	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Control Delay (d), s/veh	12.0	12.0		13.0	11.5		12.5	9.1		12.8	8.7	
Level of Service (LOS)	B	B		B	B		B	A		B	A	
Approach Delay, s/veh / LOS	12.0	B		12.4	B		9.3	A		8.8	A	
Intersection Delay, s/veh / LOS	9.5						A					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.09	B	1.89	B	1.86	B	1.86	B
Bicycle LOS Score / LOS	0.72	A	0.62	A	1.54	B	1.63	B

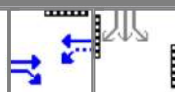
HCS7 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency				Duration, h	1.000
Analyst		Analysis Date	5/27/2021	Area Type	Other
Jurisdiction		Time Period		PHF	1.00
Urban Street		Analysis Year	2024	Analysis Period	1> 7:00
Intersection	Hudson & Summit	File Name	No Build 2024 Hudson PM.xus		
Project Description	2024 No Build PM Peak				

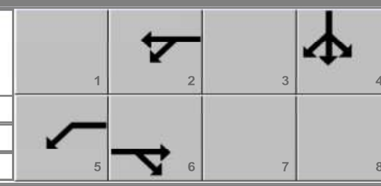


Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h		770	370	380	1020					10	10	10

Signal Information			
Cycle, s	80.0	Reference Phase	2
Offset, s	51	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	63.9	6.5	0.0	0.0	0.0	0.0
Yellow	3.6	3.6	0.0	0.0	0.0	0.0
Red	1.4	1.0	0.0	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		6	5	2				4
Case Number		8.3	0.0	14.2				12.0
Phase Duration, s		68.9	0.0	68.9				11.1
Change Period, (*Y+R* $_c$), s		5.0	5.0	5.0				4.6
Max Allow Headway (*MAH*), s		0.0	0.0	0.0				3.3
Queue Clearance Time (g_s), s								3.5
Green Extension Time (g_e), s		0.0	0.0	0.0				0.0
Phase Call Probability								0.49
Max Out Probability								0.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement		6	16	5	2					7	4	14
Adjusted Flow Rate (*v*), veh/h		607	533	173	457						30	
Adjusted Saturation Flow Rate (*s*), veh/h/ln		1856	1625	284	1615						1513	
Queue Service Time (g_s), s		26.4	7.9	3.4	10.4						1.5	
Cycle Queue Clearance Time (g_c), s		26.4	7.9	3.4	10.4						1.5	
Green Ratio (*g/C*)		0.80	0.80	0.80	0.80						0.08	
Capacity (*c*), veh/h		1482	1298	316	1290						123	
Volume-to-Capacity Ratio (*X*)		0.409	0.411	0.548	0.354						0.244	
Back of Queue (*Q*), ft/ln (95 th percentile)		71.9	63.7	142.2	111						26	
Back of Queue (*Q*), veh/ln (95 th percentile)		2.8	2.5	5.7	4.4						1.0	
Queue Storage Ratio (*RQ*) (95 th percentile)		0.00	0.00	0.00	0.00						0.00	
Uniform Delay (d_1), s/veh		2.4	2.4	24.3	4.8						34.5	
Incremental Delay (d_2), s/veh		0.8	1.0	4.9	0.6						0.4	
Initial Queue Delay (d_3), s/veh		0.0	0.0	0.0	0.0						0.0	
Control Delay (*d*), s/veh		3.2	3.4	29.3	5.3						34.8	
Level of Service (LOS)		A	A	C	A						C	

	EB		WB		NB		SB	
Approach Delay, s/veh / LOS	3.3	A	11.9	B	0.0		34.8	C
Intersection Delay, s/veh / LOS	6.8				A			

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	1.59	B	1.30	A	2.14	B	2.14	B
Bicycle LOS Score / LOS	1.43	A	1.64	B			0.54	A

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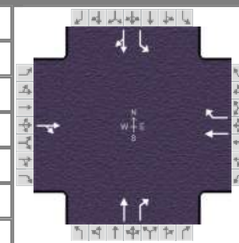
HCS7 Signalized Intersection Results Summary

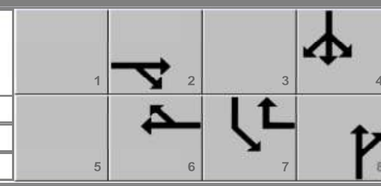
General Information				Intersection Information	
Agency				Duration, h	1.000
Analyst		Analysis Date	5/27/2021	Area Type	Other
Jurisdiction		Time Period		PHF	1.00
Urban Street		Analysis Year	2024	Analysis Period	1> 7:00
Intersection	Hudson & Indianola	File Name	No Build 2024 Hudson PM.xus		
Project Description	2024 No Build PM Peak				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h		730	30		590	430		250	140	300	130	40

Signal Information				
Cycle, s	80.0	Reference Phase	2	
Offset, s	57	Reference Point	End	
Uncoordinated	No	Simult. Gap E/W	On	
Force Mode	Fixed	Simult. Gap N/S	On	

Green	37.5	11.6	15.9	0.0	0.0	0.0
Yellow	4.1	3.0	4.1	0.0	0.0	0.0
Red	1.0	1.4	1.4	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		2		6		8	7	4
Case Number		8.0		7.0		7.3	1.0	4.0
Phase Duration, s		42.6		42.6		21.4	16.0	37.4
Change Period, (*Y+R c*), s		5.1		5.1		5.5	4.4	5.5
Max Allow Headway (*MAH*), s		0.0		0.0		3.2	3.1	3.2
Queue Clearance Time (*g s*), s						12.3	12.2	7.2
Green Extension Time (*g e*), s		0.0		0.0		1.0	0.0	1.1
Phase Call Probability						1.00	1.00	1.00
Max Out Probability						0.01	1.00	0.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement		2	12		6	16		8	18	7	4	14
Adjusted Flow Rate (*v*), veh/h		780			590	430		250	140	300	170	
Adjusted Saturation Flow Rate (*s*), veh/h/ln		1854			1870	1584		1810	1497	1781	1756	
Queue Service Time (*g s*), s		29.3			19.6	11.5		10.3	6.6	10.2	5.2	
Cycle Queue Clearance Time (*g c*), s		29.3			19.6	11.5		10.3	6.6	10.2	5.2	
Green Ratio (*g/C*)		0.47			0.47	0.61		0.20	0.20	0.37	0.40	
Capacity (*c*), veh/h		870			878	977		359	297	427	699	
Volume-to-Capacity Ratio (*X*)		0.896			0.672	0.440		0.697	0.472	0.703	0.243	
Back of Queue (*Q*), ft/ln (95 th percentile)		454.7			337.6	162.5		198.5	105.4	201.4	88.9	
Back of Queue (*Q*), veh/ln (95 th percentile)		17.9			13.3	6.5		7.9	4.2	7.9	3.5	
Queue Storage Ratio (*RQ*) (95 th percentile)		0.00			0.00	0.00		0.00	0.00	0.00	0.00	
Uniform Delay (*d 1*), s/veh		14.8			16.5	8.2		29.8	28.4	20.5	16.0	
Incremental Delay (*d 2*), s/veh		15.2			4.2	1.4		0.9	0.4	4.5	0.1	
Initial Queue Delay (*d 3*), s/veh		0.0			0.0	0.0		0.0	0.0	0.0	0.0	
Control Delay (*d*), s/veh		30.0			20.6	9.6		30.8	28.8	25.0	16.1	
Level of Service (LOS)		C			C	A		C	C	C	B	
Approach Delay, s/veh / LOS	30.0	C		16.0	B		30.1	C		21.8	C	
Intersection Delay, s/veh / LOS	23.2						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	1.89	B	2.09	B	2.12	B	1.68	B
Bicycle LOS Score / LOS	1.74	B	2.17	B	1.13	A	1.26	A

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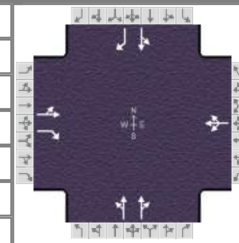
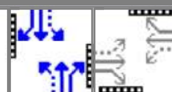
HCS7 Signalized Intersection Results Summary



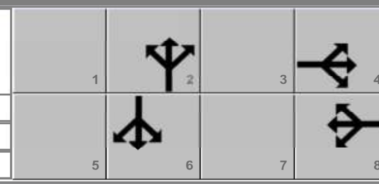
General Information				Intersection Information	
Agency				Duration, h	1.000
Analyst		Analysis Date	4/30/2021	Area Type	Other
Jurisdiction		Time Period		PHF	1.00
Urban Street		Analysis Year	2021	Analysis Period	1> 7:00
Intersection	Indianola & Arcadia	File Name	No Build 2024 Indianola PM.xus		
Project Description	2024 No Bulid PM Peak				

Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	120	60	110	10	20	20	190	460	10	10	340	100

Signal Information			
Cycle, s	80.0	Reference Phase	2
Offset, s	70	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	56.4	13.2	0.0	0.0	0.0	0.0
Yellow	4.1	3.4	0.0	0.0	0.0	0.0
Red	1.3	1.6	0.0	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4		8		2		6
Case Number		7.0		8.0		8.0		7.0
Phase Duration, s		18.2		18.2		61.8		61.8
Change Period, (*Y+R c*), s		5.0		5.0		5.4		5.4
Max Allow Headway (*MAH*), s		3.4		3.4		0.0		0.0
Queue Clearance Time (*g s*), s		11.2		4.0				
Green Extension Time (*g e*), s		0.7		0.7		0.0		0.0
Phase Call Probability		1.00		1.00				
Max Out Probability		0.00		0.00				

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h		180	110		50		300		360		441	126
Adjusted Saturation Flow Rate (*s*), veh/h/ln		1483	1493		1678		1131		1484		1852	1363
Queue Service Time (*g s*), s		7.2	5.3		0.0		0.0		6.4		0.0	4.4
Cycle Queue Clearance Time (*g c*), s		9.2	5.3		2.0		9.5		6.4		10.7	4.4
Green Ratio (*g/C*)		0.16	0.16		0.16		0.71		0.71		0.71	0.71
Capacity (*c*), veh/h		319	246		331		872		1046		1352	961
Volume-to-Capacity Ratio (*X*)		0.563	0.447		0.151		0.344		0.344		0.326	0.131
Back of Queue (*Q*), ft/ln (95 th percentile)		151.2	88.5		37.8		74		82.5		182.3	48.1
Back of Queue (*Q*), veh/ln (95 th percentile)		6.0	3.5		1.5		3.0		3.3		7.2	1.9
Queue Storage Ratio (*RQ*) (95 th percentile)		0.00	0.89		0.00		0.00		0.00		0.00	0.00
Uniform Delay (*d 1*), s/veh		31.7	30.1		28.7		4.7		4.4		8.0	7.9
Incremental Delay (*d 2*), s/veh		0.6	0.5		0.1		1.1		0.9		0.6	0.3
Initial Queue Delay (*d 3*), s/veh		0.0	0.0		0.0		0.0		0.0		0.0	0.0
Control Delay (*d*), s/veh		32.3	30.6		28.8		5.8		5.3		8.6	8.1
Level of Service (LOS)		C	C		C		A		A		A	A
Approach Delay, s/veh / LOS	31.7		C	28.8		C	5.5		A	8.5		A
Intersection Delay, s/veh / LOS	12.2						B					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	1.93	B	2.12	B	1.62	B	1.85	B
Bicycle LOS Score / LOS	0.97	A	0.57	A	1.03	A	1.23	A

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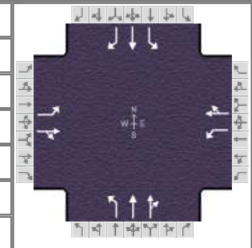
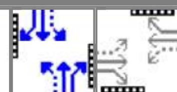
HCS7 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency				Duration, h	1.000
Analyst		Analysis Date	4/30/2021	Area Type	Other
Jurisdiction		Time Period		PHF	1.00
Urban Street		Analysis Year	2021	Analysis Period	1> 7:00
Intersection	Indianola & Weber	File Name	No Build 2024 Indianola PM.xus		
Project Description	2024 No Bulid PM Peak				

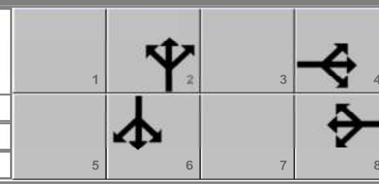


Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	70	310	40	110	350	60	60	410	90	40	350	70

Signal Information			
Cycle, s	80.0	Reference Phase	2
Offset, s	68	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	43.3	26.2	0.0	0.0	0.0	0.0
Yellow	4.1	4.1	0.0	0.0	0.0	0.0
Red	1.1	1.2	0.0	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4		8		2		6
Case Number		6.0		6.0		6.0		5.0
Phase Duration, s		31.5		31.5		48.5		48.5
Change Period, (*Y+R c*), s		5.3		5.3		5.2		5.2
Max Allow Headway (*MAH*), s		3.3		3.3		0.0		0.0
Queue Clearance Time (*g s*), s		24.1		23.4				
Green Extension Time (*g e*), s		2.2		2.2		0.0		0.0
Phase Call Probability		1.00		1.00				
Max Out Probability		0.00		0.00				

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h	70	350		110	410		64	294	242	48	418	84
Adjusted Saturation Flow Rate (*s*), veh/h/ln	910	1758		987	1740		970	1870	1511	866	1870	1500
Queue Service Time (*g s*), s	5.8	13.4		8.4	16.6		3.9	6.4	7.0	2.6	10.6	2.2
Cycle Queue Clearance Time (*g c*), s	22.1	13.4		21.4	16.6		14.6	6.4	7.0	9.8	10.6	2.2
Green Ratio (*g/C*)	0.33	0.33		0.33	0.33		0.54	0.54	0.54	0.54	0.54	0.54
Capacity (*c*), veh/h	204	577		253	571		483	1011	817	480	1011	811
Volume-to-Capacity Ratio (*X*)	0.343	0.607		0.435	0.718		0.133	0.291	0.296	0.099	0.413	0.103
Back of Queue (*Q*), ft/ln (95 th percentile)	58.9	227.9		88.9	269.5		40	112.1	100	22.8	172.5	30.1
Back of Queue (*Q*), veh/ln (95 th percentile)	2.3	9.0		3.5	10.6		1.6	4.4	4.0	0.9	6.8	1.2
Queue Storage Ratio (*RQ*) (95 th percentile)	0.91	0.00		1.48	0.00		0.00	0.00	0.00	0.00	0.00	0.00
Uniform Delay (*d 1*), s/veh	33.2	22.5		31.4	23.6		17.6	9.2	10.0	12.8	10.9	8.9
Incremental Delay (*d 2*), s/veh	0.4	0.4		0.4	0.6		0.5	0.7	0.9	0.3	0.9	0.2
Initial Queue Delay (*d 3*), s/veh	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (*d*), s/veh	33.5	22.9		31.8	24.3		18.1	9.9	10.8	13.1	11.7	9.1
Level of Service (LOS)	C	C		C	C		B	A	B	B	B	A
Approach Delay, s/veh / LOS	24.7		C	25.9		C	11.1		B	11.4		B
Intersection Delay, s/veh / LOS			17.6						B			

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.10	B	2.27	B	1.88	B	1.88	B
Bicycle LOS Score / LOS	1.18	A	1.35	A	0.95	A	1.25	A

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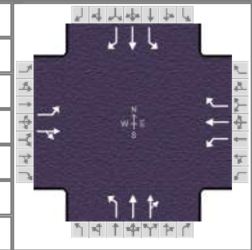
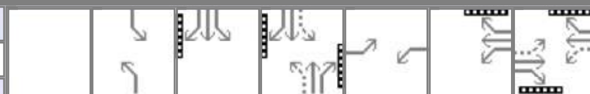
HCS7 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency				Duration, h	1.000
Analyst		Analysis Date	4/30/2021	Area Type	Other
Jurisdiction		Time Period		PHF	1.00
Urban Street		Analysis Year	2021	Analysis Period	1> 7:00
Intersection	Indianola & Broadway	File Name	No Build 2024 Indianola PM.xus		
Project Description	2024 No Bulid PM Peak				

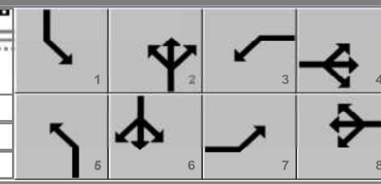


Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	120	620	80	130	570	330	100	350	90	350	360	140

Signal Information			
Cycle, s	115.1	Reference Phase	2
Offset, s	47	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	7.3	7.4	23.0	6.9	0.2	46.4
Yellow	3.0	3.0	4.1	3.0	0.0	4.1
Red	1.4	1.4	1.4	1.1	0.0	1.4

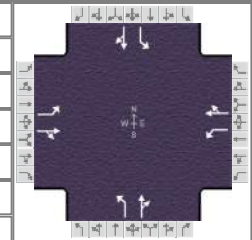


Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	7	4	3	8	5	2	1	6
Case Number	1.1	4.0	1.1	3.0	1.1	4.0	1.1	3.0
Phase Duration, s	11.0	51.9	11.2	52.2	11.7	28.5	23.5	40.3
Change Period, ($Y+R_c$), s	4.1	5.5	4.3	5.5	4.4	5.5	4.4	5.5
Max Allow Headway (*MAH*), s	3.1	2.8	3.1	2.8	3.1	2.8	3.1	2.8
Queue Clearance Time (g_s), s	6.5	45.1	6.9	32.0	7.3	17.2	18.3	20.0
Green Extension Time (g_e), s	0.2	1.2	0.0	0.8	0.2	1.3	0.6	1.3
Phase Call Probability	0.98	1.00	0.98	1.00	0.97	1.00	1.00	1.00
Max Out Probability	0.00	0.00	1.00	1.00	0.00	0.00	0.00	0.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h	120	700		130	570	330	105	255	209	329	339	132
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1753	1818		1767	1870	1559	1795	1856	1480	1767	1856	1490
Queue Service Time (g_s), s	4.5	43.1		4.9	30.0	18.4	5.3	14.7	15.2	16.3	18.0	7.8
Cycle Queue Clearance Time (g_c), s	4.5	43.1		4.9	30.0	18.4	5.3	14.7	15.2	16.3	18.0	7.8
Green Ratio (*g/C*)	0.46	0.40		0.46	0.41	0.41	0.26	0.20	0.20	0.38	0.30	0.30
Capacity (*c*), veh/h	274	734		191	759	633	310	370	295	417	560	450
Volume-to-Capacity Ratio (*X*)	0.438	0.953		0.680	0.751	0.522	0.340	0.690	0.707	0.791	0.605	0.293
Back of Queue (*Q*), ft/ln (95 th percentile)	85.5	706.5		110.2	507.4	278.7	105	279.2	233.4	266	307.3	125.7
Back of Queue (*Q*), veh/ln (95 th percentile)	3.3	27.6		4.3	20.0	11.0	4.2	10.9	9.3	10.4	12.0	5.0
Queue Storage Ratio (*RQ*) (95 th percentile)	0.31	0.00		0.34	0.00	0.00	0.60	0.00	0.00	1.06	0.00	0.00
Uniform Delay (d_1), s/veh	22.9	33.3		27.0	29.3	25.8	33.6	42.9	43.0	29.0	34.4	30.8
Incremental Delay (d_2), s/veh	0.4	9.9		7.9	3.8	0.4	0.2	0.8	1.1	0.9	0.9	0.1
Initial Queue Delay (d_3), s/veh	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (*d*), s/veh	23.3	43.2		34.9	33.1	26.2	33.8	43.7	44.2	29.9	35.3	30.9
Level of Service (LOS)	C	D		C	C	C	C	D	D	C	D	C
Approach Delay, s/veh / LOS	40.3	D		31.1	C		42.0	D		32.4	C	
Intersection Delay, s/veh / LOS	35.7						D					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.11	B	2.28	B	2.30	B	1.93	B
Bicycle LOS Score / LOS	1.84	B	2.19	B	0.93	A	1.89	B

HCS7 Signalized Intersection Results Summary

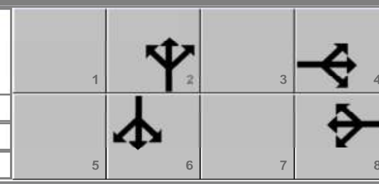


General Information				Intersection Information	
Agency				Duration, h	1.000
Analyst		Analysis Date	4/30/2021	Area Type	Other
Jurisdiction		Time Period		PHF	1.00
Urban Street		Analysis Year	2021	Analysis Period	1> 7:00
Intersection	Indianola & Oakland Park	File Name	No Build 2024 Indianola PM.xus		
Project Description	2024 No Bulid PM Peak				

Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	30	10	50	70	10	50	50	670	80	40	680	40

Signal Information			
Cycle, s	39.4	Reference Phase	2
Offset, s	61	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	20.5	9.4	0.0	0.0	0.0	0.0
Yellow	3.6	3.6	0.0	0.0	0.0	0.0
Red	1.1	1.2	0.0	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4		8		2		6
Case Number		6.0		6.0		6.0		6.0
Phase Duration, s		14.2		14.2		25.2		25.2
Change Period, (*Y+R* $_c$), s		4.8		4.8		4.7		4.7
Max Allow Headway (*MAH*), s		3.3		3.3		3.2		3.2
Queue Clearance Time (g_s), s		3.8		4.7		16.2		17.3
Green Extension Time (g_e), s		0.4		0.4		4.2		3.2
Phase Call Probability		0.91		0.91		1.00		1.00
Max Out Probability		0.00		0.00		0.00		0.32

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h	30	60		70	60		51	768		40	720	
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1362	1623		1340	1579		743	1814		705	1811	
Queue Service Time (g_s), s	0.7	1.2		1.7	1.2		2.3	13.9		1.9	12.5	
Cycle Queue Clearance Time (g_c), s	1.8	1.2		2.7	1.2		14.2	13.9		15.3	12.5	
Green Ratio (*g/C*)	0.24	0.24		0.24	0.24		0.52	0.52		0.52	0.52	
Capacity (*c*), veh/h	470	388		469	378		344	943		310	941	
Volume-to-Capacity Ratio (*X*)	0.064	0.155		0.149	0.159		0.149	0.814		0.129	0.765	
Back of Queue (*Q*), ft/ln (95 th percentile)	7.8	15.3		18.9	15.4		13.7	139		11.6	136	
Back of Queue (*Q*), veh/ln (95 th percentile)	0.3	0.6		0.7	0.6		0.5	5.4		0.5	5.3	
Queue Storage Ratio (*RQ*) (95 th percentile)	0.04	0.00		0.25	0.00		0.07	0.00		0.29	0.00	
Uniform Delay (d_1), s/veh	12.5	11.9		12.9	11.9		13.0	7.9		14.0	7.6	
Incremental Delay (d_2), s/veh	0.0	0.1		0.1	0.1		0.1	0.5		0.1	1.4	
Initial Queue Delay (d_3), s/veh	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Control Delay (*d*), s/veh	12.6	11.9		12.9	11.9		13.0	8.4		14.1	9.0	
Level of Service (LOS)	B	B		B	B		B	A		B	A	
Approach Delay, s/veh / LOS	12.1	B		12.5	B		8.7	A		9.2	A	
Intersection Delay, s/veh / LOS	9.4						A					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.09	B	1.90	B	1.86	B	1.86	B
Bicycle LOS Score / LOS	0.64	A	0.70	A	1.81	B	1.74	B

 HCS™ Streets Version 7.9 Generated: 6/29/2021 7:32:21 AM

Michael Baker INTERNATIONAL

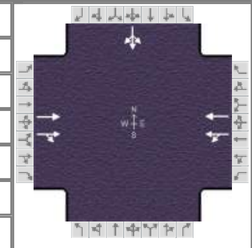
We Make a Difference

No Build 2044

AM and PM Peak Hours

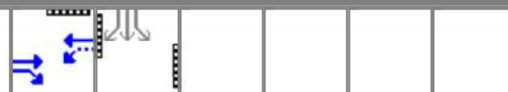
HCS7 Signalized Intersection Results Summary

General Information				Intersection Information		
Agency				Duration, h	1.000	
Analyst		Analysis Date	5/27/2021	Area Type	Other	
Jurisdiction		Time Period		PHF	1.00	
Urban Street		Analysis Year	2024	Analysis Period	1> 7:00	
Intersection	Hudson & Summit	File Name	No Build 2044 Hudson AM.xus			
Project Description	2044 No Build AM Peak					

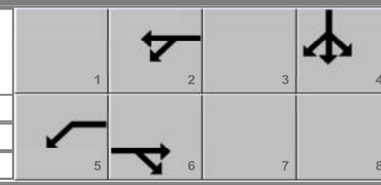


Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h		640	320	230	730					20	30	40

Signal Information			
Cycle, s	60.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	42.0	8.4	0.0	0.0	0.0	0.0
Yellow	3.6	3.6	0.0	0.0	0.0	0.0
Red	1.4	1.0	0.0	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		6	5	2				4
Case Number		8.3	0.0	14.2				12.0
Phase Duration, s		47.0	0.0	47.0				13.0
Change Period, ($Y+R_c$), s		5.0	5.0	5.0				4.6
Max Allow Headway (*MAH*), s		0.0	0.0	0.0				3.3
Queue Clearance Time (g_s), s								5.3
Green Extension Time (g_e), s		0.0	0.0	0.0				0.1
Phase Call Probability								0.78
Max Out Probability								0.00

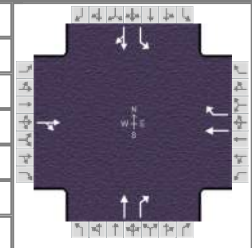
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement		6	16	5	2					7	4	14
Adjusted Flow Rate (v), veh/h		513	447	202	368						90	
Adjusted Saturation Flow Rate (s), veh/h/ln		1856	1620	536	1615						1498	
Queue Service Time (g_s), s		13.4	6.9	4.4	8.4						3.3	
Cycle Queue Clearance Time (g_c), s		13.4	6.9	4.4	8.4						3.3	
Green Ratio (g/C)		0.70	0.70	0.70	0.70						0.14	
Capacity (c), veh/h		1300	1135	476	1131						209	
Volume-to-Capacity Ratio (X)		0.394	0.394	0.424	0.326						0.430	
Back of Queue (Q), ft/ln (95 th percentile)		76	66.7	115.7	100.2						53.7	
Back of Queue (Q), veh/ln (95 th percentile)		3.0	2.7	4.6	3.9						2.1	
Queue Storage Ratio (RQ) (95 th percentile)		0.00	0.00	0.00	0.00						0.00	
Uniform Delay (d_1), s/veh		3.7	3.7	15.2	6.9						23.6	
Incremental Delay (d_2), s/veh		0.9	1.0	2.1	0.6						0.5	
Initial Queue Delay (d_3), s/veh		0.0	0.0	0.0	0.0						0.0	
Control Delay (d), s/veh		4.6	4.8	17.3	7.5						24.1	
Level of Service (LOS)		A	A	B	A						C	
Approach Delay, s/veh / LOS	4.7	A		11.0	B		0.0			24.1	C	
Intersection Delay, s/veh / LOS	8.0						A					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	1.61	B	1.32	A	2.13	B	2.13	B
Bicycle LOS Score / LOS	1.28	A	1.28	A			0.64	A

 HCS™ Streets Version 7.9 Generated: 6/29/2021 7:35:12 AM

HCS7 Signalized Intersection Results Summary

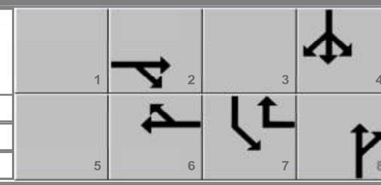
General Information				Intersection Information	
Agency				Duration, h	1.000
Analyst		Analysis Date	5/27/2021	Area Type	Other
Jurisdiction		Time Period		PHF	1.00
Urban Street		Analysis Year	2024	Analysis Period	1> 7:00
Intersection	Hudson & Indianola	File Name	No Build 2044 Hudson AM.xus		
Project Description	2044 No Build AM Peak				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h		480	20		510	260		200	120	350	150	60

Signal Information			
Cycle, s	60.0	Reference Phase	2
Offset, s	8	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	24.9	8.6	11.5	0.0	0.0	0.0
Yellow	4.1	3.0	4.1	0.0	0.0	0.0
Red	1.0	1.4	1.4	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		2		6		8	7	4
Case Number		8.0		7.0		7.3	1.0	4.0
Phase Duration, s		30.0		30.0		17.0	13.0	30.0
Change Period, (*Y+R* *c*), s		5.1		5.1		5.5	4.4	5.5
Max Allow Headway (*MAH*), s		0.0		0.0		3.2	3.1	3.2
Queue Clearance Time (*g* *s*), s						8.0	10.6	6.8
Green Extension Time (*g* *e*), s		0.0		0.0		0.5	0.0	1.0
Phase Call Probability						1.00	1.00	1.00
Max Out Probability						0.86	1.00	0.00

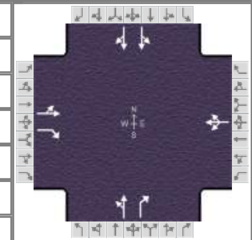
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement		2	12		6	16		8	18	7	4	14
Adjusted Flow Rate (*v*), veh/h		660			510	260		200	120	350	210	
Adjusted Saturation Flow Rate (*s*), veh/h/ln		1855			1870	1589		1810	1514	1781	1761	
Queue Service Time (*g* *s*), s		17.9			13.2	5.2		6.0	4.2	8.6	4.8	
Cycle Queue Clearance Time (*g* *c*), s		17.9			13.2	5.2		6.0	4.2	8.6	4.8	
Green Ratio (*g/C*)		0.42			0.42	0.56		0.19	0.19	0.37	0.41	
Capacity (*c*), veh/h		770			776	890		347	290	483	719	
Volume-to-Capacity Ratio (*X*)		0.857			0.657	0.292		0.577	0.414	0.724	0.292	
Back of Queue (*Q*), ft/ln (95 th percentile)		284			241.2	68.4		138.5	77.8	202.9	82.8	
Back of Queue (*Q*), veh/ln (95 th percentile)		11.2			9.5	2.7		5.5	3.1	8.0	3.3	
Queue Storage Ratio (*RQ*) (95 th percentile)		0.00			0.00	0.00		0.00	0.00	0.00	0.00	
Uniform Delay (*d* *1*), s/veh		11.4			14.1	7.0		22.0	21.3	16.2	11.9	
Incremental Delay (*d* *2*), s/veh		12.4			4.4	0.8		7.0	4.4	9.6	1.0	
Initial Queue Delay (*d* *3*), s/veh		0.0			0.0	0.0		0.0	0.0	0.0	0.0	
Control Delay (*d*), s/veh		23.8			18.5	7.8		29.0	25.6	25.8	13.0	
Level of Service (LOS)		C			B	A		C	C	C	B	
Approach Delay, s/veh / LOS	23.8	C		14.9	B		27.8	C		21.0	C	
Intersection Delay, s/veh / LOS	20.7						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	1.89	B	2.08	B	2.11	B	1.67	B
Bicycle LOS Score / LOS	1.31	A	1.76	B	1.02	A	1.41	A

 HCS™ Streets Version 7.9 Generated: 6/29/2021 7:35:12 AM

HCS7 Signalized Intersection Results Summary

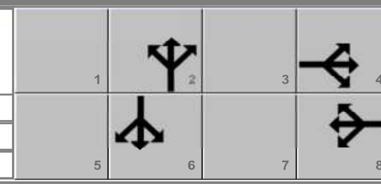
General Information				Intersection Information	
Agency				Duration, h	1.000
Analyst		Analysis Date	4/30/2021	Area Type	Other
Jurisdiction		Time Period		PHF	1.00
Urban Street		Analysis Year	2021	Analysis Period	1> 7:00
Intersection	Indianola & Arcadia	File Name	No Build 2044 Indianola AM.xus		
Project Description	2044 No Build AM Peak				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	90	100	140	20	110	50	130	290	30	20	390	120

Signal Information				
Cycle, s	60.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	39.1	10.5	0.0	0.0	0.0	0.0
Yellow	4.1	3.4	0.0	0.0	0.0	0.0
Red	1.3	1.6	0.0	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4		8		2		6
Case Number		7.0		8.0		7.0		8.0
Phase Duration, s		15.5		15.5		44.5		44.5
Change Period, (*Y+R c*), s		5.0		5.0		5.4		5.4
Max Allow Headway (*MAH*), s		3.4		3.4		0.0		0.0
Queue Clearance Time (*g s*), s		8.9		7.6				
Green Extension Time (*g e*), s		0.6		0.7		0.0		0.0
Phase Call Probability		1.00		1.00				
Max Out Probability		0.39		0.20				

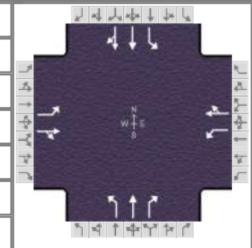
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h		190	140		180			420	30	304		228
Adjusted Saturation Flow Rate (*s*), veh/h/ln		1537	1559		1751			1403	1416	1831		1355
Queue Service Time (*g s*), s		1.3	4.9		0.0			2.9	0.5	0.0		5.3
Cycle Queue Clearance Time (*g c*), s		6.9	4.9		5.6			8.2	0.5	5.4		5.3
Green Ratio (*g/C*)		0.17	0.17		0.17			0.65	0.65	0.65		0.65
Capacity (*c*), veh/h		356	272		372			994	924	1258		884
Volume-to-Capacity Ratio (*X*)		0.533	0.515		0.484			0.423	0.032	0.242		0.258
Back of Queue (*Q*), ft/ln (95 th percentile)		111.6	80.6		103.4			84	4.5	72.5		62.1
Back of Queue (*Q*), veh/ln (95 th percentile)		4.4	3.1		4.1			3.3	0.2	2.9		2.5
Queue Storage Ratio (*RQ*) (95 th percentile)		0.00	0.81		0.00			0.00	0.00	0.00		0.00
Uniform Delay (*d 1*), s/veh		23.2	22.5		22.8			4.9	3.7	6.3		7.0
Incremental Delay (*d 2*), s/veh		0.5	0.6		0.4			1.3	0.1	0.4		0.7
Initial Queue Delay (*d 3*), s/veh		0.0	0.0		0.0			0.0	0.0	0.0		0.0
Control Delay (*d*), s/veh		23.6	23.0		23.1			6.2	3.8	6.7		7.7
Level of Service (LOS)		C	C		C			A	A	A		A
Approach Delay, s/veh / LOS	23.4	C		23.1	C		6.0	A		7.1	A	
Intersection Delay, s/veh / LOS	12.3						B					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.11	B	1.92	B	1.62	B	1.85	B
Bicycle LOS Score / LOS	1.03	A	0.78	A	1.23	A	0.92	A

 HCS™ Streets Version 7.9 Generated: 6/29/2021 8:06:51 AM

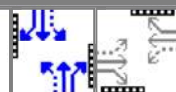
HCS7 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency				Duration, h	1.000
Analyst		Analysis Date	4/30/2021	Area Type	Other
Jurisdiction		Time Period		PHF	1.00
Urban Street		Analysis Year	2021	Analysis Period	1> 7:00
Intersection	Indianola & Weber	File Name	No Build 2044 Indianola AM.xus		
Project Description	2044 No Build AM Peak				

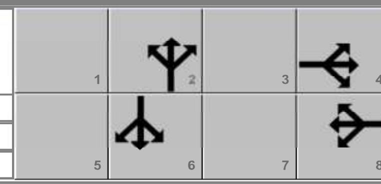


Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	60	340	40	120	260	30	60	310	100	20	330	70

Signal Information			
Cycle, s	60.0	Reference Phase	2
Offset, s	45	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	28.3	21.2	0.0	0.0	0.0	0.0
Yellow	4.1	4.1	0.0	0.0	0.0	0.0
Red	1.1	1.2	0.0	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4		8		2		6
Case Number		6.0		6.0		5.0		6.0
Phase Duration, s		26.5		26.5		33.5		33.5
Change Period, (*Y+R c*), s		5.3		5.3		5.2		5.2
Max Allow Headway (*MAH*), s		3.3		3.3		0.0		0.0
Queue Clearance Time (*g s*), s		12.7		19.6				
Green Extension Time (*g e*), s		1.8		1.7		0.0		0.0
Phase Call Probability		1.00		1.00				
Max Out Probability		0.00		0.04				

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h	60	380		120	290		55	284	91	23	233	218
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1021	1762		962	1763		946	1870	1414	1095	1870	1716
Queue Service Time (*g s*), s	2.9	10.7		7.0	7.6		2.1	6.1	2.0	0.8	4.5	4.6
Cycle Queue Clearance Time (*g c*), s	10.4	10.7		17.6	7.6		6.8	6.1	2.0	6.9	4.5	4.6
Green Ratio (*g/C*)	0.35	0.35		0.35	0.35		0.47	0.47	0.47	0.47	0.47	0.47
Capacity (*c*), veh/h	351	621		290	622		493	884	668	525	884	810
Volume-to-Capacity Ratio (*X*)	0.171	0.612		0.414	0.467		0.111	0.321	0.137	0.043	0.264	0.269
Back of Queue (*Q*), ft/ln (95 th percentile)	29.5	173.2		67.9	123.5		19.7	105.9	25.7	8.7	76.4	71.1
Back of Queue (*Q*), veh/ln (95 th percentile)	1.1	6.8		2.7	4.9		0.8	4.2	1.0	0.3	3.0	2.8
Queue Storage Ratio (*RQ*) (95 th percentile)	0.45	0.00		1.13	0.00		0.00	0.00	0.00	0.00	0.00	0.00
Uniform Delay (*d 1*), s/veh	19.1	16.0		23.3	15.0		11.0	10.9	8.1	12.2	9.5	9.6
Incremental Delay (*d 2*), s/veh	0.1	0.4		0.4	0.2		0.4	0.9	0.4	0.1	0.6	0.7
Initial Queue Delay (*d 3*), s/veh	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (*d*), s/veh	19.1	16.4		23.6	15.3		11.4	11.7	8.4	12.3	10.2	10.3
Level of Service (LOS)	B	B		C	B		B	B	A	B	B	B
Approach Delay, s/veh / LOS	16.8	B		17.7	B		11.0	B		10.3	B	
Intersection Delay, s/veh / LOS	13.8						B					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.26	B	2.09	B	1.88	B	1.88	B
Bicycle LOS Score / LOS	1.21	A	1.16	A	1.26	A	0.83	A

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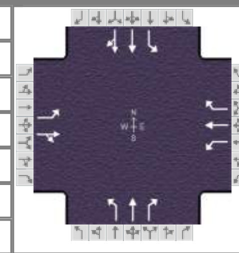
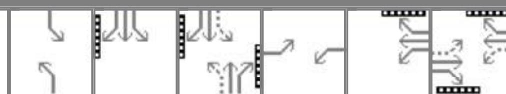
HCS7 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency				Duration, h	1.000
Analyst		Analysis Date	4/30/2021	Area Type	Other
Jurisdiction		Time Period		PHF	1.00
Urban Street		Analysis Year	2021	Analysis Period	1> 7:00
Intersection	Indianola & Broadway	File Name	No Build 2044 Indianola AM.xus		
Project Description	2044 No Build AM Peak				

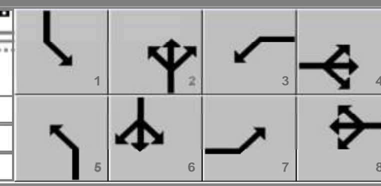


Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	100	550	30	160	750	320	130	270	150	390	280	140

Signal Information			
Cycle, s	127.6	Reference Phase	2
Offset, s	14	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	6.9	13.5	23.0	6.8	2.4	51.1
Yellow	3.0	3.0	4.1	3.0	0.0	4.1
Red	1.4	1.4	1.4	1.1	0.0	1.4

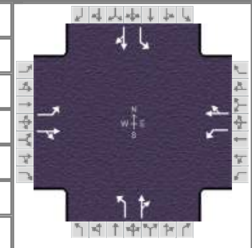


Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	7	4	3	8	5	2	1	6
Case Number	1.1	4.0	1.1	3.0	1.1	3.0	1.1	4.0
Phase Duration, s	10.9	56.6	13.3	59.0	11.3	28.5	29.2	46.4
Change Period, (*Y+R* $_c$), s	4.1	5.5	4.3	5.5	4.4	5.5	4.4	5.5
Max Allow Headway (*MAH*), s	3.1	2.7	3.1	2.7	3.1	2.8	3.1	2.8
Queue Clearance Time (g_s), s	6.2	37.3	8.7	51.6	7.1	13.5	24.4	14.5
Green Extension Time (g_e), s	0.0	0.0	0.3	1.8	0.1	0.9	0.4	1.0
Phase Call Probability	0.97	1.00	1.00	1.00	0.96	1.00	1.00	1.00
Max Out Probability	0.41	1.00	0.00	0.00	0.00	0.00	0.36	0.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h	100	580		160	750	320	88	183	102	395	225	201
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1753	1838		1767	1870	1543	1795	1856	1399	1767	1856	1587
Queue Service Time (g_s), s	4.2	35.3		6.7	49.6	19.4	5.1	11.5	8.2	22.4	11.9	12.5
Cycle Queue Clearance Time (g_c), s	4.2	35.3		6.7	49.6	19.4	5.1	11.5	8.2	22.4	11.9	12.5
Green Ratio (*g/C*)	0.45	0.40		0.47	0.42	0.42	0.23	0.18	0.18	0.39	0.32	0.32
Capacity (*c*), veh/h	160	737		283	784	647	328	334	252	507	595	509
Volume-to-Capacity Ratio (*X*)	0.624	0.787		0.564	0.957	0.495	0.269	0.549	0.404	0.778	0.377	0.394
Back of Queue (*Q*), ft/ln (95 th percentile)	82.9	592.4		128.6	837.4	291.1	101.7	231.5	129.4	363	217.8	195.2
Back of Queue (*Q*), veh/ln (95 th percentile)	3.2	23.1		5.0	33.0	11.5	4.0	9.0	5.2	14.2	8.5	7.8
Queue Storage Ratio (*RQ*) (95 th percentile)	0.30	0.00		0.40	0.00	0.00	0.58	0.00	0.00	1.45	0.00	0.00
Uniform Delay (d_1), s/veh	30.3	33.5		25.7	35.9	27.2	39.4	47.6	46.3	31.6	33.5	33.7
Incremental Delay (d_2), s/veh	1.5	5.4		0.7	13.3	0.2	0.2	0.5	0.4	3.8	0.1	0.1
Initial Queue Delay (d_3), s/veh	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (*d*), s/veh	31.8	38.9		26.3	49.3	27.4	39.5	48.1	46.6	35.4	33.6	33.8
Level of Service (LOS)	C	D		C	D	C	D	D	D	D	C	C
Approach Delay, s/veh / LOS	37.9	D		40.6	D		45.7	D		34.5	C	
Intersection Delay, s/veh / LOS	39.0						D					

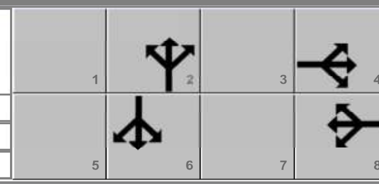
Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.28	B	2.11	B	2.31	B	1.93	B
Bicycle LOS Score / LOS	1.61	B	2.52	C	1.40	A	1.16	A

HCS7 Signalized Intersection Results Summary



General Information				Intersection Information	
Agency				Duration, h	1.000
Analyst		Analysis Date	4/30/2021	Area Type	Other
Jurisdiction		Time Period		PHF	1.00
Urban Street		Analysis Year	2021	Analysis Period	1> 7:00
Intersection	Indianola & Oakland Park	File Name	No Build 2044 Indianola AM.xus		
Project Description	2044 No Build AM Peak				

Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	50	10	80	50	10	20	50	560	60	20	690	30



Signal Information										
Cycle, s	39.0	Reference Phase	2							
Offset, s	15	Reference Point	End	Green	20.1	9.4	0.0	0.0	0.0	0.0
Uncoordinated	Yes	Simult. Gap E/W	On	Yellow	3.6	3.6	0.0	0.0	0.0	0.0
Force Mode	Fixed	Simult. Gap N/S	On	Red	1.1	1.2	0.0	0.0	0.0	0.0

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4		8		2		6
Case Number		6.0		6.0		6.0		6.0
Phase Duration, s		14.2		14.2		24.8		24.8
Change Period, ($Y+R_c$), s		4.8		4.8		4.7		4.7
Max Allow Headway (*MAH*), s		3.3		3.3		3.1		3.1
Queue Clearance Time (g_s), s		3.8		4.9		15.9		14.4
Green Extension Time (g_e), s		0.4		0.4		3.2		3.0
Phase Call Probability		0.91		0.91		1.00		1.00
Max Out Probability		0.00		0.00		0.00		0.05

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h	50	90		50	30		45	558		20	720	
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1393	1612		1307	1650		743	1824		857	1817	
Queue Service Time (g_s), s	1.1	1.8		1.2	0.6		2.0	8.4		0.6	12.4	
Cycle Queue Clearance Time (g_c), s	1.5	1.8		2.9	0.6		13.9	8.4		8.4	12.4	
Green Ratio (*g/C*)	0.24	0.24		0.24	0.24		0.52	0.52		0.52	0.52	
Capacity (*c*), veh/h	507	388		445	397		341	942		457	938	
Volume-to-Capacity Ratio (*X*)	0.099	0.232		0.112	0.076		0.132	0.593		0.044	0.768	
Back of Queue (*Q*), ft/ln (95 th percentile)	12.4	22.8		13.6	7.4		12	82.3		4.1	125	
Back of Queue (*Q*), veh/ln (95 th percentile)	0.5	0.9		0.5	0.3		0.5	3.2		0.2	4.9	
Queue Storage Ratio (*RQ*) (95 th percentile)	0.07	0.00		0.18	0.00		0.06	0.00		0.10	0.00	
Uniform Delay (d_1), s/veh	12.0	11.9		13.0	11.5		13.0	6.6		9.3	7.6	
Incremental Delay (d_2), s/veh	0.0	0.1		0.0	0.0		0.1	0.2		0.0	0.5	
Initial Queue Delay (d_3), s/veh	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Control Delay (*d*), s/veh	12.0	12.1		13.1	11.5		13.0	6.8		9.3	8.1	
Level of Service (LOS)	B	B		B	B		B	A		A	A	
Approach Delay, s/veh / LOS	12.0	B		12.5	B		7.2	A		8.1	A	
Intersection Delay, s/veh / LOS	8.4						A					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.09	B	1.89	B	1.86	B	1.86	B
Bicycle LOS Score / LOS	0.72	A	0.62	A	1.59	B	1.71	B

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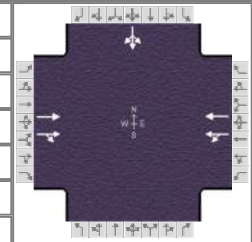
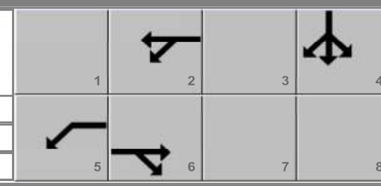
HCS7 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency				Duration, h	1.000
Analyst		Analysis Date	5/27/2021	Area Type	Other
Jurisdiction		Time Period		PHF	1.00
Urban Street		Analysis Year	2024	Analysis Period	1> 7:00
Intersection	Hudson & Summit	File Name	No Build 2044 Hudson PM.xus		
Project Description	2044 No Build PM Peak				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h		790	410	370	1070					10	10	20

Signal Information										
Cycle, s	100.0	Reference Phase	2							
Offset, s	51	Reference Point	End	Green	81.9	8.5	0.0	0.0	0.0	0.0
Uncoordinated	No	Simult. Gap E/W	On	Yellow	3.6	3.6	0.0	0.0	0.0	0.0
Force Mode	Fixed	Simult. Gap N/S	On	Red	1.4	1.0	0.0	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		6	5	2				4
Case Number		8.3	0.0	14.2				12.0
Phase Duration, s		86.9	0.0	86.9				13.1
Change Period, (*Y+R c*), s		5.0	5.0	5.0				4.6
Max Allow Headway (*MAH*), s		0.0	0.0	0.0				3.4
Queue Clearance Time (g_s), s								4.6
Green Extension Time (g_e), s		0.0	0.0	0.0				0.1
Phase Call Probability								0.67
Max Out Probability								0.00

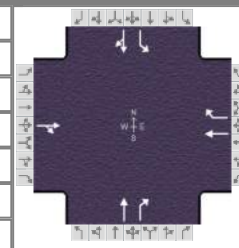
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement		6	16	5	2					7	4	14
Adjusted Flow Rate (*v*), veh/h		640	560	170	490						40	
Adjusted Saturation Flow Rate (*s*), veh/h/ln		1856	1615	248	1615						1466	
Queue Service Time (g_s), s		36.9	9.6	3.7	12.6						2.6	
Cycle Queue Clearance Time (g_c), s		36.9	9.6	3.7	12.6						2.6	
Green Ratio (*g/C*)		0.82	0.82	0.82	0.82						0.08	
Capacity (*c*), veh/h		1520	1324	275	1323						124	
Volume-to-Capacity Ratio (*X*)		0.421	0.423	0.617	0.371						0.322	
Back of Queue (*Q*), ft/ln (95 th percentile)		102.7	90.1	176.3	157.3						44.7	
Back of Queue (*Q*), veh/ln (95 th percentile)		4.0	3.6	7.1	6.2						1.7	
Queue Storage Ratio (*RQ*) (95 th percentile)		0.00	0.00	0.00	0.00						0.00	
Uniform Delay (d_1), s/veh		2.5	2.5	31.8	4.8						43.1	
Incremental Delay (d_2), s/veh		0.9	1.0	7.4	0.6						0.6	
Initial Queue Delay (d_3), s/veh		0.0	0.0	0.0	0.0						0.0	
Control Delay (*d*), s/veh		3.3	3.5	39.2	5.4						43.6	
Level of Service (LOS)		A	A	D	A						D	

	EB		WB		NB		SB	
Approach Delay, s/veh / LOS	3.4	A	14.0	B	0.0		43.6	D
Intersection Delay, s/veh / LOS	8.0				A			

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	1.59	B	1.30	A	2.15	B	2.15	B
Bicycle LOS Score / LOS	1.48	A	1.68	B			0.55	A

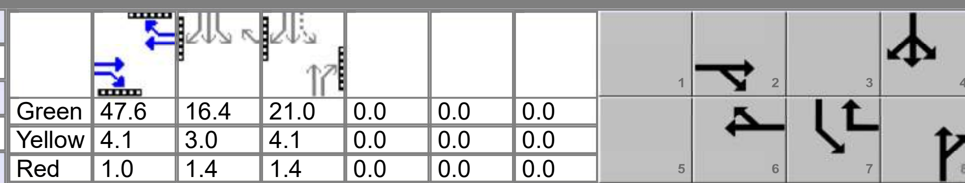
HCS7 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency				Duration, h	1.000
Analyst		Analysis Date	5/27/2021	Area Type	Other
Jurisdiction		Time Period		PHF	1.00
Urban Street		Analysis Year	2024	Analysis Period	1> 7:00
Intersection	Hudson & Indianola	File Name	No Build 2044 Hudson PM.xus		
Project Description	2044 No Build PM Peak				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h		750	30		610	480		330	160	330	170	50

Signal Information										
Cycle, s	100.0	Reference Phase	2							
Offset, s	63	Reference Point	End	Green	47.6	16.4	21.0	0.0	0.0	0.0
Uncoordinated	No	Simult. Gap E/W	On	Yellow	4.1	3.0	4.1	0.0	0.0	0.0
Force Mode	Fixed	Simult. Gap N/S	On	Red	1.0	1.4	1.4	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		2		6		8	7	4
Case Number		8.0		7.0		7.3	1.0	4.0
Phase Duration, s		52.7		52.7		26.5	20.8	47.3
Change Period, ($Y+R_c$), s		5.1		5.1		5.5	4.4	5.5
Max Allow Headway (*MAH*), s		0.0		0.0		3.2	3.1	3.2
Queue Clearance Time (g_s), s						19.6	15.8	10.3
Green Extension Time (g_e), s		0.0		0.0		1.4	0.6	1.5
Phase Call Probability						1.00	1.00	1.00
Max Out Probability						0.00	0.00	0.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement		2	12		6	16		8	18	7	4	14
Adjusted Flow Rate (*v*), veh/h		800			610	480		330	160	330	220	
Adjusted Saturation Flow Rate (*s*), veh/h/ln		1855			1870	1584		1810	1499	1781	1761	
Queue Service Time (g_s), s		38.3			25.4	15.7		17.6	9.4	13.8	8.3	
Cycle Queue Clearance Time (g_c), s		38.3			25.4	15.7		17.6	9.4	13.8	8.3	
Green Ratio (*g/C*)		0.48			0.48	0.64		0.21	0.21	0.39	0.42	
Capacity (*c*), veh/h		883			890	1017		381	315	400	737	
Volume-to-Capacity Ratio (*X*)		0.906			0.685	0.472		0.866	0.507	0.825	0.299	
Back of Queue (*Q*), ft/ln (95 th percentile)		610.2			431.8	223		316.5	155.3	245.4	150.8	
Back of Queue (*Q*), veh/ln (95 th percentile)		24.0			17.0	8.9		12.6	6.2	9.7	5.9	
Queue Storage Ratio (*RQ*) (95 th percentile)		0.00			0.00	0.00		0.00	0.00	0.00	0.00	
Uniform Delay (d_1), s/veh		19.3			20.4	9.3		38.1	34.9	25.0	19.3	
Incremental Delay (d_2), s/veh		16.4			4.4	1.6		2.4	0.5	1.7	0.1	
Initial Queue Delay (d_3), s/veh		0.0			0.0	0.0		0.0	0.0	0.0	0.0	
Control Delay (*d*), s/veh		35.7			24.8	10.9		40.6	35.4	26.7	19.4	
Level of Service (LOS)		D			C	B		D	D	C	B	
Approach Delay, s/veh / LOS	35.7	D		18.7	B		38.9	D		23.8	C	
Intersection Delay, s/veh / LOS	27.6						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	1.90	B	2.09	B	2.13	B	1.69	B
Bicycle LOS Score / LOS	1.77	B	2.29	B	1.30	A	1.40	A

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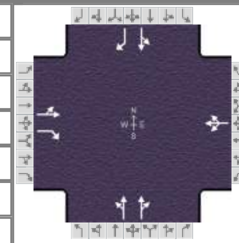
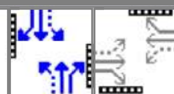
HCS7 Signalized Intersection Results Summary

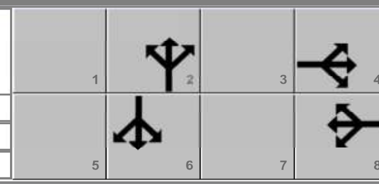
General Information				Intersection Information	
Agency				Duration, h	1.000
Analyst		Analysis Date	4/30/2021	Area Type	Other
Jurisdiction		Time Period		PHF	1.00
Urban Street		Analysis Year	2021	Analysis Period	1> 7:00
Intersection	Indianola & Arcadia	File Name	No Build 2044 Indianola PM.xus		
Project Description	2044 No Build PM Peak				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	110	80	130	10	30	30	220	540	20	10	400	90

Signal Information										
Cycle, s	50.0	Reference Phase	2							
Offset, s	70	Reference Point	End	Green	28.5	11.1	0.0	0.0	0.0	0.0
Uncoordinated	No	Simult. Gap E/W	On	Yellow	4.1	3.4	0.0	0.0	0.0	0.0
Force Mode	Fixed	Simult. Gap N/S	On	Red	1.3	1.6	0.0	0.0	0.0	0.0





Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4		8		2		6
Case Number		7.0		8.0		8.0		7.0
Phase Duration, s		16.1		16.1		33.9		33.9
Change Period, (*Y+R c*), s		5.0		5.0		5.4		5.4
Max Allow Headway (*MAH*), s		3.4		3.4		0.0		0.0
Queue Clearance Time (*g s*), s		7.2		3.7				
Green Extension Time (*g e*), s		0.4		0.6		0.0		0.0
Phase Call Probability		1.00		1.00				
Max Out Probability		0.42		0.04				

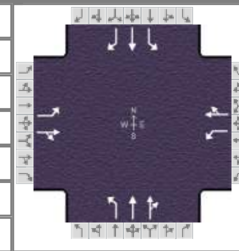
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h		190	130		70		359		421		483	106
Adjusted Saturation Flow Rate (*s*), veh/h/ln		1552	1505		1672		1131		1477		1855	1356
Queue Service Time (*g s*), s		3.6	3.7		0.0		0.3		7.2		0.0	3.0
Cycle Queue Clearance Time (*g c*), s		5.2	3.7		1.7		10.0		7.2		9.8	3.0
Green Ratio (*g/C*)		0.22	0.22		0.22		0.57		0.57		0.57	0.57
Capacity (*c*), veh/h		457	333		452		764		843		1132	774
Volume-to-Capacity Ratio (*X*)		0.415	0.390		0.155		0.470		0.499		0.426	0.137
Back of Queue (*Q*), ft/ln (95 th percentile)		81.4	54.6		27.5		84.6		94.4		161.3	30.1
Back of Queue (*Q*), veh/ln (95 th percentile)		3.2	2.1		1.1		3.4		3.8		6.4	1.2
Queue Storage Ratio (*RQ*) (95 th percentile)		0.00	0.55		0.00		0.00		0.00		0.00	0.00
Uniform Delay (*d 1*), s/veh		17.1	16.6		15.8		6.5		6.2		9.8	9.0
Incremental Delay (*d 2*), s/veh		0.2	0.3		0.1		2.1		2.1		1.0	0.3
Initial Queue Delay (*d 3*), s/veh		0.0	0.0		0.0		0.0		0.0		0.0	0.0
Control Delay (*d*), s/veh		17.3	16.9		15.9		8.6		8.3		10.8	9.3
Level of Service (LOS)		B	B		B		A		A		B	A
Approach Delay, s/veh / LOS	17.1	B		15.9	B		8.4	A		10.5	B	
Intersection Delay, s/veh / LOS	11.0						B					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	1.91	B	2.10	B	1.63	B	1.86	B
Bicycle LOS Score / LOS	1.02	A	0.60	A	1.13	A	1.31	A

 HCS™ Streets Version 7.9 Generated: 6/29/2021 8:27:29 AM

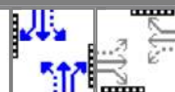
HCS7 Signalized Intersection Results Summary

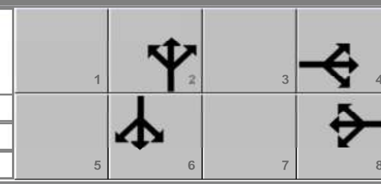
General Information				Intersection Information	
Agency				Duration, h	1.000
Analyst		Analysis Date	4/30/2021	Area Type	Other
Jurisdiction		Time Period		PHF	1.00
Urban Street		Analysis Year	2021	Analysis Period	1> 7:00
Intersection	Indianola & Weber	File Name	No Build 2044 Indianola PM.xus		
Project Description	2044 No Build PM Peak				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	80	390	40	120	440	70	70	440	120	50	370	80

Signal Information										
Cycle, s	50.0	Reference Phase	2							
Offset, s	49	Reference Point	End	Green	19.6	19.9	0.0	0.0	0.0	0.0
Uncoordinated	No	Simult. Gap E/W	On	Yellow	4.1	4.1	0.0	0.0	0.0	0.0
Force Mode	Fixed	Simult. Gap N/S	On	Red	1.1	1.2	0.0	0.0	0.0	0.0





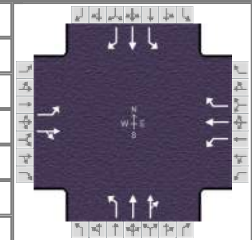
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4		8		2		6
Case Number		6.0		6.0		6.0		5.0
Phase Duration, s		25.2		25.2		24.8		24.8
Change Period, ($Y+R_c$), s		5.3		5.3		5.2		5.2
Max Allow Headway (*MAH*), s		3.3		3.3		0.0		0.0
Queue Clearance Time (g_s), s		18.9		17.7				
Green Extension Time (g_e), s		1.0		1.4		0.0		0.0
Phase Call Probability		1.00		1.00				
Max Out Probability		1.00		0.83				

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h	80	430		120	510		76	332	272	58	429	93
Adjusted Saturation Flow Rate (*s*), veh/h/ln	834	1766		920	1752		967	1870	1515	815	1870	1591
Queue Service Time (g_s), s	4.5	9.7		6.0	12.4		2.7	6.0	5.9	2.8	9.0	1.9
Cycle Queue Clearance Time (g_c), s	16.9	9.7		15.7	12.4		12.2	6.0	5.9	8.8	9.0	1.9
Green Ratio (*g/C*)	0.40	0.40		0.40	0.40		0.39	0.39	0.39	0.39	0.39	0.39
Capacity (*c*), veh/h	270	702		332	697		348	734	594	366	734	624
Volume-to-Capacity Ratio (*X*)	0.297	0.612		0.362	0.732		0.217	0.453	0.458	0.158	0.584	0.149
Back of Queue (*Q*), ft/ln (95 th percentile)	36.8	144		51	196.7		28.2	100.7	81.7	22.4	141.4	25.7
Back of Queue (*Q*), veh/ln (95 th percentile)	1.4	5.7		2.0	7.7		1.1	4.0	3.3	0.9	5.6	1.0
Queue Storage Ratio (*RQ*) (95 th percentile)	0.57	0.00		0.85	0.00		0.00	0.00	0.00	0.00	0.00	0.00
Uniform Delay (d_1), s/veh	19.9	12.0		18.2	12.8		13.9	9.7	9.3	14.3	12.0	9.8
Incremental Delay (d_2), s/veh	0.2	0.8		0.2	2.8		1.3	1.8	2.2	0.5	1.9	0.3
Initial Queue Delay (d_3), s/veh	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (*d*), s/veh	20.2	12.8		18.5	15.6		15.1	11.5	11.6	14.8	13.9	10.1
Level of Service (LOS)	C	B		B	B		B	B	B	B	B	B
Approach Delay, s/veh / LOS	13.9	B		16.1	B		11.9	B		13.3	B	
Intersection Delay, s/veh / LOS	13.8						B					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.08	B	2.25	B	1.89	B	1.89	B
Bicycle LOS Score / LOS	1.33	A	1.53	B	1.01	A	1.31	A

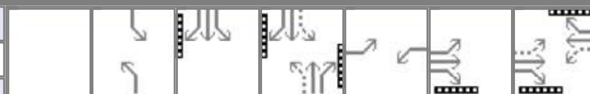
HCS7 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency				Duration, h	1.000
Analyst		Analysis Date	4/30/2021	Area Type	Other
Jurisdiction		Time Period		PHF	1.00
Urban Street		Analysis Year	2021	Analysis Period	1> 7:00
Intersection	Indianola & Broadway	File Name	No Build 2044 Indianola PM.xus		
Project Description	2044 No Build PM Peak				

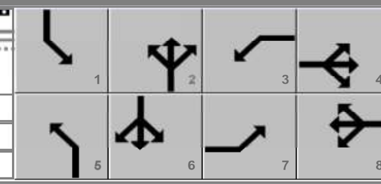


Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	130	720	90	130	660	380	110	370	90	400	380	150

Signal Information			
Cycle, s	148.3	Reference Phase	2
Offset, s	11	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	10.3	13.4	25.4	7.0	0.8	67.4
Yellow	3.0	3.0	4.1	3.0	0.0	4.1
Red	1.4	1.4	1.4	1.3	0.0	1.3



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	7	4	3	8	5	2	1	6
Case Number	1.1	4.0	1.1	3.0	1.1	4.0	1.1	3.0
Phase Duration, s	12.1	73.6	11.3	72.8	14.7	30.9	32.5	48.8
Change Period, (*Y+R* $_c$), s	4.1	5.5	4.3	5.5	4.4	5.5	4.4	5.5
Max Allow Headway (*MAH*), s	3.1	2.7	3.1	2.7	3.1	2.7	3.1	2.7
Queue Clearance Time (g_s), s	7.9	66.5	8.1	46.2	10.1	24.0	27.4	27.3
Green Extension Time (g_e), s	0.1	1.5	0.0	0.0	0.2	1.4	0.7	1.4
Phase Call Probability	1.00	1.00	1.00	1.00	0.99	1.00	1.00	1.00
Max Out Probability	0.00	0.00	1.00	1.00	0.00	0.00	0.00	0.00

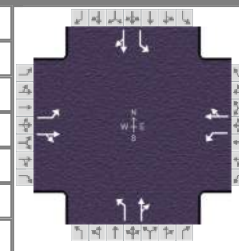
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h	130	810		130	660	380	121	276	228	378	360	142
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1753	1819		1767	1870	1585	1795	1856	1505	1767	1856	1591
Queue Service Time (g_s), s	5.9	64.5		6.1	44.2	25.6	8.1	21.5	22.0	25.4	25.3	10.3
Cycle Queue Clearance Time (g_c), s	5.9	64.5		6.1	44.2	25.6	8.1	21.5	22.0	25.4	25.3	10.3
Green Ratio (*g/C*)	0.51	0.46		0.50	0.45	0.45	0.24	0.17	0.17	0.37	0.29	0.29
Capacity (*c*), veh/h	261	835		140	849	719	284	318	258	405	541	464
Volume-to-Capacity Ratio (*X*)	0.498	0.970		0.931	0.778	0.528	0.425	0.868	0.883	0.935	0.664	0.306
Back of Queue (*Q*), ft/ln (95 th percentile)	113.9	975.4		256.7	719.5	378.6	166.5	390.8	328.3	401	413	167.4
Back of Queue (*Q*), veh/ln (95 th percentile)	4.4	38.1		10.0	28.3	14.9	6.6	15.3	13.1	15.7	16.1	6.7
Queue Storage Ratio (*RQ*) (95 th percentile)	0.41	0.00		0.79	0.00	0.00	0.95	0.00	0.00	1.60	0.00	0.00
Uniform Delay (d_1), s/veh	27.4	39.2		36.8	34.2	29.1	46.2	59.9	60.1	39.5	46.2	40.9
Incremental Delay (d_2), s/veh	0.5	5.1		88.4	4.3	0.4	0.3	2.6	3.7	3.1	0.4	0.1
Initial Queue Delay (d_3), s/veh	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (*d*), s/veh	28.0	44.2		125.2	38.6	29.5	46.5	62.5	63.7	42.7	46.6	41.0
Level of Service (LOS)	C	D		F	D	C	D	E	E	D	D	D
Approach Delay, s/veh / LOS	42.0	D		45.3	D		59.9	E		44.0	D	
Intersection Delay, s/veh / LOS	46.6						D					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.11	B	2.28	B	2.31	B	1.94	B
Bicycle LOS Score / LOS	2.04	B	2.42	B	0.96	A	2.02	B

 HCS™ Streets Version 7.9 Generated: 6/29/2021 8:27:29 AM

HCS7 Signalized Intersection Results Summary

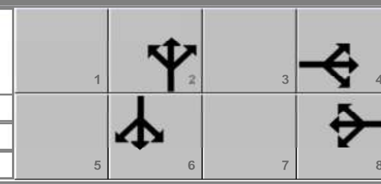
General Information				Intersection Information	
Agency				Duration, h	1.000
Analyst		Analysis Date	4/30/2021	Area Type	Other
Jurisdiction		Time Period		PHF	1.00
Urban Street		Analysis Year	2021	Analysis Period	1> 7:00
Intersection	Indianola & Oakland Park	File Name	No Build 2044 Indianola PM.xus		
Project Description	2044 No Build PM Peak				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	30	10	50	70	10	50	50	740	80	40	760	40

Signal Information			
Cycle, s	41.1	Reference Phase	2
Offset, s	36	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	22.4	9.2	0.0	0.0	0.0	0.0
Yellow	3.6	3.6	0.0	0.0	0.0	0.0
Red	1.1	1.2	0.0	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4		8		2		6
Case Number		6.0		6.0		6.0		6.0
Phase Duration, s		14.0		14.0		27.1		27.1
Change Period, (*Y+R c*), s		4.8		4.8		4.7		4.7
Max Allow Headway (*MAH*), s		3.3		3.3		3.2		3.2
Queue Clearance Time (*g s*), s		3.9		4.9		19.4		21.1
Green Extension Time (*g e*), s		0.4		0.4		2.3		1.1
Phase Call Probability		0.92		0.92		1.00		1.00
Max Out Probability		0.00		0.00		0.82		1.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h	30	60		70	60		53	863		40	800	
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1364	1626		1343	1614		690	1824		646	1817	
Queue Service Time (*g s*), s	0.7	1.2		1.8	1.2		2.8	16.8		2.3	14.7	
Cycle Queue Clearance Time (*g c*), s	1.9	1.2		2.9	1.2		17.4	16.8		19.1	14.7	
Green Ratio (*g/C*)	0.22	0.22		0.22	0.22		0.54	0.54		0.54	0.54	
Capacity (*c*), veh/h	441	364		440	362		305	994		264	991	
Volume-to-Capacity Ratio (*X*)	0.068	0.165		0.159	0.166		0.172	0.868		0.152	0.807	
Back of Queue (*Q*), ft/ln (95 th percentile)	8.5	16.7		20.9	17		16.1	201.7		13.4	195.9	
Back of Queue (*Q*), veh/ln (95 th percentile)	0.3	0.7		0.8	0.7		0.6	7.9		0.5	7.7	
Queue Storage Ratio (*RQ*) (95 th percentile)	0.05	0.00		0.28	0.00		0.08	0.00		0.34	0.00	
Uniform Delay (*d 1*), s/veh	13.6	12.9		14.0	12.9		14.7	8.1		16.3	7.6	
Incremental Delay (*d 2*), s/veh	0.0	0.1		0.1	0.1		0.1	5.2		0.1	4.6	
Initial Queue Delay (*d 3*), s/veh	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Control Delay (*d*), s/veh	13.7	13.0		14.1	13.0		14.7	13.3		16.4	12.2	
Level of Service (LOS)	B	B		B	B		B	B		B	B	
Approach Delay, s/veh / LOS	13.2	B		13.6	B		13.4	B		12.4	B	
Intersection Delay, s/veh / LOS	13.0						B					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.09	B	1.90	B	1.86	B	1.86	B
Bicycle LOS Score / LOS	0.64	A	0.70	A	1.92	B	1.87	B

 HCS™ Streets Version 7.9 Generated: 6/29/2021 8:27:29 AM

Michael Baker INTERNATIONAL

We Make a Difference

Base Analysis 2024/2044

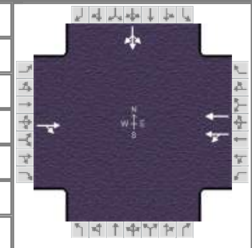
Cycle track on Hudson St

Bike lanes through E. North Broadway Intersection

AM and PM Peak Hours

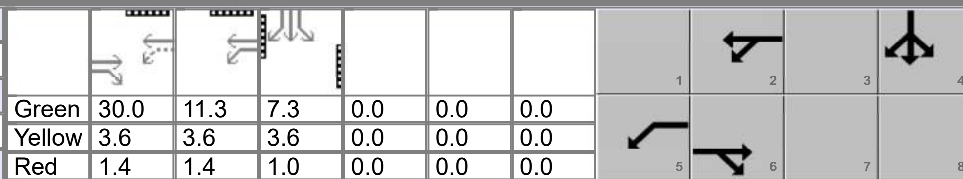
HCS7 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency				Duration, h	1.000
Analyst		Analysis Date	5/27/2021	Area Type	Other
Jurisdiction		Time Period		PHF	1.00
Urban Street		Analysis Year	2024	Analysis Period	1> 7:45
Intersection	Hudson & Summit	File Name	Build 2024 Hudson AM.xus		
Project Description	2024 Build AM Peak				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h		680	260	250	730					20	20	20

Signal Information									
Cycle, s	63.2	Reference Phase	2						
Offset, s	0	Reference Point	End	Green	30.0	11.3	7.3	0.0	0.0	0.0
Uncoordinated	Yes	Simult. Gap E/W	On	Yellow	3.6	3.6	3.6	0.0	0.0	0.0
Force Mode	Fixed	Simult. Gap N/S	On	Red	1.4	1.4	1.0	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		6	5	2				4
Case Number		8.4	0.0	14.4				12.0
Phase Duration, s		35.0	16.3	51.3				11.9
Change Period, (*Y+R* $_c$), s		5.0	5.0	5.0				4.6
Max Allow Headway (*MAH*), s		2.1	0.0	2.9				3.3
Queue Clearance Time (g_s), s		32.0		45.0				4.3
Green Extension Time (g_e), s		0.0	0.0	0.6				0.1
Phase Call Probability		1.00		1.00				0.66
Max Out Probability		1.00		0.07				0.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement		6	16	5	2					7	4	14
Adjusted Flow Rate (*v*), veh/h		940		219	341						60	
Adjusted Saturation Flow Rate (*s*), veh/h/ln		1765		484	1655						1520	
Queue Service Time (g_s), s		30.0		3.0	4.3						2.3	
Cycle Queue Clearance Time (g_c), s		30.0		43.0	4.3						2.3	
Green Ratio (*g/C*)		0.47		0.73	0.73						0.12	
Capacity (*c*), veh/h		829		449	1216						175	
Volume-to-Capacity Ratio (*X*)		1.135		0.489	0.280						0.343	
Back of Queue (*Q*), ft/ln (95 th percentile)		2352.9		89.9	31.7						39.1	
Back of Queue (*Q*), veh/ln (95 th percentile)		91.9		3.6	1.2						1.5	
Queue Storage Ratio (*RQ*) (95 th percentile)		0.00		0.00	0.00						0.00	
Uniform Delay (d_1), s/veh		17.0		16.6	2.8						26.1	
Incremental Delay (d_2), s/veh		259.3		0.2	0.0						0.4	
Initial Queue Delay (d_3), s/veh		0.0		0.0	0.0						0.0	
Control Delay (*d*), s/veh		276.3		16.9	2.9						26.5	
Level of Service (LOS)		F		B	A						C	

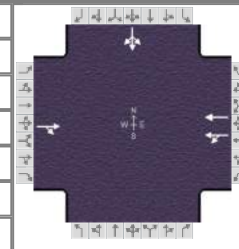
	EB		WB		NB		SB	
Approach Delay, s/veh / LOS	276.3	F	8.3	A	0.0		26.5	C
Intersection Delay, s/veh / LOS	170.5				F			

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	1.69	B	1.31	A	1.94	B	1.94	B
Bicycle LOS Score / LOS	2.87	C	2.12	B			0.16	A

 HCS™ Streets Version 7.9 Generated: 9/21/2021 8:19:51 AM

HCS7 Signalized Intersection Results Summary

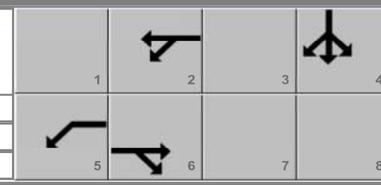
General Information				Intersection Information	
Agency				Duration, h	1.000
Analyst		Analysis Date	5/27/2021	Area Type	Other
Jurisdiction		Time Period		PHF	1.00
Urban Street		Analysis Year	2024	Analysis Period	1> 4:45
Intersection	Hudson & Summit	File Name	Build 2024 Hudson PM.xus		
Project Description	2024 Build PM Peak				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h		770	370	380	1010					10	10	10

Signal Information			
Cycle, s	66.7	Reference Phase	2
Offset, s	51	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	30.0	16.4	5.7	0.0	0.0	0.0
Yellow	3.6	3.6	3.6	0.0	0.0	0.0
Red	1.4	1.4	1.0	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		6	5	2				4
Case Number		8.4	0.0	14.4				12.0
Phase Duration, s		35.0	21.4	56.4				10.3
Change Period, (*Y+R c*), s		5.0	5.0	5.0				4.6
Max Allow Headway (*MAH*), s		2.1	0.0	3.3				3.3
Queue Clearance Time (*g s*), s		32.0		51.1				3.2
Green Extension Time (*g e*), s		0.0	0.0	0.2				0.0
Phase Call Probability		1.00		1.00				0.43
Max Out Probability		1.00		1.00				0.00

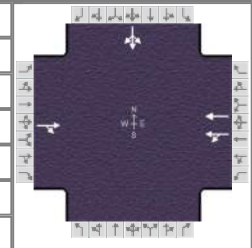
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement		6	16	5	2					7	4	14
Adjusted Flow Rate (*v*), veh/h		1140		244	386						30	
Adjusted Saturation Flow Rate (*s*), veh/h/ln		1749		584	1665						1515	
Queue Service Time (*g s*), s		30.0		4.7	4.5						1.2	
Cycle Queue Clearance Time (*g c*), s		30.0		49.1	4.5						1.2	
Green Ratio (*g/C*)		0.45		0.77	0.77						0.09	
Capacity (*c*), veh/h		786		542	1284						129	
Volume-to-Capacity Ratio (*X*)		1.451		0.450	0.301						0.232	
Back of Queue (*Q*), ft/ln (95 th percentile)		6900.9		106.6	27						21	
Back of Queue (*Q*), veh/ln (95 th percentile)		269.6		4.3	1.1						0.8	
Queue Storage Ratio (*RQ*) (95 th percentile)		0.00		0.00	0.00						0.00	
Uniform Delay (*d 1*), s/veh		18.4		16.2	2.3						28.5	
Incremental Delay (*d 2*), s/veh		818.6		0.1	0.0						0.3	
Initial Queue Delay (*d 3*), s/veh		0.0		0.0	0.0						0.0	
Control Delay (*d*), s/veh		837.0		16.4	2.3						28.8	
Level of Service (LOS)		F		B	A						C	

	EB		WB		NB		SB	
Approach Delay, s/veh / LOS	837.0	F	7.7	A	0.0		28.8	C
Intersection Delay, s/veh / LOS	533.3				F			

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	1.69	B	1.30	A	1.94	B	1.94	B
Bicycle LOS Score / LOS	3.20	C	2.46	B			1.61	B

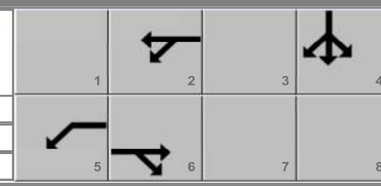
HCS7 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency				Duration, h	1.000
Analyst		Analysis Date	5/27/2021	Area Type	Other
Jurisdiction		Time Period		PHF	1.00
Urban Street		Analysis Year	2044	Analysis Period	1> 7:45
Intersection	Hudson & Summit	File Name	Build 2044 Hudson AM.xus		
Project Description	2044 Build AM Peak				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h		670	320	240	740					30	50	60

Signal Information										
Cycle, s	55.2	Reference Phase	2							
Offset, s	0	Reference Point	End	Green	30.0	1.0	9.5	0.0	0.0	0.0
Uncoordinated	Yes	Simult. Gap E/W	On	Yellow	3.6	3.6	3.6	0.0	0.0	0.0
Force Mode	Fixed	Simult. Gap N/S	On	Red	1.4	1.4	1.0	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		6	5	2				4
Case Number		8.4	0.0	14.4				12.0
Phase Duration, s		35.0	6.0	41.0				14.1
Change Period, (*Y+R c*), s		5.0	5.0	5.0				4.6
Max Allow Headway (*MAH*), s		2.1	0.0	2.9				3.3
Queue Clearance Time (*g s*), s		32.0		33.3				6.9
Green Extension Time (*g e*), s		0.0	0.0	0.7				0.1
Phase Call Probability		1.00		1.00				0.89
Max Out Probability		1.00		0.00				0.05

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement		6	16	5	2					7	4	14
Adjusted Flow Rate (*v*), veh/h		990		163	317						140	
Adjusted Saturation Flow Rate (*s*), veh/h/ln		1751		179	1627						1503	
Queue Service Time (*g s*), s		30.0		0.3	4.6						4.9	
Cycle Queue Clearance Time (*g c*), s		30.0		31.3	4.6						4.9	
Green Ratio (*g/C*)		0.54		0.65	0.65						0.17	
Capacity (*c*), veh/h		917		227	1081						252	
Volume-to-Capacity Ratio (*X*)		1.079		0.716	0.293						0.555	
Back of Queue (*Q*), ft/ln (95 th percentile)		1703.6		91.5	40.9						78.8	
Back of Queue (*Q*), veh/ln (95 th percentile)		66.5		3.7	1.6						3.0	
Queue Storage Ratio (*RQ*) (95 th percentile)		0.00		0.00	0.00						0.00	
Uniform Delay (*d 1*), s/veh		13.6		19.9	4.0						21.9	
Incremental Delay (*d 2*), s/veh		165.4		1.3	0.0						0.7	
Initial Queue Delay (*d 3*), s/veh		0.0		0.0	0.0						0.0	
Control Delay (*d*), s/veh		179.0		21.3	4.0						22.6	
Level of Service (LOS)		F		C	A						C	
Approach Delay, s/veh / LOS	179.0	F		9.9	A		0.0			22.6	C	
Intersection Delay, s/veh / LOS	115.0						F					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	1.70	B	1.33	A	1.94	B	1.94	B
Bicycle LOS Score / LOS	2.95	C	2.12	B			1.79	B

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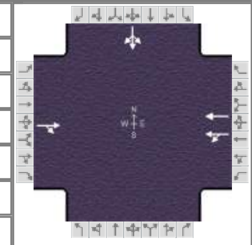
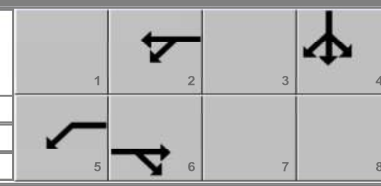
HCS7 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency				Duration, h	1.000
Analyst		Analysis Date	5/27/2021	Area Type	Other
Jurisdiction		Time Period		PHF	1.00
Urban Street		Analysis Year	2044	Analysis Period	1> 4:45
Intersection	Hudson & Summit	File Name	Build 2044 Hudson PM.xus		
Project Description	2044 Build PM Peak				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h		780	400	380	1060					20	10	20

Signal Information										
Cycle, s	69.1	Reference Phase	2							
Offset, s	51	Reference Point	End	Green	30.0	17.0	7.5	0.0	0.0	0.0
Uncoordinated	Yes	Simult. Gap E/W	On	Yellow	3.6	3.6	3.6	0.0	0.0	0.0
Force Mode	Fixed	Simult. Gap N/S	On	Red	1.4	1.4	1.0	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		6	5	2				4
Case Number		8.4	8.0	14.4				12.0
Phase Duration, s		35.0	22.0	57.0				12.1
Change Period, ($Y+R_c$), s		5.0	5.0	5.0				4.6
Max Allow Headway (*MAH*), s		2.1	0.0	3.3				3.3
Queue Clearance Time (g_s), s		32.0		52.9				4.1
Green Extension Time (g_e), s		0.0	0.0	0.0				0.1
Phase Call Probability		1.00		1.00				0.62
Max Out Probability		1.00		1.00				0.00

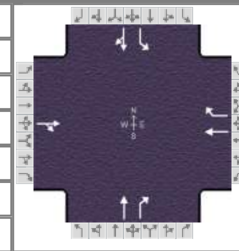
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement		6	16	5	2					7	4	14
Adjusted Flow Rate (*v*), veh/h		1180		265	415						50	
Adjusted Saturation Flow Rate (*s*), veh/h/ln		1744		600	1667						1491	
Queue Service Time (g_s), s		30.0		5.9	5.6						2.1	
Cycle Queue Clearance Time (g_c), s		30.0		50.9	5.6						2.1	
Green Ratio (*g/C*)		0.43		0.75	0.75						0.11	
Capacity (*c*), veh/h		758		540	1255						161	
Volume-to-Capacity Ratio (*X*)		1.557		0.490	0.331						0.310	
Back of Queue (*Q*), ft/ln (95 th percentile)		8300.8		138.9	41.8						35.9	
Back of Queue (*Q*), veh/ln (95 th percentile)		324.3		5.6	1.6						1.4	
Queue Storage Ratio (*RQ*) (95 th percentile)		0.00		0.00	0.00						0.00	
Uniform Delay (d_1), s/veh		19.5		17.1	2.8						28.4	
Incremental Delay (d_2), s/veh		1009.8		0.2	0.0						0.4	
Initial Queue Delay (d_3), s/veh		0.0		0.0	0.0						0.0	
Control Delay (*d*), s/veh		1029.3		17.3	2.8						28.8	
Level of Service (LOS)		F		B	A						C	

	EB		WB		NB		SB	
Approach Delay, s/veh / LOS	1029.3	F	8.4	A	0.0		28.8	C
Intersection Delay, s/veh / LOS	639.7				F			

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	1.69	B	1.31	A	1.95	B	1.95	B
Bicycle LOS Score / LOS	2.43	B	1.68	B			0.57	A

HCS7 Signalized Intersection Results Summary

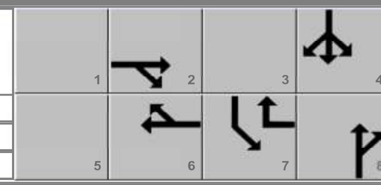
General Information				Intersection Information	
Agency				Duration, h	1.000
Analyst		Analysis Date	5/27/2021	Area Type	Other
Jurisdiction		Time Period		PHF	1.00
Urban Street		Analysis Year	2024	Analysis Period	1> 7:45
Intersection	Hudson & Indianola	File Name	Build 2024 Hudson AM.xus		
Project Description	2024 Build AM Peak				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h		480	20		500	260		160	110	340	130	60

Signal Information			
Cycle, s	95.0	Reference Phase	2
Offset, s	80	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	41.9	7.6	30.5	0.0	0.0	0.0
Yellow	4.1	3.0	4.1	0.0	0.0	0.0
Red	1.0	1.4	1.4	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		2		6		8	7	4
Case Number		8.0		7.0		7.3	1.0	4.0
Phase Duration, s		47.0		47.0		36.0	12.0	48.0
Change Period, ($Y+R_c$), s		5.1		5.1		5.5	4.4	5.5
Max Allow Headway (*MAH*), s		0.0		0.0		3.2	3.1	3.2
Queue Clearance Time (g_s), s						8.3	9.6	8.4
Green Extension Time (g_e), s		0.0		0.0		0.9	0.0	0.9
Phase Call Probability						1.00	1.00	1.00
Max Out Probability						0.00	1.00	0.00

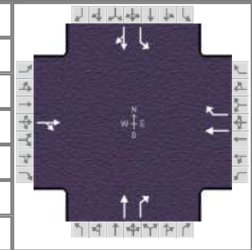
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement		2	12		6	16		8	18	7	4	14
Adjusted Flow Rate (*v*), veh/h		613			500	260		160	110	340	190	
Adjusted Saturation Flow Rate (*s*), veh/h/ln		1855			1870	1589		1810	1501	1781	1751	
Queue Service Time (g_s), s		26.2			19.4	8.9		6.3	5.1	7.6	6.4	
Cycle Queue Clearance Time (g_c), s		26.2			19.4	8.9		6.3	5.1	7.6	6.4	
Green Ratio (*g/C*)		0.44			0.44	0.52		0.32	0.32	0.42	0.45	
Capacity (*c*), veh/h		818			825	830		581	482	531	783	
Volume-to-Capacity Ratio (*X*)		0.749			0.606	0.313		0.275	0.228	0.640	0.243	
Back of Queue (*Q*), ft/ln (95 th percentile)		315.7			344.6	143.5		128.2	86.8	158.1	119	
Back of Queue (*Q*), veh/ln (95 th percentile)		12.4			13.6	5.7		5.1	3.5	6.2	4.7	
Queue Storage Ratio (*RQ*) (95 th percentile)		0.00			0.00	0.00		0.00	0.00	0.00	0.00	
Uniform Delay (d_1), s/veh		22.2			20.3	13.0		24.0	23.6	23.2	16.3	
Incremental Delay (d_2), s/veh		0.6			3.3	1.0		1.2	1.1	6.0	0.7	
Initial Queue Delay (d_3), s/veh		0.0			0.0	0.0		0.0	0.0	0.0	0.0	
Control Delay (*d*), s/veh		22.8			23.6	14.0		25.2	24.7	29.2	17.0	
Level of Service (LOS)		C			C	B		C	C	C	B	
Approach Delay, s/veh / LOS	22.8	C		20.3	C		25.0	C		24.8	C	
Intersection Delay, s/veh / LOS	22.7						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	1.91	B	2.10	B	1.92	B	1.68	B
Bicycle LOS Score / LOS	2.14	B	2.57	C	2.01	B	2.43	B

 HCS™ Streets Version 7.9 Generated: 9/21/2021 8:19:51 AM

HCS7 Signalized Intersection Results Summary

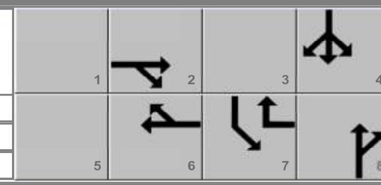
General Information				Intersection Information	
Agency				Duration, h	1.000
Analyst		Analysis Date	5/27/2021	Area Type	Other
Jurisdiction		Time Period		PHF	1.00
Urban Street		Analysis Year	2024	Analysis Period	1> 4:45
Intersection	Hudson & Indianola	File Name	Build 2024 Hudson PM.xus		
Project Description	2024 Build PM Peak				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h		740	30		590	430		250	140	300	130	40

Signal Information			
Cycle, s	70.0	Reference Phase	2
Offset, s	32	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	30.8	9.6	14.6	0.0	0.0	0.0
Yellow	4.1	3.0	4.1	0.0	0.0	0.0
Red	1.0	1.4	1.4	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		2		6		8	7	4
Case Number		8.0		7.0		7.3	1.0	4.0
Phase Duration, s		35.9		35.9		20.1	14.0	34.1
Change Period, (*Y+R* $_c$), s		5.1		5.1		5.5	4.4	5.5
Max Allow Headway (*MAH*), s		0.0		0.0		3.2	3.1	3.2
Queue Clearance Time (g_s), s						10.9	10.9	6.4
Green Extension Time (g_e), s		0.0		0.0		0.6	0.0	1.1
Phase Call Probability						1.00	1.00	1.00
Max Out Probability						0.47	1.00	0.00

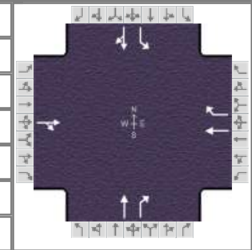
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement		2	12		6	16		8	18	7	4	14
Adjusted Flow Rate (*v*), veh/h		540			590	430		250	140	300	170	
Adjusted Saturation Flow Rate (*s*), veh/h/ln		1855			1870	1584		1810	1467	1781	1757	
Queue Service Time (g_s), s		16.1			18.0	11.0		8.9	5.8	8.9	4.4	
Cycle Queue Clearance Time (g_c), s		16.1			18.0	11.0		8.9	5.8	8.9	4.4	
Green Ratio (*g/C*)		0.44			0.44	0.58		0.21	0.21	0.37	0.41	
Capacity (*c*), veh/h		817			824	919		377	305	439	717	
Volume-to-Capacity Ratio (*X*)		0.661			0.716	0.468		0.664	0.459	0.684	0.237	
Back of Queue (*Q*), ft/ln (95 th percentile)		183.4			319.4	155		178.5	88.7	169.1	72.9	
Back of Queue (*Q*), veh/ln (95 th percentile)		7.2			12.6	6.2		7.1	3.5	6.7	2.9	
Queue Storage Ratio (*RQ*) (95 th percentile)		0.00			0.00	0.00		0.00	0.00	0.00	0.00	
Uniform Delay (d_1), s/veh		15.5			16.0	8.6		25.5	24.3	17.7	13.6	
Incremental Delay (d_2), s/veh		0.4			5.5	1.7		2.9	0.4	3.7	0.1	
Initial Queue Delay (d_3), s/veh		0.0			0.0	0.0		0.0	0.0	0.0	0.0	
Control Delay (*d*), s/veh		15.8			21.5	10.3		28.4	24.7	21.3	13.6	
Level of Service (LOS)		B			C	B		C	C	C	B	

	EB		WB		NB		SB	
Approach Delay, s/veh / LOS	15.8	B	16.7	B	27.0	C	18.6	B
Intersection Delay, s/veh / LOS	18.6				B			

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	1.89	B	2.08	B	1.92	B	1.67	B
Bicycle LOS Score / LOS	2.58	C	3.00	C	2.20	B	2.34	B

HCS7 Signalized Intersection Results Summary

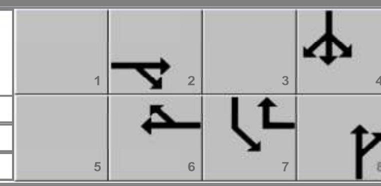
General Information				**Intersection Information**	
Agency				Duration, h	1.000
Analyst		Analysis Date	5/27/2021	Area Type	Other
Jurisdiction		Time Period		PHF	1.00
Urban Street		Analysis Year	2044	Analysis Period	1> 7:45
Intersection	Hudson & Indianola	File Name	Build 2044 Hudson AM.xus		
Project Description	2044 Build AM Peak				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h		400	20		440	330		220	170	420	210	40

Signal Information			
Cycle, s	90.0	Reference Phase	2
Offset, s	12	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	38.9	8.6	27.5	0.0	0.0	0.0
Yellow	4.1	3.0	4.1	0.0	0.0	0.0
Red	1.0	1.4	1.4	0.0	0.0	0.0

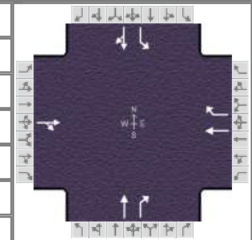


Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		2		6		8	7	4
Case Number		8.0		7.0		7.3	1.0	4.0
Phase Duration, s		44.0		44.0		33.0	13.0	46.0
Change Period, (*Y+R c*), s		5.1		5.1		5.5	4.4	5.5
Max Allow Headway (*MAH*), s		0.0		0.0		3.2	3.1	3.2
Queue Clearance Time (*g s*), s						10.6	10.6	9.9
Green Extension Time (*g e*), s		0.0		0.0		1.2	0.0	1.3
Phase Call Probability						1.00	1.00	1.00
Max Out Probability						0.00	1.00	0.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement		2	12		6	16		8	18	7	4	14
Adjusted Flow Rate (*v*), veh/h		631			440	330		220	170	420	250	
Adjusted Saturation Flow Rate (*s*), veh/h/ln		1852			1870	1589		1810	1501	1781	1808	
Queue Service Time (*g s*), s		26.4			15.7	11.1		8.6	8.0	8.6	7.9	
Cycle Queue Clearance Time (*g c*), s		26.4			15.7	11.1		8.6	8.0	8.6	7.9	
Green Ratio (*g/C*)		0.43			0.43	0.53		0.31	0.31	0.42	0.45	
Capacity (*c*), veh/h		800			808	841		553	459	493	814	
Volume-to-Capacity Ratio (*X*)		0.788			0.544	0.393		0.398	0.371	0.851	0.307	
Back of Queue (*Q*), ft/ln (95 th percentile)		315.1			287.6	177.5		179.3	138	286.8	151.1	
Back of Queue (*Q*), veh/ln (95 th percentile)		12.4			11.3	7.1		7.1	5.5	11.3	5.9	
Queue Storage Ratio (*RQ*) (95 th percentile)		0.00			0.00	0.00		0.00	0.00	0.00	0.00	
Uniform Delay (*d 1*), s/veh		22.0			19.0	12.7		24.7	24.5	25.8	15.8	
Incremental Delay (*d 2*), s/veh		0.8			2.7	1.4		2.1	2.3	19.5	1.0	
Initial Queue Delay (*d 3*), s/veh		0.0			0.0	0.0		0.0	0.0	0.0	0.0	
Control Delay (*d*), s/veh		22.8			21.6	14.0		26.9	26.8	45.3	16.8	
Level of Service (LOS)		C			C	B		C	C	D	B	
Approach Delay, s/veh / LOS	22.8		C	18.4		B	26.8		C	34.7		C
Intersection Delay, s/veh / LOS				25.3					C			

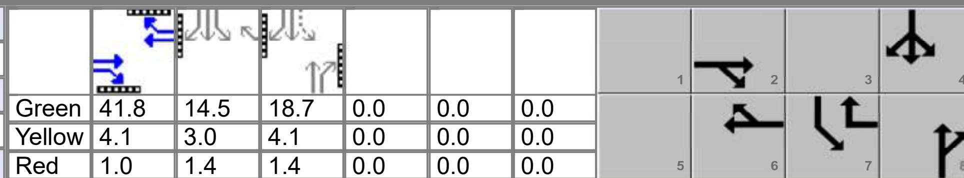
Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	1.90	B	2.10	B	1.92	B	1.68	B
Bicycle LOS Score / LOS	2.01	B	2.58	C	1.13	A	1.59	B

HCS7 Signalized Intersection Results Summary



General Information				Intersection Information	
Agency				Duration, h	1.000
Analyst		Analysis Date	5/27/2021	Area Type	Other
Jurisdiction		Time Period		PHF	1.00
Urban Street		Analysis Year	2044	Analysis Period	1> 4:45
Intersection	Hudson & Indianola	File Name	Build 2044 Hudson PM.xus		
Project Description	2044 Build PM Peak				

Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h		770	30		630	460		320	150	320	150	50



Signal Information										
Cycle, s	90.0	Reference Phase	2							
Offset, s	57	Reference Point	End	Green	41.8	14.5	18.7	0.0	0.0	0.0
Uncoordinated	No	Simult. Gap E/W	On	Yellow	4.1	3.0	4.1	0.0	0.0	0.0
Force Mode	Fixed	Simult. Gap N/S	On	Red	1.0	1.4	1.4	0.0	0.0	0.0

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		2		6		8	7	4
Case Number		8.0		7.0		7.3	1.0	4.0
Phase Duration, s		46.9		46.9		24.2	18.9	43.1
Change Period, (*Y+R c*), s		5.1		5.1		5.5	4.4	5.5
Max Allow Headway (*MAH*), s		0.0		0.0		3.2	3.1	3.2
Queue Clearance Time (*g s*), s						17.3	14.0	8.8
Green Extension Time (*g e*), s		0.0		0.0		1.2	0.5	1.4
Phase Call Probability						1.00	1.00	1.00
Max Out Probability						0.02	0.00	0.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement		2	12		6	16		8	18	7	4	14
Adjusted Flow Rate (*v*), veh/h		521			630	460		320	150	320	200	
Adjusted Saturation Flow Rate (*s*), veh/h/ln		1855			1870	1584		1810	1467	1781	1751	
Queue Service Time (*g s*), s		18.8			24.5	13.8		15.3	8.1	12.0	6.8	
Cycle Queue Clearance Time (*g c*), s		18.8			24.5	13.8		15.3	8.1	12.0	6.8	
Green Ratio (*g/C*)		0.46			0.46	0.63		0.21	0.21	0.39	0.42	
Capacity (*c*), veh/h		861			868	994		377	305	407	732	
Volume-to-Capacity Ratio (*X*)		0.605			0.725	0.463		0.849	0.491	0.787	0.273	
Back of Queue (*Q*), ft/ln (95 th percentile)		225.3			420.4	199		288.2	128.9	218.4	118.8	
Back of Queue (*Q*), veh/ln (95 th percentile)		8.9			16.6	8.0		11.4	5.2	8.6	4.7	
Queue Storage Ratio (*RQ*) (95 th percentile)		0.00			0.00	0.00		0.00	0.00	0.00	0.00	
Uniform Delay (*d 1*), s/veh		18.0			19.5	8.9		34.3	31.4	22.5	17.2	
Incremental Delay (*d 2*), s/veh		0.3			5.4	1.6		4.8	0.5	2.1	0.1	
Initial Queue Delay (*d 3*), s/veh		0.0			0.0	0.0		0.0	0.0	0.0	0.0	
Control Delay (*d*), s/veh		18.2			24.9	10.5		39.1	31.9	24.6	17.3	
Level of Service (LOS)		B			C	B		D	C	C	B	

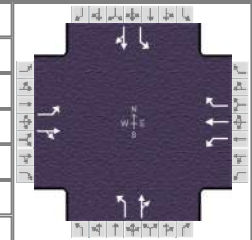
	EB		WB		NB		SB	
Approach Delay, s/veh / LOS	18.2	B	18.8	B	36.8	D	21.8	C
Intersection Delay, s/veh / LOS	22.5				C			

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	1.90	B	2.09	B	1.93	B	1.68	B
Bicycle LOS Score / LOS	2.63	C	3.11	C	2.34	B	2.42	B

 HCS™ Streets Version 7.9 Generated: 9/21/2021 8:20:32 AM

HCS7 Signalized Intersection Results Summary

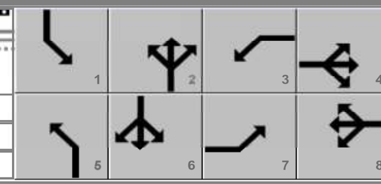
General Information				Intersection Information	
Agency				Duration, h	1.000
Analyst		Analysis Date	4/30/2021	Area Type	Other
Jurisdiction		Time Period		PHF	1.00
Urban Street		Analysis Year	2024	Analysis Period	1> 7:45
Intersection	Indianola & Broadway	File Name	Build 2024 Indianola AM.xus		
Project Description	2024 Build AM Peak				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	100	460	30	130	630	300	110	270	120	360	270	140

Signal Information			
Cycle, s	142.4	Reference Phase	2
Offset, s	38	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	6.7	13.8	41.0	7.0	2.1	47.9
Yellow	3.0	3.0	4.1	3.0	0.0	4.1
Red	1.4	1.4	1.4	1.1	0.0	1.4



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	7	4	3	8	5	2	1	6
Case Number	1.1	4.0	1.1	3.0	1.1	4.0	1.1	4.0
Phase Duration, s	11.1	53.4	13.2	55.5	11.1	46.5	29.3	64.7
Change Period, ($Y+R_c$), s	4.1	5.5	4.3	5.5	4.4	5.5	4.4	5.5
Max Allow Headway (*MAH*), s	3.1	2.8	3.1	2.8	3.1	2.8	3.1	2.8
Queue Clearance Time (g_s), s	7.3	36.4	8.8	48.8	6.3	43.0	26.7	28.2
Green Extension Time (g_e), s	0.0	0.0	0.2	1.5	0.0	0.0	0.0	0.9
Phase Call Probability	0.98	1.00	0.99	1.00	0.95	1.00	1.00	1.00
Max Out Probability	1.00	1.00	0.00	0.00	0.09	1.00	1.00	0.01

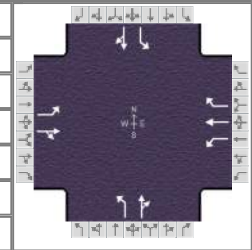
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h	100	490		130	630	300	78	275		365	415	
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1753	1835		1767	1870	1541	1795	1756		1767	1728	
Queue Service Time (g_s), s	5.3	34.4		6.8	46.8	22.3	4.3	18.7		24.7	26.2	
Cycle Queue Clearance Time (g_c), s	5.3	34.4		6.8	46.8	22.3	4.3	18.7		24.7	26.2	
Green Ratio (*g/C*)	0.38	0.34		0.40	0.35	0.35	0.33	0.29		0.48	0.42	
Capacity (*c*), veh/h	143	616		245	656	540	346	507		359	719	
Volume-to-Capacity Ratio (*X*)	0.702	0.795		0.530	0.961	0.555	0.224	0.542		1.017	0.578	
Back of Queue (*Q*), ft/ln (95 th percentile)	128.1	597.2		135.2	807.9	335	85.2	327.1		622.4	401.7	
Back of Queue (*Q*), veh/ln (95 th percentile)	5.0	23.3		5.3	31.8	13.2	3.4	12.8		24.3	15.7	
Queue Storage Ratio (*RQ*) (95 th percentile)	0.47	0.00		0.42	0.00	0.00	0.49	0.00		2.49	0.00	
Uniform Delay (d_1), s/veh	36.5	42.7		32.6	45.2	37.2	33.2	42.6		46.4	31.9	
Incremental Delay (d_2), s/veh	13.0	7.0		0.7	13.3	0.3	0.1	0.6		99.0	0.6	
Initial Queue Delay (d_3), s/veh	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Control Delay (*d*), s/veh	49.5	49.7		33.3	58.4	37.5	33.3	43.2		145.4	32.4	
Level of Service (LOS)	D	D		C	E	D	C	D		F	C	
Approach Delay, s/veh / LOS	49.7	D		49.4	D		41.0	D		85.3	F	
Intersection Delay, s/veh / LOS	58.5						E					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	1.94	B	1.93	B	2.30	B	1.93	B
Bicycle LOS Score / LOS	1.46	A	2.24	B	1.31	A	1.76	B

 HCS™ Streets Version 7.9 Generated: 9/21/2021 1:19:27 PM

HCS7 Signalized Intersection Results Summary

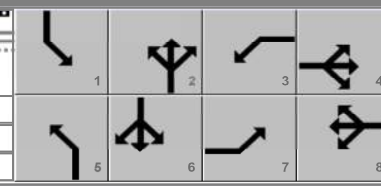
General Information				Intersection Information	
Agency				Duration, h	1.000
Analyst		Analysis Date	4/30/2021	Area Type	Other
Jurisdiction		Time Period		PHF	1.00
Urban Street		Analysis Year	2024	Analysis Period	1> 4:45
Intersection	Indianola & Broadway	File Name	Build 2024 Indianola PM.xus		
Project Description	2024 Build PM Peak				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	120	620	80	120	570	330	100	350	90	350	360	140

Signal Information			
Cycle, s	158.3	Reference Phase	2
Offset, s	41	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	8.6	12.0	42.4	8.4	0.1	62.9
Yellow	3.0	3.0	4.1	3.0	0.0	4.1
Red	1.4	1.4	1.4	1.1	0.0	1.4



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	7	4	3	8	5	2	1	6
Case Number	1.1	4.0	1.1	3.0	1.1	4.0	1.1	4.0
Phase Duration, s	12.5	68.4	12.6	68.6	13.0	47.9	29.4	64.3
Change Period, (*Y+R c*), s	4.1	5.5	4.3	5.5	4.4	5.5	4.4	5.5
Max Allow Headway (*MAH*), s	3.1	2.8	3.1	2.8	3.1	2.8	3.1	2.8
Queue Clearance Time (*g s*), s	8.4	61.7	8.3	43.7	8.6	42.1	26.1	39.0
Green Extension Time (*g e*), s	0.0	1.3	0.0	2.6	0.1	0.3	0.0	1.4
Phase Call Probability	0.99	1.00	0.99	1.00	0.99	1.00	1.00	1.00
Max Out Probability	1.00	0.88	1.00	0.01	0.01	0.96	1.00	0.00

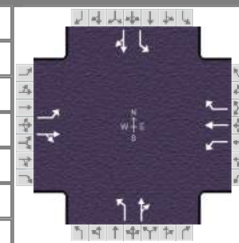
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h	120	700		120	570	330	104	458		329	471	
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1753	1818		1767	1870	1541	1795	1780		1767	1735	
Queue Service Time (*g s*), s	6.4	59.7		6.3	41.7	25.9	6.6	40.1		24.1	37.0	
Cycle Queue Clearance Time (*g c*), s	6.4	59.7		6.3	41.7	25.9	6.6	40.1		24.1	37.0	
Green Ratio (*g/C*)	0.45	0.40		0.45	0.40	0.40	0.32	0.27		0.44	0.37	
Capacity (*c*), veh/h	239	722		153	745	614	259	476		338	644	
Volume-to-Capacity Ratio (*X*)	0.502	0.969		0.783	0.765	0.538	0.402	0.961		0.975	0.730	
Back of Queue (*Q*), ft/ln (95 th percentile)	127.6	1135.3		159.9	694	381.2	134.6	773.8		631.5	559	
Back of Queue (*Q*), veh/ln (95 th percentile)	4.9	44.3		6.2	27.3	15.0	5.3	30.2		24.7	21.8	
Queue Storage Ratio (*RQ*) (95 th percentile)	0.46	0.00		0.49	0.00	0.00	0.77	0.00		2.53	0.00	
Uniform Delay (*d 1*), s/veh	32.7	46.7		38.0	41.2	36.5	40.4	57.1		48.2	42.9	
Incremental Delay (*d 2*), s/veh	0.6	40.2		17.9	4.1	0.4	0.3	39.5		59.7	2.6	
Initial Queue Delay (*d 3*), s/veh	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Control Delay (*d*), s/veh	33.3	87.0		55.9	45.3	36.9	40.7	96.6		107.9	45.5	
Level of Service (LOS)	C	F		E	D	D	D	F		F	D	
Approach Delay, s/veh / LOS	79.1	E		43.8	D		86.3	F		71.2	E	
Intersection Delay, s/veh / LOS	67.1						E					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	1.93	B	1.93	B	2.31	B	1.94	B
Bicycle LOS Score / LOS	1.84	B	2.17	B	1.38	A	1.89	B

 HCS™ Streets Version 7.9 Generated: 9/21/2021 1:19:11 PM

HCS7 Signalized Intersection Results Summary

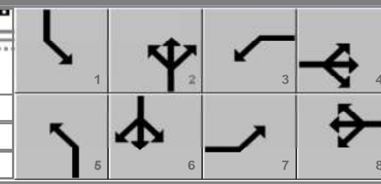
General Information				Intersection Information	
Agency				Duration, h	1.000
Analyst		Analysis Date	4/30/2021	Area Type	Other
Jurisdiction		Time Period		PHF	1.00
Urban Street		Analysis Year	2044	Analysis Period	1> 7:45
Intersection	Indianola & Broadway	File Name	Build 2044 Indianola AM.xus		
Project Description	2044 Build AM Peak				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	120	530	30	140	740	330	130	290	130	410	290	160

Signal Information			
Cycle, s	134.2	Reference Phase	2
Offset, s	50	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	7.1	15.9	24.6	7.2	1.1	54.4
Yellow	3.0	3.0	4.1	3.0	0.0	4.1
Red	1.4	1.4	1.4	1.1	0.0	1.4



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	7	4	3	8	5	2	1	6
Case Number	1.1	4.0	1.1	3.0	1.1	4.0	1.1	4.0
Phase Duration, s	11.3	59.9	12.4	61.0	11.5	30.1	31.8	50.3
Change Period, (*Y+R* $_c$), s	4.1	5.5	4.3	5.5	4.4	5.5	4.4	5.5
Max Allow Headway (*MAH*), s	3.1	2.7	3.1	2.7	3.1	2.8	3.1	2.8
Queue Clearance Time (g_s), s	7.3	36.8	8.1	53.2	7.4	23.6	27.4	34.5
Green Extension Time (g_e), s	0.0	2.7	0.0	2.7	0.1	1.1	0.3	1.1
Phase Call Probability	0.99	1.00	0.99	1.00	0.96	1.00	1.00	1.00
Max Out Probability	1.00	0.00	1.00	0.01	0.00	0.00	1.00	0.00

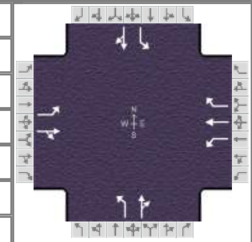
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h	120	560		140	740	330	90	290		420	460	
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1753	1837		1767	1870	1543	1795	1754		1767	1721	
Queue Service Time (g_s), s	5.3	34.8		6.1	51.2	21.3	5.4	21.6		25.4	32.5	
Cycle Queue Clearance Time (g_c), s	5.3	34.8		6.1	51.2	21.3	5.4	21.6		25.4	32.5	
Green Ratio (*g/C*)	0.46	0.41		0.46	0.41	0.41	0.23	0.18		0.40	0.33	
Capacity (*c*), veh/h	160	745		283	773	638	219	321		438	574	
Volume-to-Capacity Ratio (*X*)	0.749	0.752		0.495	0.957	0.517	0.410	0.905		0.959	0.802	
Back of Queue (*Q*), ft/ln (95 th percentile)	119.9	561.1		118.5	899	316.3	109	376.5		501.3	478.5	
Back of Queue (*Q*), veh/ln (95 th percentile)	4.6	21.9		4.6	35.4	12.5	4.3	14.7		19.6	18.7	
Queue Storage Ratio (*RQ*) (95 th percentile)	0.44	0.00		0.36	0.00	0.00	0.62	0.00		2.01	0.00	
Uniform Delay (d_1), s/veh	31.8	33.9		26.1	38.0	29.2	41.8	53.3		35.1	40.4	
Incremental Delay (d_2), s/veh	9.2	1.1		0.5	19.0	0.2	0.4	3.8		32.3	2.0	
Initial Queue Delay (d_3), s/veh	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Control Delay (*d*), s/veh	41.0	35.0		26.6	56.9	29.4	42.2	57.2		67.4	42.4	
Level of Service (LOS)	D	D		C	E	C	D	E		E	D	
Approach Delay, s/veh / LOS	36.1	D		45.9	D		53.6	D		54.3	D	
Intersection Delay, s/veh / LOS	47.1						D					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	1.92	B	1.92	B	2.31	B	1.93	B
Bicycle LOS Score / LOS	1.61	B	2.48	B	1.40	A	1.91	B

 HCS™ Streets Version 7.9 Generated: 9/21/2021 1:19:01 PM

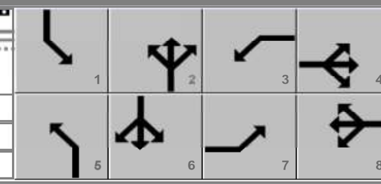
HCS7 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency				Duration, h	1.000
Analyst		Analysis Date	4/30/2021	Area Type	Other
Jurisdiction		Time Period		PHF	1.00
Urban Street		Analysis Year	2044	Analysis Period	1> 4:45
Intersection	Indianola & Broadway	File Name	Build 2044 Indianola PM.xus		
Project Description	2044 Build PM Peak				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	130	700	80	130	640	370	100	360	90	390	370	150

Signal Information										
Cycle, s	159.2	Reference Phase	2							
Offset, s	6	Reference Point	End	Green	8.9	11.7	45.0	9.2	0.5	60.0
Uncoordinated	Yes	Simult. Gap E/W	On	Yellow	3.0	3.0	4.1	3.0	0.0	4.1
Force Mode	Fixed	Simult. Gap N/S	On	Red	1.4	1.4	1.4	1.1	0.0	1.4



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	7	4	3	8	5	2	1	6
Case Number	1.1	4.0	1.1	3.0	1.1	4.0	1.1	4.0
Phase Duration, s	13.3	65.5	13.8	66.0	13.3	50.5	29.4	66.6
Change Period, (*Y+R* $_c$), s	4.1	5.5	4.3	5.5	4.4	5.5	4.4	5.5
Max Allow Headway (*MAH*), s	3.1	2.8	3.1	2.8	3.1	2.8	3.1	2.8
Queue Clearance Time (g_s), s	9.2	62.0	9.5	53.3	8.9	47.0	27.0	63.1
Green Extension Time (g_e), s	0.0	0.0	0.0	2.2	0.1	0.0	0.0	0.0
Phase Call Probability	1.00	1.00	1.00	1.00	0.99	1.00	1.00	1.00
Max Out Probability	1.00	1.00	1.00	0.44	0.02	1.00	1.00	1.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h	130	780		130	640	370	110	497		373	497	
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1753	1822		1767	1870	1540	1795	1782		1767	1732	
Queue Service Time (g_s), s	7.2	60.0		7.5	51.3	31.2	6.9	44.2		25.0	39.5	
Cycle Queue Clearance Time (g_c), s	7.2	60.0		7.5	51.3	31.2	6.9	44.2		25.0	39.5	
Green Ratio (*g/C*)	0.43	0.38		0.44	0.38	0.38	0.34	0.28		0.45	0.38	
Capacity (*c*), veh/h	181	687		150	711	585	146	504		323	665	
Volume-to-Capacity Ratio (*X*)	0.717	1.136		0.865	0.901	0.632	0.758	0.987		1.155	0.748	
Back of Queue (*Q*), ft/ln (95 th percentile)	166.3	2583.3		218.9	902.9	452.4	139.4	868.7		1215.3	587.4	
Back of Queue (*Q*), veh/ln (95 th percentile)	6.4	100.9		8.6	35.5	17.8	5.5	33.9		47.5	22.9	
Queue Storage Ratio (*RQ*) (95 th percentile)	0.60	0.00		0.67	0.00	0.00	0.80	0.00		4.86	0.00	
Uniform Delay (d_1), s/veh	37.8	49.6		41.4	46.5	40.3	43.4	56.8		53.1	42.4	
Incremental Delay (d_2), s/veh	10.3	264.8		44.6	17.1	1.7	2.7	52.5		304.7	2.9	
Initial Queue Delay (d_3), s/veh	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Control Delay (*d*), s/veh	48.1	314.4		86.0	63.6	42.0	46.1	109.3		357.8	45.3	
Level of Service (LOS)	D	F		F	E	D	D	F		F	D	
Approach Delay, s/veh / LOS	276.4	F		59.2	E		97.8	F		179.2	F	
Intersection Delay, s/veh / LOS	151.5						F					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	1.94	B	1.93	B	2.31	B	1.93	B
Bicycle LOS Score / LOS	1.99	B	2.37	B	1.40	A	1.99	B

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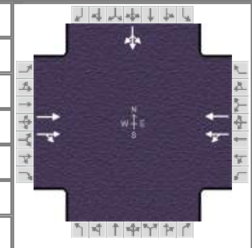
We Make a Difference

Build 2024

AM and PM Peak Hours

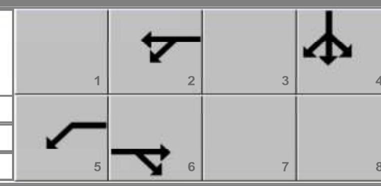
HCS7 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency				Duration, h	1.000
Analyst		Analysis Date	5/27/2021	Area Type	Other
Jurisdiction		Time Period		PHF	1.00
Urban Street		Analysis Year	2024	Analysis Period	1> 7:45
Intersection	Hudson & Summit	File Name	Build 2024 Hudson AM.xus		
Project Description	2024 Build AM Peak				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h		680	260	250	730					20	20	20

Signal Information										
Cycle, s	49.7	Reference Phase	2							
Offset, s	0	Reference Point	End	Green	28.6	6.5	0.0	0.0	0.0	0.0
Uncoordinated	Yes	Simult. Gap E/W	On	Yellow	3.6	3.6	0.0	0.0	0.0	0.0
Force Mode	Fixed	Simult. Gap N/S	On	Red	1.4	1.0	0.0	0.0	0.0	0.0



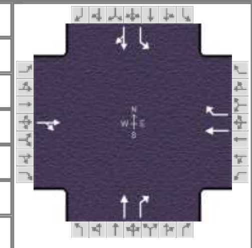
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		6	5	2				4
Case Number		8.4	0.0	14.4				12.0
Phase Duration, s		33.6	4.9	38.5				11.1
Change Period, (*Y+R c*), s		5.0	5.0	5.0				4.6
Max Allow Headway (*MAH*), s		2.1	0.0	2.9				3.3
Queue Clearance Time (*g s*), s		28.4		30.9				3.8
Green Extension Time (*g e*), s		0.2	0.0	0.8				0.1
Phase Call Probability		1.00		1.00				0.58
Max Out Probability		1.00		0.00				0.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement		6	16	5	2					7	4	14
Adjusted Flow Rate (*v*), veh/h		497	443	193	367						60	
Adjusted Saturation Flow Rate (*s*), veh/h/ln		1856	1654	129	1622						1521	
Queue Service Time (*g s*), s		26.4	8.4	0.5	4.7						1.8	
Cycle Queue Clearance Time (*g c*), s		26.4	8.4	28.9	4.7						1.8	
Green Ratio (*g/C*)		0.58	0.58	0.68	0.68						0.13	
Capacity (*c*), veh/h		1030	918	210	1112						195	
Volume-to-Capacity Ratio (*X*)		0.483	0.483	0.918	0.330						0.307	
Back of Queue (*Q*), ft/ln (95 th percentile)		104.1	90.8	90.8	31						29.5	
Back of Queue (*Q*), veh/ln (95 th percentile)		4.1	3.6	3.6	1.2						1.1	
Queue Storage Ratio (*RQ*) (95 th percentile)		0.00	0.00	0.00	0.00						0.00	
Uniform Delay (*d 1*), s/veh		7.0	7.0	19.5	3.3						20.4	
Incremental Delay (*d 2*), s/veh		0.1	0.1	5.9	0.1						0.3	
Initial Queue Delay (*d 3*), s/veh		0.0	0.0	0.0	0.0						0.0	
Control Delay (*d*), s/veh		7.1	7.1	25.4	3.3						20.7	
Level of Service (LOS)		A	A	C	A						C	
Approach Delay, s/veh / LOS	7.1	A		10.9	B		0.0			20.7	C	
Intersection Delay, s/veh / LOS	9.0						A					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	1.70	B	1.32	A	2.12	B	2.13	B
Bicycle LOS Score / LOS	2.09	B	2.12	B			0.16	A

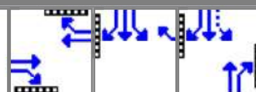
HCS7 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency				Duration, h	1.000
Analyst		Analysis Date	5/27/2021	Area Type	Other
Jurisdiction		Time Period		PHF	1.00
Urban Street		Analysis Year	2024	Analysis Period	1> 7:45
Intersection	Hudson & Indianola	File Name	Build 2024 Hudson AM.xus		
Project Description	2024 Build AM Peak				

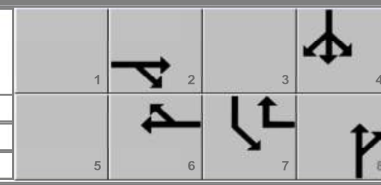


Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h		480	20		500	260		160	110	340	130	60

Signal Information			
Cycle, s	95.0	Reference Phase	2
Offset, s	80	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	41.9	7.6	30.5	0.0	0.0	0.0
Yellow	4.1	3.0	4.1	0.0	0.0	0.0
Red	1.0	1.4	1.4	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		2		6		8	7	4
Case Number		8.0		7.0		7.3	1.0	4.0
Phase Duration, s		47.0		47.0		36.0	12.0	48.0
Change Period, (*Y+R c*), s		5.1		5.1		5.5	4.4	5.5
Max Allow Headway (*MAH*), s		0.0		0.0		3.2	3.1	3.2
Queue Clearance Time (g_s), s						8.3	9.6	8.4
Green Extension Time (g_e), s		0.0		0.0		0.9	0.0	0.9
Phase Call Probability						1.00	1.00	1.00
Max Out Probability						0.00	1.00	0.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement		2	12		6	16		8	18	7	4	14
Adjusted Flow Rate (*v*), veh/h		700			500	260		160	110	340	190	
Adjusted Saturation Flow Rate (*s*), veh/h/ln		1855			1870	1589		1810	1501	1781	1751	
Queue Service Time (g_s), s		32.2			19.4	8.9		6.3	5.1	7.6	6.4	
Cycle Queue Clearance Time (g_c), s		32.2			19.4	8.9		6.3	5.1	7.6	6.4	
Green Ratio (*g/C*)		0.44			0.44	0.52		0.32	0.32	0.42	0.45	
Capacity (*c*), veh/h		818			825	830		581	482	531	783	
Volume-to-Capacity Ratio (*X*)		0.856			0.606	0.313		0.275	0.228	0.640	0.243	
Back of Queue (*Q*), ft/ln (95 th percentile)		549.9			344.6	143.5		128.2	86.8	158.1	119	
Back of Queue (*Q*), veh/ln (95 th percentile)		21.6			13.6	5.7		5.1	3.5	6.2	4.7	
Queue Storage Ratio (*RQ*) (95 th percentile)		0.00			0.00	0.00		0.00	0.00	0.00	0.00	
Uniform Delay (d_1), s/veh		23.8			20.3	13.0		24.0	23.6	23.2	16.3	
Incremental Delay (d_2), s/veh		10.9			3.3	1.0		1.2	1.1	6.0	0.7	
Initial Queue Delay (d_3), s/veh		0.0			0.0	0.0		0.0	0.0	0.0	0.0	
Control Delay (*d*), s/veh		34.8			23.6	14.0		25.2	24.7	29.2	17.0	
Level of Service (LOS)		C			C	B		C	C	C	B	
Approach Delay, s/veh / LOS	34.8		C	20.3		C	25.0		C	24.8		C
Intersection Delay, s/veh / LOS			26.4						C			

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	1.91	B	2.10	B	1.92	B	1.68	B
Bicycle LOS Score / LOS	2.14	B	2.57	C	2.01	B	2.43	B

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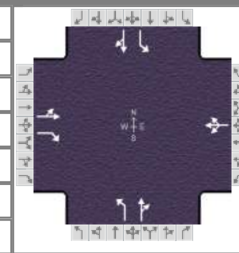
HCS7 Signalized Intersection Results Summary

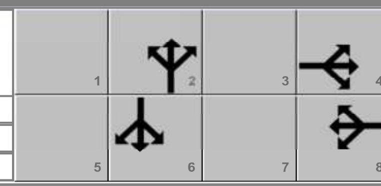
General Information				Intersection Information	
Agency				Duration, h	1.000
Analyst		Analysis Date	4/30/2021	Area Type	Other
Jurisdiction		Time Period		PHF	1.00
Urban Street		Analysis Year	2024	Analysis Period	1> 7:45
Intersection	Indianola & Arcadia	File Name	Build 2024 Indianola AM.xus		
Project Description	2024 Build AM Peak				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	80	40	140	10	40	20	130	280	10	10	360	100

Signal Information			
Cycle, s	60.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	39.2	10.4	0.0	0.0	0.0	0.0
Yellow	4.1	3.4	0.0	0.0	0.0	0.0
Red	1.3	1.6	0.0	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4		8		2		6
Case Number		7.0		8.0		6.0		6.0
Phase Duration, s		15.4		15.4		44.6		44.6
Change Period, (*Y+R c*), s		5.0		5.0		5.4		5.4
Max Allow Headway (*MAH*), s		3.4		3.4		0.0		0.0
Queue Clearance Time (g_s), s		6.9		4.0				
Green Extension Time (g_e), s		0.3		0.4		0.0		0.0
Phase Call Probability		1.00		1.00				
Max Out Probability		0.61		0.08				

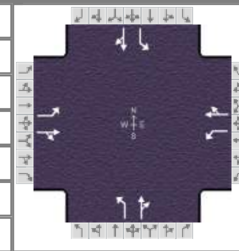
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h		120	140		70		130	290		10	446	
Adjusted Saturation Flow Rate (*s*), veh/h/ln		1514	1550		1737		958	1844		1103	1789	
Queue Service Time (g_s), s		2.1	4.9		0.0		4.5	3.9		0.1	7.8	
Cycle Queue Clearance Time (g_c), s		4.1	4.9		2.0		12.3	3.9		4.0	7.8	
Green Ratio (*g/C*)		0.17	0.17		0.17		0.65	0.65		0.65	0.65	
Capacity (*c*), veh/h		363	269		370		621	1204		769	1168	
Volume-to-Capacity Ratio (*X*)		0.331	0.520		0.189		0.209	0.241		0.013	0.382	
Back of Queue (*Q*), ft/ln (95 th percentile)		66.7	80.7		37.4		38.8	50		1.2	102.2	
Back of Queue (*Q*), veh/ln (95 th percentile)		2.6	3.2		1.5		1.6	2.0		0.0	4.0	
Queue Storage Ratio (*RQ*) (95 th percentile)		0.00	0.81		0.00		0.00	0.00		0.00	0.00	
Uniform Delay (d_1), s/veh		22.1	22.5		21.3		7.9	4.3		3.1	5.8	
Incremental Delay (d_2), s/veh		0.2	0.6		0.1		0.8	0.5		0.0	0.9	
Initial Queue Delay (d_3), s/veh		0.0	0.0		0.0		0.0	0.0		0.0	0.0	
Control Delay (*d*), s/veh		22.3	23.1		21.4		8.7	4.8		3.1	6.6	
Level of Service (LOS)		C	C		C		A	A		A	A	
Approach Delay, s/veh / LOS	22.7	C		21.4	C		6.0	A		6.6	A	
Intersection Delay, s/veh / LOS	10.7						B					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	1.92	B	1.92	B	1.62	B	1.85	B
Bicycle LOS Score / LOS	0.92	A	0.60	A	1.18	A	1.26	A

 HCS™ Streets Version 7.9 Generated: 9/17/2021 2:09:21 PM

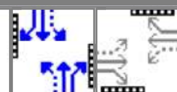
HCS7 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency				Duration, h	1.000
Analyst		Analysis Date	4/30/2021	Area Type	Other
Jurisdiction		Time Period		PHF	1.00
Urban Street		Analysis Year	2021	Analysis Period	1> 7:00
Intersection	Indianola & Weber	File Name	Build 2024 Indianola AM.xus		
Project Description	2024 Build AM Peak				

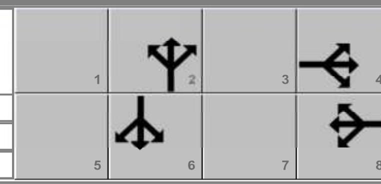


Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	50	280	20	100	220	40	40	290	90	30	310	60

Signal Information			
Cycle, s	60.0	Reference Phase	2
Offset, s	5	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	31.2	18.3	0.0	0.0	0.0	0.0
Yellow	4.1	4.1	0.0	0.0	0.0	0.0
Red	1.1	1.2	0.0	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4		8		2		6
Case Number		6.0		6.0		6.0		6.0
Phase Duration, s		23.6		23.6		36.4		36.4
Change Period, (*Y+R* $_c$), s		5.3		5.3		5.2		5.2
Max Allow Headway (*MAH*), s		3.3		3.3		0.0		0.0
Queue Clearance Time (g_s), s		11.7		15.7				
Green Extension Time (g_e), s		1.5		1.4		0.0		0.0
Phase Call Probability		1.00		1.00				
Max Out Probability		0.00		0.00				

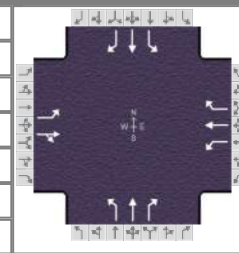
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h	50	300		100	260		36	344		33	401	
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1032	1773		1033	1738		981	1788		1032	1796	
Queue Service Time (g_s), s	2.5	8.5		5.4	7.3		1.7	7.1		1.2	8.3	
Cycle Queue Clearance Time (g_c), s	9.7	8.5		13.7	7.3		10.0	7.1		8.1	8.3	
Green Ratio (*g/C*)	0.31	0.31		0.31	0.31		0.52	0.52		0.52	0.52	
Capacity (*c*), veh/h	311	542		292	532		492	928		537	933	
Volume-to-Capacity Ratio (*X*)	0.161	0.553		0.343	0.489		0.074	0.370		0.061	0.430	
Back of Queue (*Q*), ft/ln (95 th percentile)	26.1	142.1		55.6	120		16.8	113.3		11.6	128.1	
Back of Queue (*Q*), veh/ln (95 th percentile)	1.0	5.6		2.2	4.7		0.7	4.5		0.5	5.0	
Queue Storage Ratio (*RQ*) (95 th percentile)	0.40	0.00		0.93	0.00		0.00	0.00		0.00	0.00	
Uniform Delay (d_1), s/veh	20.9	17.4		23.1	17.0		14.4	9.0		11.0	8.9	
Incremental Delay (d_2), s/veh	0.1	0.3		0.3	0.3		0.3	1.1		0.2	1.1	
Initial Queue Delay (d_3), s/veh	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Control Delay (*d*), s/veh	21.0	17.7		23.4	17.3		14.6	10.1		11.2	10.0	
Level of Service (LOS)	C	B		C	B		B	B		B	A	
Approach Delay, s/veh / LOS	18.2	B		19.0	B		10.5	B		10.1	B	
Intersection Delay, s/veh / LOS	14.1						B					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	1.90	B	1.90	B	1.88	B	1.88	B
Bicycle LOS Score / LOS	1.07	A	1.08	A	1.18	A	1.15	A

 HCS™ Streets Version 7.9 Generated: 6/29/2021 8:56:42 AM

HCS7 Signalized Intersection Results Summary

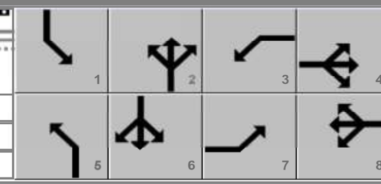
General Information				Intersection Information	
Agency				Duration, h	1.000
Analyst		Analysis Date	4/30/2021	Area Type	Other
Jurisdiction		Time Period		PHF	1.00
Urban Street		Analysis Year	2024	Analysis Period	1> 7:45
Intersection	Indianola & Broadway	File Name	Build 2024 Indianola AM.xus		
Project Description	2024 Build AM Peak				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	100	460	30	130	630	300	110	270	120	360	270	140

Signal Information			
Cycle, s	105.5	Reference Phase	2
Offset, s	38	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	6.3	7.9	23.0	6.6	0.5	37.3
Yellow	3.0	3.0	4.1	3.0	0.0	4.1
Red	1.4	1.4	1.4	1.1	0.0	1.4



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	7	4	3	8	5	2	1	6
Case Number	1.1	4.0	1.1	3.0	1.1	3.0	1.1	3.0
Phase Duration, s	10.7	42.8	11.2	43.3	10.7	28.5	23.0	40.8
Change Period, (*Y+R c*), s	4.1	5.5	4.3	5.5	4.4	5.5	4.4	5.5
Max Allow Headway (*MAH*), s	3.1	2.8	3.1	2.8	3.1	2.8	3.1	2.8
Queue Clearance Time (*g s*), s	5.7	26.8	6.9	36.4	5.4	11.4	18.1	14.1
Green Extension Time (*g e*), s	0.0	0.0	0.2	1.5	0.0	1.0	0.5	1.0
Phase Call Probability	0.95	1.00	0.98	1.00	0.90	1.00	1.00	1.00
Max Out Probability	1.00	1.00	0.00	0.00	0.03	0.00	0.06	0.00

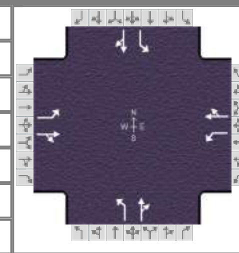
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h	100	490		130	630	300	78	190	85	365	274	142
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1753	1835		1767	1870	1541	1795	1856	1601	1767	1856	1559
Queue Service Time (*g s*), s	3.7	24.8		4.9	34.4	16.4	3.4	9.4	4.6	16.1	12.1	7.0
Cycle Queue Clearance Time (*g c*), s	3.7	24.8		4.9	34.4	16.4	3.4	9.4	4.6	16.1	12.1	7.0
Green Ratio (*g/C*)	0.42	0.35		0.42	0.36	0.36	0.28	0.22	0.22	0.41	0.33	0.33
Capacity (*c*), veh/h	189	649		291	671	553	398	405	349	531	620	521
Volume-to-Capacity Ratio (*X*)	0.528	0.755		0.447	0.939	0.543	0.195	0.470	0.242	0.686	0.441	0.272
Back of Queue (*Q*), ft/ln (95 th percentile)	71.3	434		91	557.6	250.6	66.6	192.4	79.9	262.3	218.3	115.6
Back of Queue (*Q*), veh/ln (95 th percentile)	2.8	17.0		3.6	22.0	9.9	2.6	7.5	3.2	10.2	8.5	4.6
Queue Storage Ratio (*RQ*) (95 th percentile)	0.26	0.00		0.28	0.00	0.00	0.38	0.00	0.00	1.05	0.00	0.00
Uniform Delay (*d 1*), s/veh	25.6	30.1		22.6	32.7	26.9	28.8	35.9	34.1	23.8	27.4	25.7
Incremental Delay (*d 2*), s/veh	1.1	4.7		0.4	3.2	0.3	0.1	0.3	0.1	1.1	0.1	0.1
Initial Queue Delay (*d 3*), s/veh	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (*d*), s/veh	26.6	34.7		23.0	36.0	27.3	28.9	36.2	34.2	25.0	27.6	25.8
Level of Service (LOS)	C	C		C	D	C	C	D	C	C	C	C
Approach Delay, s/veh / LOS	33.4	C		31.9	C		34.1	C		26.0	C	
Intersection Delay, s/veh / LOS	30.8						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.11	B	2.11	B	2.30	B	1.92	B
Bicycle LOS Score / LOS	1.46	A	2.24	B	1.31	A	1.76	B

 HCS™ Streets Version 7.9 Generated: 9/17/2021 2:09:21 PM

HCS7 Signalized Intersection Results Summary

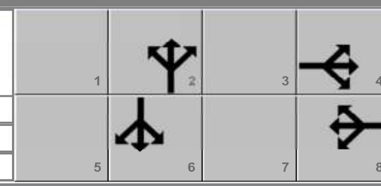
General Information				Intersection Information	
Agency				Duration, h	1.000
Analyst		Analysis Date	4/30/2021	Area Type	Other
Jurisdiction		Time Period		PHF	1.00
Urban Street		Analysis Year	2021	Analysis Period	1> 7:00
Intersection	Indianola & Oakland Park	File Name	Build 2024 Indianola AM.xus		
Project Description	2024 Build AM Peak				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	50	10	80	50	10	20	50	530	60	20	650	30

Signal Information			
Cycle, s	39.0	Reference Phase	2
Offset, s	34	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	20.1	9.4	0.0	0.0	0.0	0.0
Yellow	3.6	3.6	0.0	0.0	0.0	0.0
Red	1.1	1.2	0.0	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4		8		2		6
Case Number		6.0		6.0		6.0		6.0
Phase Duration, s		14.2		14.2		24.8		24.8
Change Period, ($Y+R_c$), s		4.8		4.8		4.7		4.7
Max Allow Headway (*MAH*), s		3.3		3.3		3.1		3.1
Queue Clearance Time (g_s), s		3.8		4.8		14.5		13.1
Green Extension Time (g_e), s		0.4		0.4		3.0		2.8
Phase Call Probability		0.91		0.91		1.00		1.00
Max Out Probability		0.00		0.00		0.00		0.04

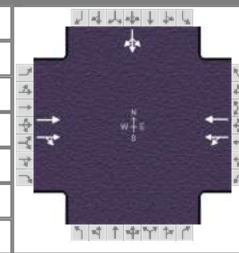
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h	50	90		50	30		46	544		20	680	
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1393	1612		1307	1650		771	1822		869	1838	
Queue Service Time (g_s), s	1.1	1.8		1.2	0.5		1.9	8.1		0.6	11.1	
Cycle Queue Clearance Time (g_c), s	1.4	1.8		2.8	0.5		12.5	8.1		8.1	11.1	
Green Ratio (*g/C*)	0.24	0.24		0.24	0.24		0.52	0.52		0.52	0.52	
Capacity (*c*), veh/h	508	388		445	397		372	941		466	948	
Volume-to-Capacity Ratio (*X*)	0.098	0.232		0.112	0.075		0.124	0.579		0.043	0.717	
Back of Queue (*Q*), ft/ln (95 th percentile)	12.4	22.8		13.4	7.4		11.4	79.3		4	111.7	
Back of Queue (*Q*), veh/ln (95 th percentile)	0.5	0.9		0.5	0.3		0.5	3.1		0.2	4.4	
Queue Storage Ratio (*RQ*) (95 th percentile)	0.07	0.00		0.18	0.00		0.06	0.00		0.10	0.00	
Uniform Delay (d_1), s/veh	12.0	11.9		13.0	11.5		11.9	6.5		9.1	7.3	
Incremental Delay (d_2), s/veh	0.0	0.1		0.0	0.0		0.0	0.2		0.0	0.4	
Initial Queue Delay (d_3), s/veh	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Control Delay (*d*), s/veh	12.0	12.0		13.1	11.5		11.9	6.7		9.2	7.7	
Level of Service (LOS)	B	B		B	B		B	A		A	A	
Approach Delay, s/veh / LOS	12.0	B		12.5	B		7.1	A		7.7	A	
Intersection Delay, s/veh / LOS	8.1						A					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.09	B	1.89	B	1.86	B	1.86	B
Bicycle LOS Score / LOS	0.72	A	0.62	A	1.54	B	1.64	B

 HCS™ Streets Version 7.9 Generated: 6/29/2021 8:56:42 AM

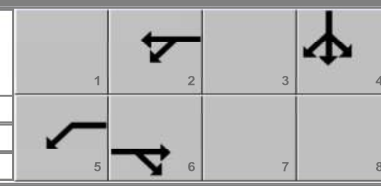
HCS7 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency				Duration, h	1.000
Analyst		Analysis Date	5/27/2021	Area Type	Other
Jurisdiction		Time Period		PHF	1.00
Urban Street		Analysis Year	2024	Analysis Period	1> 4:45
Intersection	Hudson & Summit	File Name	Build 2024 Hudson PM.xus		
Project Description	2024 Build PM Peak				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h		770	370	380	1010					10	10	10

Signal Information										
Cycle, s	65.1	Reference Phase	2							
Offset, s	51	Reference Point	End	Green	30.0	14.9	5.6	0.0	0.0	0.0
Uncoordinated	Yes	Simult. Gap E/W	On	Yellow	3.6	3.6	3.6	0.0	0.0	0.0
Force Mode	Fixed	Simult. Gap N/S	On	Red	1.4	1.4	1.0	0.0	0.0	0.0



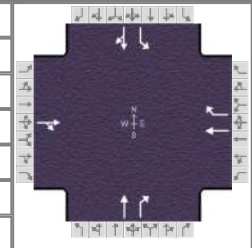
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		6	5	2				4
Case Number		8.4	0.0	14.4				12.0
Phase Duration, s		35.0	19.9	54.9				10.2
Change Period, (*Y+R* $_c$), s		5.0	5.0	5.0				4.6
Max Allow Headway (*MAH*), s		2.1	0.0	3.3				3.3
Queue Clearance Time (g_s), s		36.6		49.3				3.2
Green Extension Time (g_e), s		0.0	0.0	0.5				0.0
Phase Call Probability		1.00		1.00				0.42
Max Out Probability		1.00		1.00				0.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement		6	16	5	2					7	4	14
Adjusted Flow Rate (*v*), veh/h		607	533	241	389						30	
Adjusted Saturation Flow Rate (*s*), veh/h/ln		1856	1622	548	1662						1515	
Queue Service Time (g_s), s		34.6	17.2	4.3	4.6						1.2	
Cycle Queue Clearance Time (g_c), s		34.6	17.2	47.3	4.6						1.2	
Green Ratio (*g/C*)		0.46	0.46	0.77	0.77						0.09	
Capacity (*c*), veh/h		854	747	515	1274						130	
Volume-to-Capacity Ratio (*X*)		0.711	0.713	0.468	0.305						0.230	
Back of Queue (*Q*), ft/ln (95 th percentile)		276.1	246	104.4	26.7						20.5	
Back of Queue (*Q*), veh/ln (95 th percentile)		10.8	9.8	4.2	1.1						0.8	
Queue Storage Ratio (*RQ*) (95 th percentile)		0.00	0.00	0.00	0.00						0.00	
Uniform Delay (d_1), s/veh		14.1	14.1	16.6	2.3						27.8	
Incremental Delay (d_2), s/veh		2.4	2.8	0.2	0.0						0.3	
Initial Queue Delay (d_3), s/veh		0.0	0.0	0.0	0.0						0.0	
Control Delay (*d*), s/veh		16.5	17.0	16.8	2.3						28.1	
Level of Service (LOS)		B	B	B	A						C	

	EB		WB		NB		SB	
Approach Delay, s/veh / LOS	16.7	B	7.9	A	0.0		28.1	C
Intersection Delay, s/veh / LOS	13.8				B			

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	1.69	B	1.30	A	2.13	B	2.13	B
Bicycle LOS Score / LOS	2.25	B	2.46	B			1.61	B

HCS7 Signalized Intersection Results Summary

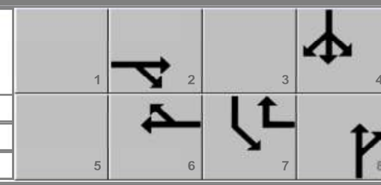


General Information				Intersection Information	
Agency				Duration, h	1.000
Analyst		Analysis Date	5/27/2021	Area Type	Other
Jurisdiction		Time Period		PHF	1.00
Urban Street		Analysis Year	2024	Analysis Period	1> 4:45
Intersection	Hudson & Indianola	File Name	Build 2024 Hudson PM.xus		
Project Description	2024 Build PM Peak				

Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h		740	30		590	430		250	140	300	130	40

Signal Information			
Cycle, s	70.0	Reference Phase	2
Offset, s	32	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	30.8	9.6	14.6	0.0	0.0	0.0
Yellow	4.1	3.0	4.1	0.0	0.0	0.0
Red	1.0	1.4	1.4	0.0	0.0	0.0



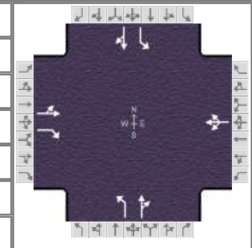
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		2		6		8	7	4
Case Number		8.0		7.0		7.3	1.0	4.0
Phase Duration, s		35.9		35.9		20.1	14.0	34.1
Change Period, (*Y+R c*), s		5.1		5.1		5.5	4.4	5.5
Max Allow Headway (*MAH*), s		0.0		0.0		3.2	3.1	3.2
Queue Clearance Time (*g s*), s						10.9	10.9	6.4
Green Extension Time (*g e*), s		0.0		0.0		0.6	0.0	1.1
Phase Call Probability						1.00	1.00	1.00
Max Out Probability						0.47	1.00	0.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement		2	12		6	16		8	18	7	4	14
Adjusted Flow Rate (*v*), veh/h		780			590	430		250	140	300	170	
Adjusted Saturation Flow Rate (*s*), veh/h/ln		1855			1870	1584		1810	1467	1781	1757	
Queue Service Time (*g s*), s		28.4			18.0	11.0		8.9	5.8	8.9	4.4	
Cycle Queue Clearance Time (*g c*), s		28.4			18.0	11.0		8.9	5.8	8.9	4.4	
Green Ratio (*g/C*)		0.44			0.44	0.58		0.21	0.21	0.37	0.41	
Capacity (*c*), veh/h		817			824	919		377	305	439	717	
Volume-to-Capacity Ratio (*X*)		0.955			0.716	0.468		0.664	0.459	0.684	0.237	
Back of Queue (*Q*), ft/ln (95 th percentile)		532.2			319.4	155		178.5	88.7	169.1	72.9	
Back of Queue (*Q*), veh/ln (95 th percentile)		21.0			12.6	6.2		7.1	3.5	6.7	2.9	
Queue Storage Ratio (*RQ*) (95 th percentile)		0.00			0.00	0.00		0.00	0.00	0.00	0.00	
Uniform Delay (*d 1*), s/veh		18.9			16.0	8.6		25.5	24.3	17.7	13.6	
Incremental Delay (*d 2*), s/veh		23.2			5.5	1.7		2.9	0.4	3.7	0.1	
Initial Queue Delay (*d 3*), s/veh		0.0			0.0	0.0		0.0	0.0	0.0	0.0	
Control Delay (*d*), s/veh		42.1			21.5	10.3		28.4	24.7	21.3	13.6	
Level of Service (LOS)		D			C	B		C	C	C	B	
Approach Delay, s/veh / LOS	42.1	D		16.7	B		27.0	C		18.6	B	
Intersection Delay, s/veh / LOS	26.0						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	1.89	B	2.08	B	1.92	B	1.67	B
Bicycle LOS Score / LOS	2.58	C	3.00	C	2.20	B	2.34	B

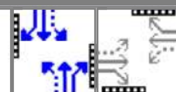
HCS7 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency				Duration, h	1.000
Analyst		Analysis Date	4/30/2021	Area Type	Other
Jurisdiction		Time Period		PHF	1.00
Urban Street		Analysis Year	2024	Analysis Period	1> 4:45
Intersection	Indianola & Arcadia	File Name	Build 2024 Indianola PM.xus		
Project Description	2024 Build PM Peak				

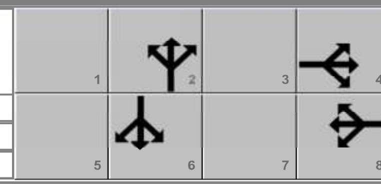


Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	110	60	110	10	20	20	180	460	10	10	340	100

Signal Information			
Cycle, s	65.0	Reference Phase	2
Offset, s	70	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	43.2	11.4	0.0	0.0	0.0	0.0
Yellow	4.1	3.4	0.0	0.0	0.0	0.0
Red	1.3	1.6	0.0	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4		8		2		6
Case Number		7.0		8.0		6.0		6.0
Phase Duration, s		16.4		16.4		48.6		48.6
Change Period, (*Y+R c*), s		5.0		5.0		5.4		5.4
Max Allow Headway (*MAH*), s		3.4		3.4		0.0		0.0
Queue Clearance Time (*g s*), s		8.8		3.6				
Green Extension Time (*g e*), s		0.7		0.7		0.0		0.0
Phase Call Probability		1.00		1.00				
Max Out Probability		0.00		0.00				

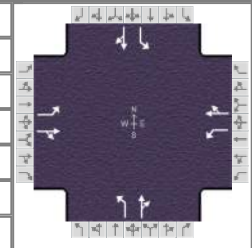
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h		170	110		50		180	470		12	529	
Adjusted Saturation Flow Rate (*s*), veh/h/ln		1496	1496		1648		883	1847		935	1776	
Queue Service Time (*g s*), s		5.2	4.3		0.0		8.2	7.4		0.6	10.1	
Cycle Queue Clearance Time (*g c*), s		6.8	4.3		1.6		18.2	7.4		7.9	10.1	
Green Ratio (*g/C*)		0.18	0.18		0.18		0.66	0.66		0.66	0.66	
Capacity (*c*), veh/h		353	262		355		561	1228		625	1181	
Volume-to-Capacity Ratio (*X*)		0.481	0.420		0.141		0.321	0.383		0.019	0.448	
Back of Queue (*Q*), ft/ln (95 th percentile)		108.8	68.2		29.1		68.9	99.7		4.5	134.2	
Back of Queue (*Q*), veh/ln (95 th percentile)		4.3	2.7		1.1		2.8	3.9		0.2	5.3	
Queue Storage Ratio (*RQ*) (95 th percentile)		0.00	0.68		0.00		0.00	0.00		0.00	0.00	
Uniform Delay (*d 1*), s/veh		24.8	23.9		22.8		9.8	4.9		9.6	6.0	
Incremental Delay (*d 2*), s/veh		0.4	0.4		0.1		1.5	0.9		0.0	1.0	
Initial Queue Delay (*d 3*), s/veh		0.0	0.0		0.0		0.0	0.0		0.0	0.0	
Control Delay (*d*), s/veh		25.2	24.3		22.9		11.3	5.8		9.7	7.0	
Level of Service (LOS)		C	C		C		B	A		A	A	
Approach Delay, s/veh / LOS	24.8		C	22.9		C	7.3		A	7.1		A
Intersection Delay, s/veh / LOS	11.0						B					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	1.92	B	1.92	B	1.62	B	1.85	B
Bicycle LOS Score / LOS	0.95	A	0.57	A	1.56	B	1.23	A

 HCS™ Streets Version 7.9 Generated: 9/17/2021 2:09:33 PM

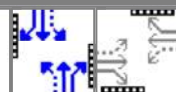
HCS7 Signalized Intersection Results Summary

General Information				Intersection Information		
Agency				Duration, h	1.000	
Analyst		Analysis Date	4/30/2021	Area Type	Other	
Jurisdiction		Time Period		PHF	1.00	
Urban Street		Analysis Year	2021	Analysis Period	1> 7:00	
Intersection	Indianola & Weber	File Name	Build 2024 Indianola PM.xus			
Project Description	2024 Build PM Peak					

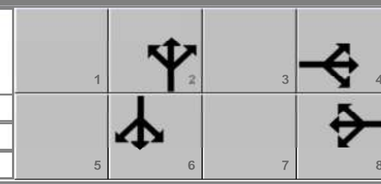


Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	70	310	40	100	350	60	60	410	90	40	350	80

Signal Information				
Cycle, s	65.0	Reference Phase	2
Offset, s	55	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	32.3	22.2	0.0	0.0	0.0	0.0
Yellow	4.1	4.1	0.0	0.0	0.0	0.0
Red	1.1	1.2	0.0	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4		8		2		6
Case Number		6.0		6.0		6.0		6.0
Phase Duration, s		27.5		27.5		37.5		37.5
Change Period, (*Y+R c*), s		5.3		5.3		5.2		5.2
Max Allow Headway (*MAH*), s		3.3		3.3		0.0		0.0
Queue Clearance Time (*g s*), s		19.8		18.5				
Green Extension Time (*g e*), s		2.0		2.0		0.0		0.0
Phase Call Probability		1.00		1.00				
Max Out Probability		0.01		0.01				

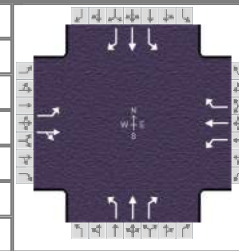
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h	70	350		100	410		63	527		46	493	
Adjusted Saturation Flow Rate (*s*), veh/h/ln	905	1758		987	1734		906	1798		875	1785	
Queue Service Time (*g s*), s	4.7	10.6		6.0	13.2		2.9	13.7		2.6	12.5	
Cycle Queue Clearance Time (*g c*), s	17.8	10.6		16.5	13.2		15.8	13.7		16.4	12.5	
Green Ratio (*g/C*)	0.34	0.34		0.34	0.34		0.50	0.50		0.50	0.50	
Capacity (*c*), veh/h	238	601		289	593		385	893		359	886	
Volume-to-Capacity Ratio (*X*)	0.295	0.582		0.346	0.691		0.164	0.590		0.128	0.556	
Back of Queue (*Q*), ft/ln (95 th percentile)	44.8	177.7		60.4	213		28.7	215.2		23.6	177	
Back of Queue (*Q*), veh/ln (95 th percentile)	1.7	7.0		2.4	8.4		1.1	8.5		0.9	7.0	
Queue Storage Ratio (*RQ*) (95 th percentile)	0.69	0.00		1.01	0.00		0.00	0.00		0.00	0.00	
Uniform Delay (*d 1*), s/veh	26.0	17.6		24.3	18.4		14.7	11.9		17.6	11.4	
Incremental Delay (*d 2*), s/veh	0.3	0.3		0.3	0.5		0.7	2.3		0.4	1.4	
Initial Queue Delay (*d 3*), s/veh	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Control Delay (*d*), s/veh	26.3	17.9		24.6	19.0		15.4	14.2		18.0	12.8	
Level of Service (LOS)	C	B		C	B		B	B		B	B	
Approach Delay, s/veh / LOS	19.3	B		20.1	C		14.3	B		13.2	B	
Intersection Delay, s/veh / LOS	16.5						B					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	1.90	B	1.90	B	1.88	B	1.88	B
Bicycle LOS Score / LOS	1.18	A	1.33	A	1.41	A	1.26	A

 HCS™ Streets Version 7.9 Generated: 6/29/2021 8:59:19 AM

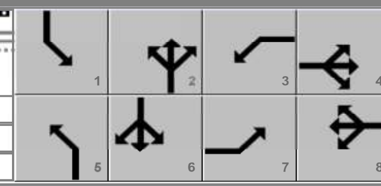
HCS7 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency				Duration, h	1.000
Analyst		Analysis Date	4/30/2021	Area Type	Other
Jurisdiction		Time Period		PHF	1.00
Urban Street		Analysis Year	2024	Analysis Period	1> 4:45
Intersection	Indianola & Broadway	File Name	Build 2024 Indianola PM.xus		
Project Description	2024 Build PM Peak				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h	120	620	80	120	570	330	100	350	90	350	360	140

Signal Information											
Cycle, s	124.3	Reference Phase	2								
Offset, s	41	Reference Point	End	Green	7.4	7.9	27.2	6.9	0.2	50.8	
Uncoordinated	Yes	Simult. Gap E/W	On	Yellow	3.0	3.0	4.1	3.0	0.0	4.1	
Force Mode	Fixed	Simult. Gap N/S	On	Red	1.4	1.4	1.4	1.1	0.0	1.4	



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	7	4	3	8	5	2	1	6
Case Number	1.1	4.0	1.1	3.0	1.1	3.0	1.1	3.0
Phase Duration, s	11.0	56.3	11.2	56.5	11.8	32.7	24.1	45.0
Change Period, ($Y+R_c$), s	4.1	5.5	4.3	5.5	4.4	5.5	4.4	5.5
Max Allow Headway (*MAH*), s	3.1	2.8	3.1	2.8	3.1	2.8	3.1	2.8
Queue Clearance Time (g_s), s	6.9	48.1	6.9	34.2	7.5	25.8	19.3	21.0
Green Extension Time (g_e), s	0.0	2.6	0.1	2.7	0.1	1.3	0.4	1.3
Phase Call Probability	0.98	1.00	0.98	1.00	0.97	1.00	1.00	1.00
Max Out Probability	1.00	0.03	0.98	0.00	0.00	0.00	0.14	0.00

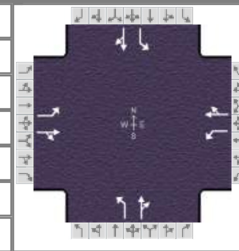
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (v), veh/h	120	700		120	570	330	104	364	94	329	339	132
Adjusted Saturation Flow Rate (s), veh/h/ln	1753	1818		1767	1870	1541	1795	1856	1570	1767	1856	1512
Queue Service Time (g_s), s	4.9	46.1		4.9	32.2	20.0	5.5	23.8	6.2	17.3	19.0	8.1
Cycle Queue Clearance Time (g_c), s	4.9	46.1		4.9	32.2	20.0	5.5	23.8	6.2	17.3	19.0	8.1
Green Ratio (g/C)	0.47	0.41		0.47	0.41	0.41	0.28	0.22	0.22	0.39	0.32	0.32
Capacity (c), veh/h	268	744		184	768	633	322	406	343	366	590	480
Volume-to-Capacity Ratio (X)	0.448	0.941		0.652	0.742	0.521	0.323	0.897	0.273	0.899	0.575	0.274
Back of Queue (Q), ft/ln (95 th percentile)	93.6	800		96.9	527.7	298	110.1	418.8	107.7	328.5	321.3	133.2
Back of Queue (Q), veh/ln (95 th percentile)	3.6	31.2		3.8	20.8	11.7	4.4	16.4	4.3	12.8	12.6	5.3
Queue Storage Ratio (RQ) (95 th percentile)	0.34	0.00		0.30	0.00	0.00	0.63	0.00	0.00	1.31	0.00	0.00
Uniform Delay (d_1), s/veh	24.6	35.4		29.0	31.1	27.5	34.8	47.3	40.4	31.5	35.5	31.8
Incremental Delay (d_2), s/veh	0.4	17.3		2.3	1.6	0.2	0.2	4.9	0.1	15.2	0.2	0.1
Initial Queue Delay (d_3), s/veh	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	25.0	52.7		31.4	32.7	27.8	34.9	52.2	40.6	46.6	35.7	31.9
Level of Service (LOS)	C	D		C	C	C	C	D	D	D	D	C
Approach Delay, s/veh / LOS	48.6	D		31.0	C		47.1	D		39.6	D	
Intersection Delay, s/veh / LOS	40.5						D					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.11	B	2.11	B	2.30	B	1.93	B
Bicycle LOS Score / LOS	1.84	B	2.17	B	1.38	A	1.89	B

 HCS™ Streets Version 7.9 Generated: 9/17/2021 2:09:33 PM

HCS7 Signalized Intersection Results Summary

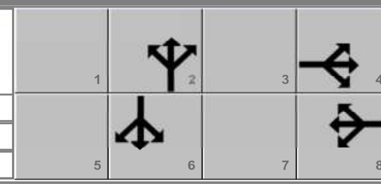
General Information				Intersection Information		
Agency				Duration, h	1.000	
Analyst		Analysis Date	4/30/2021	Area Type	Other	
Jurisdiction		Time Period		PHF	1.00	
Urban Street		Analysis Year	2021	Analysis Period	1> 7:00	
Intersection	Indianola & Oakland Park	File Name	Build 2024 Indianola PM.xus			
Project Description	2024 Build PM Peak					



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h	30	10	50	70	10	50	50	670	80	40	680	40

Signal Information			
Cycle, s	39.9	Reference Phase	2
Offset, s	14	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	20.9	9.4	0.0	0.0	0.0	0.0
Yellow	3.6	3.6	0.0	0.0	0.0	0.0
Red	1.1	1.2	0.0	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4		8		2		6
Case Number		6.0		6.0		6.0		6.0
Phase Duration, s		14.2		14.2		25.6		25.6
Change Period, ($Y+R_c$), s		4.8		4.8		4.7		4.7
Max Allow Headway (*MAH*), s		3.3		3.3		3.2		3.2
Queue Clearance Time (g_s), s		3.7		4.8		15.8		17.0
Green Extension Time (g_e), s		0.4		0.4		4.2		4.2
Phase Call Probability		0.91		0.91		1.00		1.00
Max Out Probability		0.00		0.00		0.00		0.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (v), veh/h	30	60		70	60		51	763		40	720	
Adjusted Saturation Flow Rate (s), veh/h/ln	1362	1623		1340	1579		743	1814		708	1833	
Queue Service Time (g_s), s	0.7	1.2		1.7	1.2		2.2	13.8		1.9	12.3	
Cycle Queue Clearance Time (g_c), s	1.7	1.2		2.8	1.2		13.7	13.8		15.0	12.3	
Green Ratio (g/C)	0.24	0.24		0.24	0.24		0.53	0.53		0.53	0.53	
Capacity (c), veh/h	472	388		466	377		354	947		318	956	
Volume-to-Capacity Ratio (X)	0.064	0.155		0.150	0.159		0.144	0.806		0.126	0.753	
Back of Queue (Q), ft/ln (95 th percentile)	7.8	15.4		19.2	15.6		13.4	133.3		11.4	123.6	
Back of Queue (Q), veh/ln (95 th percentile)	0.3	0.6		0.8	0.6		0.5	5.2		0.5	4.8	
Queue Storage Ratio (RQ) (95 th percentile)	0.04	0.00		0.26	0.00		0.07	0.00		0.28	0.00	
Uniform Delay (d_1), s/veh	12.6	11.9		13.0	12.0		12.6	7.8		13.7	7.5	
Incremental Delay (d_2), s/veh	0.0	0.1		0.1	0.1		0.0	0.4		0.1	0.5	
Initial Queue Delay (d_3), s/veh	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Control Delay (d), s/veh	12.6	12.0		13.1	12.0		12.6	8.2		13.8	7.9	
Level of Service (LOS)	B	B		B	B		B	A		B	A	
Approach Delay, s/veh / LOS	12.2	B		12.6	B		8.5	A		8.2	A	
Intersection Delay, s/veh / LOS	8.9						A					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.09	B	1.90	B	1.86	B	1.86	B
Bicycle LOS Score / LOS	0.64	A	0.70	A	1.81	B	1.74	B

Michael Baker
INTERNATIONAL

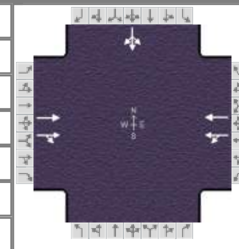
We Make a Difference

Build 2044

AM and PM Peak Hours

HCS7 Signalized Intersection Results Summary

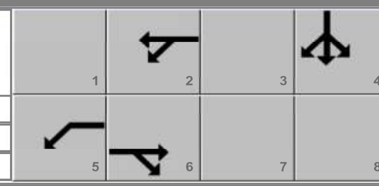
General Information				Intersection Information	
Agency				Duration, h	1.000
Analyst		Analysis Date	5/27/2021	Area Type	Other
Jurisdiction		Time Period		PHF	1.00
Urban Street		Analysis Year	2044	Analysis Period	1> 7:45
Intersection	Hudson & Summit	File Name	Build 2044 Hudson AM.xus		
Project Description	2044 Build AM Peak				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h		670	320	240	740					30	50	60

Signal Information			
Cycle, s	41.3	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	23.0	8.5	0.0	0.0	0.0	0.0
Yellow	3.6	3.6	0.0	0.0	0.0	0.0
Red	1.4	1.0	0.0	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		6	5	2				4
Case Number		8.4	0.0	14.4				12.0
Phase Duration, s		28.0	0.2	28.2				13.1
Change Period, ($Y+R_c$), s		5.0	5.0	5.0				4.6
Max Allow Headway (*MAH*), s		2.1	0.0	2.9				3.3
Queue Clearance Time (g_s), s		21.6		18.4				5.4
Green Extension Time (g_e), s		0.6	0.0	0.8				0.1
Phase Call Probability		1.00		1.00				0.80
Max Out Probability		0.02		0.00				0.01

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement		6	16	5	2					7	4	14
Adjusted Flow Rate (*v*), veh/h		528	462	168	312						140	
Adjusted Saturation Flow Rate (*s*), veh/h/ln		1856	1625	169	1615						1505	
Queue Service Time (g_s), s		19.6	7.4	0.0	4.3						3.4	
Cycle Queue Clearance Time (g_c), s		19.6	7.4	16.4	4.3						3.4	
Green Ratio (*g/C*)		0.56	0.56	0.56	0.56						0.21	
Capacity (*c*), veh/h		1026	898	242	909						311	
Volume-to-Capacity Ratio (*X*)		0.514	0.514	0.694	0.343						0.450	
Back of Queue (*Q*), ft/ln (95 th percentile)		72.2	62	46.9	34.9						48.7	
Back of Queue (*Q*), veh/ln (95 th percentile)		2.8	2.5	1.9	1.4						1.9	
Queue Storage Ratio (*RQ*) (95 th percentile)		0.00	0.00	0.00	0.00						0.00	
Uniform Delay (d_1), s/veh		5.8	5.8	15.2	4.9						14.4	
Incremental Delay (d_2), s/veh		0.1	0.2	1.1	0.1						0.4	
Initial Queue Delay (d_3), s/veh		0.0	0.0	0.0	0.0						0.0	
Control Delay (*d*), s/veh		6.0	6.0	16.4	5.0						14.8	
Level of Service (LOS)		A	A	B	A						B	

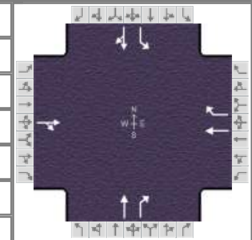
	EB		WB		NB		SB	
Approach Delay, s/veh / LOS	6.0	A	9.0	A	0.0		14.8	B
Intersection Delay, s/veh / LOS	7.6				A			

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	1.70	B	1.34	A	2.12	B	2.12	B
Bicycle LOS Score / LOS	2.13	B	2.12	B			1.79	B

 HCS™ Streets Version 7.9 Generated: 9/21/2021 1:55:35 PM

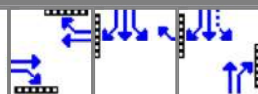
HCS7 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency				Duration, h	1.000
Analyst		Analysis Date	5/27/2021	Area Type	Other
Jurisdiction		Time Period		PHF	1.00
Urban Street		Analysis Year	2044	Analysis Period	1> 7:45
Intersection	Hudson & Indianola	File Name	Build 2044 Hudson AM.xus		
Project Description	2044 Build AM Peak				

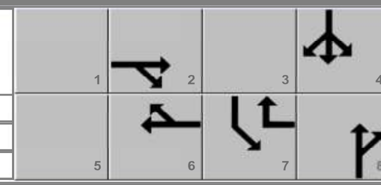


Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h		400	20		440	330		220	170	420	210	40

Signal Information			
Cycle, s	90.0	Reference Phase	2
Offset, s	12	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	38.9	8.6	27.5	0.0	0.0	0.0
Yellow	4.1	3.0	4.1	0.0	0.0	0.0
Red	1.0	1.4	1.4	0.0	0.0	0.0



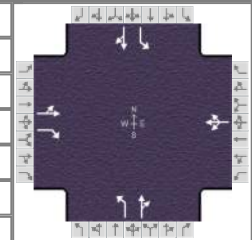
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		2		6		8	7	4
Case Number		8.0		7.0		7.3	1.0	4.0
Phase Duration, s		44.0		44.0		33.0	13.0	46.0
Change Period, (*Y+R c*), s		5.1		5.1		5.5	4.4	5.5
Max Allow Headway (*MAH*), s		0.0		0.0		3.2	3.1	3.2
Queue Clearance Time (*g s*), s						10.6	10.6	9.9
Green Extension Time (*g e*), s		0.0		0.0		1.2	0.0	1.3
Phase Call Probability						1.00	1.00	1.00
Max Out Probability						0.00	1.00	0.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement		2	12		6	16		8	18	7	4	14
Adjusted Flow Rate (*v*), veh/h		700			440	330		220	170	420	250	
Adjusted Saturation Flow Rate (*s*), veh/h/ln		1852			1870	1589		1810	1501	1781	1808	
Queue Service Time (*g s*), s		31.1			15.7	11.1		8.6	8.0	8.6	7.9	
Cycle Queue Clearance Time (*g c*), s		31.1			15.7	11.1		8.6	8.0	8.6	7.9	
Green Ratio (*g/C*)		0.43			0.43	0.53		0.31	0.31	0.42	0.45	
Capacity (*c*), veh/h		800			808	841		553	459	493	814	
Volume-to-Capacity Ratio (*X*)		0.875			0.544	0.393		0.398	0.371	0.851	0.307	
Back of Queue (*Q*), ft/ln (95 th percentile)		538.9			287.6	177.5		179.3	138	286.8	151.1	
Back of Queue (*Q*), veh/ln (95 th percentile)		21.2			11.3	7.1		7.1	5.5	11.3	5.9	
Queue Storage Ratio (*RQ*) (95 th percentile)		0.00			0.00	0.00		0.00	0.00	0.00	0.00	
Uniform Delay (*d 1*), s/veh		23.3			19.0	12.7		24.7	24.5	25.8	15.8	
Incremental Delay (*d 2*), s/veh		12.6			2.7	1.4		2.1	2.3	19.5	1.0	
Initial Queue Delay (*d 3*), s/veh		0.0			0.0	0.0		0.0	0.0	0.0	0.0	
Control Delay (*d*), s/veh		35.9			21.6	14.0		26.9	26.8	45.3	16.8	
Level of Service (LOS)		D			C	B		C	C	D	B	
Approach Delay, s/veh / LOS	35.9	D		18.4	B		26.8	C		34.7	C	
Intersection Delay, s/veh / LOS	28.8						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	1.90	B	2.10	B	1.92	B	1.68	B
Bicycle LOS Score / LOS	2.01	B	2.58	C	1.13	A	1.59	B

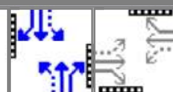
 HCS™ Streets Version 7.9 Generated: 9/21/2021 1:55:35 PM

HCS7 Signalized Intersection Results Summary

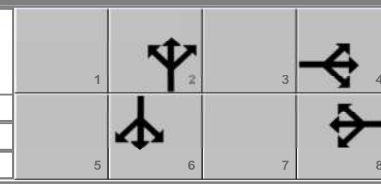
General Information				Intersection Information		
Agency				Duration, h	1.000	
Analyst		Analysis Date	4/30/2021	Area Type	Other	
Jurisdiction		Time Period		PHF	1.00	
Urban Street		Analysis Year	2044	Analysis Period	1> 7:45	
Intersection	Indianola & Arcadia	File Name	Build 2044 Indianola AM.xus			
Project Description	2044 Build AM Peak					

Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	80	60	210	10	70	30	190	330	20	10	440	110

Signal Information			
Cycle, s	60.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	38.5	11.1	0.0	0.0	0.0	0.0
Yellow	4.1	3.4	0.0	0.0	0.0	0.0
Red	1.3	1.6	0.0	0.0	0.0	0.0



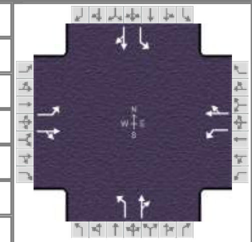
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4		8		2		6
Case Number		7.0		8.0		6.0		6.0
Phase Duration, s		16.1		16.1		43.9		43.9
Change Period, (*Y+R c*), s		5.0		5.0		5.4		5.4
Max Allow Headway (*MAH*), s		3.4		3.4		0.0		0.0
Queue Clearance Time (g_s), s		9.7		5.2				
Green Extension Time (g_e), s		1.0		1.0		0.0		0.0
Phase Call Probability		1.00		1.00				
Max Out Probability		0.00		0.00				

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h		140	210		110		190	350		9	509	
Adjusted Saturation Flow Rate (*s*), veh/h/ln		1538	1551		1754		904	1836		1045	1795	
Queue Service Time (g_s), s		1.4	7.7		0.0		8.3	5.1		0.2	9.7	
Cycle Queue Clearance Time (g_c), s		4.7	7.7		3.2		18.0	5.1		5.2	9.7	
Green Ratio (*g/C*)		0.18	0.18		0.18		0.64	0.64		0.64	0.64	
Capacity (*c*), veh/h		378	286		389		554	1179		703	1152	
Volume-to-Capacity Ratio (*X*)		0.370	0.733		0.283		0.343	0.297		0.013	0.442	
Back of Queue (*Q*), ft/ln (95 th percentile)		77.5	127.4		59.3		72.1	66.6		1.5	134.9	
Back of Queue (*Q*), veh/ln (95 th percentile)		3.1	5.0		2.3		2.9	2.6		0.1	5.3	
Queue Storage Ratio (*RQ*) (95 th percentile)		0.00	1.27		0.00		0.00	0.00		0.00	0.00	
Uniform Delay (d_1), s/veh		21.7	23.1		21.3		10.3	4.7		4.2	6.6	
Incremental Delay (d_2), s/veh		0.2	1.4		0.1		1.7	0.6		0.0	1.1	
Initial Queue Delay (d_3), s/veh		0.0	0.0		0.0		0.0	0.0		0.0	0.0	
Control Delay (*d*), s/veh		22.0	24.5		21.4		12.0	5.4		4.2	7.7	
Level of Service (LOS)		C	C		C		B	A		A	A	
Approach Delay, s/veh / LOS	23.5		C	21.4		C	7.7		A	7.6		A
Intersection Delay, s/veh / LOS	12.3						B					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	1.92	B	1.92	B	1.63	B	1.85	B
Bicycle LOS Score / LOS	1.07	A	0.67	A	1.38	A	1.41	A

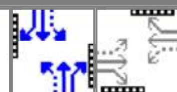
HCS7 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency				Duration, h	1.000
Analyst		Analysis Date	4/30/2021	Area Type	Other
Jurisdiction		Time Period		PHF	1.00
Urban Street		Analysis Year	2021	Analysis Period	1> 7:00
Intersection	Indianola & Weber	File Name	Build 2044 Indianola AM.xus		
Project Description	2044 Build AM Peak				

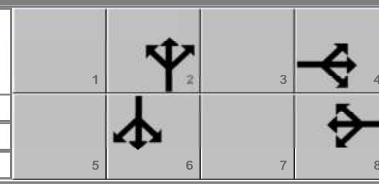


Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	60	340	40	120	260	30	60	310	100	30	330	70

Signal Information			
Cycle, s	60.0	Reference Phase	2
Offset, s	60	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	28.2	21.3	0.0	0.0	0.0	0.0
Yellow	4.1	4.1	0.0	0.0	0.0	0.0
Red	1.1	1.2	0.0	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4		8		2		6
Case Number		6.0		6.0		6.0		6.0
Phase Duration, s		26.6		26.6		33.4		33.4
Change Period, (*Y+R* $_c$), s		5.3		5.3		5.2		5.2
Max Allow Headway (*MAH*), s		3.3		3.3		0.0		0.0
Queue Clearance Time (g_s), s		12.7		19.6				
Green Extension Time (g_e), s		1.8		1.7		0.0		0.0
Phase Call Probability		1.00		1.00				
Max Out Probability		0.00		0.04				

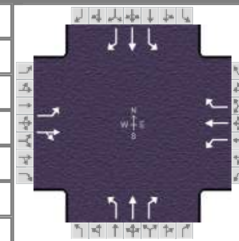
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h	60	380		120	290		56	384		33	434	
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1021	1762		962	1763		961	1791		999	1803	
Queue Service Time (g_s), s	2.9	10.7		7.0	7.6		2.9	8.9		1.4	10.0	
Cycle Queue Clearance Time (g_c), s	10.4	10.7		17.6	7.6		12.9	8.9		10.3	10.0	
Green Ratio (*g/C*)	0.35	0.35		0.35	0.35		0.47	0.47		0.47	0.47	
Capacity (*c*), veh/h	352	621		290	622		411	846		443	852	
Volume-to-Capacity Ratio (*X*)	0.171	0.612		0.414	0.466		0.137	0.454		0.074	0.510	
Back of Queue (*Q*), ft/ln (95 th percentile)	29.5	173.2		67.9	123.5		28.7	149.8		13.7	154.2	
Back of Queue (*Q*), veh/ln (95 th percentile)	1.1	6.8		2.7	4.9		1.1	5.9		0.5	6.1	
Queue Storage Ratio (*RQ*) (95 th percentile)	0.45	0.00		1.13	0.00		0.00	0.00		0.00	0.00	
Uniform Delay (d_1), s/veh	19.1	16.0		23.3	15.0		17.0	11.2		14.2	11.0	
Incremental Delay (d_2), s/veh	0.1	0.4		0.4	0.2		0.6	1.5		0.2	1.4	
Initial Queue Delay (d_3), s/veh	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Control Delay (*d*), s/veh	19.1	16.4		23.6	15.2		17.6	12.7		14.4	12.4	
Level of Service (LOS)	B	B		C	B		B	B		B	B	
Approach Delay, s/veh / LOS	16.8		B	17.7		B	13.3		B	12.5		B
Intersection Delay, s/veh / LOS	15.0						B					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	1.90	B	1.90	B	1.88	B	1.88	B
Bicycle LOS Score / LOS	1.21	A	1.16	A	1.26	A	1.20	A

 HCS™ Streets Version 7.9 Generated: 6/30/2021 11:28:24 AM

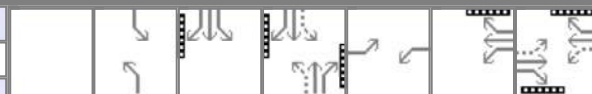
HCS7 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency				Duration, h	1.000
Analyst		Analysis Date	4/30/2021	Area Type	Other
Jurisdiction		Time Period		PHF	1.00
Urban Street		Analysis Year	2044	Analysis Period	1> 7:45
Intersection	Indianola & Broadway	File Name	Build 2044 Indianola AM.xus		
Project Description	2044 Build AM Peak				

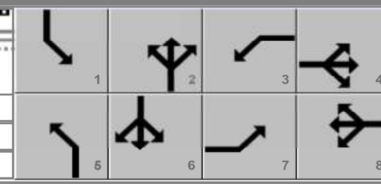


Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	120	530	30	140	740	330	130	290	130	410	290	160

Signal Information			
Cycle, s	130.8	Reference Phase	2
Offset, s	50	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	7.0	15.3	23.0	7.1	1.0	53.4
Yellow	3.0	3.0	4.1	3.0	0.0	4.1
Red	1.4	1.4	1.4	1.1	0.0	1.4



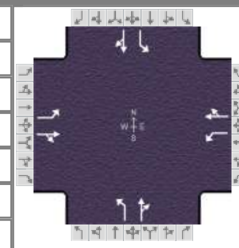
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	7	4	3	8	5	2	1	6
Case Number	1.1	4.0	1.1	3.0	1.1	3.0	1.1	3.0
Phase Duration, s	11.2	58.9	12.2	59.9	11.4	28.5	31.2	48.2
Change Period, (*Y+R* $_c$), s	4.1	5.5	4.3	5.5	4.4	5.5	4.4	5.5
Max Allow Headway (*MAH*), s	3.1	2.7	3.1	2.7	3.1	2.8	3.1	2.8
Queue Clearance Time (g_s), s	7.2	35.9	8.0	51.9	7.3	15.0	26.5	18.7
Green Extension Time (g_e), s	0.0	2.7	0.0	2.7	0.1	1.1	0.3	1.1
Phase Call Probability	0.99	1.00	0.99	1.00	0.96	1.00	1.00	1.00
Max Out Probability	1.00	0.00	1.00	0.01	0.00	0.00	0.80	0.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h	120	560		140	740	330	90	200	90	420	297	164
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1753	1837		1767	1870	1543	1795	1856	1599	1767	1856	1558
Queue Service Time (g_s), s	5.2	33.9		6.0	49.9	20.7	5.3	13.0	6.4	24.5	16.7	10.3
Cycle Queue Clearance Time (g_c), s	5.2	33.9		6.0	49.9	20.7	5.3	13.0	6.4	24.5	16.7	10.3
Green Ratio (*g/C*)	0.46	0.41		0.47	0.42	0.42	0.23	0.18	0.18	0.40	0.33	0.33
Capacity (*c*), veh/h	163	749		287	778	641	344	327	282	507	606	509
Volume-to-Capacity Ratio (*X*)	0.735	0.747		0.488	0.952	0.514	0.261	0.613	0.319	0.827	0.489	0.322
Back of Queue (*Q*), ft/ln (95 th percentile)	113.7	545.9		114.7	863.2	308.4	106.7	254.3	115.4	395.2	284.2	161.6
Back of Queue (*Q*), veh/ln (95 th percentile)	4.4	21.3		4.5	34.0	12.1	4.2	9.9	4.6	15.4	11.1	6.5
Queue Storage Ratio (*RQ*) (95 th percentile)	0.41	0.00		0.35	0.00	0.00	0.61	0.00	0.00	1.58	0.00	0.00
Uniform Delay (d_1), s/veh	31.0	32.9		25.3	36.8	28.3	40.7	49.6	46.9	32.5	35.2	33.0
Incremental Delay (d_2), s/veh	7.6	1.0		0.5	16.4	0.2	0.1	0.6	0.2	5.8	0.1	0.1
Initial Queue Delay (d_3), s/veh	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (*d*), s/veh	38.5	33.9		25.8	53.2	28.6	40.8	50.3	47.1	38.3	35.3	33.1
Level of Service (LOS)	D	C		C	D	C	D	D	D	D	D	C
Approach Delay, s/veh / LOS	34.7	C		43.3	D		47.3	D		36.3	D	
Intersection Delay, s/veh / LOS	40.0						D					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.11	B	2.11	B	2.31	B	1.93	B
Bicycle LOS Score / LOS	1.61	B	2.48	B	1.40	A	1.91	B

HCS7 Signalized Intersection Results Summary

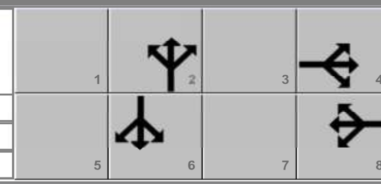
General Information				Intersection Information	
Agency				Duration, h	1.000
Analyst		Analysis Date	4/30/2021	Area Type	Other
Jurisdiction		Time Period		PHF	1.00
Urban Street		Analysis Year	2021	Analysis Period	1> 7:00
Intersection	Indianola & Oakland Park	File Name	Build 2044 Indianola AM.xus		
Project Description	2044 Build AM Peak				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	50	10	80	50	10	20	50	610	80	20	750	30

Signal Information			
Cycle, s	39.8	Reference Phase	2
Offset, s	7	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	21.0	9.4	0.0	0.0	0.0	0.0
Yellow	3.6	3.6	0.0	0.0	0.0	0.0
Red	1.1	1.2	0.0	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4		8		2		6
Case Number		6.0		6.0		6.0		6.0
Phase Duration, s		14.2		14.2		25.7		25.7
Change Period, (*Y+R* $_c$), s		4.8		4.8		4.7		4.7
Max Allow Headway (*MAH*), s		3.3		3.3		3.1		3.1
Queue Clearance Time (g_s), s		3.8		4.9		17.7		15.9
Green Extension Time (g_e), s		0.4		0.4		3.6		3.5
Phase Call Probability		0.91		0.91		1.00		1.00
Max Out Probability		0.00		0.00		0.00		0.01

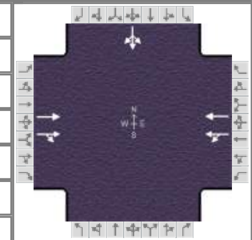
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h	50	90		50	30		44	607		20	780	
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1393	1612		1307	1650		702	1817		820	1840	
Queue Service Time (g_s), s	1.1	1.8		1.3	0.6		2.2	9.5		0.7	13.9	
Cycle Queue Clearance Time (g_c), s	1.5	1.8		2.9	0.6		15.7	9.5		9.7	13.9	
Green Ratio (*g/C*)	0.24	0.24		0.24	0.24		0.53	0.53		0.53	0.53	
Capacity (*c*), veh/h	502	385		439	394		308	947		424	959	
Volume-to-Capacity Ratio (*X*)	0.100	0.234		0.114	0.076		0.143	0.640		0.047	0.813	
Back of Queue (*Q*), ft/ln (95 th percentile)	12.7	23.5		13.8	7.6		12.7	93		4.4	142.8	
Back of Queue (*Q*), veh/ln (95 th percentile)	0.5	0.9		0.5	0.3		0.5	3.6		0.2	5.6	
Queue Storage Ratio (*RQ*) (95 th percentile)	0.07	0.00		0.18	0.00		0.06	0.00		0.11	0.00	
Uniform Delay (d_1), s/veh	12.2	12.1		13.3	11.7		14.2	6.8		10.1	7.9	
Incremental Delay (d_2), s/veh	0.0	0.1		0.0	0.0		0.1	0.2		0.0	0.7	
Initial Queue Delay (d_3), s/veh	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Control Delay (*d*), s/veh	12.2	12.3		13.3	11.7		14.2	7.0		10.1	8.5	
Level of Service (LOS)	B	B		B	B		B	A		B	A	
Approach Delay, s/veh / LOS	12.2	B		12.7	B		7.5	A		8.6	A	
Intersection Delay, s/veh / LOS	8.6						A					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.09	B	1.90	B	1.86	B	1.86	B
Bicycle LOS Score / LOS	0.72	A	0.62	A	1.71	B	1.81	B

 HCS™ Streets Version 7.9 Generated: 6/30/2021 11:28:24 AM

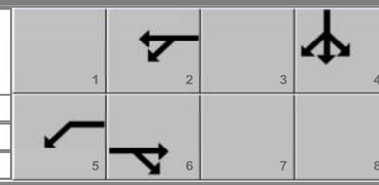
HCS7 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency				Duration, h	1.000
Analyst		Analysis Date	5/27/2021	Area Type	Other
Jurisdiction		Time Period		PHF	1.00
Urban Street		Analysis Year	2044	Analysis Period	1> 4:45
Intersection	Hudson & Summit	File Name	Build 2044 Hudson PM.xus		
Project Description	2044 Build PM Peak				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h		780	400	380	1060					20	10	20

Signal Information										
Cycle, s	69.1	Reference Phase	2							
Offset, s	51	Reference Point	End	Green	30.0	17.0	7.5	0.0	0.0	0.0
Uncoordinated	Yes	Simult. Gap E/W	On	Yellow	3.6	3.6	3.6	0.0	0.0	0.0
Force Mode	Fixed	Simult. Gap N/S	On	Red	1.4	1.4	1.0	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		6	5	2				4
Case Number		8.4	0.0	14.4				12.0
Phase Duration, s		35.0	22.0	57.0				12.1
Change Period, (*Y+R* $_c$), s		5.0	5.0	5.0				4.6
Max Allow Headway (*MAH*), s		2.1	0.0	3.3				3.3
Queue Clearance Time (g_s), s		38.3		52.9				4.1
Green Extension Time (g_e), s		0.0	0.0	0.0				0.1
Phase Call Probability		1.00		1.00				0.62
Max Out Probability		1.00		1.00				0.00

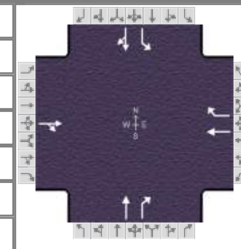
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement		6	16	5	2					7	4	14
Adjusted Flow Rate (*v*), veh/h		630	550	265	415						50	
Adjusted Saturation Flow Rate (*s*), veh/h/ln		1856	1613	600	1667						1491	
Queue Service Time (g_s), s		36.3	20.2	5.9	5.6						2.1	
Cycle Queue Clearance Time (g_c), s		36.3	20.2	50.9	5.6						2.1	
Green Ratio (*g/C*)		0.43	0.43	0.75	0.75						0.11	
Capacity (*c*), veh/h		806	701	540	1255						161	
Volume-to-Capacity Ratio (*X*)		0.781	0.786	0.490	0.331						0.310	
Back of Queue (*Q*), ft/ln (95 th percentile)		337.9	301.7	138.8	41.8						35.8	
Back of Queue (*Q*), veh/ln (95 th percentile)		13.2	12.1	5.6	1.6						1.4	
Queue Storage Ratio (*RQ*) (95 th percentile)		0.00	0.00	0.00	0.00						0.00	
Uniform Delay (d_1), s/veh		16.7	16.8	17.1	2.8						28.4	
Incremental Delay (d_2), s/veh		4.7	5.6	0.2	0.0						0.4	
Initial Queue Delay (d_3), s/veh		0.0	0.0	0.0	0.0						0.0	
Control Delay (*d*), s/veh		21.4	22.4	17.3	2.8						28.8	
Level of Service (LOS)		C	C	B	A						C	
Approach Delay, s/veh / LOS	21.9		C	8.4		A	0.0			28.8		C
Intersection Delay, s/veh / LOS	17.3						B					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	1.69	B	1.31	A	2.14	B	2.14	B
Bicycle LOS Score / LOS	1.46	A	1.68	B			0.57	A

 HCS™ Streets Version 7.9 Generated: 9/21/2021 1:55:34 PM

HCS7 Signalized Intersection Results Summary

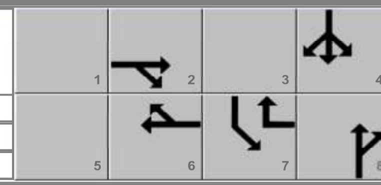
General Information				Intersection Information	
Agency				Duration, h	1.000
Analyst		Analysis Date	5/27/2021	Area Type	Other
Jurisdiction		Time Period		PHF	1.00
Urban Street		Analysis Year	2044	Analysis Period	1> 4:45
Intersection	Hudson & Indianola	File Name	Build 2044 Hudson PM.xus		
Project Description	2044 Build PM Peak				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h		770	30		630	460		320	150	320	150	50

Signal Information			
Cycle, s	90.0	Reference Phase	2
Offset, s	57	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	41.8	14.5	18.7	0.0	0.0	0.0
Yellow	4.1	3.0	4.1	0.0	0.0	0.0
Red	1.0	1.4	1.4	0.0	0.0	0.0



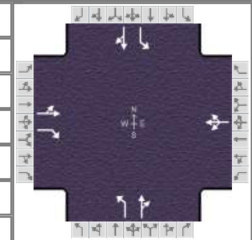
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		2		6		8	7	4
Case Number		8.0		7.0		7.3	1.0	4.0
Phase Duration, s		46.9		46.9		24.2	18.9	43.1
Change Period, (*Y+R* *c*), s		5.1		5.1		5.5	4.4	5.5
Max Allow Headway (*MAH*), s		0.0		0.0		3.2	3.1	3.2
Queue Clearance Time (*g* *s*), s						17.3	14.0	8.8
Green Extension Time (*g* *e*), s		0.0		0.0		1.2	0.5	1.4
Phase Call Probability						1.00	1.00	1.00
Max Out Probability						0.02	0.00	0.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement		2	12		6	16		8	18	7	4	14
Adjusted Flow Rate (*v*), veh/h		800			630	460		320	150	320	200	
Adjusted Saturation Flow Rate (*s*), veh/h/ln		1855			1870	1584		1810	1467	1781	1751	
Queue Service Time (*g* *s*), s		36.5			24.5	13.8		15.3	8.1	12.0	6.8	
Cycle Queue Clearance Time (*g* *c*), s		36.5			24.5	13.8		15.3	8.1	12.0	6.8	
Green Ratio (*g/C*)		0.46			0.46	0.63		0.21	0.21	0.39	0.42	
Capacity (*c*), veh/h		861			868	994		377	305	407	732	
Volume-to-Capacity Ratio (*X*)		0.929			0.725	0.463		0.849	0.491	0.787	0.273	
Back of Queue (*Q*), ft/ln (95 th percentile)		579.7			420.4	199		288.2	128.9	218.4	118.8	
Back of Queue (*Q*), veh/ln (95 th percentile)		22.8			16.6	8.0		11.4	5.2	8.6	4.7	
Queue Storage Ratio (*RQ*) (95 th percentile)		0.00			0.00	0.00		0.00	0.00	0.00	0.00	
Uniform Delay (*d* *1*), s/veh		22.7			19.5	8.9		34.3	31.4	22.5	17.2	
Incremental Delay (*d* *2*), s/veh		13.5			5.4	1.6		4.8	0.5	2.1	0.1	
Initial Queue Delay (*d* *3*), s/veh		0.0			0.0	0.0		0.0	0.0	0.0	0.0	
Control Delay (*d*), s/veh		36.2			24.9	10.5		39.1	31.9	24.6	17.3	
Level of Service (LOS)		D			C	B		D	C	C	B	
Approach Delay, s/veh / LOS	36.2	D		18.8	B		36.8	D		21.8	C	
Intersection Delay, s/veh / LOS	27.1						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	1.90	B	2.09	B	1.93	B	1.68	B
Bicycle LOS Score / LOS	2.63	C	3.11	C	2.34	B	2.42	B

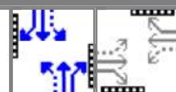
HCS7 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency				Duration, h	1.000
Analyst		Analysis Date	4/30/2021	Area Type	Other
Jurisdiction		Time Period		PHF	1.00
Urban Street		Analysis Year	2044	Analysis Period	1> 4:45
Intersection	Indianola & Arcadia	File Name	Build 2044 Indianola PM.xus		
Project Description	2044 Build PM Peak				

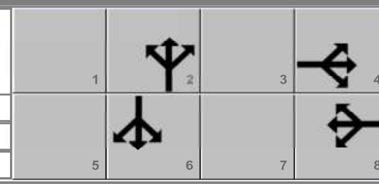


Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	90	80	110	10	30	30	190	530	30	10	390	80

Signal Information			
Cycle, s	60.0	Reference Phase	2
Offset, s	70	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	38.3	11.3	0.0	0.0	0.0	0.0
Yellow	4.1	3.4	0.0	0.0	0.0	0.0
Red	1.3	1.6	0.0	0.0	0.0	0.0



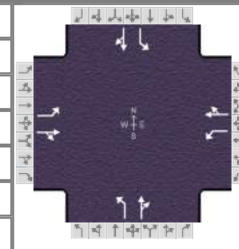
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4		8		2		6
Case Number		7.0		8.0		6.0		6.0
Phase Duration, s		16.3		16.3		43.7		43.7
Change Period, (*Y+R* $_c$), s		5.0		5.0		5.4		5.4
Max Allow Headway (*MAH*), s		3.4		3.4		0.0		0.0
Queue Clearance Time (g_s), s		7.8		4.1				
Green Extension Time (g_e), s		0.6		0.7		0.0		0.0
Phase Call Probability		1.00		1.00				
Max Out Probability		0.02		0.00				

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h		170	110		70		190	560		12	550	
Adjusted Saturation Flow Rate (*s*), veh/h/ln		1565	1499		1647		867	1834		861	1798	
Queue Service Time (g_s), s		3.7	3.9		0.0		9.0	9.5		0.6	10.4	
Cycle Queue Clearance Time (g_c), s		5.8	3.9		2.1		19.3	9.5		10.1	10.4	
Green Ratio (*g/C*)		0.19	0.19		0.19		0.64	0.64		0.64	0.64	
Capacity (*c*), veh/h		386	282		378		524	1171		533	1148	
Volume-to-Capacity Ratio (*X*)		0.440	0.390		0.185		0.362	0.478		0.022	0.478	
Back of Queue (*Q*), ft/ln (95 th percentile)		95.8	60.7		36.7		76.2	129.3		4.9	139.9	
Back of Queue (*Q*), veh/ln (95 th percentile)		3.8	2.4		1.4		3.0	5.1		0.2	5.5	
Queue Storage Ratio (*RQ*) (95 th percentile)		0.00	0.61		0.00		0.00	0.00		0.00	0.00	
Uniform Delay (d_1), s/veh		22.0	21.3		20.6		10.9	5.6		11.8	6.5	
Incremental Delay (d_2), s/veh		0.3	0.3		0.1		1.9	1.4		0.1	1.1	
Initial Queue Delay (d_3), s/veh		0.0	0.0		0.0		0.0	0.0		0.0	0.0	
Control Delay (*d*), s/veh		22.3	21.7		20.7		12.9	7.0		11.9	7.6	
Level of Service (LOS)		C	C		C		B	A		B	A	
Approach Delay, s/veh / LOS	22.1	C		20.7	C		8.5	A		7.6	A	
Intersection Delay, s/veh / LOS	11.0						B					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	1.92	B	1.92	B	1.63	B	1.85	B
Bicycle LOS Score / LOS	0.95	A	0.60	A	1.73	B	1.28	A

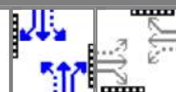
HCS7 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency				Duration, h	1.000
Analyst		Analysis Date	4/30/2021	Area Type	Other
Jurisdiction		Time Period		PHF	1.00
Urban Street		Analysis Year	2021	Analysis Period	1> 7:00
Intersection	Indianola & Weber	File Name	Build 2044 Indianola PM.xus		
Project Description	2044 Build PM Peak				

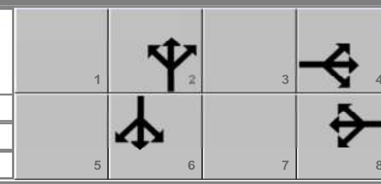


Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	90	400	40	110	450	70	80	420	110	50	360	80

Signal Information			
Cycle, s	60.0	Reference Phase	2
Offset, s	53	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	24.7	24.8	0.0	0.0	0.0	0.0
Yellow	4.1	4.1	0.0	0.0	0.0	0.0
Red	1.1	1.2	0.0	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4		8		2		6
Case Number		6.0		6.0		6.0		6.0
Phase Duration, s		30.1		30.1		29.9		29.9
Change Period, (*Y+R* $_c$), s		5.3		5.3		5.2		5.2
Max Allow Headway (*MAH*), s		3.3		3.3		0.0		0.0
Queue Clearance Time (*g* $_s$), s		23.2		20.1				
Green Extension Time (*g* $_e$), s		1.7		2.2		0.0		0.0
Phase Call Probability		1.00		1.00				
Max Out Probability		0.57		0.27				

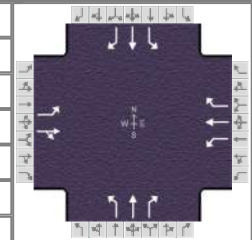
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h	90	440		110	520		85	565		57	498	
Adjusted Saturation Flow Rate (*s*), veh/h/ln	821	1766		909	1741		902	1786		845	1784	
Queue Service Time (*g* $_s$), s	6.2	11.7		6.4	15.0		3.7	15.3		3.6	13.7	
Cycle Queue Clearance Time (*g* $_c$), s	21.2	11.7		18.1	15.0		18.5	15.3		18.9	13.7	
Green Ratio (*g/C*)	0.41	0.41		0.41	0.41		0.41	0.41		0.41	0.41	
Capacity (*c*), veh/h	254	730		319	719		286	735		252	734	
Volume-to-Capacity Ratio (*X*)	0.354	0.603		0.345	0.723		0.298	0.768		0.224	0.678	
Back of Queue (*Q*), ft/ln (95 th percentile)	52.3	182.9		57.7	232.4		41.3	214.4		33.3	192.1	
Back of Queue (*Q*), veh/ln (95 th percentile)	2.0	7.2		2.3	9.2		1.6	8.4		1.3	7.6	
Queue Storage Ratio (*RQ*) (95 th percentile)	0.80	0.00		0.96	0.00		0.00	0.00		0.00	0.00	
Uniform Delay (*d* $_1$), s/veh	23.6	13.8		20.8	14.7		16.8	12.4		22.9	14.4	
Incremental Delay (*d* $_2$), s/veh	0.3	0.4		0.2	2.0		1.8	5.4		0.9	2.3	
Initial Queue Delay (*d* $_3$), s/veh	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Control Delay (*d*), s/veh	23.9	14.2		21.1	16.7		18.6	17.7		23.8	16.7	
Level of Service (LOS)	C	B		C	B		B	B		C	B	
Approach Delay, s/veh / LOS	15.8	B		17.5	B		17.8	B		17.4	B	
Intersection Delay, s/veh / LOS	17.2						B					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	1.89	B	1.89	B	1.89	B	1.89	B
Bicycle LOS Score / LOS	1.36	A	1.53	B	1.49	A	1.30	A

 HCS™ Streets Version 7.9 Generated: 6/29/2021 8:31:10 AM

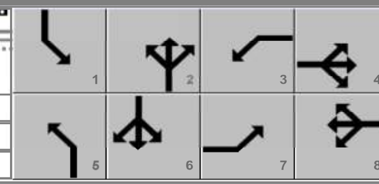
HCS7 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency				Duration, h	1.000
Analyst		Analysis Date	4/30/2021	Area Type	Other
Jurisdiction		Time Period		PHF	1.00
Urban Street		Analysis Year	2044	Analysis Period	1> 4:45
Intersection	Indianola & Broadway	File Name	Build 2044 Indianola PM.xus		
Project Description	2044 Build PM Peak				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	130	700	80	130	640	370	100	360	90	390	370	150

Signal Information										
Cycle, s	147.6	Reference Phase	2							
Offset, s	6	Reference Point	End	Green	8.8	11.8	34.2	8.3	0.5	60.0
Uncoordinated	Yes	Simult. Gap E/W	On	Yellow	3.0	3.0	4.1	3.0	0.0	4.1
Force Mode	Fixed	Simult. Gap N/S	On	Red	1.4	1.4	1.4	1.1	0.0	1.4



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	7	4	3	8	5	2	1	6
Case Number	1.1	4.0	1.1	3.0	1.1	3.0	1.1	3.0
Phase Duration, s	12.4	65.5	12.9	66.0	13.2	39.7	29.4	55.9
Change Period, (*Y+R* $_c$), s	4.1	5.5	4.3	5.5	4.4	5.5	4.4	5.5
Max Allow Headway (*MAH*), s	3.1	2.8	3.1	2.8	3.1	2.8	3.1	2.8
Queue Clearance Time (g_s), s	8.3	62.0	8.6	47.3	8.9	32.9	27.0	24.9
Green Extension Time (g_e), s	0.0	0.0	0.0	2.8	0.1	1.3	0.0	1.4
Phase Call Probability	1.00	1.00	1.00	1.00	0.99	1.00	1.00	1.00
Max Out Probability	1.00	1.00	1.00	0.13	0.02	0.02	1.00	0.00

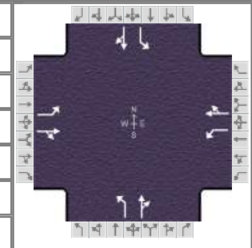
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h	130	780		130	640	370	110	398	99	373	354	143
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1753	1822		1767	1870	1541	1795	1856	1571	1767	1856	1517
Queue Service Time (g_s), s	6.3	60.0		6.6	45.3	27.5	6.9	30.9	7.7	25.0	22.9	10.1
Cycle Queue Clearance Time (g_c), s	6.3	60.0		6.6	45.3	27.5	6.9	30.9	7.7	25.0	22.9	10.1
Green Ratio (*g/C*)	0.46	0.41		0.47	0.41	0.41	0.29	0.23	0.23	0.42	0.34	0.34
Capacity (*c*), veh/h	217	741		152	767	632	335	431	365	370	634	518
Volume-to-Capacity Ratio (*X*)	0.598	1.053		0.855	0.835	0.586	0.329	0.923	0.273	1.007	0.558	0.277
Back of Queue (*Q*), ft/ln (95 th percentile)	128.8	1742.6		190.6	760.5	399.3	135.3	544	132.9	650.3	379.6	160.1
Back of Queue (*Q*), veh/ln (95 th percentile)	5.0	68.1		7.4	29.9	15.7	5.4	21.3	5.3	25.4	14.8	6.4
Queue Storage Ratio (*RQ*) (95 th percentile)	0.47	0.00		0.59	0.00	0.00	0.77	0.00	0.00	2.60	0.00	0.00
Uniform Delay (d_1), s/veh	31.9	43.8		37.7	39.1	33.8	39.7	55.4	46.4	42.3	39.5	35.3
Incremental Delay (d_2), s/veh	2.1	130.8		35.6	8.0	1.0	0.1	13.5	0.1	83.3	0.2	0.1
Initial Queue Delay (d_3), s/veh	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (*d*), s/veh	34.0	174.6		73.3	47.1	34.8	39.8	68.9	46.5	125.5	39.8	35.4
Level of Service (LOS)	C	F		E	D	C	D	E	D	F	D	D
Approach Delay, s/veh / LOS	154.5	F		46.1	D		59.9	E		75.8	E	
Intersection Delay, s/veh / LOS	83.8						F					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.12	B	2.12	B	2.31	B	1.94	B
Bicycle LOS Score / LOS	1.99	B	2.37	B	1.40	A	1.99	B

 HCS™ Streets Version 7.9 Generated: 9/17/2021 2:10:28 PM

HCS7 Signalized Intersection Results Summary

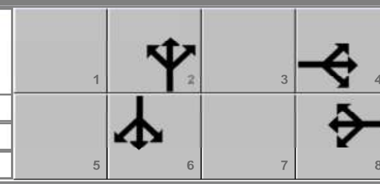
General Information				Intersection Information	
Agency				Duration, h	1.000
Analyst		Analysis Date	4/30/2021	Area Type	Other
Jurisdiction		Time Period		PHF	1.00
Urban Street		Analysis Year	2021	Analysis Period	1> 7:00
Intersection	Indianola & Oakland Park	File Name	Build 2044 Indianola PM.xus		
Project Description	2044 Build PM Peak				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h	30	10	50	70	10	50	50	730	80	40	750	40

Signal Information			
Cycle, s	44.0	Reference Phase	2
Offset, s	11	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	24.9	9.6	0.0	0.0	0.0	0.0
Yellow	3.6	3.6	0.0	0.0	0.0	0.0
Red	1.1	1.2	0.0	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4		8		2		6
Case Number		6.0		6.0		6.0		6.0
Phase Duration, s		14.4		14.4		29.6		29.6
Change Period, ($Y+R_c$), s		4.8		4.8		4.7		4.7
Max Allow Headway (*MAH*), s		3.3		3.3		3.2		3.2
Queue Clearance Time (g_s), s		4.1		5.1		18.7		20.3
Green Extension Time (g_e), s		0.4		0.4		5.0		5.0
Phase Call Probability		0.93		0.93		1.00		1.00
Max Out Probability		0.00		0.00		0.00		0.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (v), veh/h	30	60		70	60		52	845		40	790	
Adjusted Saturation Flow Rate (s), veh/h/ln	1361	1623		1340	1578		696	1817		656	1835	
Queue Service Time (g_s), s	0.8	1.3		1.9	1.3		2.7	16.7		2.3	14.5	
Cycle Queue Clearance Time (g_c), s	2.1	1.3		3.1	1.3		16.4	16.7		18.3	14.5	
Green Ratio (g/C)	0.22	0.22		0.22	0.22		0.57	0.57		0.57	0.57	
Capacity (c), veh/h	426	358		425	349		336	1020		293	1030	
Volume-to-Capacity Ratio (X)	0.070	0.167		0.165	0.172		0.155	0.829		0.137	0.767	
Back of Queue (Q), ft/ln (95 th percentile)	9.4	18.4		22.9	18.7		15.5	148.2		13.1	147.6	
Back of Queue (Q), veh/ln (95 th percentile)	0.4	0.7		0.9	0.7		0.6	5.8		0.5	5.8	
Queue Storage Ratio (RQ) (95 th percentile)	0.05	0.00		0.30	0.00		0.08	0.00		0.33	0.00	
Uniform Delay (d_1), s/veh	14.6	13.8		15.0	13.8		13.4	7.9		15.1	7.4	
Incremental Delay (d_2), s/veh	0.0	0.1		0.1	0.1		0.0	0.3		0.1	0.5	
Initial Queue Delay (d_3), s/veh	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Control Delay (d), s/veh	14.6	13.8		15.0	13.9		13.5	8.2		15.2	7.8	
Level of Service (LOS)	B	B		B	B		B	A		B	A	
Approach Delay, s/veh / LOS	14.1	B		14.5	B		8.5	A		8.2	A	
Intersection Delay, s/veh / LOS	9.0						A					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.09	B	1.90	B	1.85	B	1.85	B
Bicycle LOS Score / LOS	0.64	A	0.70	A	1.91	B	1.86	B

Michael Baker
INTERNATIONAL

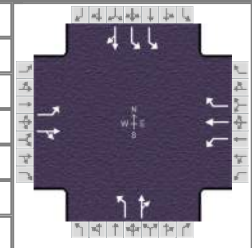
We Make a Difference

Build 2024 Alternative 1

AM and PM Peak Hours

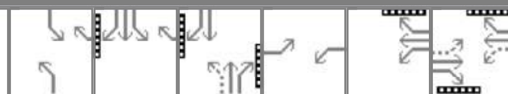
HCS7 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency				Duration, h	1.000
Analyst		Analysis Date	4/30/2021	Area Type	Other
Jurisdiction		Time Period		PHF	1.00
Urban Street		Analysis Year	2021	Analysis Period	1> 7:00
Intersection	Indianola & Broadway	File Name	Build 2024 Indianola AM.xus		
Project Description	2024 Build AM Peak Alternative				

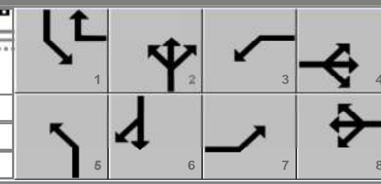


Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h	100	460	30	130	630	300	110	270	120	360	270	140

Signal Information			
Cycle, s	97.3	Reference Phase	2
Offset, s	13	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	6.2	2.5	23.0	6.5	0.5	34.8
Yellow	3.0	3.0	4.1	3.0	0.0	4.1
Red	1.4	1.4	1.4	1.1	0.0	1.4



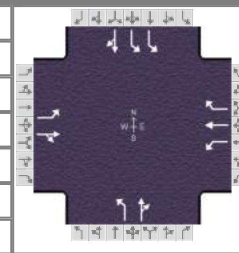
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	7	4	3	8	5	2	1	6
Case Number	1.1	4.0	1.1	3.0	1.1	4.0	2.0	4.0
Phase Duration, s	10.6	40.3	11.1	40.8	10.6	28.5	17.4	35.4
Change Period, ($Y+R_c$), s	4.1	5.5	4.3	5.5	4.4	5.5	4.4	5.5
Max Allow Headway (*MAH*), s	3.1	2.8	3.1	2.8	3.1	2.8	3.1	2.8
Queue Clearance Time (g_s), s	5.4	24.8	6.4	33.6	5.1	15.9	12.1	23.5
Green Extension Time (g_e), s	0.1	0.0	0.1	1.5	0.1	1.0	0.9	1.0
Phase Call Probability	0.93	1.00	0.97	1.00	0.88	1.00	1.00	1.00
Max Out Probability	0.00	1.00	0.02	0.00	0.00	0.00	0.00	0.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (v), veh/h	100	490		130	630	300	78	275		365	415	
Adjusted Saturation Flow Rate (s), veh/h/ln	1753	1835		1767	1870	1542	1795	1755		1716	1726	
Queue Service Time (g_s), s	3.4	22.8		4.4	31.6	11.9	3.1	13.9		10.1	21.5	
Cycle Queue Clearance Time (g_c), s	3.4	22.8		4.4	31.6	11.9	3.1	13.9		10.1	21.5	
Green Ratio (g/C)	0.43	0.36		0.43	0.36	0.50	0.30	0.24		0.13	0.31	
Capacity (c), veh/h	208	658		312	679	773	251	414		461	529	
Volume-to-Capacity Ratio (X)	0.480	0.745		0.417	0.927	0.388	0.309	0.664		0.791	0.785	
Back of Queue (Q), ft/ln (95 th percentile)	62.9	399.2		81.2	510.2	180.3	59	247.3		181.9	329.1	
Back of Queue (Q), veh/ln (95 th percentile)	2.4	15.6		3.2	20.1	7.1	2.3	9.7		7.1	12.9	
Queue Storage Ratio (*RQ*) (95 th percentile)	0.23	0.00		0.25	0.00	0.00	0.34	0.00		0.73	0.00	
Uniform Delay (d_1), s/veh	23.2	27.4		20.3	29.9	15.3	26.6	33.8		40.9	30.9	
Incremental Delay (d_2), s/veh	0.6	4.2		0.3	2.7	0.1	0.2	0.7		0.9	0.7	
Initial Queue Delay (d_3), s/veh	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Control Delay (d), s/veh	23.8	31.6		20.6	32.5	15.4	26.9	34.5		41.8	31.6	
Level of Service (LOS)	C	C		C	C	B	C	C		D	C	
Approach Delay, s/veh / LOS	30.3	C		26.2	C		32.8	C		36.4	D	
Intersection Delay, s/veh / LOS	30.8						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	1.92	B	2.11	B	2.29	B	1.92	B
Bicycle LOS Score / LOS	1.46	A	2.24	B	1.31	A	1.76	B

 HCS™ Streets Version 7.9 Generated: 6/29/2021 7:59:57 PM

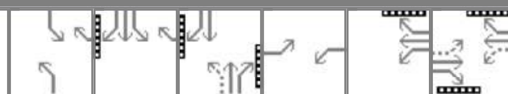
HCS7 Signalized Intersection Results Summary



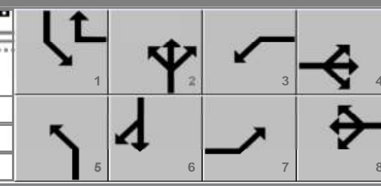
General Information				Intersection Information	
Agency				Duration, h	1.000
Analyst		Analysis Date	4/30/2021	Area Type	Other
Jurisdiction		Time Period		PHF	1.00
Urban Street		Analysis Year	2021	Analysis Period	1> 7:00
Intersection	Indianola & Broadway	File Name	Build 2024 Indianola PM.xus		
Project Description	2024 Build PM Peak Alternative				

Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	120	620	80	120	570	330	100	350	90	350	360	140

Signal Information			
Cycle, s	134.0	Reference Phase	2
Offset, s	27	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	7.5	3.4	37.1	7.3	0.2	54.6
Yellow	3.0	3.0	4.1	3.0	0.0	4.1
Red	1.4	1.4	1.4	1.1	0.0	1.4



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	7	4	3	8	5	2	1	6
Case Number	1.1	4.0	1.1	3.0	1.1	4.0	2.0	4.0
Phase Duration, s	11.4	60.1	11.6	60.2	11.9	42.6	19.7	50.4
Change Period, ($Y+R_c$), s	4.1	5.5	4.3	5.5	4.4	5.5	4.4	5.5
Max Allow Headway (*MAH*), s	3.1	2.8	3.1	2.8	3.1	2.8	3.1	2.8
Queue Clearance Time (g_s), s	7.3	51.8	7.3	36.8	7.5	35.6	14.6	35.3
Green Extension Time (g_e), s	0.1	2.6	0.1	2.7	0.1	1.4	0.6	1.4
Phase Call Probability	0.99	1.00	0.99	1.00	0.98	1.00	1.00	1.00
Max Out Probability	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h	120	700		120	570	330	104	458		329	471	
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1753	1818		1767	1870	1541	1795	1780		1716	1732	
Queue Service Time (g_s), s	5.3	49.8		5.3	34.8	17.5	5.5	33.6		12.6	33.3	
Cycle Queue Clearance Time (g_c), s	5.3	49.8		5.3	34.8	17.5	5.5	33.6		12.6	33.3	
Green Ratio (*g/C*)	0.46	0.41		0.46	0.41	0.52	0.33	0.28		0.11	0.34	
Capacity (*c*), veh/h	261	741		177	765	811	221	494		391	581	
Volume-to-Capacity Ratio (*X*)	0.459	0.945		0.680	0.746	0.407	0.470	0.928		0.842	0.810	
Back of Queue (*Q*), ft/ln (95 th percentile)	102.7	861.2		104.2	569.8	261.1	110.2	564.5		224.8	502.5	
Back of Queue (*Q*), veh/ln (95 th percentile)	4.0	33.6		4.1	22.4	10.3	4.4	22.1		8.8	19.6	
Queue Storage Ratio (*RQ*) (95 th percentile)	0.37	0.00		0.32	0.00	0.00	0.63	0.00		0.90	0.00	
Uniform Delay (d_1), s/veh	26.7	38.3		31.5	33.8	19.5	34.9	47.2		58.3	40.7	
Incremental Delay (d_2), s/veh	0.5	18.2		1.7	1.6	0.1	0.5	10.8		1.8	2.6	
Initial Queue Delay (d_3), s/veh	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Control Delay (*d*), s/veh	27.1	56.6		33.2	35.4	19.6	35.3	58.0		60.2	43.3	
Level of Service (LOS)	C	E		C	D	B	D	E		E	D	
Approach Delay, s/veh / LOS	52.3	D		30.0	C		53.8	D		50.2	D	
Intersection Delay, s/veh / LOS	44.9						D					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	1.92	B	2.11	B	2.30	B	1.93	B
Bicycle LOS Score / LOS	1.84	B	2.17	B	1.38	A	1.89	B

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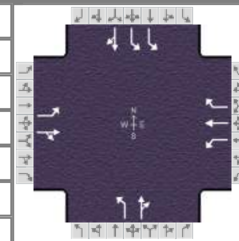
Build 2044 Alternative 1

AM and PM Peak Hours

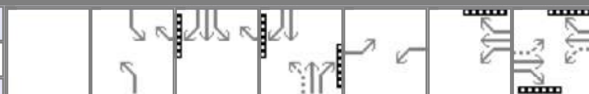
HCS7 Signalized Intersection Results Summary

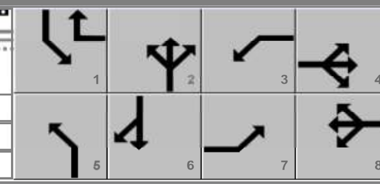
General Information				Intersection Information	
Agency				Duration, h	1.000
Analyst		Analysis Date	4/30/2021	Area Type	Other
Jurisdiction		Time Period		PHF	1.00
Urban Street		Analysis Year	2021	Analysis Period	1> 7:00
Intersection	Indianola & Broadway	File Name	Build 2044 Indianola AM.xus		
Project Description	2044 Build AM Peak Alternative				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h	120	530	30	140	740	330	130	290	130	410	290	160

Signal Information										
Cycle, s	117.3	Reference Phase	2							
Offset, s	56	Reference Point	End	Green	6.7	6.4	23.7	6.9	0.7	49.0
Uncoordinated	Yes	Simult. Gap E/W	On	Yellow	3.0	3.0	4.1	3.0	0.0	4.1
Force Mode	Fixed	Simult. Gap N/S	On	Red	1.4	1.4	1.4	1.1	0.0	1.4





Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	7	4	3	8	5	2	1	6
Case Number	1.1	4.0	1.1	3.0	1.1	4.0	2.0	4.0
Phase Duration, s	11.0	54.5	11.7	55.1	11.1	29.2	21.9	40.0
Change Period, ($Y+R_c$), s	4.1	5.5	4.3	5.5	4.4	5.5	4.4	5.5
Max Allow Headway (*MAH*), s	3.1	2.7	3.1	2.7	3.1	2.8	3.1	2.8
Queue Clearance Time (g_s), s	6.6	32.3	7.3	46.8	6.6	20.8	16.1	32.7
Green Extension Time (g_e), s	0.2	2.5	0.0	1.8	0.2	1.1	1.0	1.1
Phase Call Probability	0.98	1.00	0.99	1.00	0.95	1.00	1.00	1.00
Max Out Probability	0.00	0.07	1.00	0.00	0.00	0.00	0.00	0.00

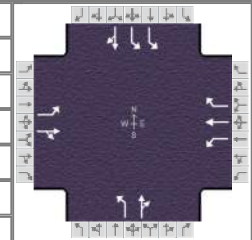
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (v), veh/h	120	560		140	740	330	90	290		420	460	
Adjusted Saturation Flow Rate (s), veh/h/ln	1753	1837		1767	1870	1543	1795	1754		1716	1720	
Queue Service Time (g_s), s	4.6	30.3		5.3	44.8	13.8	4.6	18.8		14.1	30.7	
Cycle Queue Clearance Time (g_c), s	4.6	30.3		5.3	44.8	13.8	4.6	18.8		14.1	30.7	
Green Ratio (g/C)	0.48	0.42		0.49	0.42	0.58	0.26	0.20		0.15	0.29	
Capacity (c), veh/h	183	770		312	795	894	181	356		514	509	
Volume-to-Capacity Ratio (X)	0.654	0.727		0.449	0.931	0.369	0.497	0.816		0.815	0.904	
Back of Queue (Q), ft/ln (95 th percentile)	88	504.5		99.5	721.3	207	93.3	327		235.4	449.3	
Back of Queue (Q), veh/ln (95 th percentile)	3.4	19.7		3.9	28.4	8.1	3.7	12.8		9.2	17.6	
Queue Storage Ratio (RQ) (95 th percentile)	0.32	0.00		0.31	0.00	0.00	0.53	0.00		0.94	0.00	
Uniform Delay (d_1), s/veh	27.6	28.9		21.9	32.6	13.7	36.6	45.4		49.1	40.3	
Incremental Delay (d_2), s/veh	1.5	3.1		0.4	6.3	0.1	0.7	1.6		0.8	1.6	
Initial Queue Delay (d_3), s/veh	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Control Delay (d), s/veh	29.1	32.0		22.3	38.9	13.8	37.3	47.0		49.8	42.0	
Level of Service (LOS)	C	C		C	D	B	D	D		D	D	
Approach Delay, s/veh / LOS	31.5	C		30.1	C		44.7	D		45.7	D	
Intersection Delay, s/veh / LOS	36.5						D					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	1.92	B	2.11	B	2.30	B	1.93	B
Bicycle LOS Score / LOS	1.61	B	2.48	B	1.40	A	1.91	B

 HCS™ Streets Version 7.9 Generated: 6/30/2021 8:30:22 AM

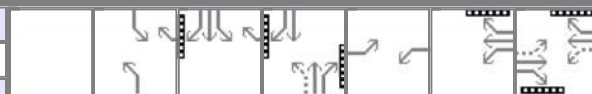
HCS7 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency				Duration, h	1.000
Analyst		Analysis Date	4/30/2021	Area Type	Other
Jurisdiction		Time Period		PHF	1.00
Urban Street		Analysis Year	2021	Analysis Period	1> 7:00
Intersection	Indianola & Broadway	File Name	Build 2044 Indianola PM.xus		
Project Description	2044 Build PM Peak Alternative				

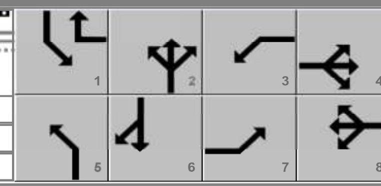


Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	130	700	80	130	640	370	100	360	90	390	370	150

Signal Information				
Cycle, s	162.5	Reference Phase	2
Offset, s	29	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	8.9	6.9	47.8	9.1	0.8	65.0
Yellow	3.0	3.0	4.1	3.0	0.0	4.1
Red	1.4	1.4	1.4	1.1	0.0	1.4



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	7	4	3	8	5	2	1	6
Case Number	1.1	4.0	1.1	3.0	1.1	4.0	2.0	4.0
Phase Duration, s	13.2	70.5	14.1	71.3	13.3	53.3	24.6	64.6
Change Period, (*Y+R c*), s	4.1	5.5	4.3	5.5	4.4	5.5	4.4	5.5
Max Allow Headway (*MAH*), s	3.1	2.8	3.1	2.8	3.1	2.8	3.1	2.8
Queue Clearance Time (*g s*), s	9.1	67.0	9.7	52.3	8.9	46.4	19.3	43.7
Green Extension Time (*g e*), s	0.1	0.0	0.1	2.8	0.1	1.4	0.9	1.5
Phase Call Probability	1.00	1.00	1.00	1.00	0.99	1.00	1.00	1.00
Max Out Probability	0.03	1.00	0.07	0.13	0.02	0.01	0.00	0.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h	130	780		130	640	370	110	497		373	497	
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1753	1822		1767	1870	1541	1795	1782		1716	1731	
Queue Service Time (*g s*), s	7.1	65.0		7.7	50.3	24.2	6.9	44.4		17.3	41.7	
Cycle Queue Clearance Time (*g c*), s	7.1	65.0		7.7	50.3	24.2	6.9	44.4		17.3	41.7	
Green Ratio (*g/C*)	0.46	0.40		0.46	0.41	0.53	0.35	0.29		0.12	0.36	
Capacity (*c*), veh/h	208	729		151	758	821	229	524		427	629	
Volume-to-Capacity Ratio (*X*)	0.626	1.071		0.862	0.845	0.450	0.482	0.948		0.873	0.790	
Back of Queue (*Q*), ft/ln (95 th percentile)	142.5	1991.1		178.8	842.5	348.9	137.2	738.9		290.8	620.8	
Back of Queue (*Q*), veh/ln (95 th percentile)	5.5	77.8		7.0	33.2	13.7	5.4	28.9		11.4	24.2	
Queue Storage Ratio (*RQ*) (95 th percentile)	0.52	0.00		0.55	0.00	0.00	0.78	0.00		1.16	0.00	
Uniform Delay (*d 1*), s/veh	35.7	48.8		44.2	43.7	23.7	40.4	56.1		69.9	46.2	
Incremental Delay (*d 2*), s/veh	1.2	157.3		21.6	8.9	0.1	0.4	18.8		1.5	4.1	
Initial Queue Delay (*d 3*), s/veh	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Control Delay (*d*), s/veh	36.9	206.1		65.8	52.7	23.8	40.7	74.9		71.4	50.2	
Level of Service (LOS)	D	F		E	D	C	D	E		E	D	
Approach Delay, s/veh / LOS	181.9	F		44.8	D		68.7	E		59.3	E	
Intersection Delay, s/veh / LOS	87.9						F					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	1.93	B	2.12	B	2.31	B	1.94	B
Bicycle LOS Score / LOS	1.99	B	2.37	B	1.40	A	1.99	B

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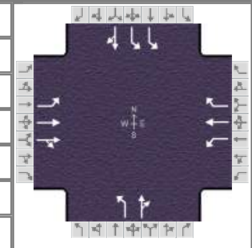
Build 2044 Alternative 2

AM and PM Peak Hours

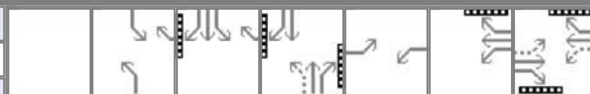
HCS7 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency				Duration, h	1.000
Analyst		Analysis Date	4/30/2021	Area Type	Other
Jurisdiction		Time Period		PHF	1.00
Urban Street		Analysis Year	2021	Analysis Period	1> 7:00
Intersection	Indianola & Broadway	File Name	Build 2044 Indianola AM.xus		
Project Description	2044 Build AM Peak Alternative				

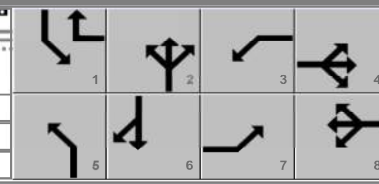


Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	120	530	30	140	740	330	130	290	130	410	290	160

Signal Information			
Cycle, s	117.1	Reference Phase	2
Offset, s	56	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	6.7	6.4	23.6	6.9	0.9	48.8
Yellow	3.0	3.0	4.1	3.0	0.0	4.1
Red	1.4	1.4	1.4	1.1	0.0	1.4



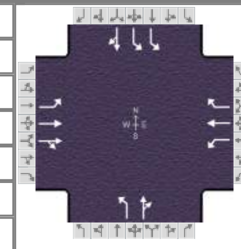
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	7	4	3	8	5	2	1	6
Case Number	1.1	4.0	1.1	3.0	1.1	4.0	2.0	4.0
Phase Duration, s	11.0	54.3	11.9	55.1	11.1	29.1	21.8	39.9
Change Period, ($Y+R_c$), s	4.1	5.5	4.3	5.5	4.4	5.5	4.4	5.5
Max Allow Headway (*MAH*), s	3.1	2.7	3.1	2.7	3.1	2.8	3.1	2.8
Queue Clearance Time (g_s), s	6.6	14.5	7.3	46.7	6.6	20.8	16.1	32.6
Green Extension Time (g_e), s	0.2	2.6	0.2	2.1	0.0	1.1	1.0	1.1
Phase Call Probability	0.98	1.00	0.99	1.00	0.95	1.00	1.00	1.00
Max Out Probability	0.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h	120	282	278	140	740	330	90	290		420	460	
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1753	1856	1819	1767	1870	1543	1795	1754		1716	1720	
Queue Service Time (g_s), s	4.6	12.4	12.5	5.3	44.7	13.7	4.6	18.8		14.1	30.6	
Cycle Queue Clearance Time (g_c), s	4.6	12.4	12.5	5.3	44.7	13.7	4.6	18.8		14.1	30.6	
Green Ratio (*g/C*)	0.48	0.42	0.42	0.49	0.42	0.58	0.26	0.20		0.15	0.29	
Capacity (*c*), veh/h	184	774	759	445	795	893	181	355		514	508	
Volume-to-Capacity Ratio (*X*)	0.651	0.365	0.366	0.314	0.931	0.369	0.497	0.818		0.816	0.906	
Back of Queue (*Q*), ft/ln (95 th percentile)	88	235.3	226.9	98.3	692.3	206.1	92.9	326		234.9	448.3	
Back of Queue (*Q*), veh/ln (95 th percentile)	3.4	9.2	9.1	3.8	27.3	8.1	3.7	12.7		9.2	17.5	
Queue Storage Ratio (*RQ*) (95 th percentile)	0.32	0.00	0.00	0.30	0.00	0.00	0.53	0.00		0.94	0.00	
Uniform Delay (d_1), s/veh	27.5	23.8	23.8	18.0	32.5	13.6	36.5	45.3		48.9	40.2	
Incremental Delay (d_2), s/veh	1.5	0.1	0.1	0.1	2.4	0.1	0.7	1.7		0.8	1.7	
Initial Queue Delay (d_3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Control Delay (*d*), s/veh	29.0	23.9	23.9	18.1	34.9	13.7	37.2	46.9		49.6	41.9	
Level of Service (LOS)	C	C	C	B	C	B	D	D		D	D	
Approach Delay, s/veh / LOS	24.8	C		27.2	C		44.6	D		45.6	D	
Intersection Delay, s/veh / LOS	33.9						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	1.92	B	2.11	B	2.30	B	2.12	B
Bicycle LOS Score / LOS	1.05	A	2.48	B	1.40	A	1.91	B

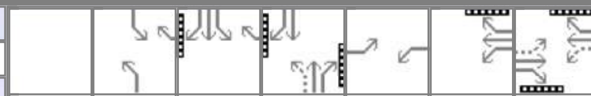
HCS7 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency				Duration, h	1.000
Analyst		Analysis Date	4/30/2021	Area Type	Other
Jurisdiction		Time Period		PHF	1.00
Urban Street		Analysis Year	2021	Analysis Period	1> 7:00
Intersection	Indianola & Broadway	File Name	Build 2044 Indianola PM.xus		
Project Description					

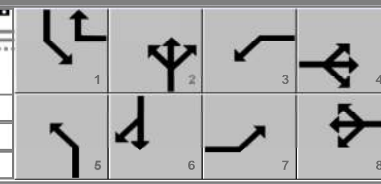


Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h	130	700	80	130	640	370	100	360	90	390	370	150

Signal Information			
Cycle, s	130.2	Reference Phase	2
Offset, s	53	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	7.5	4.9	39.0	7.0	1.2	46.7
Yellow	3.0	3.0	4.1	3.0	0.0	4.1
Red	1.4	1.4	1.4	1.1	0.0	1.4



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	7	4	3	8	5	2	1	6
Case Number	1.1	4.0	1.1	3.0	1.1	4.0	2.0	4.0
Phase Duration, s	11.1	52.2	12.3	53.4	11.9	44.5	21.2	53.8
Change Period, ($Y+R_c$), s	4.1	5.5	4.3	5.5	4.4	5.5	4.4	5.5
Max Allow Headway (MAH), s	3.1	2.8	3.1	2.8	3.1	2.8	3.1	2.8
Queue Clearance Time (g_s), s	8.1	24.8	8.0	44.9	7.5	37.4	15.9	35.0
Green Extension Time (g_e), s	0.0	2.9	0.0	2.8	0.1	1.5	0.9	1.5
Phase Call Probability	0.99	1.00	0.99	1.00	0.98	1.00	1.00	1.00
Max Out Probability	1.00	0.00	1.00	0.04	0.00	0.00	0.00	0.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (v), veh/h	130	397	383	130	640	370	110	497		373	497	
Adjusted Saturation Flow Rate (s), veh/h/ln	1753	1856	1788	1767	1870	1540	1795	1782		1716	1731	
Queue Service Time (g_s), s	6.1	22.8	22.8	6.0	42.9	20.8	5.5	35.4		13.9	33.0	
Cycle Queue Clearance Time (g_c), s	6.1	22.8	22.8	6.0	42.9	20.8	5.5	35.4		13.9	33.0	
Green Ratio (g/C)	0.41	0.36	0.36	0.42	0.37	0.50	0.36	0.30		0.13	0.37	
Capacity (c), veh/h	167	666	641	290	688	771	252	534		443	643	
Volume-to-Capacity Ratio (X)	0.776	0.596	0.597	0.448	0.930	0.480	0.438	0.930		0.841	0.773	
Back of Queue (Q), ft/ln (95 th percentile)	163.5	396.4	375.9	117	754.5	301.2	108.5	548.1		238.2	481.1	
Back of Queue (Q), veh/ln (95 th percentile)	6.3	15.5	15.0	4.6	29.7	11.9	4.3	21.4		9.3	18.8	
Queue Storage Ratio (RQ) (95 th percentile)	0.59	0.00	0.00	0.36	0.00	0.00	0.62	0.00		0.95	0.00	
Uniform Delay (d_1), s/veh	32.5	34.1	34.2	26.1	39.6	21.7	31.6	44.4		55.5	36.2	
Incremental Delay (d_2), s/veh	20.9	0.3	0.3	0.4	14.4	0.2	0.3	5.0		1.1	0.5	
Initial Queue Delay (d_3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Control Delay (d), s/veh	53.4	34.5	34.5	26.5	54.0	21.9	31.9	49.3		56.7	36.7	
Level of Service (LOS)	D	C	C	C	D	C	C	D		E	D	
Approach Delay, s/veh / LOS	37.2	D		40.5	D		46.2	D		45.2	D	
Intersection Delay, s/veh / LOS	41.8						D					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	1.93	B	2.12	B	2.30	B	2.12	B
Bicycle LOS Score / LOS	1.24	A	2.37	B	1.40	A	1.99	B

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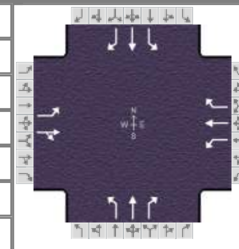
N. Broadway
Build 2029, 2034, and 2039

PM Peak Hours

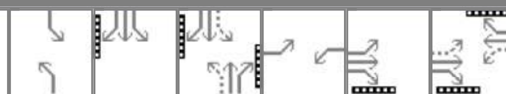
HCS7 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency				Duration, h	1.000
Analyst		Analysis Date	4/30/2021	Area Type	Other
Jurisdiction		Time Period		PHF	1.00
Urban Street		Analysis Year	2044	Analysis Period	1> 4:45
Intersection	Indianola & Broadway	File Name	Build 2034 Broadway PM.xus		
Project Description	2029 Build PM Peak				

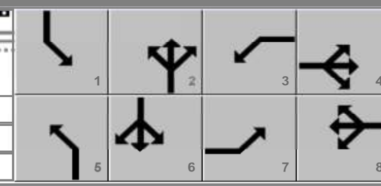


Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	123	640	80	123	588	340	100	353	90	360	363	143

Signal Information			
Cycle, s	130.8	Reference Phase	2
Offset, s	6	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	7.0	11.0	27.7	7.0	0.2	53.8
Yellow	3.0	3.0	4.1	3.0	0.0	4.1
Red	1.4	1.4	1.4	1.3	0.0	1.3



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	7	4	3	8	5	2	1	6
Case Number	1.1	4.0	1.1	3.0	1.1	3.0	1.1	3.0
Phase Duration, s	11.5	59.4	11.3	59.2	11.4	33.2	26.8	48.7
Change Period, (*Y+R* $_c$), s	4.1	5.5	4.3	5.5	4.4	5.5	4.4	5.5
Max Allow Headway (*MAH*), s	3.1	2.8	3.1	2.8	3.1	2.8	3.1	2.8
Queue Clearance Time (g_s), s	7.3	52.5	7.3	37.4	7.7	26.3	22.2	23.4
Green Extension Time (g_e), s	0.2	1.3	0.0	0.0	0.0	1.4	0.2	1.4
Phase Call Probability	0.99	1.00	0.99	1.00	0.97	1.00	1.00	1.00
Max Out Probability	0.00	0.00	1.00	1.00	1.00	0.00	1.00	0.00

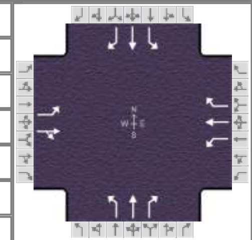
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h	123	720		123	588	340	100	353	90	360	363	143
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1753	1819		1767	1870	1541	1795	1856	1569	1767	1856	1514
Queue Service Time (g_s), s	5.3	50.5		5.3	35.4	21.9	5.7	24.3	6.3	20.2	21.4	9.2
Cycle Queue Clearance Time (g_c), s	5.3	50.5		5.3	35.4	21.9	5.7	24.3	6.3	20.2	21.4	9.2
Green Ratio (*g/C*)	0.47	0.41		0.47	0.41	0.41	0.27	0.21	0.21	0.40	0.33	0.33
Capacity (*c*), veh/h	268	751		158	768	633	308	394	333	385	613	500
Volume-to-Capacity Ratio (*X*)	0.458	0.959		0.778	0.765	0.537	0.325	0.896	0.270	0.934	0.592	0.286
Back of Queue (*Q*), ft/ln (95 th percentile)	101.5	791.8		145.2	593.3	324.1	114.3	436.7	0.7	474.3	380.5	151.9
Back of Queue (*Q*), veh/ln (95 th percentile)	3.9	30.9		5.7	23.4	12.8	4.5	17.1	0.0	18.5	14.9	6.1
Queue Storage Ratio (*RQ*) (95 th percentile)	0.37	0.00		0.45	0.00	0.00	0.65	0.00	0.00	1.90	0.00	0.00
Uniform Delay (d_1), s/veh	25.7	37.4		31.2	33.2	29.2	37.7	50.2	43.2	33.0	36.6	32.5
Incremental Delay (d_2), s/veh	0.5	6.0		22.4	4.3	0.5	0.2	3.1	0.2	39.4	0.8	0.1
Initial Queue Delay (d_3), s/veh	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (*d*), s/veh	26.1	43.5		53.7	37.5	29.7	37.9	53.3	43.3	72.4	37.4	32.6
Level of Service (LOS)	C	D		D	D	C	D	D	D	E	D	C
Approach Delay, s/veh / LOS	40.9	D		36.9	D		48.8	D		51.1	D	
Intersection Delay, s/veh / LOS	43.6						D					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.11	B	2.11	B	2.31	B	1.93	B
Bicycle LOS Score / LOS	1.88	B	2.22	B	1.38	A	1.92	B

 HCS™ Streets Version 7.9 Generated: 9/21/2021 10:54:33 AM

HCS7 Signalized Intersection Results Summary

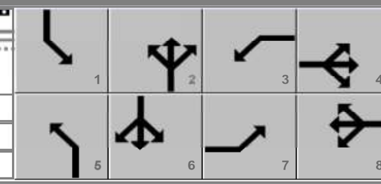
General Information				Intersection Information	
Agency				Duration, h	1.000
Analyst		Analysis Date	4/30/2021	Area Type	Other
Jurisdiction		Time Period		PHF	1.00
Urban Street		Analysis Year	2044	Analysis Period	1> 4:45
Intersection	Indianola & Broadway	File Name	Build 2039 Broadway PM.xus		
Project Description	2034 Build PM Peak				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	125	660	80	125	605	350	100	355	90	370	365	145

Signal Information				
Cycle, s	146.0	Reference Phase	2
Offset, s	6	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	8.2	14.0	31.0	7.0	1.0	60.8
Yellow	3.0	3.0	4.1	3.0	0.0	4.1
Red	1.4	1.4	1.4	1.3	0.0	1.3



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	7	4	3	8	5	2	1	6
Case Number	1.1	4.0	1.1	3.0	1.1	3.0	1.1	3.0
Phase Duration, s	12.3	67.2	11.3	66.2	12.6	36.5	31.1	54.9
Change Period, (*Y+R* $_c$), s	4.1	5.5	4.3	5.5	4.4	5.5	4.4	5.5
Max Allow Headway (*MAH*), s	3.1	2.8	3.1	2.8	3.1	2.8	3.1	2.8
Queue Clearance Time (g_s), s	7.9	60.0	8.0	43.0	8.3	29.3	25.8	25.8
Green Extension Time (g_e), s	0.2	1.2	0.0	0.0	0.0	1.4	0.7	1.4
Phase Call Probability	0.99	1.00	0.99	1.00	0.98	1.00	1.00	1.00
Max Out Probability	0.00	0.05	1.00	1.00	1.00	0.00	0.00	0.00

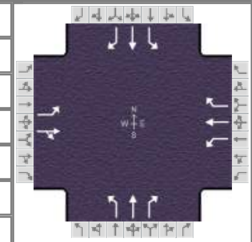
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h	125	740		125	605	350	100	355	90	370	365	145
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1753	1820		1767	1870	1541	1795	1856	1569	1767	1856	1516
Queue Service Time (g_s), s	5.9	58.0		6.0	41.0	25.2	6.3	27.3	7.0	23.8	23.8	10.3
Cycle Queue Clearance Time (g_c), s	5.9	58.0		6.0	41.0	25.2	6.3	27.3	7.0	23.8	23.8	10.3
Green Ratio (*g/C*)	0.47	0.42		0.47	0.42	0.42	0.27	0.21	0.21	0.41	0.34	0.34
Capacity (*c*), veh/h	257	770		143	778	641	317	394	333	398	628	513
Volume-to-Capacity Ratio (*X*)	0.487	0.961		0.874	0.777	0.546	0.315	0.900	0.270	0.929	0.581	0.283
Back of Queue (*Q*), ft/ln (95 th percentile)	116.6	1024.7		210.4	679.9	368.4	128.9	486.6	125.2	412.7	418.4	172.8
Back of Queue (*Q*), veh/ln (95 th percentile)	4.5	40.0		8.2	26.8	14.5	5.1	19.0	5.0	16.1	16.3	6.9
Queue Storage Ratio (*RQ*) (95 th percentile)	0.42	0.00		0.65	0.00	0.00	0.74	0.00	0.00	1.65	0.00	0.00
Uniform Delay (d_1), s/veh	28.8	41.2		35.3	37.0	32.4	41.7	56.3	48.3	38.4	40.0	35.5
Incremental Delay (d_2), s/veh	0.5	25.5		54.3	4.7	0.6	0.2	3.2	0.2	4.6	0.4	0.1
Initial Queue Delay (d_3), s/veh	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (*d*), s/veh	29.4	66.7		89.6	41.7	32.9	41.9	59.5	48.4	43.0	40.4	35.6
Level of Service (LOS)	C	E		F	D	C	D	E	D	D	D	D
Approach Delay, s/veh / LOS	61.3	E		44.4	D		54.5	D		40.7	D	
Intersection Delay, s/veh / LOS	49.4						D					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.12	B	2.12	B	2.31	B	1.94	B
Bicycle LOS Score / LOS	1.91	B	2.27	B	1.39	A	1.94	B

 HCS™ Streets Version 7.9 Generated: 9/21/2021 10:54:42 AM

HCS7 Signalized Intersection Results Summary

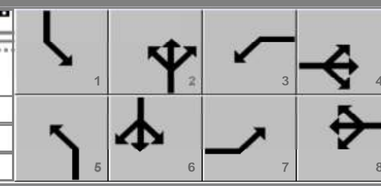
General Information				Intersection Information	
Agency				Duration, h	1.000
Analyst		Analysis Date	4/30/2021	Area Type	Other
Jurisdiction		Time Period		PHF	1.00
Urban Street		Analysis Year	2044	Analysis Period	1> 4:45
Intersection	Indianola & Broadway	File Name	Build 2044 Broadway PM.xus		
Project Description	2039 Build PM Peak				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	128	680	80	128	623	360	100	358	90	380	368	148

Signal Information				
Cycle, s	154.9	Reference Phase	2
Offset, s	6	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	8.8	16.5	32.1	7.0	1.4	65.1
Yellow	3.0	3.0	4.1	3.0	0.0	4.1
Red	1.4	1.4	1.4	1.3	0.0	1.3



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	7	4	3	8	5	2	1	6
Case Number	1.1	4.0	1.1	3.0	1.1	3.0	1.1	3.0
Phase Duration, s	12.7	71.9	11.3	70.5	13.2	37.6	34.1	58.5
Change Period, (*Y+R c*), s	4.1	5.5	4.3	5.5	4.4	5.5	4.4	5.5
Max Allow Headway (*MAH*), s	3.1	2.8	3.1	2.8	3.1	2.8	3.1	2.8
Queue Clearance Time (*g s*), s	8.4	65.4	8.7	46.9	8.7	31.4	29.1	27.2
Green Extension Time (*g e*), s	0.2	0.9	0.0	0.0	0.2	0.7	0.6	0.0
Phase Call Probability	1.00	1.00	1.00	1.00	0.99	1.00	1.00	1.00
Max Out Probability	0.00	0.54	1.00	1.00	0.00	0.00	0.00	1.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h	128	760		128	623	360	100	358	90	380	368	148
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1753	1821		1767	1870	1541	1795	1856	1569	1767	1856	1517
Queue Service Time (*g s*), s	6.4	63.4		6.7	44.9	27.4	6.7	29.4	7.5	27.1	25.2	11.0
Cycle Queue Clearance Time (*g c*), s	6.4	63.4		6.7	44.9	27.4	6.7	29.4	7.5	27.1	25.2	11.0
Green Ratio (*g/C*)	0.48	0.43		0.47	0.42	0.42	0.26	0.21	0.21	0.41	0.34	0.34
Capacity (*c*), veh/h	246	781		131	785	647	318	384	325	404	635	519
Volume-to-Capacity Ratio (*X*)	0.520	0.974		0.978	0.794	0.557	0.314	0.931	0.277	0.942	0.580	0.285
Back of Queue (*Q*), ft/ln (95 th percentile)	126.7	1188.2		315.3	742.8	398.3	137.8	524.5	133.9	541.1	444	186.8
Back of Queue (*Q*), veh/ln (95 th percentile)	4.9	46.4		12.3	29.2	15.7	5.5	20.5	5.4	21.1	17.3	7.5
Queue Storage Ratio (*RQ*) (95 th percentile)	0.46	0.00		0.97	0.00	0.00	0.79	0.00	0.00	2.16	0.00	0.00
Uniform Delay (*d 1*), s/veh	30.8	43.4		39.4	39.2	34.1	44.6	60.4	51.7	43.7	41.8	37.2
Incremental Delay (*d 2*), s/veh	0.6	39.1		134.2	5.4	0.6	0.2	4.9	0.2	27.1	0.9	0.1
Initial Queue Delay (*d 3*), s/veh	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (*d*), s/veh	31.4	82.5		173.6	44.6	34.7	44.8	65.3	51.9	70.9	42.7	37.3
Level of Service (LOS)	C	F		F	D	C	D	E	D	E	D	D
Approach Delay, s/veh / LOS	75.1	E		56.2	E		59.3	E		53.8	D	
Intersection Delay, s/veh / LOS	61.0						E					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.12	B	2.12	B	2.31	B	1.94	B
Bicycle LOS Score / LOS	1.95	B	2.32	B	1.39	A	1.97	B

Appendix C:

Turn Lane Calculations

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Indianola & Hudson

Turn Lane Calculations

Length of Turn Lane Calculation Worksheet
Based on ODOT L&D Manual, Release Date 7/1/2018

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Project Name:	Indianola Ave Road Diet		Analysis Date:	6/28/2021
Intersection:	Indianola Ave & Hudson Ave		Movement:	NBL
				2024 AM Peak Build
Design Speed =	35	(Speed in mph)		
Turn Demand Volume =	Low	(High or Low)		
Type of Traffic Control =	Signalized	(Signalized, Unsignalized Stopped Crossroad, or Unsignalized Through Road)		
Condition =	A	(A, B, or C obtained from Table 401-9E)		

BASIS FOR COMPUTING LENGTH OF TURN LANES

401-9E
REFERENCE SECTIONS 401.6.1, 401.6.3

TYPE OF TRAFFIC CONTROL	DESIGN SPEED (mph) 30 - 35		40 - 45		50 - 60	
	TURN DEMAND VOLUME					
	HIGH	LOW[1]	HIGH	LOW[1]	HIGH	LOW[1]
SIGNALIZED	A	A	B or C[2]	B or C[2]	B or C[2]	B or C[2]
UNSIGNALIZED STOPPED CROSSROAD	A	A	A	A	A	A
UNSIGNALIZED THROUGH ROAD	A	A	C	B	B or C[2]	B

[1] LOW is considered 10% or less of approach traffic volume.
[2] Whichever is greater

Turn Demand Volume (1)=	0
Approach Volume =	270
Turn / Approach =	0%

(1) PM Peak (highest volume).

Note: Based on L&D Manual guidance, left turn lane recommended to not exceed 600 feet (storage).

Storage Length at Intersections: 401-10E

Average No. of Vehicles/Cycle	Required Length		Average No. of Vehicles/Cycle	Required Length
1	50	ft	17	600 ft
2	100	ft	18	625 ft
3	150	ft	19	650 ft
4	175	ft	20	675 ft
5	200	ft	21	725 ft
6	250	ft	22	750 ft
7	275	ft	23	775 ft
8	325	ft	24	800 ft
9	350	ft	25	825 ft
10	375	ft	30	975 ft
11	400	ft	35	1125 ft
12	450	ft	40	1250 ft
13	475	ft	45	1400 ft
14	500	ft	50	1550 ft
15	525	ft	55	1700 ft
16	550	ft	60	1850 ft

Left Turn Storage Lane Length Calculation

DHV (Turning Lane) =	0	If Cycles are unknown, assume:	Unsignalized or 2 Phase - 60 Cycles/Hr
Cycle Length =	95		3 Phase - 40 Cycles/Hr
Cycles per Hour =	38		4 Phase - 30 Cycles/Hr
Average Vehicles per Cycle=	1	Required Turn Lane Storage Length =	50 ft (from Figure 401-10)

Adjacent Through Lane Storage Calculation

Adjacent Lane(s) Volume =	380	Number of Lanes	1
Average Vehicles per Cycle=	10	Required Length (per lane) =	375 ft
Required Length (total) =	375	ft (from Figure 401-10)	

Condition A **Storage Only**
(Storage Length, Figure 401-10)
Length = 50 ft (diverging taper) + 50 ft **Length = 100 ft**

Condition B **High Speed Deceleration Only**

Design Speed	Length (including 50' Diverging Taper)	
40	125	ft
45	175	ft
50	225	ft
55	285	ft
60	345	ft

Length = #N/A ft

Condition C **Moderate Speed Deceleration and Storage**

Design Speed	Length (including 50' Diverging Taper)					(Storage Length, Figure 401-10)
40	165	ft	115	ft	+	50 ft
45	175	ft	125	ft	+	50 ft
50	195	ft	145	ft	+	50 ft
55	215	ft	165	ft	+	50 ft
60	235	ft	185	ft	+	50 ft

Length = #N/A ft

Minimum Required Storage Lane Length (including 50' diverging taper) Per Lane = 100 feet
Perferred Storage Lane Length (including 50' diverging taper) Per Lane = 425 feet

Note: Minimum required storage lane length reflects required storage of vehicles calculated using volume and cycle length. Preferred storage length varies from minimum storage lane length when adjacent through lane queue is projected to be greater than the minimum required storage length.

Length of Turn Lane Calculation Worksheet
Based on ODOT L&D Manual, Release Date 7/1/2018

Michael Baker INTERNATIONAL

Project Name:	Indianola Ave Road Diet	Analysis Date:	6/28/2021
Intersection:	Indianola Ave & Hudson Ave	Movement:	SBL
			2024 AM Peak Build
Design Speed =	35	(Speed in mph)	
Turn Demand Volume =	High	(High or Low)	
Type of Traffic Control =	Signalized	(Signalized, Unsignalized Stopped Crossroad, or Unsignalized Through Road)	
Condition =	A	(A, B, or C obtained from Table 401-9E)	

BASIS FOR COMPUTING LENGTH OF TURN LANES

401-9E
REFERENCE SECTIONS 401.6.1, 401.6.3

TYPE OF TRAFFIC CONTROL	DESIGN SPEED (mph)					
	30 - 35		40 - 45		50 - 60	
	TURN DEMAND VOLUME					
	HIGH	LOW[1]	HIGH	LOW[1]	HIGH	LOW[1]
SIGNALIZED	A	A	B or C[2]	B or C[2]	B or C[2]	B or C[2]
UNSIGNALIZED STOPPED CROSSROAD	A	A	A	A	A	A
UNSIGNALIZED THROUGH ROAD	A	A	C	B	B or C[2]	B

1 LOW is considered 10% or less of approach traffic volume.
2 Whichever is greater

Turn Demand Volume (1)=	340
Approach Volume =	530
Turn / Approach =	64%
(1) PM Peak (highest volume).	

Note: Based on L&D Manual guidance, left turn lane recommended to not exceed 600 feet (storage).

Storage Length at Intersections: 401-10E

Average No. of Vehicles/Cycle	Required Length	Average No. of Vehicles/Cycle	Required Length
1	50 ft	17	600 ft
2	100 ft	18	625 ft
3	150 ft	19	650 ft
4	175 ft	20	675 ft
5	200 ft	21	725 ft
6	250 ft	22	750 ft
7	275 ft	23	775 ft
8	325 ft	24	800 ft
9	350 ft	25	825 ft
10	375 ft	30	975 ft
11	400 ft	35	1125 ft
12	450 ft	40	1250 ft
13	475 ft	45	1400 ft
14	500 ft	50	1550 ft
15	525 ft	55	1700 ft
16	550 ft	60	1850 ft

Left Turn Storage Lane Length Calculation

DHV (Turning Lane) =	340	If Cycles are unknown, assume:	Unsignalized or 2 Phase - 60 Cycles/Hr
Cycle Length =	95		3 Phase - 40 Cycles/Hr
Cycles per Hour =	38		4 Phase - 30 Cycles/Hr
Average Vehicles per Cycle=	9	Required Turn Lane Storage Length =	350 ft (from Figure 401-10)

Adjacent Through Lane Storage Calculation

Adjacent Lane(s) Volume =	370	Number of Lanes	1
Average Vehicles per Cycle=	10	Required Length (per lane) =	375 ft
Required Length (total) =	375 ft (from Figure 401-10)		

Condition A **Storage Only**
Length = 50 ft (diverging taper) + 350 ft (Storage Length, Figure 401-10) **Length = 400 ft**

Condition B **High Speed Deceleration Only**

Design Speed	Length (including 50' Diverging Taper)
40	125 ft
45	175 ft
50	225 ft
55	285 ft
60	345 ft

Length = #N/A ft

Condition C **Moderate Speed Deceleration and Storage**

Design Speed	Length (including 50' Diverging Taper)			(Storage Length, Figure 401-10)
40	465 ft	115 ft	+	350 ft
45	475 ft	125 ft	+	350 ft
50	495 ft	145 ft	+	350 ft
55	515 ft	165 ft	+	350 ft
60	535 ft	185 ft	+	350 ft

Length = #N/A ft

Minimum Required Storage Lane Length (including 50' diverging taper) Per Lane = 400 feet
Perferred Storage Lane Length (including 50' diverging taper) Per Lane = 400 feet

Note: Minimum required storage lane length reflects required storage of vehicles calculated using volume and cycle length. Preferred storage length varies from minimum storage lane length when adjacent through lane queue is projected to be greater than the minimum required storage length.

Length of Turn Lane Calculation Worksheet
Based on ODOT L&D Manual, Release Date 7/1/2018

Michael Baker INTERNATIONAL

Project Name:	Indianola Ave Road Diet		Analysis Date:	6/28/2021
Intersection:	Indianola Ave & Hudson Ave		Movement:	EBL
				2024 AM Peak Build
Design Speed =	35	(Speed in mph)		
Turn Demand Volume =	Low	(High or Low)		
Type of Traffic Control =	Signalized	(Signalized, Unsignalized Stopped Crossroad, or Unsignalized Through Road)		
Condition =	A	(A, B, or C obtained from Table 401-9E)		

BASIS FOR COMPUTING LENGTH OF TURN LANES	401-9E REFERENCE SECTIONS 401.6.1, 401.6.3					
TYPE OF TRAFFIC CONTROL	DESIGN SPEED (mph)					
	30 - 35		40 - 45		50 - 60	
	TURN DEMAND VOLUME					
	HIGH	LOW[1]	HIGH	LOW[1]	HIGH	LOW[1]
SIGNALIZED	A	A	B or C[2]	B or C[2]	B or C[2]	B or C[2]
UNSIGNALIZED STOPPED CROSSROAD	A	A	A	A	A	A
UNSIGNALIZED THROUGH ROAD	A	A	C	B	B or C[2]	B

[1] LOW is considered 10% or less of approach traffic volume.
[2] Whichever is greater

Turn Demand Volume (1)=	0
Approach Volume =	500
Turn / Approach =	0%

(1) PM Peak (highest volume).

Note: Based on L&D Manual guidance, left turn lane recommended to not exceed 600 feet (storage).

Storage Length at Intersections: 401-10E

Average No. of Vehicles/Cycle	Required Length	Average No. of Vehicles/Cycle	Required Length
1	50 ft	17	600 ft
2	100 ft	18	625 ft
3	150 ft	19	650 ft
4	175 ft	20	675 ft
5	200 ft	21	725 ft
6	250 ft	22	750 ft
7	275 ft	23	775 ft
8	325 ft	24	800 ft
9	350 ft	25	825 ft
10	375 ft	30	975 ft
11	400 ft	35	1125 ft
12	450 ft	40	1250 ft
13	475 ft	45	1400 ft
14	500 ft	50	1550 ft
15	525 ft	55	1700 ft
16	550 ft	60	1850 ft

Left Turn Storage Lane Length Calculation

DHV (Turning Lane) =	0	If Cycles are unknown, assume:	Unsignalized or 2 Phase - 60 Cycles/Hr
Cycle Length =	95		3 Phase - 40 Cycles/Hr
Cycles per Hour =	38		4 Phase - 30 Cycles/Hr
Average Vehicles per Cycle=	1	Required Turn Lane Storage Length =	50 ft (from Figure 401-10)

Adjacent Through Lane Storage Calculation

Adjacent Lane(s) Volume =	380	Number of Lanes	1
Average Vehicles per Cycle=	10	Required Length (per lane) =	375 ft
Required Length (total) =	375 ft (from Figure 401-10)		

Condition A **Storage Only**
Length = 50 ft (diverging taper) + 50 ft (Storage Length, Figure 401-10) **Length = 100 ft**

Condition B **High Speed Deceleration Only**

Design Speed	Length (including 50' Diverging Taper)
40	125 ft
45	175 ft
50	225 ft
55	285 ft
60	345 ft

Length = #N/A ft

Condition C **Moderate Speed Deceleration and Storage**

Design Speed	Length (including 50' Diverging Taper)			(Storage Length, Figure 401-10)
40	165 ft	115 ft	+	50 ft
45	175 ft	125 ft	+	50 ft
50	195 ft	145 ft	+	50 ft
55	215 ft	165 ft	+	50 ft
60	235 ft	185 ft	+	50 ft

Length = #N/A ft

Minimum Required Storage Lane Length (including 50' diverging taper) Per Lane = 100 feet
Perferred Storage Lane Length (including 50' diverging taper) Per Lane = 425 feet

Note: Minimum required storage lane length reflects required storage of vehicles calculated using volume and cycle length. Preferred storage length varies from minimum storage lane length when adjacent through lane queue is projected to be greater than the minimum required storage length.

Length of Turn Lane Calculation Worksheet
Based on ODOT L&D Manual, Release Date 7/1/2018

Michael Baker INTERNATIONAL

Project Name:	Indianola Ave Road Diet	Analysis Date:	6/28/2021
Intersection:	Indianola Ave & Hudson Ave	Movement:	WBL
			2024 AM Peak Build
Design Speed =	35	(Speed in mph)	
Turn Demand Volume =	Low	(High or Low)	
Type of Traffic Control =	Signalized	(Signalized, Unsignalized Stopped Crossroad, or Unsignalized Through Road)	
Condition =	A	(A, B, or C obtained from Table 401-9E)	

BASIS FOR COMPUTING LENGTH OF TURN LANES	401-9E REFERENCE SECTIONS 401.6.1, 401.6.3

TYPE OF TRAFFIC CONTROL	DESIGN SPEED (mph)					
	30 - 35		40 - 45		50 - 60	
	TURN DEMAND VOLUME					
	HIGH	LOW[1]	HIGH	LOW[1]	HIGH	LOW[1]
SIGNALIZED	A	A	B or C[2]	B or C[2]	B or C[2]	B or C[2]
UNSIGNALIZED STOPPED CROSSROAD	A	A	A	A	A	A
UNSIGNALIZED THROUGH ROAD	A	A	C	B	B or C[2]	B

[1] LOW is considered 10% or less of approach traffic volume.
[2] Whichever is greater

Turn Demand Volume (1)=	0
Approach Volume =	760
Turn / Approach =	0%
(1) PM Peak (highest volume).	

Note: Based on L&D Manual guidance, left turn lane recommended to not exceed 600 feet (storage).

Storage Length at Intersections: 401-10E

Average No. of Vehicles/Cycle	Required Length		Average No. of Vehicles/Cycle	Required Length
1	50	ft	17	600 ft
2	100	ft	18	625 ft
3	150	ft	19	650 ft
4	175	ft	20	675 ft
5	200	ft	21	725 ft
6	250	ft	22	750 ft
7	275	ft	23	775 ft
8	325	ft	24	800 ft
9	350	ft	25	825 ft
10	375	ft	30	975 ft
11	400	ft	35	1125 ft
12	450	ft	40	1250 ft
13	475	ft	45	1400 ft
14	500	ft	50	1550 ft
15	525	ft	55	1700 ft
16	550	ft	60	1850 ft

Left Turn Storage Lane Length Calculation

DHV (Turning Lane) =	0	If Cycles are unknown, assume: Unsignalized or 2 Phase - 60 Cycles/Hr
Cycle Length =	95	3 Phase - 40 Cycles/Hr
Cycles per Hour =	38	4 Phase - 30 Cycles/Hr
Average Vehicles per Cycle=	1	Required Turn Lane Storage Length = 50 ft (from Figure 401-10)

Adjacent Through Lane Storage Calculation

Adjacent Lane(s) Volume =	370	Number of Lanes 1
Average Vehicles per Cycle=	10	Required Length (per lane) = 375 ft
Required Length (total) =	375	ft (from Figure 401-10)

Condition A **Storage Only** (Storage Length, Figure 401-10)
Length = 50 ft (diverging taper) + 50 ft **Length = 100 ft**

Condition B **High Speed Deceleration Only**

Design Speed	Length (including 50' Diverging Taper)	
40	125	ft
45	175	ft
50	225	ft
55	285	ft
60	345	ft

Length = #N/A ft

Condition C **Moderate Speed Deceleration and Storage**

Design Speed	Length (including 50' Diverging Taper)					(Storage Length, Figure 401-10)
40	165	ft	115	ft	+	50 ft
45	175	ft	125	ft	+	50 ft
50	195	ft	145	ft	+	50 ft
55	215	ft	165	ft	+	50 ft
60	235	ft	185	ft	+	50 ft

Length = #N/A ft

Minimum Required Storage Lane Length (including 50' diverging taper) Per Lane = 100 feet
Perferred Storage Lane Length (including 50' diverging taper) Per Lane = 425 feet

Note: Minimum required storage lane length reflects required storage of vehicles calculated using volume and cycle length. Preferred storage length varies from minimum storage lane length when adjacent through lane queue is projected to be greater than the minimum required storage length.

Length of Turn Lane Calculation Worksheet

Based on ODOT L&D Manual, Release Date 7/1/2018

Michael Baker INTERNATIONAL

Project Name:	Indianola Ave Road Diet	Analysis Date:	6/28/2021
Intersection:	Indianola Ave & Hudson Ave	Movement:	NBL
			2024 PM Peak Build
Design Speed =	35	(Speed in mph)	
Turn Demand Volume =	Low	(High or Low)	
Type of Traffic Control =	Signalized	(Signalized, Unsignalized Stopped Crossroad, or Unsignalized Through Road)	
Condition =	A	(A, B, or C obtained from Table 401-9E)	

BASIS FOR COMPUTING LENGTH OF TURN LANES

401-9E

REFERENCE SECTIONS 401.6.1, 401.6.3

TYPE OF TRAFFIC CONTROL	DESIGN SPEED (mph)					
	30 - 35		40 - 45		50 - 60	
	TURN DEMAND VOLUME					
	HIGH	LOW[1]	HIGH	LOW[1]	HIGH	LOW[1]
SIGNALIZED	A	A	B or C[2]	B or C[2]	B or C[2]	B or C[2]
UNSIGNALIZED STOPPED CROSSROAD	A	A	A	A	A	A
UNSIGNALIZED THROUGH ROAD	A	A	C	B	B or C[2]	B

[1] LOW is considered 10% or less of approach traffic volume.

[2] Whichever is greater

Turn Demand Volume (1)=	0
Approach Volume =	390
Turn / Approach =	0%
(1) PM Peak (highest volume).	

Note: Based on L&D Manual guidance, left turn lane recommended to not exceed 600 feet (storage).

Storage Length at Intersections: 401-10E

Average No. of Vehicles/Cycle	Required Length		Average No. of Vehicles/Cycle	Required Length
1	50	**ft**	17	600 ft
2	100	ft	18	625 ft
3	150	ft	19	650 ft
4	175	ft	20	675 ft
5	200	ft	21	725 ft
6	250	ft	22	750 ft
7	275	ft	23	775 ft
8	325	ft	24	800 ft
9	350	ft	25	825 ft
10	375	ft	30	975 ft
11	400	ft	35	1125 ft
12	450	ft	40	1250 ft
13	475	ft	45	1400 ft
14	500	ft	50	1550 ft
15	525	ft	55	1700 ft
16	550	ft	60	1850 ft

Left Turn Storage Lane Length Calculation

DHV (Turning Lane) =	0	If Cycles are unknown, assume:	Unsignalized or 2 Phase - 60 Cycles/Hr
Cycle Length =	70		3 Phase - 40 Cycles/Hr
Cycles per Hour =	51		4 Phase - 30 Cycles/Hr
Average Vehicles per Cycle=	1	Required Turn Lane Storage Length =	50 ft (from Figure 401-10)

Adjacent Through Lane Storage Calculation

Adjacent Lane(s) Volume =	500	Number of Lanes	1
Average Vehicles per Cycle=	10	Required Length (per lane) =	375 ft
Required Length (total) =	375 ft (from Figure 401-10)		

Condition A **Storage Only** (Storage Length, Figure 401-10)

Length = 50 ft (diverging taper) + 50 ft **Length = 100 ft**

Condition B **High Speed Deceleration Only**

Design Speed	Length (including 50' Diverging Taper)	
40	125	ft
45	175	ft
50	225	ft
55	285	ft
60	345	ft

Length = #N/A ft

Condition C **Moderate Speed Deceleration and Storage**

Design Speed	Length (including 50' Diverging Taper)					(Storage Length, Figure 401-10)
40	165	ft	115	ft	+	50 ft
45	175	ft	125	ft	+	50 ft
50	195	ft	145	ft	+	50 ft
55	215	ft	165	ft	+	50 ft
60	235	ft	185	ft	+	50 ft

Length = #N/A ft

Minimum Required Storage Lane Length (including 50' diverging taper) Per Lane = 100 feet

Perferred Storage Lane Length (including 50' diverging taper) Per Lane = 425 feet

Note: Minimum required storage lane length reflects required storage of vehicles calculated using volume and cycle length. Preferred storage length varies from minimum storage lane length when adjacent through lane queue is projected to be greater than the minimum required storage length.

Length of Turn Lane Calculation Worksheet
Based on ODOT L&D Manual, Release Date 7/1/2018

Michael Baker INTERNATIONAL

Project Name:	Indianola Ave Road Diet	Analysis Date:	6/28/2021
Intersection:	Indianola Ave & Hudson Ave	Movement:	SBL
			2024 PM Peak Build
Design Speed =	35	(Speed in mph)	
Turn Demand Volume =	High	(High or Low)	
Type of Traffic Control =	Signalized	(Signalized, Unsignalized Stopped Crossroad, or Unsignalized Through Road)	
Condition =	A	(A, B, or C obtained from Table 401-9E)	

BASIS FOR COMPUTING LENGTH OF TURN LANES — 401-9E REFERENCE SECTIONS 401.6.1, 401.6.3

TYPE OF TRAFFIC CONTROL	DESIGN SPEED (mph) 30 - 35		40 - 45		50 - 60	
	TURN DEMAND VOLUME					
	HIGH	LOW[1]	HIGH	LOW[1]	HIGH	LOW[1]
SIGNALIZED	A	A	B or C[2]	B or C[2]	B or C[2]	B or C[2]
UNSIGNALIZED STOPPED CROSSROAD	A	A	A	A	A	A
UNSIGNALIZED THROUGH ROAD	A	A	C	B	B or C[2]	B

1 LOW is considered 10% or less of approach traffic volume.
2 Whichever is greater

Turn Demand Volume (1)=	300
Approach Volume =	470
Turn / Approach =	64%
(1) PM Peak (highest volume).	

Note: Based on L&D Manual guidance, left turn lane recommended to not exceed 600 feet (storage).

Storage Length at Intersections: 401-10E

Average No. of Vehicles/Cycle	Required Length		Average No. of Vehicles/Cycle	Required Length
1	50	ft	17	600 ft
2	100	ft	18	625 ft
3	150	ft	19	650 ft
4	175	ft	20	675 ft
5	200	ft	21	725 ft
6	250	ft	22	750 ft
7	275	ft	23	775 ft
8	325	ft	24	800 ft
9	350	ft	25	825 ft
10	375	ft	30	975 ft
11	400	ft	35	1125 ft
12	450	ft	40	1250 ft
13	475	ft	45	1400 ft
14	500	ft	50	1550 ft
15	525	ft	55	1700 ft
16	550	ft	60	1850 ft

Left Turn Storage Lane Length Calculation

DHV (Turning Lane) =	300	If Cycles are unknown, assume:	Unsignalized or 2 Phase - 60 Cycles/Hr
Cycle Length =	70		3 Phase - 40 Cycles/Hr
Cycles per Hour =	51		4 Phase - 30 Cycles/Hr
Average Vehicles per Cycle=	6	Required Turn Lane Storage Length =	250 ft (from Figure 401-10)

Adjacent Through Lane Storage Calculation

Adjacent Lane(s) Volume =	430	Number of Lanes	1
Average Vehicles per Cycle=	8	Required Length (per lane) =	325 ft
Required Length (total) =	325 ft (from Figure 401-10)		

Condition A **Storage Only**
(Storage Length, Figure 401-10)
Length = 50 ft (diverging taper) + 250 ft **Length = 300 ft**

Condition B **High Speed Deceleration Only**

Design Speed	Length (including 50' Diverging Taper)
40	125 ft
45	175 ft
50	225 ft
55	285 ft
60	345 ft

Length = #N/A ft

Condition C **Moderate Speed Deceleration and Storage**

Design Speed	Length (including 50' Diverging Taper)			(Storage Length, Figure 401-10)
40	365 ft	115 ft	+	250 ft
45	375 ft	125 ft	+	250 ft
50	395 ft	145 ft	+	250 ft
55	415 ft	165 ft	+	250 ft
60	435 ft	185 ft	+	250 ft

Length = #N/A ft

Minimum Required Storage Lane Length (including 50' diverging taper) Per Lane = 300 feet
Perferred Storage Lane Length (including 50' diverging taper) Per Lane = 375 feet

Note: Minimum required storage lane length reflects required storage of vehicles calculated using volume and cycle length. Preferred storage length varies from minimum storage lane length when adjacent through lane queue is projected to be greater than the minimum required storage length.

Length of Turn Lane Calculation Worksheet

Based on ODOT L&D Manual, Release Date 7/1/2018

Michael Baker INTERNATIONAL

Project Name:	Indianola Ave Road Diet	Analysis Date:	6/28/2021
Intersection:	Indianola Ave & Hudson Ave	Movement:	EBL
			2024 PM Peak Build
Design Speed =	35	(Speed in mph)	
Turn Demand Volume =	Low	(High or Low)	
Type of Traffic Control =	Signalized	(Signalized, Unsignalized Stopped Crossroad, or Unsignalized Through Road)	
Condition =	A	(A, B, or C obtained from Table 401-9E)	

BASIS FOR COMPUTING LENGTH OF TURN LANES	**401-9E REFERENCE SECTIONS 401.6.1, 401.6.3**

TYPE OF TRAFFIC CONTROL	DESIGN SPEED (mph)					
	30 - 35		40 - 45		50 - 60	
	TURN DEMAND VOLUME					
	HIGH	LOW[1]	HIGH	LOW[1]	HIGH	LOW[1]
SIGNALIZED	A	A	B or C[2]	B or C[2]	B or C[2]	B or C[2]
UNSIGNALIZED STOPPED CROSSROAD	A	A	A	A	A	A
UNSIGNALIZED THROUGH ROAD	A	A	C	B	B or C[2]	B

1 LOW is considered 10% or less of approach traffic volume.
2 Whichever is greater

Turn Demand Volume (1)=	0
Approach Volume =	770
Turn / Approach =	0%
(1) PM Peak (highest volume).	

Note: Based on L&D Manual guidance, left turn lane recommended to not exceed 600 feet (storage).

Storage Length at Intersections: 401-10E

Average No. of Vehicles/Cycle	Required Length	Average No. of Vehicles/Cycle	Required Length
1	50 **ft**	17	600 ft
2	100 ft	18	625 ft
3	150 ft	19	650 ft
4	175 ft	20	675 ft
5	200 ft	21	725 ft
6	250 ft	22	750 ft
7	275 ft	23	775 ft
8	325 ft	24	800 ft
9	350 ft	25	825 ft
10	375 ft	30	975 ft
11	400 ft	35	1125 ft
12	450 ft	40	1250 ft
13	475 ft	45	1400 ft
14	500 ft	50	1550 ft
15	525 ft	55	1700 ft
16	550 ft	60	1850 ft

Left Turn Storage Lane Length Calculation

DHV (Turning Lane) =	0	If Cycles are unknown, assume:	Unsignalized or 2 Phase - 60 Cycles/Hr
Cycle Length =	70		3 Phase - 40 Cycles/Hr
Cycles per Hour =	51		4 Phase - 30 Cycles/Hr
Average Vehicles per Cycle=	1	Required Turn Lane Storage Length =	50 ft (from Figure 401-10)

Adjacent Through Lane Storage Calculation

Adjacent Lane(s) Volume =	500	Number of Lanes	1
Average Vehicles per Cycle=	10	Required Length (per lane) =	375 ft
Required Length (total) =	375 ft (from Figure 401-10)		

Condition A **Storage Only** (Storage Length, Figure 401-10)

Length = 50 ft (diverging taper) + 50 ft **Length = 100 ft**

Condition B **High Speed Deceleration Only**

Design Speed	Length (including 50' Diverging Taper)
40	125 ft
45	175 ft
50	225 ft
55	285 ft
60	345 ft

Length = #N/A ft

Condition C **Moderate Speed Deceleration and Storage**

Design Speed	Length (including 50' Diverging Taper)			(Storage Length, Figure 401-10)
40	165 ft	115 ft	+	50 ft
45	175 ft	125 ft	+	50 ft
50	195 ft	145 ft	+	50 ft
55	215 ft	165 ft	+	50 ft
60	235 ft	185 ft	+	50 ft

Length = #N/A ft

Minimum Required Storage Lane Length (including 50' diverging taper) Per Lane = 100 feet

Perferred Storage Lane Length (including 50' diverging taper) Per Lane = 425 feet

Note: Minimum required storage lane length reflects required storage of vehicles calculated using volume and cycle length. Preferred storage length varies from minimum storage lane length when adjacent through lane queue is projected to be greater than the minimum required storage length.

Length of Turn Lane Calculation Worksheet

Based on ODOT L&D Manual, Release Date 7/1/2018

Michael Baker INTERNATIONAL

Project Name: Indianola Ave Road Diet

Intersection: Indianola Ave & Hudson Ave

Analysis Date: 6/28/2021

Movement: WBL

2024 PM Peak Build

Design Speed = 35 (Speed in mph)

Turn Demand Volume = Low (High or Low)

Type of Traffic Control = Signalized (Signalized, Unsignalized Stopped Crossroad, or Unsignalized Through Road)

Condition = A (A, B, or C obtained from Table 401-9E)

BASIS FOR COMPUTING LENGTH OF TURN LANES — **401-9E REFERENCE SECTIONS 401.6.1, 401.6.3**

TYPE OF TRAFFIC CONTROL	DESIGN SPEED (mph) 30 - 35		40 - 45		50 - 60	
	TURN DEMAND VOLUME					
	HIGH	LOW[1]	HIGH	LOW[1]	HIGH	LOW[1]
SIGNALIZED	A	A	B or C[2]	B or C[2]	B or C[2]	B or C[2]
UNSIGNALIZED STOPPED CROSSROAD	A	A	A	A	A	A
UNSIGNALIZED THROUGH ROAD	A	A	C	B	B or C[2]	B

[1] LOW is considered 10% or less of approach traffic volume.

[2] Whichever is greater

Turn Demand Volume (1)=	0
Approach Volume =	1,020
Turn / Approach =	0%
(1) PM Peak (highest volume).	

Note: Based on L&D Manual guidance, left turn lane recommended to not exceed 600 feet (storage).

Storage Length at Intersections: 401-10E

Average No. of Vehicles/Cycle	Required Length	Average No. of Vehicles/Cycle	Required Length
1	50 ft	17	600 ft
2	100 ft	18	625 ft
3	150 ft	19	650 ft
4	175 ft	20	675 ft
5	200 ft	21	725 ft
6	250 ft	22	750 ft
7	275 ft	23	775 ft
8	325 ft	24	800 ft
9	350 ft	25	825 ft
10	375 ft	30	975 ft
11	400 ft	35	1125 ft
12	450 ft	40	1250 ft
13	475 ft	45	1400 ft
14	500 ft	50	1550 ft
15	525 ft	55	1700 ft
16	550 ft	60	1850 ft

Left Turn Storage Lane Length Calculation

DHV (Turning Lane) =	0
Cycle Length =	70
Cycles per Hour =	51
Average Vehicles per Cycle=	1

If Cycles are unknown, assume: Unsignalized or 2 Phase - 60 Cycles/Hr; 3 Phase - 40 Cycles/Hr; 4 Phase - 30 Cycles/Hr

Required Turn Lane Storage Length = 50 ft (from Figure 401-10)

Adjacent Through Lane Storage Calculation

Adjacent Lane(s) Volume =	430
Average Vehicles per Cycle=	8
Required Length (total) =	325 ft (from Figure 401-10)

Number of Lanes = 1

Required Length (per lane) = 325 ft

Condition A **Storage Only**

Length = 50 ft (diverging taper) + (Storage Length, Figure 401-10) 50 ft — **Length = 100 ft**

Condition B **High Speed Deceleration Only**

Design Speed	Length (including 50' Diverging Taper)
40	125 ft
45	175 ft
50	225 ft
55	285 ft
60	345 ft

Length = #N/A ft

Condition C **Moderate Speed Deceleration and Storage**

Design Speed	Length (including 50' Diverging Taper)			(Storage Length, Figure 401-10)
40	165 ft	115 ft	+	50 ft
45	175 ft	125 ft	+	50 ft
50	195 ft	145 ft	+	50 ft
55	215 ft	165 ft	+	50 ft
60	235 ft	185 ft	+	50 ft

Length = #N/A ft

Minimum Required Storage Lane Length (including 50' diverging taper) Per Lane = 100 feet

Perferred Storage Lane Length (including 50' diverging taper) Per Lane = 375 feet

Note: Minimum required storage lane length reflects required storage of vehicles calculated using volume and cycle length. Preferred storage length varies from minimum storage lane length when adjacent through lane queue is projected to be greater than the minimum required storage length.

Length of Turn Lane Calculation Worksheet
Based on ODOT L&D Manual, Release Date 7/1/2018

Michael Baker INTERNATIONAL

Project Name:	Indianola Ave Road Diet	Analysis Date:	6/28/2021
Intersection:	Indianola Ave & Hudson Ave	Movement:	NBL
			2044 AM Peak Build

Design Speed =	35	(Speed in mph)
Turn Demand Volume =	Low	(High or Low)
Type of Traffic Control =	Signalized	(Signalized, Unsignalized Stopped Crossroad, or Unsignalized Through Road)
Condition =	A	(A, B, or C obtained from Table 401-9E)

BASIS FOR COMPUTING LENGTH OF TURN LANES — **401-9E REFERENCE SECTIONS 401.6.1, 401.6.3**

TYPE OF TRAFFIC CONTROL	DESIGN SPEED (mph) 30 - 35		40 - 45		50 - 60	
	TURN DEMAND VOLUME					
	HIGH	LOW[1]	HIGH	LOW[1]	HIGH	LOW[1]
SIGNALIZED	A	A	B or C[2]	B or C[2]	B or C[2]	B or C[2]
UNSIGNALIZED STOPPED CROSSROAD	A	A	A	A	A	A
UNSIGNALIZED THROUGH ROAD	A	A	C	B	B or C[2]	B

1 LOW is considered 10% or less of approach traffic volume.
2 Whichever is greater

Turn Demand Volume (1)=	0
Approach Volume =	390
Turn / Approach =	0%
(1) PM Peak (highest volume).	

Note: Based on L&D Manual guidance, left turn lane recommended to not exceed 600 feet (storage).

Storage Length at Intersections: 401-10E

Average No. of Vehicles/Cycle	Required Length	Average No. of Vehicles/Cycle	Required Length
1	50 ft	17	600 ft
2	100 ft	18	625 ft
3	150 ft	19	650 ft
4	175 ft	20	675 ft
5	200 ft	21	725 ft
6	250 ft	22	750 ft
7	275 ft	23	775 ft
8	325 ft	24	800 ft
9	350 ft	25	825 ft
10	375 ft	30	975 ft
11	400 ft	35	1125 ft
12	450 ft	40	1250 ft
13	475 ft	45	1400 ft
14	500 ft	50	1550 ft
15	525 ft	55	1700 ft
16	550 ft	60	1850 ft

Left Turn Storage Lane Length Calculation

DHV (Turning Lane) =	0	If Cycles are unknown, assume:	Unsignalized or 2 Phase - 60 Cycles/Hr
Cycle Length =	90		3 Phase - 40 Cycles/Hr
Cycles per Hour =	40		4 Phase - 30 Cycles/Hr
Average Vehicles per Cycle=	1	Required Turn Lane Storage Length =	50 ft (from Figure 401-10)

Adjacent Through Lane Storage Calculation

Adjacent Lane(s) Volume =	410	Number of Lanes	1
Average Vehicles per Cycle=	10	Required Length (per lane) =	375 ft
Required Length (total) =	375 ft (from Figure 401-10)		

Condition A **Storage Only** (Storage Length, Figure 401-10)

Length = 50 ft (diverging taper) + 50 ft **Length = 100 ft**

Condition B **High Speed Deceleration Only**

Design Speed	Length (including 50' Diverging Taper)
40	125 ft
45	175 ft
50	225 ft
55	285 ft
60	345 ft

Length = #N/A ft

Condition C **Moderate Speed Deceleration and Storage**

Design Speed	Length (including 50' Diverging Taper)			(Storage Length, Figure 401-10)
40	165 ft	115 ft	+	50 ft
45	175 ft	125 ft	+	50 ft
50	195 ft	145 ft	+	50 ft
55	215 ft	165 ft	+	50 ft
60	235 ft	185 ft	+	50 ft

Length = #N/A ft

Minimum Required Storage Lane Length (including 50' diverging taper) Per Lane =	**100 feet**
Perferred Storage Lane Length (including 50' diverging taper) Per Lane =	**425 feet**

Note: Minimum required storage lane length reflects required storage of vehicles calculated using volume and cycle length. Preferred storage length varies from minimum storage lane length when adjacent through lane queue is projected to be greater than the minimum required storage length.

Length of Turn Lane Calculation Worksheet

Based on ODOT L&D Manual, Release Date 7/1/2018

Michael Baker INTERNATIONAL

Project Name:	Indianola Ave Road Diet	Analysis Date:	6/28/2021
Intersection:	Indianola Ave & Hudson Ave	Movement:	SBL
			2044 AM Peak Build
Design Speed =	35	(Speed in mph)	
Turn Demand Volume =	High	(High or Low)	
Type of Traffic Control =	Signalized	(Signalized, Unsignalized Stopped Crossroad, or Unsignalized Through Road)	
Condition =	A	(A, B, or C obtained from Table 401-9E)	

BASIS FOR COMPUTING LENGTH OF TURN LANES — **401-9E REFERENCE SECTIONS 401.6.1, 401.6.3**

TYPE OF TRAFFIC CONTROL	DESIGN SPEED (mph) 30 - 35		40 - 45		50 - 60	
	TURN DEMAND VOLUME					
	HIGH	LOW[1]	HIGH	LOW[1]	HIGH	LOW[1]
SIGNALIZED	A	A	B or C[2]	B or C[2]	B or C[2]	B or C[2]
UNSIGNALIZED STOPPED CROSSROAD	A	A	A	A	A	A
UNSIGNALIZED THROUGH ROAD	A	A	C	B	B or C[2]	B

[1] LOW is considered 10% or less of approach traffic volume.
[2] Whichever is greater

Turn Demand Volume (1)=	420
Approach Volume =	670
Turn / Approach =	63%

(1) PM Peak (highest volume).

Note: Based on L&D Manual guidance, left turn lane recommended to not exceed 600 feet (storage).

Storage Length at Intersections: 401-10E

Average No. of Vehicles/Cycle	Required Length		Average No. of Vehicles/Cycle	Required Length
1	50	ft	17	600 ft
2	100	ft	18	625 ft
3	150	ft	19	650 ft
4	175	ft	20	675 ft
5	200	ft	21	725 ft
6	250	ft	22	750 ft
7	275	ft	23	775 ft
8	325	ft	24	800 ft
9	350	ft	25	825 ft
10	375	ft	30	975 ft
11	400	ft	35	1125 ft
12	450	ft	40	1250 ft
13	475	ft	45	1400 ft
14	500	ft	50	1550 ft
15	525	ft	55	1700 ft
16	550	ft	60	1850 ft

Left Turn Storage Lane Length Calculation

DHV (Turning Lane) =	420	If Cycles are unknown, assume:	Unsignalized or 2 Phase - 60 Cycles/Hr
Cycle Length =	90		3 Phase - 40 Cycles/Hr
Cycles per Hour =	40		4 Phase - 30 Cycles/Hr
Average Vehicles per Cycle=	11	Required Turn Lane Storage Length =	400 ft (from Figure 401-10)

Adjacent Through Lane Storage Calculation

Adjacent Lane(s) Volume =	400	Number of Lanes	1
Average Vehicles per Cycle=	10	Required Length (per lane) =	375 ft
Required Length (total) =	375 ft (from Figure 401-10)		

Condition A **Storage Only**

Length = 50 ft (diverging taper) + 400 ft (Storage Length, Figure 401-10) **Length = 450 ft**

Condition B **High Speed Deceleration Only**

Design Speed	Length (including 50' Diverging Taper)	
40	125	ft
45	175	ft
50	225	ft
55	285	ft
60	345	ft

Length = #N/A ft

Condition C **Moderate Speed Deceleration and Storage**

Design Speed	Length (including 50' Diverging Taper)					(Storage Length, Figure 401-10)
40	515	ft	115	ft	+	400 ft
45	525	ft	125	ft	+	400 ft
50	545	ft	145	ft	+	400 ft
55	565	ft	165	ft	+	400 ft
60	585	ft	185	ft	+	400 ft

Length = #N/A ft

Minimum Required Storage Lane Length (including 50' diverging taper) Per Lane = 450 feet

Perferred Storage Lane Length (including 50' diverging taper) Per Lane = 450 feet

Note: Minimum required storage lane length reflects required storage of vehicles calculated using volume and cycle length. Preferred storage length varies from minimum storage lane length when adjacent through lane queue is projected to be greater than the minimum required storage length.

Length of Turn Lane Calculation Worksheet
Based on ODOT L&D Manual, Release Date 7/1/2018

Michael Baker INTERNATIONAL

Project Name: Indianola Ave Road Diet
Intersection: Indianola Ave & Hudson Ave
Analysis Date: 6/28/2021
Movement: EBL
2044 AM Peak Build

Design Speed = 35 (Speed in mph)
Turn Demand Volume = Low (High or Low)
Type of Traffic Control = Signalized (Signalized, Unsignalized Stopped Crossroad, or Unsignalized Through Road)
Condition = A (A, B, or C obtained from Table 401-9E)

BASIS FOR COMPUTING LENGTH OF TURN LANES — **401-9E REFERENCE SECTIONS 401.6.1, 401.6.3**

TYPE OF TRAFFIC CONTROL	DESIGN SPEED (mph) 30 - 35		40 - 45		50 - 60	
	TURN DEMAND VOLUME					
	HIGH	LOW[1]	HIGH	LOW[1]	HIGH	LOW[1]
SIGNALIZED	A	A	B or C[2]	B or C[2]	B or C[2]	B or C[2]
UNSIGNALIZED STOPPED CROSSROAD	A	A	A	A	A	A
UNSIGNALIZED THROUGH ROAD	A	A	C	B	B or C[2]	B

[1] LOW is considered 10% or less of approach traffic volume.
[2] Whichever is greater

Turn Demand Volume (1)= 0
Approach Volume = 420
Turn / Approach = 0%
(1) PM Peak (highest volume).

Note: Based on L&D Manual guidance, left turn lane recommended to not exceed 600 feet (storage).

Storage Length at Intersections: 401-10E

Average No. of Vehicles/Cycle	Required Length	Average No. of Vehicles/Cycle	Required Length
1	50 ft	17	600 ft
2	100 ft	18	625 ft
3	150 ft	19	650 ft
4	175 ft	20	675 ft
5	200 ft	21	725 ft
6	250 ft	22	750 ft
7	275 ft	23	775 ft
8	325 ft	24	800 ft
9	350 ft	25	825 ft
10	375 ft	30	975 ft
11	400 ft	35	1125 ft
12	450 ft	40	1250 ft
13	475 ft	45	1400 ft
14	500 ft	50	1550 ft
15	525 ft	55	1700 ft
16	550 ft	60	1850 ft

Left Turn Storage Lane Length Calculation

DHV (Turning Lane) = 0
Cycle Length = 90
Cycles per Hour = 40
Average Vehicles per Cycle= 1

If Cycles are unknown, assume: Unsignalized or 2 Phase - 60 Cycles/Hr; 3 Phase - 40 Cycles/Hr; 4 Phase - 30 Cycles/Hr
Required Turn Lane Storage Length = 50 ft (from Figure 401-10)

Adjacent Through Lane Storage Calculation

Adjacent Lane(s) Volume = 410
Average Vehicles per Cycle= 10
Required Length (total) = 375 ft (from Figure 401-10)
Number of Lanes 1
Required Length (per lane) = 375 ft

Condition A **Storage Only**
Length = 50 ft (diverging taper) + 50 ft (Storage Length, Figure 401-10) **Length = 100 ft**

Condition B **High Speed Deceleration Only**

Design Speed	Length (including 50' Diverging Taper)
40	125 ft
45	175 ft
50	225 ft
55	285 ft
60	345 ft

Length = #N/A ft

Condition C **Moderate Speed Deceleration and Storage**

Design Speed	Length (including 50' Diverging Taper)			(Storage Length, Figure 401-10)
40	165 ft	115 ft	+	50 ft
45	175 ft	125 ft	+	50 ft
50	195 ft	145 ft	+	50 ft
55	215 ft	165 ft	+	50 ft
60	235 ft	185 ft	+	50 ft

Length = #N/A ft

Minimum Required Storage Lane Length (including 50' diverging taper) Per Lane = 100 feet
Perferred Storage Lane Length (including 50' diverging taper) Per Lane = 425 feet

Note: Minimum required storage lane length reflects required storage of vehicles calculated using volume and cycle length. Preferred storage length varies from minimum storage lane length when adjacent through lane queue is projected to be greater than the minimum required storage length.

Length of Turn Lane Calculation Worksheet

Based on ODOT L&D Manual, Release Date 7/1/2018

Michael Baker INTERNATIONAL

Project Name:	Indianola Ave Road Diet	Analysis Date:	6/28/2021
Intersection:	Indianola Ave & Hudson Ave	Movement:	WBL
			2044 AM Peak Build
Design Speed =	35	(Speed in mph)	
Turn Demand Volume =	Low	(High or Low)	
Type of Traffic Control =	Signalized	(Signalized, Unsignalized Stopped Crossroad, or Unsignalized Through Road)	
Condition =	A	(A, B, or C obtained from Table 401-9E)	

BASIS FOR COMPUTING LENGTH OF TURN LANES	401-9E REFERENCE SECTIONS 401.6.1, 401.6.3

TYPE OF TRAFFIC CONTROL	DESIGN SPEED (mph)					
	30 - 35		40 - 45		50 - 60	
	TURN DEMAND VOLUME					
	HIGH	LOW[1]	HIGH	LOW[1]	HIGH	LOW[1]
SIGNALIZED	A	A	B or C[2]	B or C[2]	B or C[2]	B or C[2]
UNSIGNALIZED STOPPED CROSSROAD	A	A	A	A	A	A
UNSIGNALIZED THROUGH ROAD	A	A	C	B	B or C[2]	B

[1] LOW is considered 10% or less of approach traffic volume.

[2] Whichever is greater

Turn Demand Volume (1)=	0
Approach Volume =	770
Turn / Approach =	0%
(1) PM Peak (highest volume).	

Note: Based on L&D Manual guidance, left turn lane recommended to not exceed 600 feet (storage).

Storage Length at Intersections: 401-10E

Average No. of Vehicles/Cycle	Required Length		Average No. of Vehicles/Cycle	Required Length
1	50	**ft**	17	600 ft
2	100	ft	18	625 ft
3	150	ft	19	650 ft
4	175	ft	20	675 ft
5	200	ft	21	725 ft
6	250	ft	22	750 ft
7	275	ft	23	775 ft
8	325	ft	24	800 ft
9	350	ft	25	825 ft
10	375	ft	30	975 ft
11	400	ft	35	1125 ft
12	450	ft	40	1250 ft
13	475	ft	45	1400 ft
14	500	ft	50	1550 ft
15	525	ft	55	1700 ft
16	550	ft	60	1850 ft

Left Turn Storage Lane Length Calculation

DHV (Turning Lane) =	0	If Cycles are unknown, assume:	Unsignalized or 2 Phase - 60 Cycles/Hr
Cycle Length =	90		3 Phase - 40 Cycles/Hr
Cycles per Hour =	40		4 Phase - 30 Cycles/Hr
Average Vehicles per Cycle=	1	Required Turn Lane Storage Length =	50 ft (from Figure 401-10)

Adjacent Through Lane Storage Calculation

Adjacent Lane(s) Volume =	400	Number of Lanes	1
Average Vehicles per Cycle=	10	Required Length (per lane) =	375 ft
Required Length (total) =	375 ft (from Figure 401-10)		

Condition A **Storage Only** (Storage Length, Figure 401-10)

Length = 50 ft (diverging taper) + 50 ft **Length = 100 ft**

Condition B **High Speed Deceleration Only**

Design Speed	Length (including 50' Diverging Taper)
40	125 ft
45	175 ft
50	225 ft
55	285 ft
60	345 ft

Length = #N/A ft

Condition C **Moderate Speed Deceleration and Storage**

Design Speed	Length (including 50' Diverging Taper)			(Storage Length, Figure 401-10)
40	165 ft	115 ft	+	50 ft
45	175 ft	125 ft	+	50 ft
50	195 ft	145 ft	+	50 ft
55	215 ft	165 ft	+	50 ft
60	235 ft	185 ft	+	50 ft

Length = #N/A ft

Minimum Required Storage Lane Length (including 50' diverging taper) Per Lane =	**100 feet**
Perferred Storage Lane Length (including 50' diverging taper) Per Lane =	**425 feet**

Note: Minimum required storage lane length reflects required storage of vehicles calculated using volume and cycle length. Preferred storage length varies from minimum storage lane length when adjacent through lane queue is projected to be greater than the minimum required storage length.

Length of Turn Lane Calculation Worksheet

Based on ODOT L&D Manual, Release Date 7/1/2018

Michael Baker INTERNATIONAL

Project Name:	Indianola Ave Road Diet	Analysis Date:	6/28/2021
Intersection:	Indianola Ave & Hudson Ave	Movement:	NBL
			2044 PM Peak Build

Design Speed =	35	(Speed in mph)
Turn Demand Volume =	Low	(High or Low)
Type of Traffic Control =	Signalized	(Signalized, Unsignalized Stopped Crossroad, or Unsignalized Through Road)
Condition =	A	(A, B, or C obtained from Table 401-9E)

BASIS FOR COMPUTING LENGTH OF TURN LANES — **401-9E** **REFERENCE SECTIONS 401.6.1, 401.6.3**

TYPE OF TRAFFIC CONTROL	DESIGN SPEED (mph) 30 - 35		40 - 45		50 - 60	
	TURN DEMAND VOLUME					
	HIGH	LOW[1]	HIGH	LOW[1]	HIGH	LOW[1]
SIGNALIZED	A	A	B or C[2]	B or C[2]	B or C[2]	B or C[2]
UNSIGNALIZED STOPPED CROSSROAD	A	A	A	A	A	A
UNSIGNALIZED THROUGH ROAD	A	A	C	B	B or C[2]	B

1 LOW is considered 10% or less of approach traffic volume.
2 Whichever is greater

Turn Demand Volume (1)=	0
Approach Volume =	470
Turn / Approach =	0%

(1) PM Peak (highest volume).

Note: Based on L&D Manual guidance, left turn lane recommended to not exceed 600 feet (storage).

Storage Length at Intersections: 401-10E

Average No. of Vehicles/Cycle	Required Length		Average No. of Vehicles/Cycle	Required Length
1	50	ft	17	600 ft
2	100	ft	18	625 ft
3	150	ft	19	650 ft
4	175	ft	20	675 ft
5	200	ft	21	725 ft
6	250	ft	22	750 ft
7	275	ft	23	775 ft
8	325	ft	24	800 ft
9	350	ft	25	825 ft
10	375	ft	30	975 ft
11	400	ft	35	1125 ft
12	450	ft	40	1250 ft
13	475	ft	45	1400 ft
14	500	ft	50	1550 ft
15	525	ft	55	1700 ft
16	550	ft	60	1850 ft

Left Turn Storage Lane Length Calculation

DHV (Turning Lane) =	0	If Cycles are unknown, assume:	Unsignalized or 2 Phase - 60 Cycles/Hr
Cycle Length =	90		3 Phase - 40 Cycles/Hr
Cycles per Hour =	40		4 Phase - 30 Cycles/Hr
Average Vehicles per Cycle=	1	Required Turn Lane Storage Length =	50 ft (from Figure 401-10)

Adjacent Through Lane Storage Calculation

Adjacent Lane(s) Volume =	520	Number of Lanes	1
Average Vehicles per Cycle=	13	Required Length (per lane) =	475 ft
Required Length (total) =	475	ft (from Figure 401-10)	

Condition A **Storage Only**

Length = 50 ft (diverging taper) + (Storage Length, Figure 401-10) 50 ft **Length = 100 ft**

Condition B **High Speed Deceleration Only**

Design Speed	Length (including 50' Diverging Taper)
40	125 ft
45	175 ft
50	225 ft
55	285 ft
60	345 ft

Length = #N/A ft

Condition C **Moderate Speed Deceleration and Storage**

Design Speed	Length (including 50' Diverging Taper)			(Storage Length, Figure 401-10)
40	165 ft	115 ft	+	50 ft
45	175 ft	125 ft	+	50 ft
50	195 ft	145 ft	+	50 ft
55	215 ft	165 ft	+	50 ft
60	235 ft	185 ft	+	50 ft

Length = #N/A ft

Minimum Required Storage Lane Length (including 50' diverging taper) Per Lane = 100 feet

Perferred Storage Lane Length (including 50' diverging taper) Per Lane = 525 feet

Note: Minimum required storage lane length reflects required storage of vehicles calculated using volume and cycle length. Preferred storage length varies from minimum storage lane length when adjacent through lane queue is projected to be greater than the minimum required storage length.

Length of Turn Lane Calculation Worksheet

Based on ODOT L&D Manual, Release Date 7/1/2018

Michael Baker INTERNATIONAL

Project Name:	Indianola Ave Road Diet	Analysis Date:	6/28/2021
Intersection:	Indianola Ave & Hudson Ave	Movement:	SBL
			2044 PM Peak Build

Design Speed =	35	(Speed in mph)
Turn Demand Volume =	High	(High or Low)
Type of Traffic Control =	Signalized	(Signalized, Unsignalized Stopped Crossroad, or Unsignalized Through Road)
Condition =	A	(A, B, or C obtained from Table 401-9E)

BASIS FOR COMPUTING LENGTH OF TURN LANES — **401-9E** REFERENCE SECTIONS 401.6.1, 401.6.3

TYPE OF TRAFFIC CONTROL	DESIGN SPEED (mph) 30 - 35		40 - 45		50 - 60	
	TURN DEMAND VOLUME					
	HIGH	LOW[1]	HIGH	LOW[1]	HIGH	LOW[1]
SIGNALIZED	A	A	B or C[2]	B or C[2]	B or C[2]	B or C[2]
UNSIGNALIZED STOPPED CROSSROAD	A	A	A	A	A	A
UNSIGNALIZED THROUGH ROAD	A	A	C	B	B or C[2]	B

Turn Demand Volume (1)=	320
Approach Volume =	520
Turn / Approach =	62%
(1) PM Peak (highest volume).	

Note: Based on L&D Manual guidance, left turn lane recommended to not exceed 600 feet (storage).

1 LOW is considered 10% or less of approach traffic volume.
2 Whichever is greater

Storage Length at Intersections: 401-10E

Average No. of Vehicles/Cycle	Required Length	Average No. of Vehicles/Cycle	Required Length
1	50 ft	17	600 ft
2	100 ft	18	625 ft
3	150 ft	19	650 ft
4	175 ft	20	675 ft
5	200 ft	21	725 ft
6	250 ft	22	750 ft
7	275 ft	23	775 ft
8	325 ft	24	800 ft
9	350 ft	25	825 ft
10	375 ft	30	975 ft
11	400 ft	35	1125 ft
12	450 ft	40	1250 ft
13	475 ft	45	1400 ft
14	500 ft	50	1550 ft
15	525 ft	55	1700 ft
16	550 ft	60	1850 ft

Left Turn Storage Lane Length Calculation

DHV (Turning Lane) =	320	If Cycles are unknown, assume: Unsignalized or 2 Phase - 60 Cycles/Hr
Cycle Length =	90	3 Phase - 40 Cycles/Hr
Cycles per Hour =	40	4 Phase - 30 Cycles/Hr
Average Vehicles per Cycle=	8	Required Turn Lane Storage Length = 325 ft (from Figure 401-10)

Adjacent Through Lane Storage Calculation

Adjacent Lane(s) Volume =	440	Number of Lanes: 1
Average Vehicles per Cycle=	11	Required Length (per lane) = 400 ft
Required Length (total) =	400 ft (from Figure 401-10)	

Condition A **Storage Only**

Length = 50 ft (diverging taper) + 325 ft (Storage Length, Figure 401-10) **Length = 375 ft**

Condition B **High Speed Deceleration Only**

Design Speed	Length (including 50' Diverging Taper)
40	125 ft
45	175 ft
50	225 ft
55	285 ft
60	345 ft

Length = #N/A ft

Condition C **Moderate Speed Deceleration and Storage**

Design Speed	Length (including 50' Diverging Taper)			(Storage Length, Figure 401-10)
40	440 ft	115 ft	+	325 ft
45	450 ft	125 ft	+	325 ft
50	470 ft	145 ft	+	325 ft
55	490 ft	165 ft	+	325 ft
60	510 ft	185 ft	+	325 ft

Length = #N/A ft

Minimum Required Storage Lane Length (including 50' diverging taper) Per Lane = 375 feet

Perferred Storage Lane Length (including 50' diverging taper) Per Lane = 450 feet

Note: Minimum required storage lane length reflects required storage of vehicles calculated using volume and cycle length. Preferred storage length varies from minimum storage lane length when adjacent through lane queue is projected to be greater than the minimum required storage length.

Length of Turn Lane Calculation Worksheet
Based on ODOT L&D Manual, Release Date 7/1/2018

Michael Baker INTERNATIONAL

Project Name:	Indianola Ave Road Diet	Analysis Date:	6/28/2021
Intersection:	Indianola Ave & Hudson Ave	Movement:	EBL
			2044 PM Peak Build
Design Speed =	35	(Speed in mph)	
Turn Demand Volume =	Low	(High or Low)	
Type of Traffic Control =	Signalized	(Signalized, Unsignalized Stopped Crossroad, or Unsignalized Through Road)	
Condition =	A	(A, B, or C obtained from Table 401-9E)	

BASIS FOR COMPUTING LENGTH OF TURN LANES — 401-9E REFERENCE SECTIONS 401.6.1, 401.6.3

TYPE OF TRAFFIC CONTROL	DESIGN SPEED (mph)					
	30 - 35		40 - 45		50 - 60	
	TURN DEMAND VOLUME					
	HIGH	LOW[1]	HIGH	LOW[1]	HIGH	LOW[1]
SIGNALIZED	A	A	B or C[2]	B or C[2]	B or C[2]	B or C[2]
UNSIGNALIZED STOPPED CROSSROAD	A	A	A	A	A	A
UNSIGNALIZED THROUGH ROAD	A	A	C	B	B or C[2]	B

1 LOW is considered 10% or less of approach traffic volume.
2 Whichever is greater

Turn Demand Volume (1)=	0
Approach Volume =	800
Turn / Approach =	0%
(1) PM Peak (highest volume).	

Note: Based on L&D Manual guidance, left turn lane recommended to not exceed 600 feet (storage).

Storage Length at Intersections: 401-10E

Average No. of Vehicles/Cycle	Required Length	Average No. of Vehicles/Cycle	Required Length
1	50 ft	17	600 ft
2	100 ft	18	625 ft
3	150 ft	19	650 ft
4	175 ft	20	675 ft
5	200 ft	21	725 ft
6	250 ft	22	750 ft
7	275 ft	23	775 ft
8	325 ft	24	800 ft
9	350 ft	25	825 ft
10	375 ft	30	975 ft
11	400 ft	35	1125 ft
12	450 ft	40	1250 ft
13	475 ft	45	1400 ft
14	500 ft	50	1550 ft
15	525 ft	55	1700 ft
16	550 ft	60	1850 ft

Left Turn Storage Lane Length Calculation

DHV (Turning Lane) =	0	If Cycles are unknown, assume:	Unsignalized or 2 Phase - 60 Cycles/Hr
Cycle Length =	90		3 Phase - 40 Cycles/Hr
Cycles per Hour =	40		4 Phase - 30 Cycles/Hr
Average Vehicles per Cycle=	1	Required Turn Lane Storage Length =	50 ft (from Figure 401-10)

Adjacent Through Lane Storage Calculation

Adjacent Lane(s) Volume =	520	Number of Lanes	1
Average Vehicles per Cycle=	13	Required Length (per lane) =	475 ft
Required Length (total) =	475 ft (from Figure 401-10)		

Condition A **Storage Only**
Length = 50 ft (diverging taper) + 50 ft (Storage Length, Figure 401-10) — **Length = 100 ft**

Condition B **High Speed Deceleration Only**

Design Speed	Length (including 50' Diverging Taper)
40	125 ft
45	175 ft
50	225 ft
55	285 ft
60	345 ft

Length = #N/A ft

Condition C **Moderate Speed Deceleration and Storage**

Design Speed	Length (including 50' Diverging Taper)			(Storage Length, Figure 401-10)
40	165 ft	115 ft	+	50 ft
45	175 ft	125 ft	+	50 ft
50	195 ft	145 ft	+	50 ft
55	215 ft	165 ft	+	50 ft
60	235 ft	185 ft	+	50 ft

Length = #N/A ft

Minimum Required Storage Lane Length (including 50' diverging taper) Per Lane = 100 feet
Perferred Storage Lane Length (including 50' diverging taper) Per Lane = 525 feet

Note: Minimum required storage lane length reflects required storage of vehicles calculated using volume and cycle length. Preferred storage length varies from minimum storage lane length when adjacent through lane queue is projected to be greater than the minimum required storage length.

Length of Turn Lane Calculation Worksheet
Based on ODOT L&D Manual, Release Date 7/1/2018

Michael Baker INTERNATIONAL

Project Name:	Indianola Ave Road Diet	Analysis Date:	6/28/2021
Intersection:	Indianola Ave & Hudson Ave	Movement:	WBL
			2044 PM Peak Build
Design Speed =	35	(Speed in mph)	
Turn Demand Volume =	Low	(High or Low)	
Type of Traffic Control =	Signalized	(Signalized, Unsignalized Stopped Crossroad, or Unsignalized Through Road)	
Condition =	A	(A, B, or C obtained from Table 401-9E)	

BASIS FOR COMPUTING LENGTH OF TURN LANES	401-9E REFERENCE SECTIONS 401.6.1, 401.6.3

TYPE OF TRAFFIC CONTROL	DESIGN SPEED (mph) 30 - 35		40 - 45		50 - 60	
	TURN DEMAND VOLUME					
	HIGH	LOW[1]	HIGH	LOW[1]	HIGH	LOW[1]
SIGNALIZED	A	A	B or C[2]	B or C[2]	B or C[2]	B or C[2]
UNSIGNALIZED STOPPED CROSSROAD	A	A	A	A	A	A
UNSIGNALIZED THROUGH ROAD	A	A	C	B	B or C[2]	B

[1] LOW is considered 10% or less of approach traffic volume.
[2] Whichever is greater

Turn Demand Volume (1)=	0
Approach Volume =	1,090
Turn / Approach =	0%
(1) PM Peak (highest volume).	

Note: Based on L&D Manual guidance, left turn lane recommended to not exceed 600 feet (storage).

Storage Length at Intersections: 401-10E

Average No. of Vehicles/Cycle	Required Length		Average No. of Vehicles/Cycle	Required Length
1	50	ft	17	600 ft
2	100	ft	18	625 ft
3	150	ft	19	650 ft
4	175	ft	20	675 ft
5	200	ft	21	725 ft
6	250	ft	22	750 ft
7	275	ft	23	775 ft
8	325	ft	24	800 ft
9	350	ft	25	825 ft
10	375	ft	30	975 ft
11	400	ft	35	1125 ft
12	450	ft	40	1250 ft
13	475	ft	45	1400 ft
14	500	ft	50	1550 ft
15	525	ft	55	1700 ft
16	550	ft	60	1850 ft

Left Turn Storage Lane Length Calculation

DHV (Turning Lane) =	0	If Cycles are unknown, assume:	Unsignalized or 2 Phase - 60 Cycles/Hr
Cycle Length =	90		3 Phase - 40 Cycles/Hr
Cycles per Hour =	40		4 Phase - 30 Cycles/Hr
Average Vehicles per Cycle=	1	Required Turn Lane Storage Length =	50 ft (from Figure 401-10)

Adjacent Through Lane Storage Calculation

Adjacent Lane(s) Volume =	440	Number of Lanes	1
Average Vehicles per Cycle=	11	Required Length (per lane) =	400 ft
Required Length (total) =	400 ft (from Figure 401-10)		

Condition A **Storage Only**

Length = 50 ft (diverging taper) + 50 ft (Storage Length, Figure 401-10) **Length = 100 ft**

Condition B **High Speed Deceleration Only**

Design Speed	Length (including 50' Diverging Taper)
40	125 ft
45	175 ft
50	225 ft
55	285 ft
60	345 ft

Length = #N/A ft

Condition C **Moderate Speed Deceleration and Storage**

Design Speed	Length (including 50' Diverging Taper)			(Storage Length, Figure 401-10)
40	165 ft	115 ft	+	50 ft
45	175 ft	125 ft	+	50 ft
50	195 ft	145 ft	+	50 ft
55	215 ft	165 ft	+	50 ft
60	235 ft	185 ft	+	50 ft

Length = #N/A ft

Minimum Required Storage Lane Length (including 50' diverging taper) Per Lane = 100 feet

Perferred Storage Lane Length (including 50' diverging taper) Per Lane = 450 feet

Note: Minimum required storage lane length reflects required storage of vehicles calculated using volume and cycle length. Preferred storage length varies from minimum storage lane length when adjacent through lane queue is projected to be greater than the minimum required storage length.

Michael Baker
INTERNATIONAL

We Make a Difference

Indianola & Arcadia

Turn Lane Calculations

Length of Turn Lane Calculation Worksheet
Based on ODOT L&D Manual, Release Date 7/1/2018

Michael Baker INTERNATIONAL

Project Name:	Indianola Ave Road Diet	Analysis Date:	9/15/2021
Intersection:	Indianola Ave & Arcadia Ave	Movement:	NBL
			2024 AM Peak Build
Design Speed =	35	(Speed in mph)	
Turn Demand Volume =	High	(High or Low)	
Type of Traffic Control =	Signalized	(Signalized, Unsignalized Stopped Crossroad, or Unsignalized Through Road)	
Condition =	A	(A, B, or C obtained from Table 401-9E)	

BASIS FOR COMPUTING LENGTH OF TURN LANES — 401-9E REFERENCE SECTIONS 401.6.1, 401.6.3

TYPE OF TRAFFIC CONTROL	DESIGN SPEED (mph) 30 - 35		40 - 45		50 - 60	
TURN DEMAND VOLUME	HIGH	LOW[1]	HIGH	LOW[1]	HIGH	LOW[1]
SIGNALIZED	A	A	B or C[2]	B or C[2]	B or C[2]	B or C[2]
UNSIGNALIZED STOPPED CROSSROAD	A	A	A	A	A	A
UNSIGNALIZED THROUGH ROAD	A	A	C	B	B or C[2]	B

1 LOW is considered 10% or less of approach traffic volume.
2 Whichever is greater

Turn Demand Volume (1)=	130
Approach Volume =	420
Turn / Approach =	31%

(1) PM Peak (highest volume).

Note: Based on L&D Manual guidance, left turn lane recommended to not exceed 600 feet (storage).

Storage Length at Intersections: 401-10E

Average No. of Vehicles/Cycle	Required Length	Average No. of Vehicles/Cycle	Required Length
1	50 ft	17	600 ft
2	100 ft	18	625 ft
3	150 ft	19	650 ft
4	175 ft	20	675 ft
5	200 ft	21	725 ft
6	250 ft	22	750 ft
7	275 ft	23	775 ft
8	325 ft	24	800 ft
9	350 ft	25	825 ft
10	375 ft	30	975 ft
11	400 ft	35	1125 ft
12	450 ft	40	1250 ft
13	475 ft	45	1400 ft
14	500 ft	50	1550 ft
15	525 ft	55	1700 ft
16	550 ft	60	1850 ft

Left Turn Storage Lane Length Calculation

DHV (Turning Lane) =	130	If Cycles are unknown, assume:	Unsignalized or 2 Phase - 60 Cycles/Hr
Cycle Length =	60		3 Phase - 40 Cycles/Hr
Cycles per Hour =	60		4 Phase - 30 Cycles/Hr
Average Vehicles per Cycle=	2	Required Turn Lane Storage Length =	100 ft (from Figure 401-10)

Adjacent Through Lane Storage Calculation

Adjacent Lane(s) Volume =	380	Number of Lanes	1
Average Vehicles per Cycle=	6	Required Length (per lane) =	250 ft
Required Length (total) =	250 ft (from Figure 401-10)		

Condition A **Storage Only**
Length = 50 ft (diverging taper) + 100 ft (Storage Length, Figure 401-10) **Length = 150 ft**

Condition B **High Speed Deceleration Only**

Design Speed	Length (including 50' Diverging Taper)
40	125 ft
45	175 ft
50	225 ft
55	285 ft
60	345 ft

Length = #N/A ft

Condition C **Moderate Speed Deceleration and Storage**

Design Speed	Length (including 50' Diverging Taper)			(Storage Length, Figure 401-10)
40	215 ft	115 ft	+	100 ft
45	225 ft	125 ft	+	100 ft
50	245 ft	145 ft	+	100 ft
55	265 ft	165 ft	+	100 ft
60	285 ft	185 ft	+	100 ft

Length = #N/A ft

Minimum Required Storage Lane Length (including 50' diverging taper) Per Lane = 150 feet
Perferred Storage Lane Length (including 50' diverging taper) Per Lane = 300 feet

Note: Minimum required storage lane length reflects required storage of vehicles calculated using volume and cycle length. Preferred storage length varies from minimum storage lane length when adjacent through lane queue is projected to be greater than the minimum required storage length.

Length of Turn Lane Calculation Worksheet
Based on ODOT L&D Manual, Release Date 7/1/2018

Michael Baker INTERNATIONAL

Project Name:	Indianola Ave Road Diet	Analysis Date:	9/15/2021
Intersection:	Indianola Ave & Arcadia Ave	Movement:	SBL
			2024 AM Peak Build
Design Speed =	35	(Speed in mph)	
Turn Demand Volume =	Low	(High or Low)	
Type of Traffic Control =	Signalized	(Signalized, Unsignalized Stopped Crossroad, or Unsignalized Through Road)	
Condition =	A	(A, B, or C obtained from Table 401-9E)	

BASIS FOR COMPUTING LENGTH OF TURN LANES — 401-9E REFERENCE SECTIONS 401.6.1, 401.6.3

TYPE OF TRAFFIC CONTROL	DESIGN SPEED (mph) 30 - 35		40 - 45		50 - 60	
	TURN DEMAND VOLUME					
	HIGH	LOW[1]	HIGH	LOW[1]	HIGH	LOW[1]
SIGNALIZED	A	A	B or C[2]	B or C[2]	B or C[2]	B or C[2]
UNSIGNALIZED STOPPED CROSSROAD	A	A	A	A	A	A
UNSIGNALIZED THROUGH ROAD	A	A	C	B	B or C[2]	B

1 LOW is considered 10% or less of approach traffic volume.
2 Whichever is greater

Turn Demand Volume (1)=	10
Approach Volume =	470
Turn / Approach =	2%
(1) PM Peak (highest volume).	

Note: Based on L&D Manual guidance, left turn lane recommended to not exceed 600 feet (storage).

Storage Length at Intersections: 401-10E

Average No. of Vehicles/Cycle	Required Length	Average No. of Vehicles/Cycle	Required Length
1	50 ft	17	600 ft
2	100 ft	18	625 ft
3	150 ft	19	650 ft
4	175 ft	20	675 ft
5	200 ft	21	725 ft
6	250 ft	22	750 ft
7	275 ft	23	775 ft
8	325 ft	24	800 ft
9	350 ft	25	825 ft
10	375 ft	30	975 ft
11	400 ft	35	1125 ft
12	450 ft	40	1250 ft
13	475 ft	45	1400 ft
14	500 ft	50	1550 ft
15	525 ft	55	1700 ft
16	550 ft	60	1850 ft

Left Turn Storage Lane Length Calculation

DHV (Turning Lane) =	10	If Cycles are unknown, assume:	Unsignalized or 2 Phase - 60 Cycles/Hr
Cycle Length =	60		3 Phase - 40 Cycles/Hr
Cycles per Hour =	60		4 Phase - 30 Cycles/Hr
Average Vehicles per Cycle=	1	Required Turn Lane Storage Length =	50 ft (from Figure 401-10)

Adjacent Through Lane Storage Calculation

Adjacent Lane(s) Volume =	370	Number of Lanes	1
Average Vehicles per Cycle=	6	Required Length (per lane) =	250 ft
Required Length (total) =	250 ft (from Figure 401-10)		

Condition A **Storage Only**
Length = 50 ft (diverging taper) + 50 ft (Storage Length, Figure 401-10) **Length = 100 ft**

Condition B **High Speed Deceleration Only**

Design Speed	Length (including 50' Diverging Taper)
40	125 ft
45	175 ft
50	225 ft
55	285 ft
60	345 ft

Length = #N/A ft

Condition C **Moderate Speed Deceleration and Storage**

Design Speed	Length (including 50' Diverging Taper)			(Storage Length, Figure 401-10)
40	165 ft	115 ft	+	50 ft
45	175 ft	125 ft	+	50 ft
50	195 ft	145 ft	+	50 ft
55	215 ft	165 ft	+	50 ft
60	235 ft	185 ft	+	50 ft

Length = #N/A ft

Minimum Required Storage Lane Length (including 50' diverging taper) Per Lane = 100 feet
Perferred Storage Lane Length (including 50' diverging taper) Per Lane = 300 feet

Note: Minimum required storage lane length reflects required storage of vehicles calculated using volume and cycle length. Preferred storage length varies from minimum storage lane length when adjacent through lane queue is projected to be greater than the minimum required storage length.

Length of Turn Lane Calculation Worksheet

Based on ODOT L&D Manual, Release Date 7/1/2018

Project Name:	Indianola Ave Road Diet		Analysis Date:	9/15/2021
Intersection:	Indianola Ave & Arcadia Ave		Movement:	EBR
				2024 AM Peak Build
Design Speed =	35	(Speed in mph)		
Turn Demand Volume =	High	(High or Low)		
Type of Traffic Control =	Signalized	(Signalized, Unsignalized Stopped Crossroad, or Unsignalized Through Road)		
Condition =	A	(A, B, or C obtained from Table 401-9E)		

BASIS FOR COMPUTING LENGTH OF TURN LANES — **401-9E REFERENCE SECTIONS 401.6.1, 401.6.3**

TYPE OF TRAFFIC CONTROL	DESIGN SPEED (mph)					
	30 - 35		40 - 45		50 - 60	
	TURN DEMAND VOLUME					
	HIGH	LOW[1]	HIGH	LOW[1]	HIGH	LOW[1]
SIGNALIZED	A	A	B or C[2]	B or C[2]	B or C[2]	B or C[2]
UNSIGNALIZED STOPPED CROSSROAD	A	A	A	A	A	A
UNSIGNALIZED THROUGH ROAD	A	A	C	B	B or C[2]	B

[1] LOW is considered 10% or less of approach traffic volume.

[2] Whichever is greater

Turn Demand Volume (1)=	140
Approach Volume =	260
Turn / Approach =	54%
(1) PM Peak (highest volume).	

Note: Based on L&D Manual guidance, left turn lane recommended to not exceed 600 feet (storage).

Storage Length at Intersections: 401-10E

Average No. of Vehicles/Cycle	Required Length		Average No. of Vehicles/Cycle	Required Length
1	50	**ft**	17	600 ft
2	100	ft	18	625 ft
3	150	ft	19	650 ft
4	175	ft	20	675 ft
5	200	ft	21	725 ft
6	250	ft	22	750 ft
7	275	ft	23	775 ft
8	325	ft	24	800 ft
9	350	ft	25	825 ft
10	375	ft	30	975 ft
11	400	ft	35	1125 ft
12	450	ft	40	1250 ft
13	475	ft	45	1400 ft
14	500	ft	50	1550 ft
15	525	ft	55	1700 ft
16	550	ft	60	1850 ft

Left Turn Storage Lane Length Calculation

DHV (Turning Lane) =	140	If Cycles are unknown, assume:	Unsignalized or 2 Phase - 60 Cycles/Hr
Cycle Length =	60		3 Phase - 40 Cycles/Hr
Cycles per Hour =	60		4 Phase - 30 Cycles/Hr
Average Vehicles per Cycle=	2	Required Turn Lane Storage Length =	100 ft (from Figure 401-10)

Adjacent Through Lane Storage Calculation

Adjacent Lane(s) Volume =	380	Number of Lanes	1
Average Vehicles per Cycle=	6	Required Length (per lane) =	250 ft
Required Length (total) =	250 ft (from Figure 401-10)		

Condition A **Storage Only** (Storage Length, Figure 401-10)

Length = 50 ft (diverging taper) + 100 ft — **Length = 150 ft**

Condition B **High Speed Deceleration Only**

Design Speed	Length (including 50' Diverging Taper)
40	125 ft
45	175 ft
50	225 ft
55	285 ft
60	345 ft

Length = #N/A ft

Condition C **Moderate Speed Deceleration and Storage**

Design Speed	Length (including 50' Diverging Taper)			(Storage Length, Figure 401-10)
40	215 ft	115 ft	+	100 ft
45	225 ft	125 ft	+	100 ft
50	245 ft	145 ft	+	100 ft
55	265 ft	165 ft	+	100 ft
60	285 ft	185 ft	+	100 ft

Length = #N/A ft

Minimum Required Storage Lane Length (including 50' diverging taper) Per Lane = 150 feet

Perferred Storage Lane Length (including 50' diverging taper) Per Lane = 300 feet

Note: Minimum required storage lane length reflects required storage of vehicles calculated using volume and cycle length. Preferred storage length varies from minimum storage lane length when adjacent through lane queue is projected to be greater than the minimum required storage length.

Length of Turn Lane Calculation Worksheet
Based on ODOT L&D Manual, Release Date 7/1/2018

Michael Baker INTERNATIONAL

Project Name:	Indianola Ave Road Diet	Analysis Date:	9/15/2021
Intersection:	Indianola Ave & Arcadia Ave	Movement:	WBL
			2024 AM Peak Build
Design Speed =	35	(Speed in mph)	
Turn Demand Volume =	High	(High or Low)	
Type of Traffic Control =	Signalized	(Signalized, Unsignalized Stopped Crossroad, or Unsignalized Through Road)	
Condition =	A	(A, B, or C obtained from Table 401-9E)	

BASIS FOR COMPUTING LENGTH OF TURN LANES — **401-9E REFERENCE SECTIONS 401.6.1, 401.6.3**

TYPE OF TRAFFIC CONTROL	DESIGN SPEED (mph) 30 - 35		40 - 45		50 - 60	
	TURN DEMAND VOLUME					
	HIGH	LOW[1]	HIGH	LOW[1]	HIGH	LOW[1]
SIGNALIZED	A	A	B or C[2]	B or C[2]	B or C[2]	B or C[2]
UNSIGNALIZED STOPPED CROSSROAD	A	A	A	A	A	A
UNSIGNALIZED THROUGH ROAD	A	A	C	B	B or C[2]	B

[1] LOW is considered 10% or less of approach traffic volume.
[2] Whichever is greater

Turn Demand Volume (1)=	10
Approach Volume =	70
Turn / Approach =	14%
(1) PM Peak (highest volume).	

Note: Based on L&D Manual guidance, left turn lane recommended to not exceed 600 feet (storage).

Storage Length at Intersections: 401-10E

Average No. of Vehicles/Cycle	Required Length		Average No. of Vehicles/Cycle	Required Length
1	50	ft	17	600 ft
2	100	ft	18	625 ft
3	150	ft	19	650 ft
4	175	ft	20	675 ft
5	200	ft	21	725 ft
6	250	ft	22	750 ft
7	275	ft	23	775 ft
8	325	ft	24	800 ft
9	350	ft	25	825 ft
10	375	ft	30	975 ft
11	400	ft	35	1125 ft
12	450	ft	40	1250 ft
13	475	ft	45	1400 ft
14	500	ft	50	1550 ft
15	525	ft	55	1700 ft
16	550	ft	60	1850 ft

Left Turn Storage Lane Length Calculation

DHV (Turning Lane) =	10	If Cycles are unknown, assume:	Unsignalized or 2 Phase - 60 Cycles/Hr
Cycle Length =	60		3 Phase - 40 Cycles/Hr
Cycles per Hour =	60		4 Phase - 30 Cycles/Hr
Average Vehicles per Cycle=	1	Required Turn Lane Storage Length =	50 ft (from Figure 401-10)

Adjacent Through Lane Storage Calculation

Adjacent Lane(s) Volume =	370	Number of Lanes	1
Average Vehicles per Cycle=	6	Required Length (per lane) =	250 ft
Required Length (total) =	250 ft (from Figure 401-10)		

Condition A **Storage Only**

Length = 50 ft (diverging taper) + 50 ft (Storage Length, Figure 401-10) **Length = 100 ft**

Condition B **High Speed Deceleration Only**

Design Speed	Length (including 50' Diverging Taper)
40	125 ft
45	175 ft
50	225 ft
55	285 ft
60	345 ft

Length = #N/A ft

Condition C **Moderate Speed Deceleration and Storage**

Design Speed	Length (including 50' Diverging Taper)			(Storage Length, Figure 401-10)
40	165 ft	115 ft	+	50 ft
45	175 ft	125 ft	+	50 ft
50	195 ft	145 ft	+	50 ft
55	215 ft	165 ft	+	50 ft
60	235 ft	185 ft	+	50 ft

Length = #N/A ft

Minimum Required Storage Lane Length (including 50' diverging taper) Per Lane = 100 feet

Perferred Storage Lane Length (including 50' diverging taper) Per Lane = 300 feet

Note: Minimum required storage lane length reflects required storage of vehicles calculated using volume and cycle length. Preferred storage length varies from minimum storage lane length when adjacent through lane queue is projected to be greater than the minimum required storage length.

Length of Turn Lane Calculation Worksheet

Based on ODOT L&D Manual, Release Date 7/1/2018

Michael Baker INTERNATIONAL

Project Name:	Indianola Ave Road Diet	Analysis Date:	9/15/2021
Intersection:	Indianola Ave & Arcadia Ave	Movement:	NBL
			2024 PM Peak Build

Design Speed =	35	(Speed in mph)
Turn Demand Volume =	High	(High or Low)
Type of Traffic Control =	Signalized	(Signalized, Unsignalized Stopped Crossroad, or Unsignalized Through Road)
Condition =	A	(A, B, or C obtained from Table 401-9E)

BASIS FOR COMPUTING LENGTH OF TURN LANES

401-9E
REFERENCE SECTIONS 401.6.1, 401.6.3

TYPE OF TRAFFIC CONTROL	DESIGN SPEED (mph)					
	30 - 35		40 - 45		50 - 60	
	TURN DEMAND VOLUME					
	HIGH	LOW[1]	HIGH	LOW[1]	HIGH	LOW[1]
SIGNALIZED	A	A	B or C[2]	B or C[2]	B or C[2]	B or C[2]
UNSIGNALIZED STOPPED CROSSROAD	A	A	A	A	A	A
UNSIGNALIZED THROUGH ROAD	A	A	C	B	B or C[2]	B

[1] LOW is considered 10% or less of approach traffic volume.
[2] Whichever is greater

Turn Demand Volume (1)=	180
Approach Volume =	650
Turn / Approach =	28%
(1) PM Peak (highest volume).	

Note: Based on L&D Manual guidance, left turn lane recommended to not exceed 600 feet (storage).

Storage Length at Intersections: 401-10E

Average No. of Vehicles/Cycle	Required Length	Average No. of Vehicles/Cycle	Required Length
1	50 **ft**	17	600 ft
2	100 ft	18	625 ft
3	150 ft	19	650 ft
4	175 ft	20	675 ft
5	200 ft	21	725 ft
6	250 ft	22	750 ft
7	275 ft	23	775 ft
8	325 ft	24	800 ft
9	350 ft	25	825 ft
10	375 ft	30	975 ft
11	400 ft	35	1125 ft
12	450 ft	40	1250 ft
13	475 ft	45	1400 ft
14	500 ft	50	1550 ft
15	525 ft	55	1700 ft
16	550 ft	60	1850 ft

Left Turn Storage Lane Length Calculation

DHV (Turning Lane) =	180	If Cycles are unknown, assume:	Unsignalized or 2 Phase - 60 Cycles/Hr
Cycle Length =	65		3 Phase - 40 Cycles/Hr
Cycles per Hour =	55		4 Phase - 30 Cycles/Hr
Average Vehicles per Cycle=	3	Required Turn Lane Storage Length =	150 ft (from Figure 401-10)

Adjacent Through Lane Storage Calculation

Adjacent Lane(s) Volume =	500	Number of Lanes	1
Average Vehicles per Cycle=	9	Required Length (per lane) =	350 ft
Required Length (total) =	350 ft (from Figure 401-10)		

Condition A **Storage Only**

Length = 50 ft (diverging taper) + 150 ft (Storage Length, Figure 401-10) **Length = 200 ft**

Condition B **High Speed Deceleration Only**

Design Speed	Length (including 50' Diverging Taper)
40	125 ft
45	175 ft
50	225 ft
55	285 ft
60	345 ft

Length = #N/A ft

Condition C **Moderate Speed Deceleration and Storage**

Design Speed	Length (including 50' Diverging Taper)			(Storage Length, Figure 401-10)
40	265 ft	115 ft	+	150 ft
45	275 ft	125 ft	+	150 ft
50	295 ft	145 ft	+	150 ft
55	315 ft	165 ft	+	150 ft
60	335 ft	185 ft	+	150 ft

Length = #N/A ft

Minimum Required Storage Lane Length (including 50' diverging taper) Per Lane = 200 feet

Perferred Storage Lane Length (including 50' diverging taper) Per Lane = 400 feet

Note: Minimum required storage lane length reflects required storage of vehicles calculated using volume and cycle length. Preferred storage length varies from minimum storage lane length when adjacent through lane queue is projected to be greater than the minimum required storage length.

Length of Turn Lane Calculation Worksheet
Based on ODOT L&D Manual, Release Date 7/1/2018

Michael Baker INTERNATIONAL

Project Name:	Indianola Ave Road Diet	Analysis Date:	9/15/2021
Intersection:	Indianola Ave & Arcadia Ave	Movement:	SBL
			2024 PM Peak Build

Design Speed =	35	(Speed in mph)
Turn Demand Volume =	Low	(High or Low)
Type of Traffic Control =	Signalized	(Signalized, Unsignalized Stopped Crossroad, or Unsignalized Through Road)
Condition =	A	(A, B, or C obtained from Table 401-9E)

BASIS FOR COMPUTING LENGTH OF TURN LANES — **401-9E** **REFERENCE SECTIONS 401.6.1, 401.6.3**

TYPE OF TRAFFIC CONTROL	DESIGN SPEED (mph) 30 - 35		40 - 45		50 - 60	
	TURN DEMAND VOLUME					
	HIGH	LOW[1]	HIGH	LOW[1]	HIGH	LOW[1]
SIGNALIZED	A	A	B or C[2]	B or C[2]	B or C[2]	B or C[2]
UNSIGNALIZED STOPPED CROSSROAD	A	A	A	A	A	A
UNSIGNALIZED THROUGH ROAD	A	A	C	B	B or C[2]	B

[1] LOW is considered 10% or less of approach traffic volume.
[2] Whichever is greater

Turn Demand Volume (1)=	10
Approach Volume =	450
Turn / Approach =	2%

(1) PM Peak (highest volume).

Note: Based on L&D Manual guidance, left turn lane recommended to not exceed 600 feet (storage).

Storage Length at Intersections: 401-10E

Average No. of Vehicles/Cycle	Required Length	Average No. of Vehicles/Cycle	Required Length
1	50 ft	17	600 ft
2	100 ft	18	625 ft
3	150 ft	19	650 ft
4	175 ft	20	675 ft
5	200 ft	21	725 ft
6	250 ft	22	750 ft
7	275 ft	23	775 ft
8	325 ft	24	800 ft
9	350 ft	25	825 ft
10	375 ft	30	975 ft
11	400 ft	35	1125 ft
12	450 ft	40	1250 ft
13	475 ft	45	1400 ft
14	500 ft	50	1550 ft
15	525 ft	55	1700 ft
16	550 ft	60	1850 ft

Left Turn Storage Lane Length Calculation

DHV (Turning Lane) =	10	
Cycle Length =	65	
Cycles per Hour =	55	
Average Vehicles per Cycle=	1	

If Cycles are unknown, assume: Unsignalized or 2 Phase - 60 Cycles/Hr; 3 Phase - 40 Cycles/Hr; 4 Phase - 30 Cycles/Hr

Required Turn Lane Storage Length = 50 ft (from Figure 401-10)

Adjacent Through Lane Storage Calculation

Adjacent Lane(s) Volume =	430
Average Vehicles per Cycle=	8
Required Length (total) =	325 ft (from Figure 401-10)

Number of Lanes 1
Required Length (per lane) = 325 ft

Condition A **Storage Only**
Length = 50 ft (diverging taper) + 50 ft (Storage Length, Figure 401-10) **Length = 100 ft**

Condition B **High Speed Deceleration Only**

Design Speed	Length (including 50' Diverging Taper)
40	125 ft
45	175 ft
50	225 ft
55	285 ft
60	345 ft

Length = #N/A ft

Condition C **Moderate Speed Deceleration and Storage**

Design Speed	Length (including 50' Diverging Taper)			(Storage Length, Figure 401-10)
40	165 ft	115 ft	+	50 ft
45	175 ft	125 ft	+	50 ft
50	195 ft	145 ft	+	50 ft
55	215 ft	165 ft	+	50 ft
60	235 ft	185 ft	+	50 ft

Length = #N/A ft

Minimum Required Storage Lane Length (including 50' diverging taper) Per Lane = 100 feet
Perferred Storage Lane Length (including 50' diverging taper) Per Lane = 375 feet

Note: Minimum required storage lane length reflects required storage of vehicles calculated using volume and cycle length. Preferred storage length varies from minimum storage lane length when adjacent through lane queue is projected to be greater than the minimum required storage length.

Length of Turn Lane Calculation Worksheet
Based on ODOT L&D Manual, Release Date 7/1/2018

Michael Baker INTERNATIONAL

Project Name:	Indianola Ave Road Diet	Analysis Date:	9/15/2021
Intersection:	Indianola Ave & Arcadia Ave	Movement:	EBR
			2024 PM Peak Build
Design Speed =	35	(Speed in mph)	
Turn Demand Volume =	High	(High or Low)	
Type of Traffic Control =	Signalized	(Signalized, Unsignalized Stopped Crossroad, or Unsignalized Through Road)	
Condition =	A	(A, B, or C obtained from Table 401-9E)	

BASIS FOR COMPUTING LENGTH OF TURN LANES — 401-9E REFERENCE SECTIONS 401.6.1, 401.6.3

TYPE OF TRAFFIC CONTROL	DESIGN SPEED (mph) 30 - 35		40 - 45		50 - 60	
	TURN DEMAND VOLUME					
	HIGH	LOW[1]	HIGH	LOW[1]	HIGH	LOW[1]
SIGNALIZED	A	A	B or C[2]	B or C[2]	B or C[2]	B or C[2]
UNSIGNALIZED STOPPED CROSSROAD	A	A	A	A	A	A
UNSIGNALIZED THROUGH ROAD	A	A	C	B	B or C[2]	B

[1] LOW is considered 10% or less of approach traffic volume.
[2] Whichever is greater

Turn Demand Volume (1)=	110
Approach Volume =	280
Turn / Approach =	39%
(1) PM Peak (highest volume).	

Note: Based on L&D Manual guidance, left turn lane recommended to not exceed 600 feet (storage).

Storage Length at Intersections: 401-10E

Average No. of Vehicles/Cycle	Required Length	Average No. of Vehicles/Cycle	Required Length
1	50 ft	17	600 ft
2	100 ft	18	625 ft
3	150 ft	19	650 ft
4	175 ft	20	675 ft
5	200 ft	21	725 ft
6	250 ft	22	750 ft
7	275 ft	23	775 ft
8	325 ft	24	800 ft
9	350 ft	25	825 ft
10	375 ft	30	975 ft
11	400 ft	35	1125 ft
12	450 ft	40	1250 ft
13	475 ft	45	1400 ft
14	500 ft	50	1550 ft
15	525 ft	55	1700 ft
16	550 ft	60	1850 ft

Left Turn Storage Lane Length Calculation

DHV (Turning Lane) =	110	If Cycles are unknown, assume:	Unsignalized or 2 Phase - 60 Cycles/Hr
Cycle Length =	65		3 Phase - 40 Cycles/Hr
Cycles per Hour =	55		4 Phase - 30 Cycles/Hr
Average Vehicles per Cycle=	2	Required Turn Lane Storage Length =	100 ft (from Figure 401-10)

Adjacent Through Lane Storage Calculation

Adjacent Lane(s) Volume =	500	Number of Lanes	1
Average Vehicles per Cycle=	9	Required Length (per lane) =	350 ft
Required Length (total) =	350 ft (from Figure 401-10)		

Condition A **Storage Only**

Length = 50 ft (diverging taper) + 100 ft (Storage Length, Figure 401-10) — **Length = 150 ft**

Condition B **High Speed Deceleration Only**

Design Speed	Length (including 50' Diverging Taper)
40	125 ft
45	175 ft
50	225 ft
55	285 ft
60	345 ft

Length = #N/A ft

Condition C **Moderate Speed Deceleration and Storage**

Design Speed	Length (including 50' Diverging Taper)			(Storage Length, Figure 401-10)
40	215 ft	115 ft	+	100 ft
45	225 ft	125 ft	+	100 ft
50	245 ft	145 ft	+	100 ft
55	265 ft	165 ft	+	100 ft
60	285 ft	185 ft	+	100 ft

Length = #N/A ft

Minimum Required Storage Lane Length (including 50' diverging taper) Per Lane = 150 feet

Perferred Storage Lane Length (including 50' diverging taper) Per Lane = 400 feet

Note: Minimum required storage lane length reflects required storage of vehicles calculated using volume and cycle length. Preferred storage length varies from minimum storage lane length when adjacent through lane queue is projected to be greater than the minimum required storage length.

Length of Turn Lane Calculation Worksheet
Based on ODOT L&D Manual, Release Date 7/1/2018

Michael Baker INTERNATIONAL

Project Name:	Indianola Ave Road Diet	Analysis Date:	9/15/2021
Intersection:	Indianola Ave & Arcadia Ave	Movement:	WBL
			2024 PM Peak Build
Design Speed =	35	(Speed in mph)	
Turn Demand Volume =	High	(High or Low)	
Type of Traffic Control =	Signalized	(Signalized, Unsignalized Stopped Crossroad, or Unsignalized Through Road)	
Condition =	A	(A, B, or C obtained from Table 401-9E)	

BASIS FOR COMPUTING LENGTH OF TURN LANES — 401-9E REFERENCE SECTIONS 401.6.1, 401.6.3

TYPE OF TRAFFIC CONTROL	DESIGN SPEED (mph) 30 - 35		40 - 45		50 - 60	
	TURN DEMAND VOLUME					
	HIGH	LOW[1]	HIGH	LOW[1]	HIGH	LOW[1]
SIGNALIZED	A	A	B or C[2]	B or C[2]	B or C[2]	B or C[2]
UNSIGNALIZED STOPPED CROSSROAD	A	A	A	A	A	A
UNSIGNALIZED THROUGH ROAD	A	A	C	B	B or C[2]	B

1 LOW is considered 10% or less of approach traffic volume.
2 Whichever is greater

Turn Demand Volume (1)=	10
Approach Volume =	50
Turn / Approach =	20%
(1) PM Peak (highest volume).	

Note: Based on L&D Manual guidance, left turn lane recommended to not exceed 600 feet (storage).

Storage Length at Intersections: 401-10E

Average No. of Vehicles/Cycle	Required Length	Average No. of Vehicles/Cycle	Required Length
1	50 ft	17	600 ft
2	100 ft	18	625 ft
3	150 ft	19	650 ft
4	175 ft	20	675 ft
5	200 ft	21	725 ft
6	250 ft	22	750 ft
7	275 ft	23	775 ft
8	325 ft	24	800 ft
9	350 ft	25	825 ft
10	375 ft	30	975 ft
11	400 ft	35	1125 ft
12	450 ft	40	1250 ft
13	475 ft	45	1400 ft
14	500 ft	50	1550 ft
15	525 ft	55	1700 ft
16	550 ft	60	1850 ft

Left Turn Storage Lane Length Calculation

DHV (Turning Lane) =	10	If Cycles are unknown, assume:	Unsignalized or 2 Phase - 60 Cycles/Hr
Cycle Length =	65		3 Phase - 40 Cycles/Hr
Cycles per Hour =	55		4 Phase - 30 Cycles/Hr
Average Vehicles per Cycle=	1	Required Turn Lane Storage Length =	50 ft (from Figure 401-10)

Adjacent Through Lane Storage Calculation

Adjacent Lane(s) Volume =	430	Number of Lanes	1
Average Vehicles per Cycle=	8	Required Length (per lane) =	325 ft
Required Length (total) =	325 ft (from Figure 401-10)		

Condition A **Storage Only**
Length = 50 ft (diverging taper) + (Storage Length, Figure 401-10) 50 ft — **Length = 100 ft**

Condition B **High Speed Deceleration Only**

Design Speed	Length (including 50' Diverging Taper)
40	125 ft
45	175 ft
50	225 ft
55	285 ft
60	345 ft

Length = #N/A ft

Condition C **Moderate Speed Deceleration and Storage**

Design Speed	Length (including 50' Diverging Taper)			(Storage Length, Figure 401-10)
40	165 ft	115 ft	+	50 ft
45	175 ft	125 ft	+	50 ft
50	195 ft	145 ft	+	50 ft
55	215 ft	165 ft	+	50 ft
60	235 ft	185 ft	+	50 ft

Length = #N/A ft

Minimum Required Storage Lane Length (including 50' diverging taper) Per Lane = 100 feet
Perferred Storage Lane Length (including 50' diverging taper) Per Lane = 375 feet

Note: Minimum required storage lane length reflects required storage of vehicles calculated using volume and cycle length. Preferred storage length varies from minimum storage lane length when adjacent through lane queue is projected to be greater than the minimum required storage length.

Length of Turn Lane Calculation Worksheet
Based on ODOT L&D Manual, Release Date 7/1/2018

Michael Baker INTERNATIONAL

Project Name:	Indianola Ave Road Diet	Analysis Date:	9/15/2021
Intersection:	Indianola Ave & Arcadia Ave	Movement:	NBL
			2044 AM Peak Build
Design Speed =	35	(Speed in mph)	
Turn Demand Volume =	High	(High or Low)	
Type of Traffic Control =	Signalized	(Signalized, Unsignalized Stopped Crossroad, or Unsignalized Through Road)	
Condition =	A	(A, B, or C obtained from Table 401-9E)	

BASIS FOR COMPUTING LENGTH OF TURN LANES — 401-9E REFERENCE SECTIONS 401.6.1, 401.6.3

TYPE OF TRAFFIC CONTROL	DESIGN SPEED (mph) 30 - 35		40 - 45		50 - 60	
	TURN DEMAND VOLUME					
	HIGH	LOW[1]	HIGH	LOW[1]	HIGH	LOW[1]
SIGNALIZED	A	A	B or C[2]	B or C[2]	B or C[2]	B or C[2]
UNSIGNALIZED STOPPED CROSSROAD	A	A	A	A	A	A
UNSIGNALIZED THROUGH ROAD	A	A	C	B	B or C[2]	B

[1] LOW is considered 10% or less of approach traffic volume.
[2] Whichever is greater

Turn Demand Volume (1)=	190
Approach Volume =	540
Turn / Approach =	35%

(1) PM Peak (highest volume).

Note: Based on L&D Manual guidance, left turn lane recommended to not exceed 600 feet (storage).

Storage Length at Intersections: 401-10E

Average No. of Vehicles/Cycle	Required Length	Average No. of Vehicles/Cycle	Required Length
1	50 ft	17	600 ft
2	100 ft	18	625 ft
3	150 ft	19	650 ft
4	175 ft	20	675 ft
5	200 ft	21	725 ft
6	250 ft	22	750 ft
7	275 ft	23	775 ft
8	325 ft	24	800 ft
9	350 ft	25	825 ft
10	375 ft	30	975 ft
11	400 ft	35	1125 ft
12	450 ft	40	1250 ft
13	475 ft	45	1400 ft
14	500 ft	50	1550 ft
15	525 ft	55	1700 ft
16	550 ft	60	1850 ft

Left Turn Storage Lane Length Calculation

DHV (Turning Lane) =	190	If Cycles are unknown, assume:	Unsignalized or 2 Phase - 60 Cycles/Hr
Cycle Length =	60		3 Phase - 40 Cycles/Hr
Cycles per Hour =	60		4 Phase - 30 Cycles/Hr
Average Vehicles per Cycle=	3	Required Turn Lane Storage Length =	150 ft (from Figure 401-10)

Adjacent Through Lane Storage Calculation

Adjacent Lane(s) Volume =	410	Number of Lanes	1
Average Vehicles per Cycle=	7	Required Length (per lane) =	275 ft
Required Length (total) =	275 ft (from Figure 401-10)		

Condition A **Storage Only**
Length = 50 ft (diverging taper) + 150 ft (Storage Length, Figure 401-10) **Length = 200 ft**

Condition B **High Speed Deceleration Only**

Design Speed	Length (including 50' Diverging Taper)
40	125 ft
45	175 ft
50	225 ft
55	285 ft
60	345 ft

Length = #N/A ft

Condition C **Moderate Speed Deceleration and Storage**

Design Speed	Length (including 50' Diverging Taper)			(Storage Length, Figure 401-10)
40	265 ft	115 ft	+	150 ft
45	275 ft	125 ft	+	150 ft
50	295 ft	145 ft	+	150 ft
55	315 ft	165 ft	+	150 ft
60	335 ft	185 ft	+	150 ft

Length = #N/A ft

Minimum Required Storage Lane Length (including 50' diverging taper) Per Lane = 200 feet
Perferred Storage Lane Length (including 50' diverging taper) Per Lane = 325 feet

Note: Minimum required storage lane length reflects required storage of vehicles calculated using volume and cycle length. Preferred storage length varies from minimum storage lane length when adjacent through lane queue is projected to be greater than the minimum required storage length.

Length of Turn Lane Calculation Worksheet
Based on ODOT L&D Manual, Release Date 7/1/2018

Michael Baker INTERNATIONAL

Project Name: Indianola Ave Road Diet
Intersection: Indianola Ave & Arcadia Ave
Analysis Date: 9/15/2021
Movement: SBL
2044 AM Peak Build

Design Speed = 35 (Speed in mph)
Turn Demand Volume = Low (High or Low)
Type of Traffic Control = Signalized (Signalized, Unsignalized Stopped Crossroad, or Unsignalized Through Road)
Condition = A (A, B, or C obtained from Table 401-9E)

BASIS FOR COMPUTING LENGTH OF TURN LANES	**401-9E REFERENCE SECTIONS 401.6.1, 401.6.3**

TYPE OF TRAFFIC CONTROL	DESIGN SPEED (mph)					
	30 - 35		40 - 45		50 - 60	
	TURN DEMAND VOLUME					
	HIGH	LOW[1]	HIGH	LOW[1]	HIGH	LOW[1]
SIGNALIZED	A	A	B or C[2]	B or C[2]	B or C[2]	B or C[2]
UNSIGNALIZED STOPPED CROSSROAD	A	A	A	A	A	A
UNSIGNALIZED THROUGH ROAD	A	A	C	B	B or C[2]	B

1 LOW is considered 10% or less of approach traffic volume.
2 Whichever is greater

Turn Demand Volume (1)=	10
Approach Volume =	560
Turn / Approach =	2%
(1) PM Peak (highest volume).	

Note: Based on L&D Manual guidance, left turn lane recommended to not exceed 600 feet (storage).

Storage Length at Intersections: 401-10E

Average No. of Vehicles/Cycle	Required Length	Average No. of Vehicles/Cycle	Required Length
1	50 ft	17	600 ft
2	100 ft	18	625 ft
3	150 ft	19	650 ft
4	175 ft	20	675 ft
5	200 ft	21	725 ft
6	250 ft	22	750 ft
7	275 ft	23	775 ft
8	325 ft	24	800 ft
9	350 ft	25	825 ft
10	375 ft	30	975 ft
11	400 ft	35	1125 ft
12	450 ft	40	1250 ft
13	475 ft	45	1400 ft
14	500 ft	50	1550 ft
15	525 ft	55	1700 ft
16	550 ft	60	1850 ft

Left Turn Storage Lane Length Calculation

DHV (Turning Lane) = 10
Cycle Length = 60
Cycles per Hour = 60
Average Vehicles per Cycle= 1

If Cycles are unknown, assume: Unsignalized or 2 Phase - 60 Cycles/Hr; 3 Phase - 40 Cycles/Hr; 4 Phase - 30 Cycles/Hr
Required Turn Lane Storage Length = 50 ft (from Figure 401-10)

Adjacent Through Lane Storage Calculation

Adjacent Lane(s) Volume = 400
Average Vehicles per Cycle= 7
Required Length (total) = 275 ft (from Figure 401-10)
Number of Lanes 1
Required Length (per lane) = 275 ft

Condition A **Storage Only**
Length = 50 ft (diverging taper) + 50 ft (Storage Length, Figure 401-10)
Length = 100 ft

Condition B **High Speed Deceleration Only**

Design Speed	Length (including 50' Diverging Taper)
40	125 ft
45	175 ft
50	225 ft
55	285 ft
60	345 ft

Length = #N/A ft

Condition C **Moderate Speed Deceleration and Storage**

Design Speed	Length (including 50' Diverging Taper)			(Storage Length, Figure 401-10)
40	165 ft	115 ft	+	50 ft
45	175 ft	125 ft	+	50 ft
50	195 ft	145 ft	+	50 ft
55	215 ft	165 ft	+	50 ft
60	235 ft	185 ft	+	50 ft

Length = #N/A ft

Minimum Required Storage Lane Length (including 50' diverging taper) Per Lane = 100 feet
Perferred Storage Lane Length (including 50' diverging taper) Per Lane = 325 feet

Note: Minimum required storage lane length reflects required storage of vehicles calculated using volume and cycle length. Preferred storage length varies from minimum storage lane length when adjacent through lane queue is projected to be greater than the minimum required storage length.

Length of Turn Lane Calculation Worksheet
Based on ODOT L&D Manual, Release Date 7/1/2018

Michael Baker INTERNATIONAL

Project Name:	Indianola Ave Road Diet	Analysis Date:	9/15/2021
Intersection:	Indianola Ave & Arcadia Ave	Movement:	EBR
			2044 AM Peak Build
Design Speed =	35	(Speed in mph)	
Turn Demand Volume =	High	(High or Low)	
Type of Traffic Control =	Signalized	(Signalized, Unsignalized Stopped Crossroad, or Unsignalized Through Road)	
Condition =	A	(A, B, or C obtained from Table 401-9E)	

BASIS FOR COMPUTING LENGTH OF TURN LANES

401-9E
REFERENCE SECTIONS 401.6.1, 401.6.3

TYPE OF TRAFFIC CONTROL	DESIGN SPEED (mph)					
	30 - 35		40 - 45		50 - 60	
	TURN DEMAND VOLUME					
	HIGH	LOW[1]	HIGH	LOW[1]	HIGH	LOW[1]
SIGNALIZED	A	A	B or C[2]	B or C[2]	B or C[2]	B or C[2]
UNSIGNALIZED STOPPED CROSSROAD	A	A	A	A	A	A
UNSIGNALIZED THROUGH ROAD	A	A	C	B	B or C[2]	B

[1] LOW is considered 10% or less of approach traffic volume.
[2] Whichever is greater

Turn Demand Volume (1)=	210
Approach Volume =	350
Turn / Approach =	60%
(1) PM Peak (highest volume).	

Note: Based on L&D Manual guidance, left turn lane recommended to not exceed 600 feet (storage).

Storage Length at Intersections: 401-10E

Average No. of Vehicles/Cycle	Required Length	Average No. of Vehicles/Cycle	Required Length
1	50 **ft**	17	600 ft
2	100 ft	18	625 ft
3	150 ft	19	650 ft
4	175 ft	20	675 ft
5	200 ft	21	725 ft
6	250 ft	22	750 ft
7	275 ft	23	775 ft
8	325 ft	24	800 ft
9	350 ft	25	825 ft
10	375 ft	30	975 ft
11	400 ft	35	1125 ft
12	450 ft	40	1250 ft
13	475 ft	45	1400 ft
14	500 ft	50	1550 ft
15	525 ft	55	1700 ft
16	550 ft	60	1850 ft

Left Turn Storage Lane Length Calculation

DHV (Turning Lane) =	210	If Cycles are unknown, assume:	Unsignalized or 2 Phase - 60 Cycles/Hr
Cycle Length =	60		3 Phase - 40 Cycles/Hr
Cycles per Hour =	60		4 Phase - 30 Cycles/Hr
Average Vehicles per Cycle=	4	Required Turn Lane Storage Length =	175 ft (from Figure 401-10)

Adjacent Through Lane Storage Calculation

Adjacent Lane(s) Volume =	410	Number of Lanes	1
Average Vehicles per Cycle=	7	Required Length (per lane) =	275 ft
Required Length (total) =	275 ft (from Figure 401-10)		

Condition A **Storage Only** (Storage Length, Figure 401-10)
Length = 50 ft (diverging taper) + 175 ft **Length = 225 ft**

Condition B **High Speed Deceleration Only**

Design Speed	Length (including 50' Diverging Taper)
40	125 ft
45	175 ft
50	225 ft
55	285 ft
60	345 ft

Length = #N/A ft

Condition C **Moderate Speed Deceleration and Storage**

Design Speed	Length (including 50' Diverging Taper)			(Storage Length, Figure 401-10)
40	290 ft	115 ft	+	175 ft
45	300 ft	125 ft	+	175 ft
50	320 ft	145 ft	+	175 ft
55	340 ft	165 ft	+	175 ft
60	360 ft	185 ft	+	175 ft

Length = #N/A ft

Minimum Required Storage Lane Length (including 50' diverging taper) Per Lane = 225 feet
Perferred Storage Lane Length (including 50' diverging taper) Per Lane = 325 feet

Note: Minimum required storage lane length reflects required storage of vehicles calculated using volume and cycle length. Preferred storage length varies from minimum storage lane length when adjacent through lane queue is projected to be greater than the minimum required storage length.

Length of Turn Lane Calculation Worksheet
Based on ODOT L&D Manual, Release Date 7/1/2018

Michael Baker INTERNATIONAL

Project Name:	Indianola Ave Road Diet	Analysis Date:	9/15/2021
Intersection:	Indianola Ave & Arcadia Ave	Movement:	WBL
			2044 AM Peak Build
Design Speed =	35	(Speed in mph)	
Turn Demand Volume =	Low	(High or Low)	
Type of Traffic Control =	Signalized	(Signalized, Unsignalized Stopped Crossroad, or Unsignalized Through Road)	
Condition =	A	(A, B, or C obtained from Table 401-9E)	

BASIS FOR COMPUTING LENGTH OF TURN LANES — 401-9E REFERENCE SECTIONS 401.6.1, 401.6.3

TYPE OF TRAFFIC CONTROL	DESIGN SPEED (mph) 30 - 35		40 - 45		50 - 60	
	TURN DEMAND VOLUME					
	HIGH	LOW[1]	HIGH	LOW[1]	HIGH	LOW[1]
SIGNALIZED	A	A	B or C[2]	B or C[2]	B or C[2]	B or C[2]
UNSIGNALIZED STOPPED CROSSROAD	A	A	A	A	A	A
UNSIGNALIZED THROUGH ROAD	A	A	C	B	B or C[2]	B

1 LOW is considered 10% or less of approach traffic volume.
2 Whichever is greater

Turn Demand Volume (1)=	10
Approach Volume =	110
Turn / Approach =	9%

(1) PM Peak (highest volume).

Note: Based on L&D Manual guidance, left turn lane recommended to not exceed 600 feet (storage).

Storage Length at Intersections: 401-10E

Average No. of Vehicles/Cycle	Required Length	Average No. of Vehicles/Cycle	Required Length
1	50 ft	17	600 ft
2	100 ft	18	625 ft
3	150 ft	19	650 ft
4	175 ft	20	675 ft
5	200 ft	21	725 ft
6	250 ft	22	750 ft
7	275 ft	23	775 ft
8	325 ft	24	800 ft
9	350 ft	25	825 ft
10	375 ft	30	975 ft
11	400 ft	35	1125 ft
12	450 ft	40	1250 ft
13	475 ft	45	1400 ft
14	500 ft	50	1550 ft
15	525 ft	55	1700 ft
16	550 ft	60	1850 ft

Left Turn Storage Lane Length Calculation

DHV (Turning Lane) =	10	If Cycles are unknown, assume:	Unsignalized or 2 Phase - 60 Cycles/Hr
Cycle Length =	60		3 Phase - 40 Cycles/Hr
Cycles per Hour =	60		4 Phase - 30 Cycles/Hr
Average Vehicles per Cycle=	1	Required Turn Lane Storage Length =	50 ft (from Figure 401-10)

Adjacent Through Lane Storage Calculation

Adjacent Lane(s) Volume =	400	Number of Lanes	1
Average Vehicles per Cycle=	7	Required Length (per lane) =	275 ft
Required Length (total) =	275 ft (from Figure 401-10)		

Condition A **Storage Only**
Length = 50 ft (diverging taper) + 50 ft (Storage Length, Figure 401-10) **Length = 100 ft**

Condition B **High Speed Deceleration Only**

Design Speed	Length (including 50' Diverging Taper)
40	125 ft
45	175 ft
50	225 ft
55	285 ft
60	345 ft

Length = #N/A ft

Condition C **Moderate Speed Deceleration and Storage**

Design Speed	Length (including 50' Diverging Taper)			(Storage Length, Figure 401-10)
40	165 ft	115 ft	+	50 ft
45	175 ft	125 ft	+	50 ft
50	195 ft	145 ft	+	50 ft
55	215 ft	165 ft	+	50 ft
60	235 ft	185 ft	+	50 ft

Length = #N/A ft

Minimum Required Storage Lane Length (including 50' diverging taper) Per Lane = 100 feet

Perferred Storage Lane Length (including 50' diverging taper) Per Lane = 325 feet

Note: Minimum required storage lane length reflects required storage of vehicles calculated using volume and cycle length. Preferred storage length varies from minimum storage lane length when adjacent through lane queue is projected to be greater than the minimum required storage length.

Length of Turn Lane Calculation Worksheet
Based on ODOT L&D Manual, Release Date 7/1/2018

Michael Baker INTERNATIONAL

Project Name:	Indianola Ave Road Diet	Analysis Date:	9/15/2021
Intersection:	Indianola Ave & Arcadia Ave	Movement:	NBL
			2044 PM Peak Build

Design Speed =	35	(Speed in mph)
Turn Demand Volume =	High	(High or Low)
Type of Traffic Control =	Signalized	(Signalized, Unsignalized Stopped Crossroad, or Unsignalized Through Road)
Condition =	A	(A, B, or C obtained from Table 401-9E)

BASIS FOR COMPUTING LENGTH OF TURN LANES — **401-9E** — **REFERENCE SECTIONS 401.6.1, 401.6.3**

TYPE OF TRAFFIC CONTROL	DESIGN SPEED (mph)					
	30 - 35		40 - 45		50 - 60	
	TURN DEMAND VOLUME					
	HIGH	LOW[1]	HIGH	LOW[1]	HIGH	LOW[1]
SIGNALIZED	A	A	B or C[2]	B or C[2]	B or C[2]	B or C[2]
UNSIGNALIZED STOPPED CROSSROAD	A	A	A	A	A	A
UNSIGNALIZED THROUGH ROAD	A	A	C	B	B or C[2]	B

[1] LOW is considered 10% or less of approach traffic volume.
[2] Whichever is greater

Turn Demand Volume (1)=	190
Approach Volume =	750
Turn / Approach =	25%
(1) PM Peak (highest volume).	

Note: Based on L&D Manual guidance, left turn lane recommended to not exceed 600 feet (storage).

Storage Length at Intersections: 401-10E

Average No. of Vehicles/Cycle	Required Length		Average No. of Vehicles/Cycle	Required Length
1	50	ft	17	600 ft
2	100	ft	18	625 ft
3	150	ft	19	650 ft
4	175	ft	20	675 ft
5	200	ft	21	725 ft
6	250	ft	22	750 ft
7	275	ft	23	775 ft
8	325	ft	24	800 ft
9	350	ft	25	825 ft
10	375	ft	30	975 ft
11	400	ft	35	1125 ft
12	450	ft	40	1250 ft
13	475	ft	45	1400 ft
14	500	ft	50	1550 ft
15	525	ft	55	1700 ft
16	550	ft	60	1850 ft

Left Turn Storage Lane Length Calculation

DHV (Turning Lane) =	190	If Cycles are unknown, assume: Unsignalized or 2 Phase - 60 Cycles/Hr
Cycle Length =	60	3 Phase - 40 Cycles/Hr
Cycles per Hour =	60	4 Phase - 30 Cycles/Hr
Average Vehicles per Cycle=	3	Required Turn Lane Storage Length = 150 ft (from Figure 401-10)

Adjacent Through Lane Storage Calculation

Adjacent Lane(s) Volume =	520	Number of Lanes 1
Average Vehicles per Cycle=	9	Required Length (per lane) = 350 ft
Required Length (total) =	350	ft (from Figure 401-10)

Condition A **Storage Only**
(Storage Length, Figure 401-10)
Length = 50 ft (diverging taper) + 150 ft **Length = 200 ft**

Condition B **High Speed Deceleration Only**

Design Speed	Length (including 50' Diverging Taper)	
40	125	ft
45	175	ft
50	225	ft
55	285	ft
60	345	ft

Length = #N/A ft

Condition C **Moderate Speed Deceleration and Storage**

Design Speed	Length (including 50' Diverging Taper)					(Storage Length, Figure 401-10)
40	265	ft	115	ft	+	150 ft
45	275	ft	125	ft	+	150 ft
50	295	ft	145	ft	+	150 ft
55	315	ft	165	ft	+	150 ft
60	335	ft	185	ft	+	150 ft

Length = #N/A ft

Minimum Required Storage Lane Length (including 50' diverging taper) Per Lane = 200 feet
Perferred Storage Lane Length (including 50' diverging taper) Per Lane = 400 feet

Note: Minimum required storage lane length reflects required storage of vehicles calculated using volume and cycle length. Preferred storage length varies from minimum storage lane length when adjacent through lane queue is projected to be greater than the minimum required storage length.

Length of Turn Lane Calculation Worksheet
Based on ODOT L&D Manual, Release Date 7/1/2018

Michael Baker INTERNATIONAL

Project Name:	Indianola Ave Road Diet	Analysis Date:	9/15/2021
Intersection:	Indianola Ave & Arcadia Ave	Movement:	SBL
			2044 PM Peak Build
Design Speed =	35	(Speed in mph)	
Turn Demand Volume =	Low	(High or Low)	
Type of Traffic Control =	Signalized	(Signalized, Unsignalized Stopped Crossroad, or Unsignalized Through Road)	
Condition =	A	(A, B, or C obtained from Table 401-9E)	

BASIS FOR COMPUTING LENGTH OF TURN LANES — **401-9E** — **REFERENCE SECTIONS 401.6.1, 401.6.3**

TYPE OF TRAFFIC CONTROL	DESIGN SPEED (mph) 30 - 35		40 - 45		50 - 60	
	TURN DEMAND VOLUME					
	HIGH	LOW[1]	HIGH	LOW[1]	HIGH	LOW[1]
SIGNALIZED	A	A	B or C[2]	B or C[2]	B or C[2]	B or C[2]
UNSIGNALIZED STOPPED CROSSROAD	A	A	A	A	A	A
UNSIGNALIZED THROUGH ROAD	A	A	C	B	B or C[2]	B

1 LOW is considered 10% or less of approach traffic volume.
2 Whichever is greater

Turn Demand Volume (1)=	10
Approach Volume =	480
Turn / Approach =	2%
(1) PM Peak (highest volume).	

Note: Based on L&D Manual guidance, left turn lane recommended to not exceed 600 feet (storage).

Storage Length at Intersections: 401-10E

Average No. of Vehicles/Cycle	Required Length	Average No. of Vehicles/Cycle	Required Length
1	50 ft	17	600 ft
2	100 ft	18	625 ft
3	150 ft	19	650 ft
4	175 ft	20	675 ft
5	200 ft	21	725 ft
6	250 ft	22	750 ft
7	275 ft	23	775 ft
8	325 ft	24	800 ft
9	350 ft	25	825 ft
10	375 ft	30	975 ft
11	400 ft	35	1125 ft
12	450 ft	40	1250 ft
13	475 ft	45	1400 ft
14	500 ft	50	1550 ft
15	525 ft	55	1700 ft
16	550 ft	60	1850 ft

Left Turn Storage Lane Length Calculation

DHV (Turning Lane) =	10	If Cycles are unknown, assume:	Unsignalized or 2 Phase - 60 Cycles/Hr
Cycle Length =	60		3 Phase - 40 Cycles/Hr
Cycles per Hour =	60		4 Phase - 30 Cycles/Hr
Average Vehicles per Cycle=	1	Required Turn Lane Storage Length =	50 ft (from Figure 401-10)

Adjacent Through Lane Storage Calculation

Adjacent Lane(s) Volume =	440	Number of Lanes	1
Average Vehicles per Cycle=	7	Required Length (per lane) =	275 ft
Required Length (total) =	275 ft (from Figure 401-10)		

Condition A **Storage Only** (Storage Length, Figure 401-10)
Length = 50 ft (diverging taper) + 50 ft **Length = 100 ft**

Condition B **High Speed Deceleration Only**

Design Speed	Length (including 50' Diverging Taper)
40	125 ft
45	175 ft
50	225 ft
55	285 ft
60	345 ft

Length = #N/A ft

Condition C **Moderate Speed Deceleration and Storage**

Design Speed	Length (including 50' Diverging Taper)			(Storage Length, Figure 401-10)
40	165 ft	115 ft	+	50 ft
45	175 ft	125 ft	+	50 ft
50	195 ft	145 ft	+	50 ft
55	215 ft	165 ft	+	50 ft
60	235 ft	185 ft	+	50 ft

Length = #N/A ft

Minimum Required Storage Lane Length (including 50' diverging taper) Per Lane = 100 feet
Perferred Storage Lane Length (including 50' diverging taper) Per Lane = 325 feet

Note: Minimum required storage lane length reflects required storage of vehicles calculated using volume and cycle length. Preferred storage length varies from minimum storage lane length when adjacent through lane queue is projected to be greater than the minimum required storage length.

Length of Turn Lane Calculation Worksheet
Based on ODOT L&D Manual, Release Date 7/1/2018

Michael Baker INTERNATIONAL

Project Name:	Indianola Ave Road Diet	Analysis Date:	9/15/2021
Intersection:	Indianola Ave & Arcadia Ave	Movement:	EBR
			2044 PM Peak Build
Design Speed =	35	(Speed in mph)	
Turn Demand Volume =	High	(High or Low)	
Type of Traffic Control =	Signalized	(Signalized, Unsignalized Stopped Crossroad, or Unsignalized Through Road)	
Condition =	A	(A, B, or C obtained from Table 401-9E)	

BASIS FOR COMPUTING LENGTH OF TURN LANES — 401-9E REFERENCE SECTIONS 401.6.1, 401.6.3

TYPE OF TRAFFIC CONTROL	DESIGN SPEED (mph) 30 - 35		40 - 45		50 - 60	
	TURN DEMAND VOLUME					
	HIGH	LOW[1]	HIGH	LOW[1]	HIGH	LOW[1]
SIGNALIZED	A	A	B or C[2]	B or C[2]	B or C[2]	B or C[2]
UNSIGNALIZED STOPPED CROSSROAD	A	A	A	A	A	A
UNSIGNALIZED THROUGH ROAD	A	A	C	B	B or C[2]	B

1 LOW is considered 10% or less of approach traffic volume.
2 Whichever is greater

Turn Demand Volume (1)=	110
Approach Volume =	280
Turn / Approach =	39%
(1) PM Peak (highest volume).	

Note: Based on L&D Manual guidance, left turn lane recommended to not exceed 600 feet (storage).

Storage Length at Intersections: 401-10E

Average No. of Vehicles/Cycle	Required Length	Average No. of Vehicles/Cycle	Required Length
1	50 ft	17	600 ft
2	100 ft	18	625 ft
3	150 ft	19	650 ft
4	175 ft	20	675 ft
5	200 ft	21	725 ft
6	250 ft	22	750 ft
7	275 ft	23	775 ft
8	325 ft	24	800 ft
9	350 ft	25	825 ft
10	375 ft	30	975 ft
11	400 ft	35	1125 ft
12	450 ft	40	1250 ft
13	475 ft	45	1400 ft
14	500 ft	50	1550 ft
15	525 ft	55	1700 ft
16	550 ft	60	1850 ft

Left Turn Storage Lane Length Calculation

DHV (Turning Lane) =	110	If Cycles are unknown, assume:	Unsignalized or 2 Phase - 60 Cycles/Hr
Cycle Length =	60		3 Phase - 40 Cycles/Hr
Cycles per Hour =	60		4 Phase - 30 Cycles/Hr
Average Vehicles per Cycle=	2	Required Turn Lane Storage Length =	100 ft (from Figure 401-10)

Adjacent Through Lane Storage Calculation

Adjacent Lane(s) Volume =	520	Number of Lanes	1
Average Vehicles per Cycle=	9	Required Length (per lane) =	350 ft
Required Length (total) =	350 ft (from Figure 401-10)		

Condition A **Storage Only**

Length = 50 ft (diverging taper) + 100 ft (Storage Length, Figure 401-10) — **Length = 150 ft**

Condition B **High Speed Deceleration Only**

Design Speed	Length (including 50' Diverging Taper)
40	125 ft
45	175 ft
50	225 ft
55	285 ft
60	345 ft

Length = #N/A ft

Condition C **Moderate Speed Deceleration and Storage**

Design Speed	Length (including 50' Diverging Taper)			(Storage Length, Figure 401-10)
40	215 ft	115 ft	+	100 ft
45	225 ft	125 ft	+	100 ft
50	245 ft	145 ft	+	100 ft
55	265 ft	165 ft	+	100 ft
60	285 ft	185 ft	+	100 ft

Length = #N/A ft

Minimum Required Storage Lane Length (including 50' diverging taper) Per Lane = 150 feet
Perferred Storage Lane Length (including 50' diverging taper) Per Lane = 400 feet

Note: Minimum required storage lane length reflects required storage of vehicles calculated using volume and cycle length. Preferred storage length varies from minimum storage lane length when adjacent through lane queue is projected to be greater than the minimum required storage length.

Length of Turn Lane Calculation Worksheet
Based on ODOT L&D Manual, Release Date 7/1/2018

Michael Baker INTERNATIONAL

Project Name:	Indianola Ave Road Diet	Analysis Date:	9/15/2021
Intersection:	Indianola Ave & Arcadia Ave	Movement:	WBL
			2044 PM Peak Build
Design Speed =	35	(Speed in mph)	
Turn Demand Volume =	High	(High or Low)	
Type of Traffic Control =	Signalized	(Signalized, Unsignalized Stopped Crossroad, or Unsignalized Through Road)	
Condition =	A	(A, B, or C obtained from Table 401-9E)	

BASIS FOR COMPUTING LENGTH OF TURN LANES — 401-9E REFERENCE SECTIONS 401.6.1, 401.6.3

TYPE OF TRAFFIC CONTROL	DESIGN SPEED (mph) 30 - 35		40 - 45		50 - 60	
	TURN DEMAND VOLUME					
	HIGH	LOW[1]	HIGH	LOW[1]	HIGH	LOW[1]
SIGNALIZED	A	A	B or C[2]	B or C[2]	B or C[2]	B or C[2]
UNSIGNALIZED STOPPED CROSSROAD	A	A	A	A	A	A
UNSIGNALIZED THROUGH ROAD	A	A	C	B	B or C[2]	B

1 LOW is considered 10% or less of approach traffic volume.
2 Whichever is greater

Turn Demand Volume (1)=	10
Approach Volume =	70
Turn / Approach =	14%
(1) PM Peak (highest volume).	

Note: Based on L&D Manual guidance, left turn lane recommended to not exceed 600 feet (storage).

Storage Length at Intersections: 401-10E

Average No. of Vehicles/Cycle	Required Length	Average No. of Vehicles/Cycle	Required Length
1	50 ft	17	600 ft
2	100 ft	18	625 ft
3	150 ft	19	650 ft
4	175 ft	20	675 ft
5	200 ft	21	725 ft
6	250 ft	22	750 ft
7	275 ft	23	775 ft
8	325 ft	24	800 ft
9	350 ft	25	825 ft
10	375 ft	30	975 ft
11	400 ft	35	1125 ft
12	450 ft	40	1250 ft
13	475 ft	45	1400 ft
14	500 ft	50	1550 ft
15	525 ft	55	1700 ft
16	550 ft	60	1850 ft

Left Turn Storage Lane Length Calculation

DHV (Turning Lane) =	10	If Cycles are unknown, assume:	Unsignalized or 2 Phase - 60 Cycles/Hr
Cycle Length =	60		3 Phase - 40 Cycles/Hr
Cycles per Hour =	60		4 Phase - 30 Cycles/Hr
Average Vehicles per Cycle=	1	Required Turn Lane Storage Length =	50 ft (from Figure 401-10)

Adjacent Through Lane Storage Calculation

Adjacent Lane(s) Volume =	440	Number of Lanes	1
Average Vehicles per Cycle=	7	Required Length (per lane) =	275 ft
Required Length (total) =	275 ft (from Figure 401-10)		

Condition A **Storage Only**
Length = 50 ft (diverging taper) + 50 ft (Storage Length, Figure 401-10)
Length = 100 ft

Condition B **High Speed Deceleration Only**

Design Speed	Length (including 50' Diverging Taper)
40	125 ft
45	175 ft
50	225 ft
55	285 ft
60	345 ft

Length = #N/A ft

Condition C **Moderate Speed Deceleration and Storage**

Design Speed	Length (including 50' Diverging Taper)			(Storage Length, Figure 401-10)
40	165 ft	115 ft	+	50 ft
45	175 ft	125 ft	+	50 ft
50	195 ft	145 ft	+	50 ft
55	215 ft	165 ft	+	50 ft
60	235 ft	185 ft	+	50 ft

Length = #N/A ft

Minimum Required Storage Lane Length (including 50' diverging taper) Per Lane = 100 feet
Perferred Storage Lane Length (including 50' diverging taper) Per Lane = 325 feet

Note: Minimum required storage lane length reflects required storage of vehicles calculated using volume and cycle length. Preferred storage length varies from minimum storage lane length when adjacent through lane queue is projected to be greater than the minimum required storage length.

Michael Baker
INTERNATIONAL

We Make a Difference

Indianola & Weber

Turn Lane Calculations

Length of Turn Lane Calculation Worksheet
Based on ODOT L&D Manual, Release Date 7/1/2018

Michael Baker INTERNATIONAL

Project Name: Indianola Ave Road Diet
Intersection: Indianola Ave & Weber Rd
Analysis Date: 6/28/2021
Movement: NBL
2024 AM Peak Build

Design Speed = 35 (Speed in mph)
Turn Demand Volume = Low (High or Low)
Type of Traffic Control = Signalized (Signalized, Unsignalized Stopped Crossroad, or Unsignalized Through Road)
Condition = A (A, B, or C obtained from Table 401-9E)

BASIS FOR COMPUTING LENGTH OF TURN LANES — **401-9E REFERENCE SECTIONS 401.6.1, 401.6.3**

TYPE OF TRAFFIC CONTROL	DESIGN SPEED (mph) 30 - 35		40 - 45		50 - 60	
	TURN DEMAND VOLUME					
	HIGH	LOW[1]	HIGH	LOW[1]	HIGH	LOW[1]
SIGNALIZED	A	A	B or C[2]	B or C[2]	B or C[2]	B or C[2]
UNSIGNALIZED STOPPED CROSSROAD	A	A	A	A	A	A
UNSIGNALIZED THROUGH ROAD	A	A	C	B	B or C[2]	B

1 LOW is considered 10% or less of approach traffic volume.
2 Whichever is greater

Turn Demand Volume (1)=	40
Approach Volume =	420
Turn / Approach =	10%
(1) PM Peak (highest volume).	

Note: Based on L&D Manual guidance, left turn lane recommended to not exceed 600 feet (storage).

Storage Length at Intersections: 401-10E

Average No. of Vehicles/Cycle	Required Length	Average No. of Vehicles/Cycle	Required Length
1	50 ft	17	600 ft
2	100 ft	18	625 ft
3	150 ft	19	650 ft
4	175 ft	20	675 ft
5	200 ft	21	725 ft
6	250 ft	22	750 ft
7	275 ft	23	775 ft
8	325 ft	24	800 ft
9	350 ft	25	825 ft
10	375 ft	30	975 ft
11	400 ft	35	1125 ft
12	450 ft	40	1250 ft
13	475 ft	45	1400 ft
14	500 ft	50	1550 ft
15	525 ft	55	1700 ft
16	550 ft	60	1850 ft

Left Turn Storage Lane Length Calculation

DHV (Turning Lane) = 40
Cycle Length = 60
Cycles per Hour = 60
Average Vehicles per Cycle= 1

If Cycles are unknown, assume: Unsignalized or 2 Phase - 60 Cycles/Hr; 3 Phase - 40 Cycles/Hr; 4 Phase - 30 Cycles/Hr

Required Turn Lane Storage Length = 50 ft (from Figure 401-10)

Adjacent Through Lane Storage Calculation

Adjacent Lane(s) Volume = 380
Average Vehicles per Cycle= 6
Required Length (total) = 250 ft (from Figure 401-10)
Number of Lanes 1
Required Length (per lane) = 250 ft

Condition A **Storage Only**
Length = 50 ft (diverging taper) + 50 ft (Storage Length, Figure 401-10) **Length = 100 ft**

Condition B **High Speed Deceleration Only**

Design Speed	Length (including 50' Diverging Taper)
40	125 ft
45	175 ft
50	225 ft
55	285 ft
60	345 ft

Length = #N/A ft

Condition C **Moderate Speed Deceleration and Storage**

Design Speed	Length (including 50' Diverging Taper)			(Storage Length, Figure 401-10)
40	165 ft	115 ft	+	50 ft
45	175 ft	125 ft	+	50 ft
50	195 ft	145 ft	+	50 ft
55	215 ft	165 ft	+	50 ft
60	235 ft	185 ft	+	50 ft

Length = #N/A ft

Minimum Required Storage Lane Length (including 50' diverging taper) Per Lane = 100 feet
Perferred Storage Lane Length (including 50' diverging taper) Per Lane = 300 feet

Note: Minimum required storage lane length reflects required storage of vehicles calculated using volume and cycle length. Preferred storage length varies from minimum storage lane length when adjacent through lane queue is projected to be greater than the minimum required storage length.

Length of Turn Lane Calculation Worksheet
Based on ODOT L&D Manual, Release Date 7/1/2018

Michael Baker INTERNATIONAL

Project Name: Indianola Ave Road Diet
Intersection: Indianola Ave & Weber Rd
Analysis Date: 6/28/2021
Movement: SBL
2024 AM Peak Build

Design Speed = 35 (Speed in mph)
Turn Demand Volume = Low (High or Low)
Type of Traffic Control = Signalized (Signalized, Unsignalized Stopped Crossroad, or Unsignalized Through Road)
Condition = A (A, B, or C obtained from Table 401-9E)

BASIS FOR COMPUTING LENGTH OF TURN LANES

401-9E REFERENCE SECTIONS 401.6.1, 401.6.3

TYPE OF TRAFFIC CONTROL	DESIGN SPEED (mph) 30 - 35		40 - 45		50 - 60	
	TURN DEMAND VOLUME					
	HIGH	LOW[1]	HIGH	LOW[1]	HIGH	LOW[1]
SIGNALIZED	A	A	B or C[2]	B or C[2]	B or C[2]	B or C[2]
UNSIGNALIZED STOPPED CROSSROAD	A	A	A	A	A	A
UNSIGNALIZED THROUGH ROAD	A	A	C	B	B or C[2]	B

1 LOW is considered 10% or less of approach traffic volume.
2 Whichever is greater

Turn Demand Volume (1)= 30
Approach Volume = 400
Turn / Approach = 8%
(1) PM Peak (highest volume).

Note: Based on L&D Manual guidance, left turn lane recommended to not exceed 600 feet (storage).

Storage Length at Intersections: 401-10E

Average No. of Vehicles/Cycle	Required Length	Average No. of Vehicles/Cycle	Required Length
1	50 ft	17	600 ft
2	100 ft	18	625 ft
3	150 ft	19	650 ft
4	175 ft	20	675 ft
5	200 ft	21	725 ft
6	250 ft	22	750 ft
7	275 ft	23	775 ft
8	325 ft	24	800 ft
9	350 ft	25	825 ft
10	375 ft	30	975 ft
11	400 ft	35	1125 ft
12	450 ft	40	1250 ft
13	475 ft	45	1400 ft
14	500 ft	50	1550 ft
15	525 ft	55	1700 ft
16	550 ft	60	1850 ft

Left Turn Storage Lane Length Calculation

DHV (Turning Lane) = 30
Cycle Length = 60
Cycles per Hour = 60
Average Vehicles per Cycle= 1

If Cycles are unknown, assume: Unsignalized or 2 Phase - 60 Cycles/Hr; 3 Phase - 40 Cycles/Hr; 4 Phase - 30 Cycles/Hr
Required Turn Lane Storage Length = 50 ft (from Figure 401-10)

Adjacent Through Lane Storage Calculation

Adjacent Lane(s) Volume = 370
Average Vehicles per Cycle= 6
Required Length (total) = 250 ft (from Figure 401-10)
Number of Lanes 1
Required Length (per lane) = 250 ft

Condition A **Storage Only**
Length = 50 ft (diverging taper) + 50 ft (Storage Length, Figure 401-10)
Length = 100 ft

Condition B **High Speed Deceleration Only**

Design Speed	Length (including 50' Diverging Taper)
40	125 ft
45	175 ft
50	225 ft
55	285 ft
60	345 ft

Length = #N/A ft

Condition C **Moderate Speed Deceleration and Storage**

Design Speed	Length (including 50' Diverging Taper)			(Storage Length, Figure 401-10)
40	165 ft	115 ft	+	50 ft
45	175 ft	125 ft	+	50 ft
50	195 ft	145 ft	+	50 ft
55	215 ft	165 ft	+	50 ft
60	235 ft	185 ft	+	50 ft

Length = #N/A ft

Minimum Required Storage Lane Length (including 50' diverging taper) Per Lane = 100 feet
Perferred Storage Lane Length (including 50' diverging taper) Per Lane = 300 feet

Note: Minimum required storage lane length reflects required storage of vehicles calculated using volume and cycle length. Preferred storage length varies from minimum storage lane length when adjacent through lane queue is projected to be greater than the minimum required storage length.

Length of Turn Lane Calculation Worksheet
Based on ODOT L&D Manual, Release Date 7/1/2018

Michael Baker INTERNATIONAL

Project Name:	Indianola Ave Road Diet	Analysis Date:	6/28/2021
Intersection:	Indianola Ave & Weber Rd	Movement:	EBL
			2024 AM Peak Build
Design Speed =	35	(Speed in mph)	
Turn Demand Volume =	High	(High or Low)	
Type of Traffic Control =	Signalized	(Signalized, Unsignalized Stopped Crossroad, or Unsignalized Through Road)	
Condition =	A	(A, B, or C obtained from Table 401-9E)	

BASIS FOR COMPUTING LENGTH OF TURN LANES	401-9E REFERENCE SECTIONS 401.6.1, 401.6.3					
TYPE OF TRAFFIC CONTROL	DESIGN SPEED (mph)					
	30 - 35		40 - 45		50 - 60	
	TURN DEMAND VOLUME					
	HIGH	LOW[1]	HIGH	LOW[1]	HIGH	LOW[1]
SIGNALIZED	A	A	B or C[2]	B or C[2]	B or C[2]	B or C[2]
UNSIGNALIZED STOPPED CROSSROAD	A	A	A	A	A	A
UNSIGNALIZED THROUGH ROAD	A	A	C	B	B or C[2]	B

Turn Demand Volume (1)=	50
Approach Volume =	350
Turn / Approach =	14%

(1) PM Peak (highest volume).

Note: Based on L&D Manual guidance, left turn lane recommended to not exceed 600 feet (storage).

1 LOW is considered 10% or less of approach traffic volume.
2 Whichever is greater

Storage Length at Intersections: 401-10E

Average No. of Vehicles/Cycle	Required Length	Average No. of Vehicles/Cycle	Required Length
1	50 ft	17	600 ft
2	100 ft	18	625 ft
3	150 ft	19	650 ft
4	175 ft	20	675 ft
5	200 ft	21	725 ft
6	250 ft	22	750 ft
7	275 ft	23	775 ft
8	325 ft	24	800 ft
9	350 ft	25	825 ft
10	375 ft	30	975 ft
11	400 ft	35	1125 ft
12	450 ft	40	1250 ft
13	475 ft	45	1400 ft
14	500 ft	50	1550 ft
15	525 ft	55	1700 ft
16	550 ft	60	1850 ft

Left Turn Storage Lane Length Calculation

DHV (Turning Lane) =	50	If Cycles are unknown, assume:	Unsignalized or 2 Phase - 60 Cycles/Hr
Cycle Length =	60		3 Phase - 40 Cycles/Hr
Cycles per Hour =	60		4 Phase - 30 Cycles/Hr
Average Vehicles per Cycle=	1	Required Turn Lane Storage Length =	50 ft (from Figure 401-10)

Adjacent Through Lane Storage Calculation

Adjacent Lane(s) Volume =	380	Number of Lanes	1
Average Vehicles per Cycle=	6	Required Length (per lane) =	250 ft
Required Length (total) =	250 ft (from Figure 401-10)		

Condition A **Storage Only**

Length = 50 ft (diverging taper) + 50 ft (Storage Length, Figure 401-10) **Length = 100 ft**

Condition B High Speed Deceleration Only

Design Speed	Length (including 50' Diverging Taper)
40	125 ft
45	175 ft
50	225 ft
55	285 ft
60	345 ft

Length = #N/A ft

Condition C Moderate Speed Deceleration and Storage

Design Speed	Length (including 50' Diverging Taper)			(Storage Length, Figure 401-10)
40	165 ft	115 ft	+	50 ft
45	175 ft	125 ft	+	50 ft
50	195 ft	145 ft	+	50 ft
55	215 ft	165 ft	+	50 ft
60	235 ft	185 ft	+	50 ft

Length = #N/A ft

Minimum Required Storage Lane Length (including 50' diverging taper) Per Lane = 100 feet

Perferred Storage Lane Length (including 50' diverging taper) Per Lane = 300 feet

Note: Minimum required storage lane length reflects required storage of vehicles calculated using volume and cycle length. Preferred storage length varies from minimum storage lane length when adjacent through lane queue is projected to be greater than the minimum required storage length.

Length of Turn Lane Calculation Worksheet
Based on ODOT L&D Manual, Release Date 7/1/2018

Michael Baker INTERNATIONAL

Project Name:	Indianola Ave Road Diet	Analysis Date:	6/28/2021
Intersection:	Indianola Ave & Weber Rd	Movement:	WBL
			2024 AM Peak Build
Design Speed =	35	(Speed in mph)	
Turn Demand Volume =	High	(High or Low)	
Type of Traffic Control =	Signalized	(Signalized, Unsignalized Stopped Crossroad, or Unsignalized Through Road)	
Condition =	A	(A, B, or C obtained from Table 401-9E)	

BASIS FOR COMPUTING LENGTH OF TURN LANES

401-9E
REFERENCE SECTIONS 401.6.1, 401.6.3

TYPE OF TRAFFIC CONTROL	DESIGN SPEED (mph)					
	30 - 35		40 - 45		50 - 60	
	TURN DEMAND VOLUME					
	HIGH	LOW[1]	HIGH	LOW[1]	HIGH	LOW[1]
SIGNALIZED	A	A	B or C[2]	B or C[2]	B or C[2]	B or C[2]
UNSIGNALIZED STOPPED CROSSROAD	A	A	A	A	A	A
UNSIGNALIZED THROUGH ROAD	A	A	C	B	B or C[2]	B

[1] LOW is considered 10% or less of approach traffic volume.
[2] Whichever is greater

Turn Demand Volume (1)=	100
Approach Volume =	360
Turn / Approach =	28%
(1) PM Peak (highest volume).	

Note: Based on L&D Manual guidance, left turn lane recommended to not exceed 600 feet (storage).

Storage Length at Intersections: 401-10E

Average No. of Vehicles/Cycle	Required Length	Average No. of Vehicles/Cycle	Required Length
1	50 ft	17	600 ft
2	100 ft	18	625 ft
3	150 ft	19	650 ft
4	175 ft	20	675 ft
5	200 ft	21	725 ft
6	250 ft	22	750 ft
7	275 ft	23	775 ft
8	325 ft	24	800 ft
9	350 ft	25	825 ft
10	375 ft	30	975 ft
11	400 ft	35	1125 ft
12	450 ft	40	1250 ft
13	475 ft	45	1400 ft
14	500 ft	50	1550 ft
15	525 ft	55	1700 ft
16	550 ft	60	1850 ft

Left Turn Storage Lane Length Calculation

DHV (Turning Lane) =	100	If Cycles are unknown, assume:	Unsignalized or 2 Phase - 60 Cycles/Hr
Cycle Length =	60		3 Phase - 40 Cycles/Hr
Cycles per Hour =	60		4 Phase - 30 Cycles/Hr
Average Vehicles per Cycle=	2	Required Turn Lane Storage Length =	100 ft (from Figure 401-10)

Adjacent Through Lane Storage Calculation

Adjacent Lane(s) Volume =	370	Number of Lanes	1
Average Vehicles per Cycle=	6	Required Length (per lane) =	250 ft
Required Length (total) =	250 ft (from Figure 401-10)		

Condition A **Storage Only**
Length = 50 ft (diverging taper) + 100 ft (Storage Length, Figure 401-10)
Length = 150 ft

Condition B **High Speed Deceleration Only**

Design Speed	Length (including 50' Diverging Taper)
40	125 ft
45	175 ft
50	225 ft
55	285 ft
60	345 ft

Length = #N/A ft

Condition C **Moderate Speed Deceleration and Storage**

Design Speed	Length (including 50' Diverging Taper)			(Storage Length, Figure 401-10)
40	215 ft	115 ft	+	100 ft
45	225 ft	125 ft	+	100 ft
50	245 ft	145 ft	+	100 ft
55	265 ft	165 ft	+	100 ft
60	285 ft	185 ft	+	100 ft

Length = #N/A ft

Minimum Required Storage Lane Length (including 50' diverging taper) Per Lane = 150 feet
Perferred Storage Lane Length (including 50' diverging taper) Per Lane = 300 feet

Note: Minimum required storage lane length reflects required storage of vehicles calculated using volume and cycle length. Preferred storage length varies from minimum storage lane length when adjacent through lane queue is projected to be greater than the minimum required storage length.

Length of Turn Lane Calculation Worksheet
Based on ODOT L&D Manual, Release Date 7/1/2018

Michael Baker INTERNATIONAL

Project Name:	Indianola Ave Road Diet	Analysis Date:	6/28/2021
Intersection:	Indianola Ave & Weber Rd	Movement:	NBL
			2024 PM Peak Build
Design Speed =	35	(Speed in mph)	
Turn Demand Volume =	High	(High or Low)	
Type of Traffic Control =	Signalized	(Signalized, Unsignalized Stopped Crossroad, or Unsignalized Through Road)	
Condition =	A	(A, B, or C obtained from Table 401-9E)	

BASIS FOR COMPUTING LENGTH OF TURN LANES

401-9E REFERENCE SECTIONS 401.6.1, 401.6.3

TYPE OF TRAFFIC CONTROL	DESIGN SPEED (mph) 30 - 35		40 - 45		50 - 60	
	TURN DEMAND VOLUME					
	HIGH	LOW[1]	HIGH	LOW[1]	HIGH	LOW[1]
SIGNALIZED	A	A	B or C[2]	B or C[2]	B or C[2]	B or C[2]
UNSIGNALIZED STOPPED CROSSROAD	A	A	A	A	A	A
UNSIGNALIZED THROUGH ROAD	A	A	C	B	B or C[2]	B

1 LOW is considered 10% or less of approach traffic volume.
2 Whichever is greater

Turn Demand Volume (1)=	60
Approach Volume =	560
Turn / Approach =	11%

(1) PM Peak (highest volume).

Note: Based on L&D Manual guidance, left turn lane recommended to not exceed 600 feet (storage).

Storage Length at Intersections: 401-10E

Average No. of Vehicles/Cycle	Required Length	Average No. of Vehicles/Cycle	Required Length
1	50 ft	17	600 ft
2	100 ft	18	625 ft
3	150 ft	19	650 ft
4	175 ft	20	675 ft
5	200 ft	21	725 ft
6	250 ft	22	750 ft
7	275 ft	23	775 ft
8	325 ft	24	800 ft
9	350 ft	25	825 ft
10	375 ft	30	975 ft
11	400 ft	35	1125 ft
12	450 ft	40	1250 ft
13	475 ft	45	1400 ft
14	500 ft	50	1550 ft
15	525 ft	55	1700 ft
16	550 ft	60	1850 ft

Left Turn Storage Lane Length Calculation

DHV (Turning Lane) =	60	If Cycles are unknown, assume:	Unsignalized or 2 Phase - 60 Cycles/Hr
Cycle Length =	65		3 Phase - 40 Cycles/Hr
Cycles per Hour =	55		4 Phase - 30 Cycles/Hr
Average Vehicles per Cycle=	1	Required Turn Lane Storage Length =	50 ft (from Figure 401-10)

Adjacent Through Lane Storage Calculation

Adjacent Lane(s) Volume =	500	Number of Lanes	1
Average Vehicles per Cycle=	9	Required Length (per lane) =	350 ft
Required Length (total) =	350 ft (from Figure 401-10)		

Condition A **Storage Only**
Length = 50 ft (diverging taper) + 50 ft (Storage Length, Figure 401-10) **Length = 100 ft**

Condition B **High Speed Deceleration Only**

Design Speed	Length (including 50' Diverging Taper)
40	125 ft
45	175 ft
50	225 ft
55	285 ft
60	345 ft

Length = #N/A ft

Condition C **Moderate Speed Deceleration and Storage**

Design Speed	Length (including 50' Diverging Taper)			(Storage Length, Figure 401-10)
40	165 ft	115 ft	+	50 ft
45	175 ft	125 ft	+	50 ft
50	195 ft	145 ft	+	50 ft
55	215 ft	165 ft	+	50 ft
60	235 ft	185 ft	+	50 ft

Length = #N/A ft

Minimum Required Storage Lane Length (including 50' diverging taper) Per Lane = 100 feet

Perferred Storage Lane Length (including 50' diverging taper) Per Lane = 400 feet

Note: Minimum required storage lane length reflects required storage of vehicles calculated using volume and cycle length. Preferred storage length varies from minimum storage lane length when adjacent through lane queue is projected to be greater than the minimum required storage length.

Length of Turn Lane Calculation Worksheet

Based on ODOT L&D Manual, Release Date 7/1/2018

Michael Baker INTERNATIONAL

Project Name:	Indianola Ave Road Diet	Analysis Date:	6/28/2021
Intersection:	Indianola Ave & Weber Rd	Movement:	SBL
			2024 PM Peak Build
Design Speed =	35	(Speed in mph)	
Turn Demand Volume =	Low	(High or Low)	
Type of Traffic Control =	Signalized	(Signalized, Unsignalized Stopped Crossroad, or Unsignalized Through Road)	
Condition =	A	(A, B, or C obtained from Table 401-9E)	

BASIS FOR COMPUTING LENGTH OF TURN LANES

401-9E REFERENCE SECTIONS 401.6.1, 401.6.3

TYPE OF TRAFFIC CONTROL	DESIGN SPEED (mph) 30 - 35		40 - 45		50 - 60	
	TURN DEMAND VOLUME					
	HIGH	LOW[1]	HIGH	LOW[1]	HIGH	LOW[1]
SIGNALIZED	A	A	B or C[2]	B or C[2]	B or C[2]	B or C[2]
UNSIGNALIZED STOPPED CROSSROAD	A	A	A	A	A	A
UNSIGNALIZED THROUGH ROAD	A	A	C	B	B or C[2]	B

1 LOW is considered 10% or less of approach traffic volume.

2 Whichever is greater

Turn Demand Volume (1)=	40
Approach Volume =	470
Turn / Approach =	9%
(1) PM Peak (highest volume).	

Note: Based on L&D Manual guidance, left turn lane recommended to not exceed 600 feet (storage).

Storage Length at Intersections: 401-10E

Average No. of Vehicles/Cycle	Required Length		Average No. of Vehicles/Cycle	Required Length
1	50	ft	17	600 ft
2	100	ft	18	625 ft
3	150	ft	19	650 ft
4	175	ft	20	675 ft
5	200	ft	21	725 ft
6	250	ft	22	750 ft
7	275	ft	23	775 ft
8	325	ft	24	800 ft
9	350	ft	25	825 ft
10	375	ft	30	975 ft
11	400	ft	35	1125 ft
12	450	ft	40	1250 ft
13	475	ft	45	1400 ft
14	500	ft	50	1550 ft
15	525	ft	55	1700 ft
16	550	ft	60	1850 ft

Left Turn Storage Lane Length Calculation

DHV (Turning Lane) =	40	If Cycles are unknown, assume:	Unsignalized or 2 Phase - 60 Cycles/Hr
Cycle Length =	65		3 Phase - 40 Cycles/Hr
Cycles per Hour =	55		4 Phase - 30 Cycles/Hr
Average Vehicles per Cycle=	1	Required Turn Lane Storage Length =	50 ft (from Figure 401-10)

Adjacent Through Lane Storage Calculation

Adjacent Lane(s) Volume =	430	Number of Lanes	1
Average Vehicles per Cycle=	8	Required Length (per lane) =	325 ft
Required Length (total) =	325 ft (from Figure 401-10)		

Condition A **Storage Only** (Storage Length, Figure 401-10)

Length = 50 ft (diverging taper) + 50 ft **Length = 100 ft**

Condition B **High Speed Deceleration Only**

Design Speed	Length (including 50' Diverging Taper)
40	125 ft
45	175 ft
50	225 ft
55	285 ft
60	345 ft

Length = #N/A ft

Condition C **Moderate Speed Deceleration and Storage**

Design Speed	Length (including 50' Diverging Taper)			(Storage Length, Figure 401-10)
40	165 ft	115 ft	+	50 ft
45	175 ft	125 ft	+	50 ft
50	195 ft	145 ft	+	50 ft
55	215 ft	165 ft	+	50 ft
60	235 ft	185 ft	+	50 ft

Length = #N/A ft

Minimum Required Storage Lane Length (including 50' diverging taper) Per Lane = 100 feet

Perferred Storage Lane Length (including 50' diverging taper) Per Lane = 375 feet

Note: Minimum required storage lane length reflects required storage of vehicles calculated using volume and cycle length. Preferred storage length varies from minimum storage lane length when adjacent through lane queue is projected to be greater than the minimum required storage length.

Length of Turn Lane Calculation Worksheet
Based on ODOT L&D Manual, Release Date 7/1/2018

Michael Baker INTERNATIONAL

Project Name:	Indianola Ave Road Diet	Analysis Date:	6/28/2021
Intersection:	Indianola Ave & Weber Rd	Movement:	EBL
			2024 PM Peak Build
Design Speed =	35	(Speed in mph)	
Turn Demand Volume =	High	(High or Low)	
Type of Traffic Control =	Signalized	(Signalized, Unsignalized Stopped Crossroad, or Unsignalized Through Road)	
Condition =	A	(A, B, or C obtained from Table 401-9E)	

BASIS FOR COMPUTING LENGTH OF TURN LANES — **401-9E** — **REFERENCE SECTIONS 401.6.1, 401.6.3**

TYPE OF TRAFFIC CONTROL	DESIGN SPEED (mph)					
	30 - 35		40 - 45		50 - 60	
	TURN DEMAND VOLUME					
	HIGH	LOW[1]	HIGH	LOW[1]	HIGH	LOW[1]
SIGNALIZED	A	A	B or C[2]	B or C[2]	B or C[2]	B or C[2]
UNSIGNALIZED STOPPED CROSSROAD	A	A	A	A	A	A
UNSIGNALIZED THROUGH ROAD	A	A	C	B	B or C[2]	B

1 LOW is considered 10% or less of approach traffic volume.
2 Whichever is greater

Turn Demand Volume (1)=	70
Approach Volume =	420
Turn / Approach =	17%
(1) PM Peak (highest volume).	

Note: Based on L&D Manual guidance, left turn lane recommended to not exceed 600 feet (storage).

Storage Length at Intersections: 401-10E

Average No. of Vehicles/Cycle	Required Length		Average No. of Vehicles/Cycle	Required Length
1	50	ft	17	600 ft
2	100	ft	18	625 ft
3	150	ft	19	650 ft
4	175	ft	20	675 ft
5	200	ft	21	725 ft
6	250	ft	22	750 ft
7	275	ft	23	775 ft
8	325	ft	24	800 ft
9	350	ft	25	825 ft
10	375	ft	30	975 ft
11	400	ft	35	1125 ft
12	450	ft	40	1250 ft
13	475	ft	45	1400 ft
14	500	ft	50	1550 ft
15	525	ft	55	1700 ft
16	550	ft	60	1850 ft

Left Turn Storage Lane Length Calculation

DHV (Turning Lane) =	70	If Cycles are unknown, assume:	Unsignalized or 2 Phase - 60 Cycles/Hr
Cycle Length =	65		3 Phase - 40 Cycles/Hr
Cycles per Hour =	55		4 Phase - 30 Cycles/Hr
Average Vehicles per Cycle=	1	Required Turn Lane Storage Length =	50 ft (from Figure 401-10)

Adjacent Through Lane Storage Calculation

Adjacent Lane(s) Volume =	500	Number of Lanes	1
Average Vehicles per Cycle=	9	Required Length (per lane) =	350 ft
Required Length (total) =	350 ft (from Figure 401-10)		

Condition A **Storage Only**
Length = 50 ft (diverging taper) + 50 ft (Storage Length, Figure 401-10) **Length = 100 ft**

Condition B **High Speed Deceleration Only**

Design Speed	Length (including 50' Diverging Taper)
40	125 ft
45	175 ft
50	225 ft
55	285 ft
60	345 ft

Length = #N/A ft

Condition C **Moderate Speed Deceleration and Storage**

Design Speed	Length (including 50' Diverging Taper)			(Storage Length, Figure 401-10)
40	165 ft	115 ft	+	50 ft
45	175 ft	125 ft	+	50 ft
50	195 ft	145 ft	+	50 ft
55	215 ft	165 ft	+	50 ft
60	235 ft	185 ft	+	50 ft

Length = #N/A ft

Minimum Required Storage Lane Length (including 50' diverging taper) Per Lane = 100 feet

Perferred Storage Lane Length (including 50' diverging taper) Per Lane = 400 feet

Note: Minimum required storage lane length reflects required storage of vehicles calculated using volume and cycle length. Preferred storage length varies from minimum storage lane length when adjacent through lane queue is projected to be greater than the minimum required storage length.

Length of Turn Lane Calculation Worksheet
Based on ODOT L&D Manual, Release Date 7/1/2018

Michael Baker INTERNATIONAL

Project Name:	Indianola Ave Road Diet	Analysis Date:	6/28/2021
Intersection:	Indianola Ave & Weber Rd	Movement:	WBL
			2024 PM Peak Build
Design Speed =	35	(Speed in mph)	
Turn Demand Volume =	High	(High or Low)	
Type of Traffic Control =	Signalized	(Signalized, Unsignalized Stopped Crossroad, or Unsignalized Through Road)	
Condition =	A	(A, B, or C obtained from Table 401-9E)	

BASIS FOR COMPUTING LENGTH OF TURN LANES — 401-9E REFERENCE SECTIONS 401.6.1, 401.6.3

TYPE OF TRAFFIC CONTROL	DESIGN SPEED (mph)					
	30 - 35		40 - 45		50 - 60	
	TURN DEMAND VOLUME					
	HIGH	LOW[1]	HIGH	LOW[1]	HIGH	LOW[1]
SIGNALIZED	A	A	B or C[2]	B or C[2]	B or C[2]	B or C[2]
UNSIGNALIZED STOPPED CROSSROAD	A	A	A	A	A	A
UNSIGNALIZED THROUGH ROAD	A	A	C	B	B or C[2]	B

[1] LOW is considered 10% or less of approach traffic volume.
[2] Whichever is greater

Turn Demand Volume (1)=	100
Approach Volume =	510
Turn / Approach =	20%
(1) PM Peak (highest volume).	

Note: Based on L&D Manual guidance, left turn lane recommended to not exceed 600 feet (storage).

Storage Length at Intersections: 401-10E

Average No. of Vehicles/Cycle	Required Length	Average No. of Vehicles/Cycle	Required Length
1	50 ft	17	600 ft
2	100 ft	18	625 ft
3	150 ft	19	650 ft
4	175 ft	20	675 ft
5	200 ft	21	725 ft
6	250 ft	22	750 ft
7	275 ft	23	775 ft
8	325 ft	24	800 ft
9	350 ft	25	825 ft
10	375 ft	30	975 ft
11	400 ft	35	1125 ft
12	450 ft	40	1250 ft
13	475 ft	45	1400 ft
14	500 ft	50	1550 ft
15	525 ft	55	1700 ft
16	550 ft	60	1850 ft

Left Turn Storage Lane Length Calculation

DHV (Turning Lane) =	100	If Cycles are unknown, assume:	Unsignalized or 2 Phase - 60 Cycles/Hr
Cycle Length =	65		3 Phase - 40 Cycles/Hr
Cycles per Hour =	55		4 Phase - 30 Cycles/Hr
Average Vehicles per Cycle=	2	Required Turn Lane Storage Length =	100 ft (from Figure 401-10)

Adjacent Through Lane Storage Calculation

Adjacent Lane(s) Volume =	430	Number of Lanes	1
Average Vehicles per Cycle=	8	Required Length (per lane) =	325 ft
Required Length (total) =	325 ft (from Figure 401-10)		

Condition A **Storage Only**

Length = 50 ft (diverging taper) + 100 ft (Storage Length, Figure 401-10) **Length = 150 ft**

Condition B **High Speed Deceleration Only**

Design Speed	Length (including 50' Diverging Taper)
40	125 ft
45	175 ft
50	225 ft
55	285 ft
60	345 ft

Length = #N/A ft

Condition C **Moderate Speed Deceleration and Storage**

Design Speed	Length (including 50' Diverging Taper)			(Storage Length, Figure 401-10)
40	215 ft	115 ft	+	100 ft
45	225 ft	125 ft	+	100 ft
50	245 ft	145 ft	+	100 ft
55	265 ft	165 ft	+	100 ft
60	285 ft	185 ft	+	100 ft

Length = #N/A ft

Minimum Required Storage Lane Length (including 50' diverging taper) Per Lane = 150 feet

Perferred Storage Lane Length (including 50' diverging taper) Per Lane = 375 feet

Note: Minimum required storage lane length reflects required storage of vehicles calculated using volume and cycle length. Preferred storage length varies from minimum storage lane length when adjacent through lane queue is projected to be greater than the minimum required storage length.

Length of Turn Lane Calculation Worksheet
Based on ODOT L&D Manual, Release Date 7/1/2018

Michael Baker INTERNATIONAL

Project Name:	Indianola Ave Road Diet	Analysis Date:	6/28/2021
Intersection:	Indianola Ave & Weber Rd	Movement:	NBL
			2044 AM Peak Build
Design Speed =	35	(Speed in mph)	
Turn Demand Volume =	High	(High or Low)	
Type of Traffic Control =	Signalized	(Signalized, Unsignalized Stopped Crossroad, or Unsignalized Through Road)	
Condition =	A	(A, B, or C obtained from Table 401-9E)	

BASIS FOR COMPUTING LENGTH OF TURN LANES — 401-9E REFERENCE SECTIONS 401.6.1, 401.6.3

TYPE OF TRAFFIC CONTROL	DESIGN SPEED (mph) 30 - 35		40 - 45		50 - 60	
	TURN DEMAND VOLUME					
	HIGH	LOW[1]	HIGH	LOW[1]	HIGH	LOW[1]
SIGNALIZED	A	A	B or C[2]	B or C[2]	B or C[2]	B or C[2]
UNSIGNALIZED STOPPED CROSSROAD	A	A	A	A	A	A
UNSIGNALIZED THROUGH ROAD	A	A	C	B	B or C[2]	B

[1] LOW is considered 10% or less of approach traffic volume.
[2] Whichever is greater

Turn Demand Volume (1)=	60
Approach Volume =	470
Turn / Approach =	13%

(1) PM Peak (highest volume).

Note: Based on L&D Manual guidance, left turn lane recommended to not exceed 600 feet (storage).

Storage Length at Intersections: 401-10E

Average No. of Vehicles/Cycle	Required Length	Average No. of Vehicles/Cycle	Required Length
1	50 ft	17	600 ft
2	100 ft	18	625 ft
3	150 ft	19	650 ft
4	175 ft	20	675 ft
5	200 ft	21	725 ft
6	250 ft	22	750 ft
7	275 ft	23	775 ft
8	325 ft	24	800 ft
9	350 ft	25	825 ft
10	375 ft	30	975 ft
11	400 ft	35	1125 ft
12	450 ft	40	1250 ft
13	475 ft	45	1400 ft
14	500 ft	50	1550 ft
15	525 ft	55	1700 ft
16	550 ft	60	1850 ft

Left Turn Storage Lane Length Calculation

DHV (Turning Lane) =	60	If Cycles are unknown, assume:	Unsignalized or 2 Phase - 60 Cycles/Hr
Cycle Length =	60		3 Phase - 40 Cycles/Hr
Cycles per Hour =	60		4 Phase - 30 Cycles/Hr
Average Vehicles per Cycle=	1	Required Turn Lane Storage Length =	50 ft (from Figure 401-10)

Adjacent Through Lane Storage Calculation

Adjacent Lane(s) Volume =	410	Number of Lanes	1
Average Vehicles per Cycle=	7	Required Length (per lane) =	275 ft
Required Length (total) =	275 ft (from Figure 401-10)		

Condition A **Storage Only**
Length = 50 ft (diverging taper) + (Storage Length, Figure 401-10) 50 ft **Length = 100 ft**

Condition B **High Speed Deceleration Only**

Design Speed	Length (including 50' Diverging Taper)
40	125 ft
45	175 ft
50	225 ft
55	285 ft
60	345 ft

Length = #N/A ft

Condition C **Moderate Speed Deceleration and Storage**

Design Speed	Length (including 50' Diverging Taper)			(Storage Length, Figure 401-10)
40	165 ft	115 ft	+	50 ft
45	175 ft	125 ft	+	50 ft
50	195 ft	145 ft	+	50 ft
55	215 ft	165 ft	+	50 ft
60	235 ft	185 ft	+	50 ft

Length = #N/A ft

Minimum Required Storage Lane Length (including 50' diverging taper) Per Lane = 100 feet
Perferred Storage Lane Length (including 50' diverging taper) Per Lane = 325 feet

Note: Minimum required storage lane length reflects required storage of vehicles calculated using volume and cycle length. Preferred storage length varies from minimum storage lane length when adjacent through lane queue is projected to be greater than the minimum required storage length.

Length of Turn Lane Calculation Worksheet

Based on ODOT L&D Manual, Release Date 7/1/2018

Michael Baker INTERNATIONAL

Project Name:	Indianola Ave Road Diet	Analysis Date:	6/28/2021
Intersection:	Indianola Ave & Weber Rd	Movement:	SBL
			2044 AM Peak Build
Design Speed =	35	(Speed in mph)	
Turn Demand Volume =	Low	(High or Low)	
Type of Traffic Control =	Signalized	(Signalized, Unsignalized Stopped Crossroad, or Unsignalized Through Road)	
Condition =	A	(A, B, or C obtained from Table 401-9E)	

BASIS FOR COMPUTING LENGTH OF TURN LANES — **401-9E** **REFERENCE SECTIONS 401.6.1, 401.6.3**

TYPE OF TRAFFIC CONTROL	DESIGN SPEED (mph)					
	30 - 35		40 - 45		50 - 60	
	TURN DEMAND VOLUME					
	HIGH	LOW[1]	HIGH	LOW[1]	HIGH	LOW[1]
SIGNALIZED	A	A	B or C[2]	B or C[2]	B or C[2]	B or C[2]
UNSIGNALIZED STOPPED CROSSROAD	A	A	A	A	A	A
UNSIGNALIZED THROUGH ROAD	A	A	C	B	B or C[2]	B

[1] LOW is considered 10% or less of approach traffic volume.
[2] Whichever is greater

Turn Demand Volume (1)=	30
Approach Volume =	430
Turn / Approach =	7%
(1) PM Peak (highest volume).	

Note: Based on L&D Manual guidance, left turn lane recommended to not exceed 600 feet (storage).

Storage Length at Intersections: 401-10E

Average No. of Vehicles/Cycle	Required Length		Average No. of Vehicles/Cycle	Required Length
1	50	ft	17	600 ft
2	100	ft	18	625 ft
3	150	ft	19	650 ft
4	175	ft	20	675 ft
5	200	ft	21	725 ft
6	250	ft	22	750 ft
7	275	ft	23	775 ft
8	325	ft	24	800 ft
9	350	ft	25	825 ft
10	375	ft	30	975 ft
11	400	ft	35	1125 ft
12	450	ft	40	1250 ft
13	475	ft	45	1400 ft
14	500	ft	50	1550 ft
15	525	ft	55	1700 ft
16	550	ft	60	1850 ft

Left Turn Storage Lane Length Calculation

DHV (Turning Lane) =	30	If Cycles are unknown, assume:	Unsignalized or 2 Phase - 60 Cycles/Hr
Cycle Length =	60		3 Phase - 40 Cycles/Hr
Cycles per Hour =	60		4 Phase - 30 Cycles/Hr
Average Vehicles per Cycle=	1	Required Turn Lane Storage Length =	50 ft (from Figure 401-10)

Adjacent Through Lane Storage Calculation

Adjacent Lane(s) Volume =	400	Number of Lanes	1
Average Vehicles per Cycle=	7	Required Length (per lane) =	275 ft
Required Length (total) =	275 ft (from Figure 401-10)		

Condition A **Storage Only**

Length = 50 ft (diverging taper) + 50 ft (Storage Length, Figure 401-10) **Length = 100 ft**

Condition B **High Speed Deceleration Only**

Design Speed	Length (including 50' Diverging Taper)
40	125 ft
45	175 ft
50	225 ft
55	285 ft
60	345 ft

Length = #N/A ft

Condition C **Moderate Speed Deceleration and Storage**

Design Speed	Length (including 50' Diverging Taper)			(Storage Length, Figure 401-10)
40	165 ft	115 ft	+	50 ft
45	175 ft	125 ft	+	50 ft
50	195 ft	145 ft	+	50 ft
55	215 ft	165 ft	+	50 ft
60	235 ft	185 ft	+	50 ft

Length = #N/A ft

Minimum Required Storage Lane Length (including 50' diverging taper) Per Lane = 100 feet

Perferred Storage Lane Length (including 50' diverging taper) Per Lane = 325 feet

Note: Minimum required storage lane length reflects required storage of vehicles calculated using volume and cycle length. Preferred storage length varies from minimum storage lane length when adjacent through lane queue is projected to be greater than the minimum required storage length.

Length of Turn Lane Calculation Worksheet
Based on ODOT L&D Manual, Release Date 7/1/2018

Michael Baker INTERNATIONAL

Project Name: Indianola Ave Road Diet
Intersection: Indianola Ave & Weber Rd
Analysis Date: 6/28/2021
Movement: EBL
2044 AM Peak Build

Design Speed = 35 (Speed in mph)
Turn Demand Volume = High (High or Low)
Type of Traffic Control = Signalized (Signalized, Unsignalized Stopped Crossroad, or Unsignalized Through Road)
Condition = A (A, B, or C obtained from Table 401-9E)

BASIS FOR COMPUTING LENGTH OF TURN LANES	401-9E REFERENCE SECTIONS 401.6.1, 401.6.3					
TYPE OF TRAFFIC CONTROL	DESIGN SPEED (mph)					
	30 - 35		40 - 45		50 - 60	
	TURN DEMAND VOLUME					
	HIGH	LOW[1]	HIGH	LOW[1]	HIGH	LOW[1]
SIGNALIZED	A	A	B or C[2]	B or C[2]	B or C[2]	B or C[2]
UNSIGNALIZED STOPPED CROSSROAD	A	A	A	A	A	A
UNSIGNALIZED THROUGH ROAD	A	A	C	B	B or C[2]	B

1 LOW is considered 10% or less of approach traffic volume.
2 Whichever is greater

Turn Demand Volume (1)=	60
Approach Volume =	440
Turn / Approach =	14%
(1) PM Peak (highest volume).	

Note: Based on L&D Manual guidance, left turn lane recommended to not exceed 600 feet (storage).

Storage Length at Intersections: 401-10E

Average No. of Vehicles/Cycle	Required Length		Average No. of Vehicles/Cycle	Required Length
1	50	**ft**	17	600 ft
2	100	ft	18	625 ft
3	150	ft	19	650 ft
4	175	ft	20	675 ft
5	200	ft	21	725 ft
6	250	ft	22	750 ft
7	275	ft	23	775 ft
8	325	ft	24	800 ft
9	350	ft	25	825 ft
10	375	ft	30	975 ft
11	400	ft	35	1125 ft
12	450	ft	40	1250 ft
13	475	ft	45	1400 ft
14	500	ft	50	1550 ft
15	525	ft	55	1700 ft
16	550	ft	60	1850 ft

Left Turn Storage Lane Length Calculation

DHV (Turning Lane) =	60
Cycle Length =	60
Cycles per Hour =	60
Average Vehicles per Cycle=	1

If Cycles are unknown, assume: Unsignalized or 2 Phase - 60 Cycles/Hr
3 Phase - 40 Cycles/Hr
4 Phase - 30 Cycles/Hr

Required Turn Lane Storage Length = 50 ft (from Figure 401-10)

Adjacent Through Lane Storage Calculation

Adjacent Lane(s) Volume =	410
Average Vehicles per Cycle=	7
Required Length (total) =	275 ft (from Figure 401-10)

Number of Lanes 1
Required Length (per lane) = 275 ft

Condition A **Storage Only**
Length = 50 ft (diverging taper) + 50 ft (Storage Length, Figure 401-10)
Length = 100 ft

Condition B **High Speed Deceleration Only**

Design Speed	Length (including 50' Diverging Taper)
40	125 ft
45	175 ft
50	225 ft
55	285 ft
60	345 ft

Length = #N/A ft

Condition C **Moderate Speed Deceleration and Storage**

Design Speed	Length (including 50' Diverging Taper)			(Storage Length, Figure 401-10)
40	165 ft	115 ft	+	50 ft
45	175 ft	125 ft	+	50 ft
50	195 ft	145 ft	+	50 ft
55	215 ft	165 ft	+	50 ft
60	235 ft	185 ft	+	50 ft

Length = #N/A ft

Minimum Required Storage Lane Length (including 50' diverging taper) Per Lane = 100 feet

Perferred Storage Lane Length (including 50' diverging taper) Per Lane = 325 feet

Note: Minimum required storage lane length reflects required storage of vehicles calculated using volume and cycle length. Preferred storage length varies from minimum storage lane length when adjacent through lane queue is projected to be greater than the minimum required storage length.

Length of Turn Lane Calculation Worksheet
Based on ODOT L&D Manual, Release Date 7/1/2018

Michael Baker INTERNATIONAL

Project Name: Indianola Ave Road Diet
Intersection: Indianola Ave & Weber Rd

Analysis Date: 6/28/2021
Movement: WBL
2044 AM Peak Build

Design Speed = 35 (Speed in mph)
Turn Demand Volume = High (High or Low)
Type of Traffic Control = Signalized (Signalized, Unsignalized Stopped Crossroad, or Unsignalized Through Road)
Condition = A (A, B, or C obtained from Table 401-9E)

BASIS FOR COMPUTING LENGTH OF TURN LANES | **401-9E** | **REFERENCE SECTIONS 401.6.1, 401.6.3**

TYPE OF TRAFFIC CONTROL	DESIGN SPEED (mph) 30 - 35 HIGH	30 - 35 LOW[1]	40 - 45 HIGH	40 - 45 LOW[1]	50 - 60 HIGH	50 - 60 LOW[1]
SIGNALIZED	A	A	B or C[2]	B or C[2]	B or C[2]	B or C[2]
UNSIGNALIZED STOPPED CROSSROAD	A	A	A	A	A	A
UNSIGNALIZED THROUGH ROAD	A	A	C	B	B or C[2]	B

1 LOW is considered 10% or less of approach traffic volume.
2 Whichever is greater

Turn Demand Volume (1)=	120
Approach Volume =	410
Turn / Approach =	29%
(1) PM Peak (highest volume).	

Note: Based on L&D Manual guidance, left turn lane recommended to not exceed 600 feet (storage).

Storage Length at Intersections: 401-10E

Average No. of Vehicles/Cycle	Required Length	Average No. of Vehicles/Cycle	Required Length
1	50 ft	17	600 ft
2	100 ft	18	625 ft
3	150 ft	19	650 ft
4	175 ft	20	675 ft
5	200 ft	21	725 ft
6	250 ft	22	750 ft
7	275 ft	23	775 ft
8	325 ft	24	800 ft
9	350 ft	25	825 ft
10	375 ft	30	975 ft
11	400 ft	35	1125 ft
12	450 ft	40	1250 ft
13	475 ft	45	1400 ft
14	500 ft	50	1550 ft
15	525 ft	55	1700 ft
16	550 ft	60	1850 ft

Left Turn Storage Lane Length Calculation

DHV (Turning Lane) = 120
Cycle Length = 60
Cycles per Hour = 60
Average Vehicles per Cycle= 2

If Cycles are unknown, assume: Unsignalized or 2 Phase - 60 Cycles/Hr; 3 Phase - 40 Cycles/Hr; 4 Phase - 30 Cycles/Hr

Required Turn Lane Storage Length = 100 ft (from Figure 401-10)

Adjacent Through Lane Storage Calculation

Adjacent Lane(s) Volume = 400
Average Vehicles per Cycle= 7
Required Length (total) = 275 ft (from Figure 401-10)
Number of Lanes 1
Required Length (per lane) = 275 ft

Condition A **Storage Only**

Length = 50 ft (diverging taper) + 100 ft (Storage Length, Figure 401-10) **Length = 150 ft**

Condition B **High Speed Deceleration Only**

Design Speed	Length (including 50' Diverging Taper)
40	125 ft
45	175 ft
50	225 ft
55	285 ft
60	345 ft

Length = #N/A ft

Condition C **Moderate Speed Deceleration and Storage**

Design Speed	Length (including 50' Diverging Taper)			(Storage Length, Figure 401-10)
40	215 ft	115 ft	+	100 ft
45	225 ft	125 ft	+	100 ft
50	245 ft	145 ft	+	100 ft
55	265 ft	165 ft	+	100 ft
60	285 ft	185 ft	+	100 ft

Length = #N/A ft

Minimum Required Storage Lane Length (including 50' diverging taper) Per Lane = 150 feet
Perferred Storage Lane Length (including 50' diverging taper) Per Lane = 325 feet

Note: Minimum required storage lane length reflects required storage of vehicles calculated using volume and cycle length. Preferred storage length varies from minimum storage lane length when adjacent through lane queue is projected to be greater than the minimum required storage length.

Length of Turn Lane Calculation Worksheet

Based on ODOT L&D Manual, Release Date 7/1/2018

Michael Baker INTERNATIONAL

Project Name:	Indianola Ave Road Diet	Analysis Date:	6/28/2021
Intersection:	Indianola Ave & Weber Rd	Movement:	NBL
			2044 PM Peak Build

Design Speed =	35	(Speed in mph)
Turn Demand Volume =	High	(High or Low)
Type of Traffic Control =	Signalized	(Signalized, Unsignalized Stopped Crossroad, or Unsignalized Through Road)
Condition =	A	(A, B, or C obtained from Table 401-9E)

BASIS FOR COMPUTING LENGTH OF TURN LANES

401-9E

REFERENCE SECTIONS 401.6.1, 401.6.3

TYPE OF TRAFFIC CONTROL	DESIGN SPEED (mph)					
	30 - 35		40 - 45		50 - 60	
	TURN DEMAND VOLUME					
	HIGH	LOW[1]	HIGH	LOW[1]	HIGH	LOW[1]
SIGNALIZED	A	A	B or C[2]	B or C[2]	B or C[2]	B or C[2]
UNSIGNALIZED STOPPED CROSSROAD	A	A	A	A	A	A
UNSIGNALIZED THROUGH ROAD	A	A	C	B	B or C[2]	B

[1] LOW is considered 10% or less of approach traffic volume.

[2] Whichever is greater

Turn Demand Volume (1)=	80
Approach Volume =	610
Turn / Approach =	13%
(1) PM Peak (highest volume).	

Note: Based on L&D Manual guidance, left turn lane recommended to not exceed 600 feet (storage).

Storage Length at Intersections: 401-10E

Average No. of Vehicles/Cycle	Required Length	Average No. of Vehicles/Cycle	Required Length
1	50 **ft**	17	600 ft
2	100 ft	18	625 ft
3	150 ft	19	650 ft
4	175 ft	20	675 ft
5	200 ft	21	725 ft
6	250 ft	22	750 ft
7	275 ft	23	775 ft
8	325 ft	24	800 ft
9	350 ft	25	825 ft
10	375 ft	30	975 ft
11	400 ft	35	1125 ft
12	450 ft	40	1250 ft
13	475 ft	45	1400 ft
14	500 ft	50	1550 ft
15	525 ft	55	1700 ft
16	550 ft	60	1850 ft

Left Turn Storage Lane Length Calculation

DHV (Turning Lane) =	80	If Cycles are unknown, assume:	Unsignalized or 2 Phase - 60 Cycles/Hr
Cycle Length =	60		3 Phase - 40 Cycles/Hr
Cycles per Hour =	60		4 Phase - 30 Cycles/Hr
Average Vehicles per Cycle=	1	Required Turn Lane Storage Length =	50 ft (from Figure 401-10)

Adjacent Through Lane Storage Calculation

Adjacent Lane(s) Volume =	520	Number of Lanes	1
Average Vehicles per Cycle=	9	Required Length (per lane) =	350 ft
Required Length (total) =	350 ft (from Figure 401-10)		

Condition A **Storage Only**

Length = 50 ft (diverging taper) + 50 ft (Storage Length, Figure 401-10) **Length = 100 ft**

Condition B **High Speed Deceleration Only**

Design Speed	Length (including 50' Diverging Taper)
40	125 ft
45	175 ft
50	225 ft
55	285 ft
60	345 ft

Length = #N/A ft

Condition C **Moderate Speed Deceleration and Storage**

Design Speed	Length (including 50' Diverging Taper)			(Storage Length, Figure 401-10)
40	165 ft	115 ft	+	50 ft
45	175 ft	125 ft	+	50 ft
50	195 ft	145 ft	+	50 ft
55	215 ft	165 ft	+	50 ft
60	235 ft	185 ft	+	50 ft

Length = #N/A ft

Minimum Required Storage Lane Length (including 50' diverging taper) Per Lane =	**100 feet**
Perferred Storage Lane Length (including 50' diverging taper) Per Lane =	**400 feet**

Note: Minimum required storage lane length reflects required storage of vehicles calculated using volume and cycle length. Preferred storage length varies from minimum storage lane length when adjacent through lane queue is projected to be greater than the minimum required storage length.

Length of Turn Lane Calculation Worksheet

Based on ODOT L&D Manual, Release Date 7/1/2018

Michael Baker INTERNATIONAL

Project Name:	Indianola Ave Road Diet	Analysis Date:	6/28/2021
Intersection:	Indianola Ave & Weber Rd	Movement:	SBL
			2044 PM Peak Build
Design Speed =	35	(Speed in mph)	
Turn Demand Volume =	High	(High or Low)	
Type of Traffic Control =	Signalized	(Signalized, Unsignalized Stopped Crossroad, or Unsignalized Through Road)	
Condition =	A	(A, B, or C obtained from Table 401-9E)	

BASIS FOR COMPUTING LENGTH OF TURN LANES — 401-9E REFERENCE SECTIONS 401.6.1, 401.6.3

TYPE OF TRAFFIC CONTROL	DESIGN SPEED (mph) 30 - 35		40 - 45		50 - 60	
	TURN DEMAND VOLUME					
	HIGH	LOW[1]	HIGH	LOW[1]	HIGH	LOW[1]
SIGNALIZED	A	A	B or C[2]	B or C[2]	B or C[2]	B or C[2]
UNSIGNALIZED STOPPED CROSSROAD	A	A	A	A	A	A
UNSIGNALIZED THROUGH ROAD	A	A	C	B	B or C[2]	B

1 LOW is considered 10% or less of approach traffic volume.
2 Whichever is greater

Turn Demand Volume (1)=	50
Approach Volume =	490
Turn / Approach =	10%
(1) PM Peak (highest volume).	

Note: Based on L&D Manual guidance, left turn lane recommended to not exceed 600 feet (storage).

Storage Length at Intersections: 401-10E

Average No. of Vehicles/Cycle	Required Length	Average No. of Vehicles/Cycle	Required Length
1	50 ft	17	600 ft
2	100 ft	18	625 ft
3	150 ft	19	650 ft
4	175 ft	20	675 ft
5	200 ft	21	725 ft
6	250 ft	22	750 ft
7	275 ft	23	775 ft
8	325 ft	24	800 ft
9	350 ft	25	825 ft
10	375 ft	30	975 ft
11	400 ft	35	1125 ft
12	450 ft	40	1250 ft
13	475 ft	45	1400 ft
14	500 ft	50	1550 ft
15	525 ft	55	1700 ft
16	550 ft	60	1850 ft

Left Turn Storage Lane Length Calculation

DHV (Turning Lane) =	50	If Cycles are unknown, assume:	Unsignalized or 2 Phase - 60 Cycles/Hr
Cycle Length =	60		3 Phase - 40 Cycles/Hr
Cycles per Hour =	60		4 Phase - 30 Cycles/Hr
Average Vehicles per Cycle=	1	Required Turn Lane Storage Length =	50 ft (from Figure 401-10)

Adjacent Through Lane Storage Calculation

Adjacent Lane(s) Volume =	440	Number of Lanes	1
Average Vehicles per Cycle=	7	Required Length (per lane) =	275 ft
Required Length (total) =	275	ft (from Figure 401-10)	

Condition A **Storage Only**

Length = 50 ft (diverging taper) + 50 ft (Storage Length, Figure 401-10) **Length = 100 ft**

Condition B **High Speed Deceleration Only**

Design Speed	Length (including 50' Diverging Taper)
40	125 ft
45	175 ft
50	225 ft
55	285 ft
60	345 ft

Length = #N/A ft

Condition C **Moderate Speed Deceleration and Storage**

Design Speed	Length (including 50' Diverging Taper)			(Storage Length, Figure 401-10)
40	165 ft	115 ft	+	50 ft
45	175 ft	125 ft	+	50 ft
50	195 ft	145 ft	+	50 ft
55	215 ft	165 ft	+	50 ft
60	235 ft	185 ft	+	50 ft

Length = #N/A ft

Minimum Required Storage Lane Length (including 50' diverging taper) Per Lane = 100 feet

Perferred Storage Lane Length (including 50' diverging taper) Per Lane = 325 feet

Note: Minimum required storage lane length reflects required storage of vehicles calculated using volume and cycle length. Preferred storage length varies from minimum storage lane length when adjacent through lane queue is projected to be greater than the minimum required storage length.

Length of Turn Lane Calculation Worksheet
Based on ODOT L&D Manual, Release Date 7/1/2018

Michael Baker INTERNATIONAL

Project Name:	Indianola Ave Road Diet		Analysis Date:	6/28/2021
Intersection:	Indianola Ave & Weber Rd		Movement:	EBL
				2044 PM Peak Build
Design Speed =	35	(Speed in mph)		
Turn Demand Volume =	High	(High or Low)		
Type of Traffic Control =	Signalized	(Signalized, Unsignalized Stopped Crossroad, or Unsignalized Through Road)		
Condition =	A	(A, B, or C obtained from Table 401-9E)		

BASIS FOR COMPUTING LENGTH OF TURN LANES

401-9E
REFERENCE SECTIONS 401.6.1, 401.6.3

TYPE OF TRAFFIC CONTROL	DESIGN SPEED (mph)					
	30 - 35		40 - 45		50 - 60	
	TURN DEMAND VOLUME					
	HIGH	LOW[1]	HIGH	LOW[1]	HIGH	LOW[1]
SIGNALIZED	A	A	B or C[2]	B or C[2]	B or C[2]	B or C[2]
UNSIGNALIZED STOPPED CROSSROAD	A	A	A	A	A	A
UNSIGNALIZED THROUGH ROAD	A	A	C	B	B or C[2]	B

[1] LOW is considered 10% or less of approach traffic volume.
[2] Whichever is greater

Turn Demand Volume (1)=	90
Approach Volume =	530
Turn / Approach =	17%
(1) PM Peak (highest volume).	

Note: Based on L&D Manual guidance, left turn lane recommended to not exceed 600 feet (storage).

Storage Length at Intersections: 401-10E

Average No. of Vehicles/Cycle	Required Length		Average No. of Vehicles/Cycle	Required Length
1	50	**ft**	17	600 ft
2	100	ft	18	625 ft
3	150	ft	19	650 ft
4	175	ft	20	675 ft
5	200	ft	21	725 ft
6	250	ft	22	750 ft
7	275	ft	23	775 ft
8	325	ft	24	800 ft
9	350	ft	25	825 ft
10	375	ft	30	975 ft
11	400	ft	35	1125 ft
12	450	ft	40	1250 ft
13	475	ft	45	1400 ft
14	500	ft	50	1550 ft
15	525	ft	55	1700 ft
16	550	ft	60	1850 ft

Left Turn Storage Lane Length Calculation

DHV (Turning Lane) =	90	If Cycles are unknown, assume:	Unsignalized or 2 Phase - 60 Cycles/Hr
Cycle Length =	60		3 Phase - 40 Cycles/Hr
Cycles per Hour =	60		4 Phase - 30 Cycles/Hr
Average Vehicles per Cycle=	2	Required Turn Lane Storage Length =	100 ft (from Figure 401-10)

Adjacent Through Lane Storage Calculation

Adjacent Lane(s) Volume =	520	Number of Lanes	1
Average Vehicles per Cycle=	9	Required Length (per lane) =	350 ft
Required Length (total) =	350 ft (from Figure 401-10)		

Condition A **Storage Only**

Length = 50 ft (diverging taper) + 100 ft (Storage Length, Figure 401-10) **Length = 150 ft**

Condition B **High Speed Deceleration Only**

Design Speed	Length (including 50' Diverging Taper)
40	125 ft
45	175 ft
50	225 ft
55	285 ft
60	345 ft

Length = #N/A ft

Condition C **Moderate Speed Deceleration and Storage**

Design Speed	Length (including 50' Diverging Taper)			(Storage Length, Figure 401-10)
40	215 ft	115 ft	+	100 ft
45	225 ft	125 ft	+	100 ft
50	245 ft	145 ft	+	100 ft
55	265 ft	165 ft	+	100 ft
60	285 ft	185 ft	+	100 ft

Length = #N/A ft

Minimum Required Storage Lane Length (including 50' diverging taper) Per Lane = 150 feet
Perferred Storage Lane Length (including 50' diverging taper) Per Lane = 400 feet

Note: Minimum required storage lane length reflects required storage of vehicles calculated using volume and cycle length. Preferred storage length varies from minimum storage lane length when adjacent through lane queue is projected to be greater than the minimum required storage length.

Length of Turn Lane Calculation Worksheet
Based on ODOT L&D Manual, Release Date 7/1/2018

Michael Baker INTERNATIONAL

Project Name:	Indianola Ave Road Diet	Analysis Date:	6/28/2021
Intersection:	Indianola Ave & Weber Rd	Movement:	WBL
			2044 PM Peak Build
Design Speed =	35	(Speed in mph)	
Turn Demand Volume =	High	(High or Low)	
Type of Traffic Control =	Signalized	(Signalized, Unsignalized Stopped Crossroad, or Unsignalized Through Road)	
Condition =	A	(A, B, or C obtained from Table 401-9E)	

BASIS FOR COMPUTING LENGTH OF TURN LANES — 401-9E REFERENCE SECTIONS 401.6.1, 401.6.3

TYPE OF TRAFFIC CONTROL	DESIGN SPEED (mph) 30 - 35		40 - 45		50 - 60	
	TURN DEMAND VOLUME					
	HIGH	LOW[1]	HIGH	LOW[1]	HIGH	LOW[1]
SIGNALIZED	A	A	B or C[2]	B or C[2]	B or C[2]	B or C[2]
UNSIGNALIZED STOPPED CROSSROAD	A	A	A	A	A	A
UNSIGNALIZED THROUGH ROAD	A	A	C	B	B or C[2]	B

1 LOW is considered 10% or less of approach traffic volume.
2 Whichever is greater

Turn Demand Volume (1)=	110
Approach Volume =	630
Turn / Approach =	17%
(1) PM Peak (highest volume).	

Note: Based on L&D Manual guidance, left turn lane recommended to not exceed 600 feet (storage).

Storage Length at Intersections: 401-10E

Average No. of Vehicles/Cycle	Required Length	Average No. of Vehicles/Cycle	Required Length
1	50 ft	17	600 ft
2	100 ft	18	625 ft
3	150 ft	19	650 ft
4	175 ft	20	675 ft
5	200 ft	21	725 ft
6	250 ft	22	750 ft
7	275 ft	23	775 ft
8	325 ft	24	800 ft
9	350 ft	25	825 ft
10	375 ft	30	975 ft
11	400 ft	35	1125 ft
12	450 ft	40	1250 ft
13	475 ft	45	1400 ft
14	500 ft	50	1550 ft
15	525 ft	55	1700 ft
16	550 ft	60	1850 ft

Left Turn Storage Lane Length Calculation

DHV (Turning Lane) =	110	If Cycles are unknown, assume:	Unsignalized or 2 Phase - 60 Cycles/Hr
Cycle Length =	60		3 Phase - 40 Cycles/Hr
Cycles per Hour =	60		4 Phase - 30 Cycles/Hr
Average Vehicles per Cycle=	2	Required Turn Lane Storage Length =	100 ft (from Figure 401-10)

Adjacent Through Lane Storage Calculation

Adjacent Lane(s) Volume =	440	Number of Lanes	1
Average Vehicles per Cycle=	7	Required Length (per lane) =	275 ft
Required Length (total) =	275 ft (from Figure 401-10)		

Condition A **Storage Only**
Length = 50 ft (diverging taper) + 100 ft (Storage Length, Figure 401-10) **Length = 150 ft**

Condition B **High Speed Deceleration Only**

Design Speed	Length (including 50' Diverging Taper)
40	125 ft
45	175 ft
50	225 ft
55	285 ft
60	345 ft

Length = #N/A ft

Condition C **Moderate Speed Deceleration and Storage**

Design Speed	Length (including 50' Diverging Taper)			(Storage Length, Figure 401-10)
40	215 ft	115 ft	+	100 ft
45	225 ft	125 ft	+	100 ft
50	245 ft	145 ft	+	100 ft
55	265 ft	165 ft	+	100 ft
60	285 ft	185 ft	+	100 ft

Length = #N/A ft

Minimum Required Storage Lane Length (including 50' diverging taper) Per Lane = 150 feet
Perferred Storage Lane Length (including 50' diverging taper) Per Lane = 325 feet

Note: Minimum required storage lane length reflects required storage of vehicles calculated using volume and cycle length. Preferred storage length varies from minimum storage lane length when adjacent through lane queue is projected to be greater than the minimum required storage length.

Michael Baker
INTERNATIONAL

We Make a Difference

Indianola & Broadway

Turn Lane Calculations

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Length of Turn Lane Calculation Worksheet
Based on ODOT L&D Manual, Release Date 7/1/2018

Michael Baker INTERNATIONAL

Project Name:	Indianola Ave Road Diet	Analysis Date:	6/28/2021
Intersection:	Indianola Ave & North Broadway	Movement:	NBL
			2024 AM Peak Build

Design Speed =	35	(Speed in mph)
Turn Demand Volume =	High	(High or Low)
Type of Traffic Control =	Signalized	(Signalized, Unsignalized Stopped Crossroad, or Unsignalized Through Road)
Condition =	A	(A, B, or C obtained from Table 401-9E)

BASIS FOR COMPUTING LENGTH OF TURN LANES — **401-9E REFERENCE SECTIONS 401.6.1, 401.6.3**

TYPE OF TRAFFIC CONTROL	DESIGN SPEED (mph) 30 - 35		40 - 45		50 - 60	
	TURN DEMAND VOLUME					
	HIGH	LOW[1]	HIGH	LOW[1]	HIGH	LOW[1]
SIGNALIZED	A	A	B or C[2]	B or C[2]	B or C[2]	B or C[2]
UNSIGNALIZED STOPPED CROSSROAD	A	A	A	A	A	A
UNSIGNALIZED THROUGH ROAD	A	A	C	B	B or C[2]	B

[1] LOW is considered 10% or less of approach traffic volume.
[2] Whichever is greater

Turn Demand Volume (1)=	110
Approach Volume =	500
Turn / Approach =	22%
(1) PM Peak (highest volume).	

Note: Based on L&D Manual guidance, left turn lane recommended to not exceed 600 feet (storage).

Storage Length at Intersections: 401-10E

Average No. of Vehicles/Cycle	Required Length		Average No. of Vehicles/Cycle	Required Length
1	50	ft	17	600 ft
2	100	ft	18	625 ft
3	150	ft	19	650 ft
4	175	ft	20	675 ft
5	200	ft	21	725 ft
6	250	ft	22	750 ft
7	275	ft	23	775 ft
8	325	ft	24	800 ft
9	350	ft	25	825 ft
10	375	ft	30	975 ft
11	400	ft	35	1125 ft
12	450	ft	40	1250 ft
13	475	ft	45	1400 ft
14	500	ft	50	1550 ft
15	525	ft	55	1700 ft
16	550	ft	60	1850 ft

Left Turn Storage Lane Length Calculation

DHV (Turning Lane) =	110	If Cycles are unknown, assume:	Unsignalized or 2 Phase - 60 Cycles/Hr
Cycle Length =	106		3 Phase - 40 Cycles/Hr
Cycles per Hour =	34		4 Phase - 30 Cycles/Hr
Average Vehicles per Cycle=	3	Required Turn Lane Storage Length =	150 ft (from Figure 401-10)

Adjacent Through Lane Storage Calculation

Adjacent Lane(s) Volume =	390	Number of Lanes	1
Average Vehicles per Cycle=	11	Required Length (per lane) =	400 ft
Required Length (total) =	400 ft (from Figure 401-10)		

Condition A **Storage Only**
Length = 50 ft (diverging taper) + 150 ft (Storage Length, Figure 401-10) **Length = 200 ft**

Condition B **High Speed Deceleration Only**

Design Speed	Length (including 50' Diverging Taper)
40	125 ft
45	175 ft
50	225 ft
55	285 ft
60	345 ft

Length = #N/A ft

Condition C **Moderate Speed Deceleration and Storage**

Design Speed	Length (including 50' Diverging Taper)			(Storage Length, Figure 401-10)
40	265 ft	115 ft	+	150 ft
45	275 ft	125 ft	+	150 ft
50	295 ft	145 ft	+	150 ft
55	315 ft	165 ft	+	150 ft
60	335 ft	185 ft	+	150 ft

Length = #N/A ft

Minimum Required Storage Lane Length (including 50' diverging taper) Per Lane = 200 feet
Perferred Storage Lane Length (including 50' diverging taper) Per Lane = 450 feet

Note: Minimum required storage lane length reflects required storage of vehicles calculated using volume and cycle length. Preferred storage length varies from minimum storage lane length when adjacent through lane queue is projected to be greater than the minimum required storage length.

Length of Turn Lane Calculation Worksheet
Based on ODOT L&D Manual, Release Date 7/1/2018

Michael Baker INTERNATIONAL

Project Name:	Indianola Ave Road Diet	Analysis Date:	6/28/2021
Intersection:	Indianola Ave & North Broadway	Movement:	SBL
			2024 AM Peak Build
Design Speed =	35	(Speed in mph)	
Turn Demand Volume =	High	(High or Low)	
Type of Traffic Control =	Signalized	(Signalized, Unsignalized Stopped Crossroad, or Unsignalized Through Road)	
Condition =	A	(A, B, or C obtained from Table 401-9E)	

BASIS FOR COMPUTING LENGTH OF TURN LANES — 401-9E REFERENCE SECTIONS 401.6.1, 401.6.3

TYPE OF TRAFFIC CONTROL	DESIGN SPEED (mph) 30 - 35		40 - 45		50 - 60	
	TURN DEMAND VOLUME					
	HIGH	LOW[1]	HIGH	LOW[1]	HIGH	LOW[1]
SIGNALIZED	A	A	B or C[2]	B or C[2]	B or C[2]	B or C[2]
UNSIGNALIZED STOPPED CROSSROAD	A	A	A	A	A	A
UNSIGNALIZED THROUGH ROAD	A	A	C	B	B or C[2]	B

[1] LOW is considered 10% or less of approach traffic volume.
[2] Whichever is greater

Turn Demand Volume (1)=	360
Approach Volume =	770
Turn / Approach =	47%
(1) PM Peak (highest volume).	

Note: Based on L&D Manual guidance, left turn lane recommended to not exceed 600 feet (storage).

Storage Length at Intersections: 401-10E

Average No. of Vehicles/Cycle	Required Length	Average No. of Vehicles/Cycle	Required Length
1	50 ft	17	600 ft
2	100 ft	18	625 ft
3	150 ft	19	650 ft
4	175 ft	20	675 ft
5	200 ft	21	725 ft
6	250 ft	22	750 ft
7	275 ft	23	775 ft
8	325 ft	24	800 ft
9	350 ft	25	825 ft
10	375 ft	30	975 ft
11	400 ft	35	1125 ft
12	450 ft	40	1250 ft
13	475 ft	45	1400 ft
14	500 ft	50	1550 ft
15	525 ft	55	1700 ft
16	550 ft	60	1850 ft

Left Turn Storage Lane Length Calculation

DHV (Turning Lane) =	360	If Cycles are unknown, assume:	Unsignalized or 2 Phase - 60 Cycles/Hr
Cycle Length =	106		3 Phase - 40 Cycles/Hr
Cycles per Hour =	34		4 Phase - 30 Cycles/Hr
Average Vehicles per Cycle=	11	Required Turn Lane Storage Length =	400 ft (from Figure 401-10)

Adjacent Through Lane Storage Calculation

Adjacent Lane(s) Volume =	410	Number of Lanes	1
Average Vehicles per Cycle=	12	Required Length (per lane) =	450 ft
Required Length (total) =	450 ft (from Figure 401-10)		

Condition A **Storage Only**
Length = 50 ft (diverging taper) + 400 ft (Storage Length, Figure 401-10) **Length = 450 ft**

Condition B **High Speed Deceleration Only**

Design Speed	Length (including 50' Diverging Taper)
40	125 ft
45	175 ft
50	225 ft
55	285 ft
60	345 ft

Length = #N/A ft

Condition C **Moderate Speed Deceleration and Storage**

Design Speed	Length (including 50' Diverging Taper)			(Storage Length, Figure 401-10)
40	515 ft	115 ft	+	400 ft
45	525 ft	125 ft	+	400 ft
50	545 ft	145 ft	+	400 ft
55	565 ft	165 ft	+	400 ft
60	585 ft	185 ft	+	400 ft

Length = #N/A ft

Minimum Required Storage Lane Length (including 50' diverging taper) Per Lane = 450 feet
Perferred Storage Lane Length (including 50' diverging taper) Per Lane = 500 feet

Note: Minimum required storage lane length reflects required storage of vehicles calculated using volume and cycle length. Preferred storage length varies from minimum storage lane length when adjacent through lane queue is projected to be greater than the minimum required storage length.

Length of Turn Lane Calculation Worksheet
Based on ODOT L&D Manual, Release Date 7/1/2018

Michael Baker INTERNATIONAL

Project Name:	Indianola Ave Road Diet	Analysis Date:	6/28/2021
Intersection:	Indianola Ave & North Broadway	Movement:	EBL
			2024 AM Peak Build
Design Speed =	35	(Speed in mph)	
Turn Demand Volume =	High	(High or Low)	
Type of Traffic Control =	Signalized	(Signalized, Unsignalized Stopped Crossroad, or Unsignalized Through Road)	
Condition =	A	(A, B, or C obtained from Table 401-9E)	

BASIS FOR COMPUTING LENGTH OF TURN LANES — **401-9E REFERENCE SECTIONS 401.6.1, 401.6.3**

TYPE OF TRAFFIC CONTROL	DESIGN SPEED (mph) 30 - 35		40 - 45		50 - 60	
	TURN DEMAND VOLUME					
	HIGH	LOW[1]	HIGH	LOW[1]	HIGH	LOW[1]
SIGNALIZED	A	A	B or C[2]	B or C[2]	B or C[2]	B or C[2]
UNSIGNALIZED STOPPED CROSSROAD	A	A	A	A	A	A
UNSIGNALIZED THROUGH ROAD	A	A	C	B	B or C[2]	B

1 LOW is considered 10% or less of approach traffic volume.
2 Whichever is greater

Turn Demand Volume (1)=	100
Approach Volume =	590
Turn / Approach =	17%
(1) PM Peak (highest volume).	

Note: Based on L&D Manual guidance, left turn lane recommended to not exceed 600 feet (storage).

Storage Length at Intersections: 401-10E

Average No. of Vehicles/Cycle	Required Length	Average No. of Vehicles/Cycle	Required Length
1	50 **ft**	17	600 ft
2	100 ft	18	625 ft
3	150 ft	19	650 ft
4	175 ft	20	675 ft
5	200 ft	21	725 ft
6	250 ft	22	750 ft
7	275 ft	23	775 ft
8	325 ft	24	800 ft
9	350 ft	25	825 ft
10	375 ft	30	975 ft
11	400 ft	35	1125 ft
12	450 ft	40	1250 ft
13	475 ft	45	1400 ft
14	500 ft	50	1550 ft
15	525 ft	55	1700 ft
16	550 ft	60	1850 ft

Left Turn Storage Lane Length Calculation

DHV (Turning Lane) =	100	If Cycles are unknown, assume:	Unsignalized or 2 Phase - 60 Cycles/Hr
Cycle Length =	106		3 Phase - 40 Cycles/Hr
Cycles per Hour =	34		4 Phase - 30 Cycles/Hr
Average Vehicles per Cycle=	3	Required Turn Lane Storage Length =	150 ft (from Figure 401-10)

Adjacent Through Lane Storage Calculation

Adjacent Lane(s) Volume =	390	Number of Lanes	1
Average Vehicles per Cycle=	11	Required Length (per lane) =	400 ft
Required Length (total) =	400 ft (from Figure 401-10)		

Condition A **Storage Only**
Length = 50 ft (diverging taper) + 150 ft (Storage Length, Figure 401-10)
Length = 200 ft

Condition B **High Speed Deceleration Only**

Design Speed	Length (including 50' Diverging Taper)
40	125 ft
45	175 ft
50	225 ft
55	285 ft
60	345 ft

Length = #N/A ft

Condition C **Moderate Speed Deceleration and Storage**

Design Speed	Length (including 50' Diverging Taper)			(Storage Length, Figure 401-10)
40	265 ft	115 ft	+	150 ft
45	275 ft	125 ft	+	150 ft
50	295 ft	145 ft	+	150 ft
55	315 ft	165 ft	+	150 ft
60	335 ft	185 ft	+	150 ft

Length = #N/A ft

Minimum Required Storage Lane Length (including 50' diverging taper) Per Lane = 200 feet
Perferred Storage Lane Length (including 50' diverging taper) Per Lane = 450 feet

Note: Minimum required storage lane length reflects required storage of vehicles calculated using volume and cycle length. Preferred storage length varies from minimum storage lane length when adjacent through lane queue is projected to be greater than the minimum required storage length.

Length of Turn Lane Calculation Worksheet
Based on ODOT L&D Manual, Release Date 7/1/2018

Michael Baker INTERNATIONAL

Project Name:	Indianola Ave Road Diet	Analysis Date:	6/28/2021
Intersection:	Indianola Ave & North Broadway	Movement:	WBL
			2024 AM Peak Build
Design Speed =	35	(Speed in mph)	
Turn Demand Volume =	High	(High or Low)	
Type of Traffic Control =	Signalized	(Signalized, Unsignalized Stopped Crossroad, or Unsignalized Through Road)	
Condition =	A	(A, B, or C obtained from Table 401-9E)	

BASIS FOR COMPUTING LENGTH OF TURN LANES — 401-9E REFERENCE SECTIONS 401.6.1, 401.6.3

TYPE OF TRAFFIC CONTROL	DESIGN SPEED (mph) 30 - 35		40 - 45		50 - 60	
	TURN DEMAND VOLUME					
	HIGH	LOW[1]	HIGH	LOW[1]	HIGH	LOW[1]
SIGNALIZED	A	A	B or C[2]	B or C[2]	B or C[2]	B or C[2]
UNSIGNALIZED STOPPED CROSSROAD	A	A	A	A	A	A
UNSIGNALIZED THROUGH ROAD	A	A	C	B	B or C[2]	B

[1] LOW is considered 10% or less of approach traffic volume.
[2] Whichever is greater

Turn Demand Volume (1)=	130
Approach Volume =	1,060
Turn / Approach =	12%

(1) PM Peak (highest volume).

Note: Based on L&D Manual guidance, left turn lane recommended to not exceed 600 feet (storage).

Storage Length at Intersections: 401-10E

Average No. of Vehicles/Cycle	Required Length	Average No. of Vehicles/Cycle	Required Length
1	50 ft	17	600 ft
2	100 ft	18	625 ft
3	150 ft	19	650 ft
4	175 ft	20	675 ft
5	200 ft	21	725 ft
6	250 ft	22	750 ft
7	275 ft	23	775 ft
8	325 ft	24	800 ft
9	350 ft	25	825 ft
10	375 ft	30	975 ft
11	400 ft	35	1125 ft
12	450 ft	40	1250 ft
13	475 ft	45	1400 ft
14	500 ft	50	1550 ft
15	525 ft	55	1700 ft
16	550 ft	60	1850 ft

Left Turn Storage Lane Length Calculation

DHV (Turning Lane) =	130	If Cycles are unknown, assume:	Unsignalized or 2 Phase - 60 Cycles/Hr
Cycle Length =	106		3 Phase - 40 Cycles/Hr
Cycles per Hour =	34		4 Phase - 30 Cycles/Hr
Average Vehicles per Cycle=	4	Required Turn Lane Storage Length =	175 ft (from Figure 401-10)

Adjacent Through Lane Storage Calculation

Adjacent Lane(s) Volume =	410	Number of Lanes	1
Average Vehicles per Cycle=	12	Required Length (per lane) =	450 ft
Required Length (total) =	450 ft (from Figure 401-10)		

Condition A **Storage Only** (Storage Length, Figure 401-10)
Length = 50 ft (diverging taper) + 175 ft — **Length = 225 ft**

Condition B **High Speed Deceleration Only**

Design Speed	Length (including 50' Diverging Taper)
40	125 ft
45	175 ft
50	225 ft
55	285 ft
60	345 ft

Length = #N/A ft

Condition C **Moderate Speed Deceleration and Storage**

Design Speed	Length (including 50' Diverging Taper)			(Storage Length, Figure 401-10)
40	290 ft	115 ft	+	175 ft
45	300 ft	125 ft	+	175 ft
50	320 ft	145 ft	+	175 ft
55	340 ft	165 ft	+	175 ft
60	360 ft	185 ft	+	175 ft

Length = #N/A ft

Minimum Required Storage Lane Length (including 50' diverging taper) Per Lane = 225 feet
Perferred Storage Lane Length (including 50' diverging taper) Per Lane = 500 feet

Note: Minimum required storage lane length reflects required storage of vehicles calculated using volume and cycle length. Preferred storage length varies from minimum storage lane length when adjacent through lane queue is projected to be greater than the minimum required storage length.

Length of Turn Lane Calculation Worksheet

Based on ODOT L&D Manual, Release Date 7/1/2018

Michael Baker INTERNATIONAL

Project Name:	Indianola Ave Road Diet	Analysis Date:	6/28/2021
Intersection:	Indianola Ave & North Broadway	Movement:	NBL
			2024 PM Peak Build
Design Speed =	35	(Speed in mph)	
Turn Demand Volume =	High	(High or Low)	
Type of Traffic Control =	Signalized	(Signalized, Unsignalized Stopped Crossroad, or Unsignalized Through Road)	
Condition =	A	(A, B, or C obtained from Table 401-9E)	

BASIS FOR COMPUTING LENGTH OF TURN LANES

401-9E

REFERENCE SECTIONS 401.6.1, 401.6.3

TYPE OF TRAFFIC CONTROL	DESIGN SPEED (mph)					
	30 - 35		40 - 45		50 - 60	
	TURN DEMAND VOLUME					
	HIGH	LOW[1]	HIGH	LOW[1]	HIGH	LOW[1]
SIGNALIZED	A	A	B or C[2]	B or C[2]	B or C[2]	B or C[2]
UNSIGNALIZED STOPPED CROSSROAD	A	A	A	A	A	A
UNSIGNALIZED THROUGH ROAD	A	A	C	B	B or C[2]	B

[1] LOW is considered 10% or less of approach traffic volume.

[2] Whichever is greater

Turn Demand Volume (1)=	100
Approach Volume =	540
Turn / Approach =	19%
(1) PM Peak (highest volume).	

Note: Based on L&D Manual guidance, left turn lane recommended to not exceed 600 feet (storage).

Storage Length at Intersections: 401-10E

Average No. of Vehicles/Cycle	Required Length	Average No. of Vehicles/Cycle	Required Length
1	50 **ft**	17	600 ft
2	100 ft	18	625 ft
3	150 ft	19	650 ft
4	175 ft	20	675 ft
5	200 ft	21	725 ft
6	250 ft	22	750 ft
7	275 ft	23	775 ft
8	325 ft	24	800 ft
9	350 ft	25	825 ft
10	375 ft	30	975 ft
11	400 ft	35	1125 ft
12	450 ft	40	1250 ft
13	475 ft	45	1400 ft
14	500 ft	50	1550 ft
15	525 ft	55	1700 ft
16	550 ft	60	1850 ft

Left Turn Storage Lane Length Calculation

DHV (Turning Lane) =	100	If Cycles are unknown, assume:	Unsignalized or 2 Phase - 60 Cycles/Hr
Cycle Length =	125		3 Phase - 40 Cycles/Hr
Cycles per Hour =	29		4 Phase - 30 Cycles/Hr
Average Vehicles per Cycle=	3	Required Turn Lane Storage Length =	150 ft (from Figure 401-10)

Adjacent Through Lane Storage Calculation

Adjacent Lane(s) Volume =	440	Number of Lanes	1
Average Vehicles per Cycle=	15	Required Length (per lane) =	525 ft
Required Length (total) =	525 ft (from Figure 401-10)		

Condition A **Storage Only**

Length = 50 ft (diverging taper) + 150 ft (Storage Length, Figure 401-10) **Length = 200 ft**

Condition B **High Speed Deceleration Only**

Design Speed	Length (including 50' Diverging Taper)
40	125 ft
45	175 ft
50	225 ft
55	285 ft
60	345 ft

Length = #N/A ft

Condition C **Moderate Speed Deceleration and Storage**

Design Speed	Length (including 50' Diverging Taper)			(Storage Length, Figure 401-10)
40	265 ft	115 ft	+	150 ft
45	275 ft	125 ft	+	150 ft
50	295 ft	145 ft	+	150 ft
55	315 ft	165 ft	+	150 ft
60	335 ft	185 ft	+	150 ft

Length = #N/A ft

Minimum Required Storage Lane Length (including 50' diverging taper) Per Lane = 200 feet

Perferred Storage Lane Length (including 50' diverging taper) Per Lane = 575 feet

Note: Minimum required storage lane length reflects required storage of vehicles calculated using volume and cycle length. Preferred storage length varies from minimum storage lane length when adjacent through lane queue is projected to be greater than the minimum required storage length.

Length of Turn Lane Calculation Worksheet
Based on ODOT L&D Manual, Release Date 7/1/2018

Michael Baker INTERNATIONAL

Project Name:	Indianola Ave Road Diet	Analysis Date:	6/28/2021
Intersection:	Indianola Ave & North Broadway	Movement:	SBL
			2024 PM Peak Build
Design Speed =	35	(Speed in mph)	
Turn Demand Volume =	High	(High or Low)	
Type of Traffic Control =	Signalized	(Signalized, Unsignalized Stopped Crossroad, or Unsignalized Through Road)	
Condition =	A	(A, B, or C obtained from Table 401-9E)	

BASIS FOR COMPUTING LENGTH OF TURN LANES — 401-9E REFERENCE SECTIONS 401.6.1, 401.6.3

TYPE OF TRAFFIC CONTROL	DESIGN SPEED (mph) 30 - 35 HIGH	30 - 35 LOW[1]	40 - 45 HIGH	40 - 45 LOW[1]	50 - 60 HIGH	50 - 60 LOW[1]
SIGNALIZED	A	A	B or C[2]	B or C[2]	B or C[2]	B or C[2]
UNSIGNALIZED STOPPED CROSSROAD	A	A	A	A	A	A
UNSIGNALIZED THROUGH ROAD	A	A	C	B	B or C[2]	B

Turn Demand Volume (1)= 350
Approach Volume = 850
Turn / Approach = 41%
(1) PM Peak (highest volume).

Note: Based on L&D Manual guidance, left turn lane recommended to not exceed 600 feet (storage).

1 LOW is considered 10% or less of approach traffic volume.
2 Whichever is greater

Storage Length at Intersections: 401-10E

Average No. of Vehicles/Cycle	Required Length	Average No. of Vehicles/Cycle	Required Length
1	50 ft	17	600 ft
2	100 ft	18	625 ft
3	150 ft	19	650 ft
4	175 ft	20	675 ft
5	200 ft	21	725 ft
6	250 ft	22	750 ft
7	275 ft	23	775 ft
8	325 ft	24	800 ft
9	350 ft	25	825 ft
10	375 ft	30	975 ft
11	400 ft	35	1125 ft
12	450 ft	40	1250 ft
13	475 ft	45	1400 ft
14	500 ft	50	1550 ft
15	525 ft	55	1700 ft
16	550 ft	60	1850 ft

Left Turn Storage Lane Length Calculation

DHV (Turning Lane) =	350	If Cycles are unknown, assume:	Unsignalized or 2 Phase - 60 Cycles/Hr
Cycle Length =	125		3 Phase - 40 Cycles/Hr
Cycles per Hour =	29		4 Phase - 30 Cycles/Hr
Average Vehicles per Cycle=	12	Required Turn Lane Storage Length =	450 ft (from Figure 401-10)

Adjacent Through Lane Storage Calculation

Adjacent Lane(s) Volume =	500	Number of Lanes	1
Average Vehicles per Cycle=	17	Required Length (per lane) =	600 ft
Required Length (total) =	600 ft (from Figure 401-10)		

Condition A **Storage Only**
Length = 50 ft (diverging taper) + 450 ft (Storage Length, Figure 401-10) **Length = 500 ft**

Condition B **High Speed Deceleration Only**

Design Speed	Length (including 50' Diverging Taper)
40	125 ft
45	175 ft
50	225 ft
55	285 ft
60	345 ft

Length = #N/A ft

Condition C **Moderate Speed Deceleration and Storage**

Design Speed	Length (including 50' Diverging Taper)			(Storage Length, Figure 401-10)
40	565 ft	115 ft	+	450 ft
45	575 ft	125 ft	+	450 ft
50	595 ft	145 ft	+	450 ft
55	615 ft	165 ft	+	450 ft
60	635 ft	185 ft	+	450 ft

Length = #N/A ft

Minimum Required Storage Lane Length (including 50' diverging taper) Per Lane = 500 feet
Perferred Storage Lane Length (including 50' diverging taper) Per Lane = 650 feet

Note: Minimum required storage lane length reflects required storage of vehicles calculated using volume and cycle length. Preferred storage length varies from minimum storage lane length when adjacent through lane queue is projected to be greater than the minimum required storage length.

Length of Turn Lane Calculation Worksheet
Based on ODOT L&D Manual, Release Date 7/1/2018

Michael Baker INTERNATIONAL

Project Name:	Indianola Ave Road Diet	Analysis Date:	6/28/2021
Intersection:	Indianola Ave & North Broadway	Movement:	EBL
			2024 PM Peak Build
Design Speed =	35	(Speed in mph)	
Turn Demand Volume =	High	(High or Low)	
Type of Traffic Control =	Signalized	(Signalized, Unsignalized Stopped Crossroad, or Unsignalized Through Road)	
Condition =	A	(A, B, or C obtained from Table 401-9E)	

BASIS FOR COMPUTING LENGTH OF TURN LANES — 401-9E REFERENCE SECTIONS 401.6.1, 401.6.3

TYPE OF TRAFFIC CONTROL	DESIGN SPEED (mph) 30 - 35		40 - 45		50 - 60	
	TURN DEMAND VOLUME					
	HIGH	LOW[1]	HIGH	LOW[1]	HIGH	LOW[1]
SIGNALIZED	A	A	B or C[2]	B or C[2]	B or C[2]	B or C[2]
UNSIGNALIZED STOPPED CROSSROAD	A	A	A	A	A	A
UNSIGNALIZED THROUGH ROAD	A	A	C	B	B or C[2]	B

1 LOW is considered 10% or less of approach traffic volume.
2 Whichever is greater

Turn Demand Volume (1)=	120
Approach Volume =	820
Turn / Approach =	15%
(1) PM Peak (highest volume).	

Note: Based on L&D Manual guidance, left turn lane recommended to not exceed 600 feet (storage).

Storage Length at Intersections: 401-10E

Average No. of Vehicles/Cycle	Required Length	Average No. of Vehicles/Cycle	Required Length
1	50 ft	17	600 ft
2	100 ft	18	625 ft
3	150 ft	19	650 ft
4	175 ft	20	675 ft
5	200 ft	21	725 ft
6	250 ft	22	750 ft
7	275 ft	23	775 ft
8	325 ft	24	800 ft
9	350 ft	25	825 ft
10	375 ft	30	975 ft
11	400 ft	35	1125 ft
12	450 ft	40	1250 ft
13	475 ft	45	1400 ft
14	500 ft	50	1550 ft
15	525 ft	55	1700 ft
16	550 ft	60	1850 ft

Left Turn Storage Lane Length Calculation

DHV (Turning Lane) =	120	If Cycles are unknown, assume:	Unsignalized or 2 Phase - 60 Cycles/Hr
Cycle Length =	125		3 Phase - 40 Cycles/Hr
Cycles per Hour =	29		4 Phase - 30 Cycles/Hr
Average Vehicles per Cycle=	4	Required Turn Lane Storage Length =	175 ft (from Figure 401-10)

Adjacent Through Lane Storage Calculation

Adjacent Lane(s) Volume =	440	Number of Lanes	1
Average Vehicles per Cycle=	15	Required Length (per lane) =	525 ft
Required Length (total) =	525 ft (from Figure 401-10)		

Condition A **Storage Only**
Length = 50 ft (diverging taper) + 175 ft (Storage Length, Figure 401-10) **Length = 225 ft**

Condition B **High Speed Deceleration Only**

Design Speed	Length (including 50' Diverging Taper)
40	125 ft
45	175 ft
50	225 ft
55	285 ft
60	345 ft

Length = #N/A ft

Condition C **Moderate Speed Deceleration and Storage**

Design Speed	Length (including 50' Diverging Taper)			(Storage Length, Figure 401-10)
40	290 ft	115 ft	+	175 ft
45	300 ft	125 ft	+	175 ft
50	320 ft	145 ft	+	175 ft
55	340 ft	165 ft	+	175 ft
60	360 ft	185 ft	+	175 ft

Length = #N/A ft

Minimum Required Storage Lane Length (including 50' diverging taper) Per Lane = 225 feet
Perferred Storage Lane Length (including 50' diverging taper) Per Lane = 575 feet

Note: Minimum required storage lane length reflects required storage of vehicles calculated using volume and cycle length. Preferred storage length varies from minimum storage lane length when adjacent through lane queue is projected to be greater than the minimum required storage length.

Length of Turn Lane Calculation Worksheet

Based on ODOT L&D Manual, Release Date 7/1/2018

Project Name: Indianola Ave Road Diet
Intersection: Indianola Ave & North Broadway
Analysis Date: 6/28/2021
Movement: WBL
2024 PM Peak Build

Design Speed = 35 (Speed in mph)
Turn Demand Volume = High (High or Low)
Type of Traffic Control = Signalized (Signalized, Unsignalized Stopped Crossroad, or Unsignalized Through Road)
Condition = A (A, B, or C obtained from Table 401-9E)

BASIS FOR COMPUTING LENGTH OF TURN LANES — **401-9E REFERENCE SECTIONS 401.6.1, 401.6.3**

TYPE OF TRAFFIC CONTROL	DESIGN SPEED (mph) 30 - 35		40 - 45		50 - 60	
	TURN DEMAND VOLUME					
	HIGH	LOW[1]	HIGH	LOW[1]	HIGH	LOW[1]
SIGNALIZED	A	A	B or C[2]	B or C[2]	B or C[2]	B or C[2]
UNSIGNALIZED STOPPED CROSSROAD	A	A	A	A	A	A
UNSIGNALIZED THROUGH ROAD	A	A	C	B	B or C[2]	B

1 LOW is considered 10% or less of approach traffic volume.
2 Whichever is greater

Turn Demand Volume (1)=	120
Approach Volume =	1,020
Turn / Approach =	12%

(1) PM Peak (highest volume).

Note: Based on L&D Manual guidance, left turn lane recommended to not exceed 600 feet (storage).

Storage Length at Intersections: 401-10E

Average No. of Vehicles/Cycle	Required Length	Average No. of Vehicles/Cycle	Required Length
1	50 ft	17	600 ft
2	100 ft	18	625 ft
3	150 ft	19	650 ft
4	175 ft	20	675 ft
5	200 ft	21	725 ft
6	250 ft	22	750 ft
7	275 ft	23	775 ft
8	325 ft	24	800 ft
9	350 ft	25	825 ft
10	375 ft	30	975 ft
11	400 ft	35	1125 ft
12	450 ft	40	1250 ft
13	475 ft	45	1400 ft
14	500 ft	50	1550 ft
15	525 ft	55	1700 ft
16	550 ft	60	1850 ft

Left Turn Storage Lane Length Calculation

DHV (Turning Lane) = 120
Cycle Length = 125
Cycles per Hour = 29
Average Vehicles per Cycle= 4

If Cycles are unknown, assume: Unsignalized or 2 Phase - 60 Cycles/Hr; 3 Phase - 40 Cycles/Hr; 4 Phase - 30 Cycles/Hr

Required Turn Lane Storage Length = 175 ft (from Figure 401-10)

Adjacent Through Lane Storage Calculation

Adjacent Lane(s) Volume = 500
Average Vehicles per Cycle= 17
Required Length (total) = 600 ft (from Figure 401-10)
Number of Lanes 1
Required Length (per lane) = 600 ft

Condition A **Storage Only**
Length = 50 ft (diverging taper) + 175 ft (Storage Length, Figure 401-10)
Length = 225 ft

Condition B **High Speed Deceleration Only**

Design Speed	Length (including 50' Diverging Taper)
40	125 ft
45	175 ft
50	225 ft
55	285 ft
60	345 ft

Length = #N/A ft

Condition C **Moderate Speed Deceleration and Storage**

Design Speed	Length (including 50' Diverging Taper)			(Storage Length, Figure 401-10)
40	290 ft	115 ft	+	175 ft
45	300 ft	125 ft	+	175 ft
50	320 ft	145 ft	+	175 ft
55	340 ft	165 ft	+	175 ft
60	360 ft	185 ft	+	175 ft

Length = #N/A ft

Minimum Required Storage Lane Length (including 50' diverging taper) Per Lane = 225 feet

Perferred Storage Lane Length (including 50' diverging taper) Per Lane = 650 feet

Note: Minimum required storage lane length reflects required storage of vehicles calculated using volume and cycle length. Preferred storage length varies from minimum storage lane length when adjacent through lane queue is projected to be greater than the minimum required storage length.

Length of Turn Lane Calculation Worksheet
Based on ODOT L&D Manual, Release Date 7/1/2018

Michael Baker INTERNATIONAL

Project Name:	Indianola Ave Road Diet	Analysis Date:	6/28/2021
Intersection:	Indianola Ave & North Broadway	Movement:	NBL
			2044 AM Peak Build
Design Speed =	35	(Speed in mph)	
Turn Demand Volume =	High	(High or Low)	
Type of Traffic Control =	Signalized	(Signalized, Unsignalized Stopped Crossroad, or Unsignalized Through Road)	
Condition =	A	(A, B, or C obtained from Table 401-9E)	

BASIS FOR COMPUTING LENGTH OF TURN LANES

401-9E
REFERENCE SECTIONS 401.6.1, 401.6.3

TYPE OF TRAFFIC CONTROL	DESIGN SPEED (mph)					
	30 - 35		40 - 45		50 - 60	
	TURN DEMAND VOLUME					
	HIGH	LOW[1]	HIGH	LOW[1]	HIGH	LOW[1]
SIGNALIZED	A	A	B or C[2]	B or C[2]	B or C[2]	B or C[2]
UNSIGNALIZED STOPPED CROSSROAD	A	A	A	A	A	A
UNSIGNALIZED THROUGH ROAD	A	A	C	B	B or C[2]	B

[1] LOW is considered 10% or less of approach traffic volume.
[2] Whichever is greater

Turn Demand Volume (1)=	130
Approach Volume =	550
Turn / Approach =	24%
(1) PM Peak (highest volume).	

Note: Based on L&D Manual guidance, left turn lane recommended to not exceed 600 feet (storage).

Storage Length at Intersections: 401-10E

Average No. of Vehicles/Cycle	Required Length		Average No. of Vehicles/Cycle	Required Length
1	50	ft	17	600 ft
2	100	ft	18	625 ft
3	150	ft	19	650 ft
4	175	ft	20	675 ft
5	200	ft	21	725 ft
6	250	ft	22	750 ft
7	275	ft	23	775 ft
8	325	ft	24	800 ft
9	350	ft	25	825 ft
10	375	ft	30	975 ft
11	400	ft	35	1125 ft
12	450	ft	40	1250 ft
13	475	ft	45	1400 ft
14	500	ft	50	1550 ft
15	525	ft	55	1700 ft
16	550	ft	60	1850 ft

Left Turn Storage Lane Length Calculation

DHV (Turning Lane) =	130	If Cycles are unknown, assume:	Unsignalized or 2 Phase - 60 Cycles/Hr
Cycle Length =	131		3 Phase - 40 Cycles/Hr
Cycles per Hour =	27		4 Phase - 30 Cycles/Hr
Average Vehicles per Cycle=	5	Required Turn Lane Storage Length =	200 ft (from Figure 401-10)

Adjacent Through Lane Storage Calculation

Adjacent Lane(s) Volume =	420	Number of Lanes	1
Average Vehicles per Cycle=	16	Required Length (per lane) =	550 ft
Required Length (total) =	550 ft (from Figure 401-10)		

Condition A **Storage Only**

(Storage Length, Figure 401-10)

Length = 50 ft (diverging taper) + 200 ft **Length = 250 ft**

Condition B **High Speed Deceleration Only**

Design Speed	Length (including 50' Diverging Taper)	
40	125	ft
45	175	ft
50	225	ft
55	285	ft
60	345	ft

Length = #N/A ft

Condition C **Moderate Speed Deceleration and Storage**

Design Speed	Length (including 50' Diverging Taper)					(Storage Length, Figure 401-10)
40	315	ft	115	ft	+	200 ft
45	325	ft	125	ft	+	200 ft
50	345	ft	145	ft	+	200 ft
55	365	ft	165	ft	+	200 ft
60	385	ft	185	ft	+	200 ft

Length = #N/A ft

Minimum Required Storage Lane Length (including 50' diverging taper) Per Lane = 250 feet

Perferred Storage Lane Length (including 50' diverging taper) Per Lane = 600 feet

Note: Minimum required storage lane length reflects required storage of vehicles calculated using volume and cycle length. Preferred storage length varies from minimum storage lane length when adjacent through lane queue is projected to be greater than the minimum required storage length.

Length of Turn Lane Calculation Worksheet
Based on ODOT L&D Manual, Release Date 7/1/2018

Michael Baker INTERNATIONAL

Project Name:	Indianola Ave Road Diet	Analysis Date:	6/28/2021
Intersection:	Indianola Ave & North Broadway	Movement:	SBL
			2044 AM Peak Build
Design Speed =	35	(Speed in mph)	
Turn Demand Volume =	High	(High or Low)	
Type of Traffic Control =	Signalized	(Signalized, Unsignalized Stopped Crossroad, or Unsignalized Through Road)	
Condition =	A	(A, B, or C obtained from Table 401-9E)	

BASIS FOR COMPUTING LENGTH OF TURN LANES	401-9E REFERENCE SECTIONS 401.6.1, 401.6.3

TYPE OF TRAFFIC CONTROL	DESIGN SPEED (mph)					
	30 - 35		40 - 45		50 - 60	
	TURN DEMAND VOLUME					
	HIGH	LOW[1]	HIGH	LOW[1]	HIGH	LOW[1]
SIGNALIZED	A	A	B or C[2]	B or C[2]	B or C[2]	B or C[2]
UNSIGNALIZED STOPPED CROSSROAD	A	A	A	A	A	A
UNSIGNALIZED THROUGH ROAD	A	A	C	B	B or C[2]	B

[1] LOW is considered 10% or less of approach traffic volume.
[2] Whichever is greater

Turn Demand Volume (1)=	410
Approach Volume =	860
Turn / Approach =	48%
(1) PM Peak (highest volume).	

Note: Based on L&D Manual guidance, left turn lane recommended to not exceed 600 feet (storage).

Storage Length at Intersections: 401-10E

Average No. of Vehicles/Cycle	Required Length	Average No. of Vehicles/Cycle	Required Length
1	50 ft	17	600 ft
2	100 ft	18	625 ft
3	150 ft	19	650 ft
4	175 ft	20	675 ft
5	200 ft	21	725 ft
6	250 ft	22	750 ft
7	275 ft	23	775 ft
8	325 ft	24	800 ft
9	350 ft	25	825 ft
10	375 ft	30	975 ft
11	400 ft	35	1125 ft
12	450 ft	40	1250 ft
13	475 ft	45	1400 ft
14	500 ft	50	1550 ft
15	525 ft	55	1700 ft
16	550 ft	60	1850 ft

Left Turn Storage Lane Length Calculation

DHV (Turning Lane) =	410	If Cycles are unknown, assume:	Unsignalized or 2 Phase - 60 Cycles/Hr
Cycle Length =	131		3 Phase - 40 Cycles/Hr
Cycles per Hour =	27		4 Phase - 30 Cycles/Hr
Average Vehicles per Cycle=	15	Required Turn Lane Storage Length =	525 ft (from Figure 401-10)

Adjacent Through Lane Storage Calculation

Adjacent Lane(s) Volume =	450	Number of Lanes	1
Average Vehicles per Cycle=	17	Required Length (per lane) =	600 ft
Required Length (total) =	600 ft (from Figure 401-10)		

Condition A **Storage Only**

Length = 50 ft (diverging taper) + 525 ft (Storage Length, Figure 401-10) **Length = 575 ft**

Condition B **High Speed Deceleration Only**

Design Speed	Length (including 50' Diverging Taper)
40	125 ft
45	175 ft
50	225 ft
55	285 ft
60	345 ft

Length = #N/A ft

Condition C **Moderate Speed Deceleration and Storage**

Design Speed	Length (including 50' Diverging Taper)			(Storage Length, Figure 401-10)
40	640 ft	115 ft	+	525 ft
45	650 ft	125 ft	+	525 ft
50	670 ft	145 ft	+	525 ft
55	690 ft	165 ft	+	525 ft
60	710 ft	185 ft	+	525 ft

Length = #N/A ft

Minimum Required Storage Lane Length (including 50' diverging taper) Per Lane = 575 feet

Perferred Storage Lane Length (including 50' diverging taper) Per Lane = 650 feet

Note: Minimum required storage lane length reflects required storage of vehicles calculated using volume and cycle length. Preferred storage length varies from minimum storage lane length when adjacent through lane queue is projected to be greater than the minimum required storage length.

Length of Turn Lane Calculation Worksheet
Based on ODOT L&D Manual, Release Date 7/1/2018

Michael Baker INTERNATIONAL

Project Name:	Indianola Ave Road Diet	Analysis Date:	6/28/2021
Intersection:	Indianola Ave & North Broadway	Movement:	EBL
			2044 AM Peak Build
Design Speed =	35	(Speed in mph)	
Turn Demand Volume =	High	(High or Low)	
Type of Traffic Control =	Signalized	(Signalized, Unsignalized Stopped Crossroad, or Unsignalized Through Road)	
Condition =	A	(A, B, or C obtained from Table 401-9E)	

BASIS FOR COMPUTING LENGTH OF TURN LANES — 401-9E REFERENCE SECTIONS 401.6.1, 401.6.3

TYPE OF TRAFFIC CONTROL	DESIGN SPEED (mph) 30 - 35		40 - 45		50 - 60	
	TURN DEMAND VOLUME					
	HIGH	LOW[1]	HIGH	LOW[1]	HIGH	LOW[1]
SIGNALIZED	A	A	B or C[2]	B or C[2]	B or C[2]	B or C[2]
UNSIGNALIZED STOPPED CROSSROAD	A	A	A	A	A	A
UNSIGNALIZED THROUGH ROAD	A	A	C	B	B or C[2]	B

1 LOW is considered 10% or less of approach traffic volume.
2 Whichever is greater

Turn Demand Volume (1)=	120
Approach Volume =	680
Turn / Approach =	18%
(1) PM Peak (highest volume).	

Note: Based on L&D Manual guidance, left turn lane recommended to not exceed 600 feet (storage).

Storage Length at Intersections: 401-10E

Average No. of Vehicles/Cycle	Required Length	Average No. of Vehicles/Cycle	Required Length
1	50 ft	17	600 ft
2	100 ft	18	625 ft
3	150 ft	19	650 ft
4	175 ft	20	675 ft
5	200 ft	21	725 ft
6	250 ft	22	750 ft
7	275 ft	23	775 ft
8	325 ft	24	800 ft
9	350 ft	25	825 ft
10	375 ft	30	975 ft
11	400 ft	35	1125 ft
12	450 ft	40	1250 ft
13	475 ft	45	1400 ft
14	500 ft	50	1550 ft
15	525 ft	55	1700 ft
16	550 ft	60	1850 ft

Left Turn Storage Lane Length Calculation

DHV (Turning Lane) =	120	If Cycles are unknown, assume:	Unsignalized or 2 Phase - 60 Cycles/Hr
Cycle Length =	131		3 Phase - 40 Cycles/Hr
Cycles per Hour =	27		4 Phase - 30 Cycles/Hr
Average Vehicles per Cycle=	4	Required Turn Lane Storage Length =	175 ft (from Figure 401-10)

Adjacent Through Lane Storage Calculation

Adjacent Lane(s) Volume =	420	Number of Lanes	1
Average Vehicles per Cycle=	16	Required Length (per lane) =	550 ft
Required Length (total) =	550 ft (from Figure 401-10)		

Condition A **Storage Only**
Length = 50 ft (diverging taper) + 175 ft (Storage Length, Figure 401-10) **Length = 225 ft**

Condition B **High Speed Deceleration Only**

Design Speed	Length (including 50' Diverging Taper)
40	125 ft
45	175 ft
50	225 ft
55	285 ft
60	345 ft

Length = #N/A ft

Condition C **Moderate Speed Deceleration and Storage**

Design Speed	Length (including 50' Diverging Taper)			(Storage Length, Figure 401-10)
40	290 ft	115 ft	+	175 ft
45	300 ft	125 ft	+	175 ft
50	320 ft	145 ft	+	175 ft
55	340 ft	165 ft	+	175 ft
60	360 ft	185 ft	+	175 ft

Length = #N/A ft

Minimum Required Storage Lane Length (including 50' diverging taper) Per Lane = 225 feet
Perferred Storage Lane Length (including 50' diverging taper) Per Lane = 600 feet

Note: Minimum required storage lane length reflects required storage of vehicles calculated using volume and cycle length. Preferred storage length varies from minimum storage lane length when adjacent through lane queue is projected to be greater than the minimum required storage length.

Length of Turn Lane Calculation Worksheet
Based on ODOT L&D Manual, Release Date 7/1/2018

Michael Baker INTERNATIONAL

Project Name:	Indianola Ave Road Diet	Analysis Date:	6/28/2021
Intersection:	Indianola Ave & North Broadway	Movement:	WBL
			2044 AM Peak Build

Design Speed =	35	(Speed in mph)
Turn Demand Volume =	High	(High or Low)
Type of Traffic Control =	Signalized	(Signalized, Unsignalized Stopped Crossroad, or Unsignalized Through Road)
Condition =	A	(A, B, or C obtained from Table 401-9E)

BASIS FOR COMPUTING LENGTH OF TURN LANES — 401-9E REFERENCE SECTIONS 401.6.1, 401.6.3

TYPE OF TRAFFIC CONTROL	DESIGN SPEED (mph) 30 - 35		40 - 45		50 - 60	
	TURN DEMAND VOLUME					
	HIGH	LOW[1]	HIGH	LOW[1]	HIGH	LOW[1]
SIGNALIZED	A	A	B or C[2]	B or C[2]	B or C[2]	B or C[2]
UNSIGNALIZED STOPPED CROSSROAD	A	A	A	A	A	A
UNSIGNALIZED THROUGH ROAD	A	A	C	B	B or C[2]	B

1 LOW is considered 10% or less of approach traffic volume.
2 Whichever is greater

Turn Demand Volume (1)=	140
Approach Volume =	1,210
Turn / Approach =	12%

(1) PM Peak (highest volume).

Note: Based on L&D Manual guidance, left turn lane recommended to not exceed 600 feet (storage).

Storage Length at Intersections: 401-10E

Average No. of Vehicles/Cycle	Required Length		Average No. of Vehicles/Cycle	Required Length
1	50	ft	17	600 ft
2	100	ft	18	625 ft
3	150	ft	19	650 ft
4	175	ft	20	675 ft
5	200	ft	21	725 ft
6	250	ft	22	750 ft
7	275	ft	23	775 ft
8	325	ft	24	800 ft
9	350	ft	25	825 ft
10	375	ft	30	975 ft
11	400	ft	35	1125 ft
12	450	ft	40	1250 ft
13	475	ft	45	1400 ft
14	500	ft	50	1550 ft
15	525	ft	55	1700 ft
16	550	ft	60	1850 ft

Left Turn Storage Lane Length Calculation

DHV (Turning Lane) =	140	If Cycles are unknown, assume:	Unsignalized or 2 Phase - 60 Cycles/Hr
Cycle Length =	131		3 Phase - 40 Cycles/Hr
Cycles per Hour =	27		4 Phase - 30 Cycles/Hr
Average Vehicles per Cycle=	5	Required Turn Lane Storage Length =	200 ft (from Figure 401-10)

Adjacent Through Lane Storage Calculation

Adjacent Lane(s) Volume =	450	Number of Lanes	1
Average Vehicles per Cycle=	17	Required Length (per lane) =	600 ft
Required Length (total) =	600 ft (from Figure 401-10)		

Condition A **Storage Only**
Length = 50 ft (diverging taper) + 200 ft (Storage Length, Figure 401-10)
Length = 250 ft

Condition B **High Speed Deceleration Only**

Design Speed	Length (including 50' Diverging Taper)
40	125 ft
45	175 ft
50	225 ft
55	285 ft
60	345 ft

Length = #N/A ft

Condition C **Moderate Speed Deceleration and Storage**

Design Speed	Length (including 50' Diverging Taper)			(Storage Length, Figure 401-10)
40	315 ft	115 ft	+	200 ft
45	325 ft	125 ft	+	200 ft
50	345 ft	145 ft	+	200 ft
55	365 ft	165 ft	+	200 ft
60	385 ft	185 ft	+	200 ft

Length = #N/A ft

Minimum Required Storage Lane Length (including 50' diverging taper) Per Lane = 250 feet
Perferred Storage Lane Length (including 50' diverging taper) Per Lane = 650 feet

Note: Minimum required storage lane length reflects required storage of vehicles calculated using volume and cycle length. Preferred storage length varies from minimum storage lane length when adjacent through lane queue is projected to be greater than the minimum required storage length.

Length of Turn Lane Calculation Worksheet
Based on ODOT L&D Manual, Release Date 7/1/2018

Michael Baker INTERNATIONAL

Project Name:	Indianola Ave Road Diet	Analysis Date:	6/28/2021
Intersection:	Indianola Ave & North Broadway	Movement:	NBL
			2044 PM Peak Build
Design Speed =	35	(Speed in mph)	
Turn Demand Volume =	High	(High or Low)	
Type of Traffic Control =	Signalized	(Signalized, Unsignalized Stopped Crossroad, or Unsignalized Through Road)	
Condition =	A	(A, B, or C obtained from Table 401-9E)	

BASIS FOR COMPUTING LENGTH OF TURN LANES — 401-9E REFERENCE SECTIONS 401.6.1, 401.6.3

TYPE OF TRAFFIC CONTROL	DESIGN SPEED (mph) 30 - 35		40 - 45		50 - 60	
	TURN DEMAND VOLUME					
	HIGH	LOW[1]	HIGH	LOW[1]	HIGH	LOW[1]
SIGNALIZED	A	A	B or C[2]	B or C[2]	B or C[2]	B or C[2]
UNSIGNALIZED STOPPED CROSSROAD	A	A	A	A	A	A
UNSIGNALIZED THROUGH ROAD	A	A	C	B	B or C[2]	B

1 LOW is considered 10% or less of approach traffic volume.
2 Whichever is greater

Turn Demand Volume (1)=	100
Approach Volume =	550
Turn / Approach =	18%
(1) PM Peak (highest volume).	

Note: Based on L&D Manual guidance, left turn lane recommended to not exceed 600 feet (storage).

Storage Length at Intersections: 401-10E

Average No. of Vehicles/Cycle	Required Length	Average No. of Vehicles/Cycle	Required Length
1	50 ft	17	600 ft
2	100 ft	18	625 ft
3	150 ft	19	650 ft
4	175 ft	20	675 ft
5	200 ft	21	725 ft
6	250 ft	22	750 ft
7	275 ft	23	775 ft
8	325 ft	24	800 ft
9	350 ft	25	825 ft
10	375 ft	30	975 ft
11	400 ft	35	1125 ft
12	450 ft	40	1250 ft
13	475 ft	45	1400 ft
14	500 ft	50	1550 ft
15	525 ft	55	1700 ft
16	550 ft	60	1850 ft

Left Turn Storage Lane Length Calculation

DHV (Turning Lane) =	100	If Cycles are unknown, assume:	Unsignalized or 2 Phase - 60 Cycles/Hr
Cycle Length =	148		3 Phase - 40 Cycles/Hr
Cycles per Hour =	24		4 Phase - 30 Cycles/Hr
Average Vehicles per Cycle=	4	Required Turn Lane Storage Length =	175 ft (from Figure 401-10)

Adjacent Through Lane Storage Calculation

Adjacent Lane(s) Volume =	450	Number of Lanes	1
Average Vehicles per Cycle=	19	Required Length (per lane) =	650 ft
Required Length (total) =	650 ft (from Figure 401-10)		

Condition A **Storage Only**
Length = 50 ft (diverging taper) + 175 ft (Storage Length, Figure 401-10) **Length = 225 ft**

Condition B **High Speed Deceleration Only**

Design Speed	Length (including 50' Diverging Taper)
40	125 ft
45	175 ft
50	225 ft
55	285 ft
60	345 ft

Length = #N/A ft

Condition C **Moderate Speed Deceleration and Storage**

Design Speed	Length (including 50' Diverging Taper)			(Storage Length, Figure 401-10)
40	290 ft	115 ft	+	175 ft
45	300 ft	125 ft	+	175 ft
50	320 ft	145 ft	+	175 ft
55	340 ft	165 ft	+	175 ft
60	360 ft	185 ft	+	175 ft

Length = #N/A ft

Minimum Required Storage Lane Length (including 50' diverging taper) Per Lane = 225 feet
Perferred Storage Lane Length (including 50' diverging taper) Per Lane = 700 feet

Note: Minimum required storage lane length reflects required storage of vehicles calculated using volume and cycle length. Preferred storage length varies from minimum storage lane length when adjacent through lane queue is projected to be greater than the minimum required storage length.

Length of Turn Lane Calculation Worksheet
Based on ODOT L&D Manual, Release Date 7/1/2018

Michael Baker INTERNATIONAL

Project Name:	Indianola Ave Road Diet	Analysis Date:	6/28/2021
Intersection:	Indianola Ave & North Broadway	Movement:	SBL
			2044 PM Peak Build
Design Speed =	35	(Speed in mph)	
Turn Demand Volume =	High	(High or Low)	
Type of Traffic Control =	Signalized	(Signalized, Unsignalized Stopped Crossroad, or Unsignalized Through Road)	
Condition =	A	(A, B, or C obtained from Table 401-9E)	

BASIS FOR COMPUTING LENGTH OF TURN LANES

401-9E
REFERENCE SECTIONS 401.6.1, 401.6.3

TYPE OF TRAFFIC CONTROL	DESIGN SPEED (mph)					
	30 - 35		40 - 45		50 - 60	
	TURN DEMAND VOLUME					
	HIGH	LOW[1]	HIGH	LOW[1]	HIGH	LOW[1]
SIGNALIZED	A	A	B or C[2]	B or C[2]	B or C[2]	B or C[2]
UNSIGNALIZED STOPPED CROSSROAD	A	A	A	A	A	A
UNSIGNALIZED THROUGH ROAD	A	A	C	B	B or C[2]	B

[1] LOW is considered 10% or less of approach traffic volume.
[2] Whichever is greater

Turn Demand Volume (1)=	390
Approach Volume =	910
Turn / Approach =	43%
(1) PM Peak (highest volume).	

Note: Based on L&D Manual guidance, left turn lane recommended to not exceed 600 feet (storage).

Storage Length at Intersections: 401-10E

Average No. of Vehicles/Cycle	Required Length		Average No. of Vehicles/Cycle	Required Length
1	50	ft	17	600 ft
2	100	ft	18	625 ft
3	150	ft	19	650 ft
4	175	ft	20	675 ft
5	200	ft	21	725 ft
6	250	ft	22	750 ft
7	275	ft	23	775 ft
8	325	ft	24	800 ft
9	350	ft	25	825 ft
10	375	ft	30	975 ft
11	400	ft	35	1125 ft
12	450	ft	40	1250 ft
13	475	ft	45	1400 ft
14	500	ft	50	1550 ft
15	525	ft	55	1700 ft
16	550	ft	60	1850 ft

Left Turn Storage Lane Length Calculation

DHV (Turning Lane) =	390	If Cycles are unknown, assume:	Unsignalized or 2 Phase - 60 Cycles/Hr
Cycle Length =	148		3 Phase - 40 Cycles/Hr
Cycles per Hour =	24		4 Phase - 30 Cycles/Hr
Average Vehicles per Cycle=	16	Required Turn Lane Storage Length =	550 ft (from Figure 401-10)

Adjacent Through Lane Storage Calculation

Adjacent Lane(s) Volume =	520	Number of Lanes	1
Average Vehicles per Cycle=	22	Required Length (per lane) =	750 ft
Required Length (total) =	750 ft (from Figure 401-10)		

Condition A **Storage Only**
Length = 50 ft (diverging taper) + (Storage Length, Figure 401-10) 550 ft
Length = 600 ft

Condition B **High Speed Deceleration Only**

Design Speed	Length (including 50' Diverging Taper)
40	125 ft
45	175 ft
50	225 ft
55	285 ft
60	345 ft

Length = #N/A ft

Condition C **Moderate Speed Deceleration and Storage**

Design Speed	Length (including 50' Diverging Taper)			(Storage Length, Figure 401-10)
40	665 ft	115 ft	+	550 ft
45	675 ft	125 ft	+	550 ft
50	695 ft	145 ft	+	550 ft
55	715 ft	165 ft	+	550 ft
60	735 ft	185 ft	+	550 ft

Length = #N/A ft

Minimum Required Storage Lane Length (including 50' diverging taper) Per Lane = 600 feet
Perferred Storage Lane Length (including 50' diverging taper) Per Lane = 800 feet

Note: Minimum required storage lane length reflects required storage of vehicles calculated using volume and cycle length. Preferred storage length varies from minimum storage lane length when adjacent through lane queue is projected to be greater than the minimum required storage length.

Length of Turn Lane Calculation Worksheet
Based on ODOT L&D Manual, Release Date 7/1/2018

Michael Baker INTERNATIONAL

Project Name:	Indianola Ave Road Diet		Analysis Date:	6/28/2021
Intersection:	Indianola Ave & North Broadway		Movement:	EBL
				2044 PM Peak Build
Design Speed =	35	(Speed in mph)		
Turn Demand Volume =	High	(High or Low)		
Type of Traffic Control =	Signalized	(Signalized, Unsignalized Stopped Crossroad, or Unsignalized Through Road)		
Condition =	A	(A, B, or C obtained from Table 401-9E)		

BASIS FOR COMPUTING LENGTH OF TURN LANES — 401-9E REFERENCE SECTIONS 401.6.1, 401.6.3

TYPE OF TRAFFIC CONTROL	DESIGN SPEED (mph) 30 - 35 HIGH	30 - 35 LOW[1]	40 - 45 HIGH	40 - 45 LOW[1]	50 - 60 HIGH	50 - 60 LOW[1]
SIGNALIZED	A	A	B or C[2]	B or C[2]	B or C[2]	B or C[2]
UNSIGNALIZED STOPPED CROSSROAD	A	A	A	A	A	A
UNSIGNALIZED THROUGH ROAD	A	A	C	B	B or C[2]	B

[1] LOW is considered 10% or less of approach traffic volume.
[2] Whichever is greater

Turn Demand Volume (1)=	130
Approach Volume =	910
Turn / Approach =	14%
(1) PM Peak (highest volume).	

Note: Based on L&D Manual guidance, left turn lane recommended to not exceed 600 feet (storage).

Storage Length at Intersections: 401-10E

Average No. of Vehicles/Cycle	Required Length	Average No. of Vehicles/Cycle	Required Length
1	50 ft	17	600 ft
2	100 ft	18	625 ft
3	150 ft	19	650 ft
4	175 ft	20	675 ft
5	200 ft	21	725 ft
6	250 ft	22	750 ft
7	275 ft	23	775 ft
8	325 ft	24	800 ft
9	350 ft	25	825 ft
10	375 ft	30	975 ft
11	400 ft	35	1125 ft
12	450 ft	40	1250 ft
13	475 ft	45	1400 ft
14	500 ft	50	1550 ft
15	525 ft	55	1700 ft
16	550 ft	60	1850 ft

Left Turn Storage Lane Length Calculation

DHV (Turning Lane) =	130	If Cycles are unknown, assume:	Unsignalized or 2 Phase - 60 Cycles/Hr
Cycle Length =	148		3 Phase - 40 Cycles/Hr
Cycles per Hour =	24		4 Phase - 30 Cycles/Hr
Average Vehicles per Cycle=	5	Required Turn Lane Storage Length =	200 ft (from Figure 401-10)

Adjacent Through Lane Storage Calculation

Adjacent Lane(s) Volume =	450	Number of Lanes	1
Average Vehicles per Cycle=	19	Required Length (per lane) =	650 ft
Required Length (total) =	650 ft (from Figure 401-10)		

Condition A **Storage Only** (Storage Length, Figure 401-10)
Length = 50 ft (diverging taper) + 200 ft — **Length = 250 ft**

Condition B **High Speed Deceleration Only**

Design Speed	Length (including 50' Diverging Taper)
40	125 ft
45	175 ft
50	225 ft
55	285 ft
60	345 ft

Length = #N/A ft

Condition C **Moderate Speed Deceleration and Storage**

Design Speed	Length (including 50' Diverging Taper)			(Storage Length, Figure 401-10)
40	315 ft	115 ft	+	200 ft
45	325 ft	125 ft	+	200 ft
50	345 ft	145 ft	+	200 ft
55	365 ft	165 ft	+	200 ft
60	385 ft	185 ft	+	200 ft

Length = #N/A ft

Minimum Required Storage Lane Length (including 50' diverging taper) Per Lane = 250 feet
Perferred Storage Lane Length (including 50' diverging taper) Per Lane = 700 feet

Note: Minimum required storage lane length reflects required storage of vehicles calculated using volume and cycle length. Preferred storage length varies from minimum storage lane length when adjacent through lane queue is projected to be greater than the minimum required storage length.

Length of Turn Lane Calculation Worksheet

Based on ODOT L&D Manual, Release Date 7/1/2018

Michael Baker INTERNATIONAL

Project Name:	Indianola Ave Road Diet	Analysis Date:	6/28/2021
Intersection:	Indianola Ave & North Broadway	Movement:	WBL
			2044 PM Peak Build

Design Speed =	35	(Speed in mph)
Turn Demand Volume =	High	(High or Low)
Type of Traffic Control =	Signalized	(Signalized, Unsignalized Stopped Crossroad, or Unsignalized Through Road)
Condition =	A	(A, B, or C obtained from Table 401-9E)

BASIS FOR COMPUTING LENGTH OF TURN LANES

401-9E REFERENCE SECTIONS 401.6.1, 401.6.3

TYPE OF TRAFFIC CONTROL	DESIGN SPEED (mph) 30 - 35		40 - 45		50 - 60	
	TURN DEMAND VOLUME					
	HIGH	LOW[1]	HIGH	LOW[1]	HIGH	LOW[1]
SIGNALIZED	A	A	B or C[2]	B or C[2]	B or C[2]	B or C[2]
UNSIGNALIZED STOPPED CROSSROAD	A	A	A	A	A	A
UNSIGNALIZED THROUGH ROAD	A	A	C	B	B or C[2]	B

Turn Demand Volume (1)=	130
Approach Volume =	1,140
Turn / Approach =	11%

(1) PM Peak (highest volume).

Note: Based on L&D Manual guidance, left turn lane recommended to not exceed 600 feet (storage).

1 LOW is considered 10% or less of approach traffic volume.

2 Whichever is greater

Storage Length at Intersections: 401-10E

Average No. of Vehicles/Cycle	Required Length	Average No. of Vehicles/Cycle	Required Length
1	50 ft	17	600 ft
2	100 ft	18	625 ft
3	150 ft	19	650 ft
4	175 ft	20	675 ft
5	200 ft	21	725 ft
6	250 ft	22	750 ft
7	275 ft	23	775 ft
8	325 ft	24	800 ft
9	350 ft	25	825 ft
10	375 ft	30	975 ft
11	400 ft	35	1125 ft
12	450 ft	40	1250 ft
13	475 ft	45	1400 ft
14	500 ft	50	1550 ft
15	525 ft	55	1700 ft
16	550 ft	60	1850 ft

Left Turn Storage Lane Length Calculation

DHV (Turning Lane) =	130	If Cycles are unknown, assume:	Unsignalized or 2 Phase - 60 Cycles/Hr
Cycle Length =	148		3 Phase - 40 Cycles/Hr
Cycles per Hour =	24		4 Phase - 30 Cycles/Hr
Average Vehicles per Cycle=	5	Required Turn Lane Storage Length =	200 ft (from Figure 401-10)

Adjacent Through Lane Storage Calculation

Adjacent Lane(s) Volume =	520	Number of Lanes	1
Average Vehicles per Cycle=	22	Required Length (per lane) =	750 ft
Required Length (total) =	750 ft (from Figure 401-10)		

Condition A **Storage Only**

Length = 50 ft (diverging taper) + 200 ft (Storage Length, Figure 401-10) **Length = 250 ft**

Condition B **High Speed Deceleration Only**

Design Speed	Length (including 50' Diverging Taper)
40	125 ft
45	175 ft
50	225 ft
55	285 ft
60	345 ft

Length = #N/A ft

Condition C **Moderate Speed Deceleration and Storage**

Design Speed	Length (including 50' Diverging Taper)			(Storage Length, Figure 401-10)
40	315 ft	115 ft	+	200 ft
45	325 ft	125 ft	+	200 ft
50	345 ft	145 ft	+	200 ft
55	365 ft	165 ft	+	200 ft
60	385 ft	185 ft	+	200 ft

Length = #N/A ft

Minimum Required Storage Lane Length (including 50' diverging taper) Per Lane = 250 feet

Perferred Storage Lane Length (including 50' diverging taper) Per Lane = 800 feet

Note: Minimum required storage lane length reflects required storage of vehicles calculated using volume and cycle length. Preferred storage length varies from minimum storage lane length when adjacent through lane queue is projected to be greater than the minimum required storage length.

Length of Turn Lane Calculation Worksheet
Based on ODOT L&D Manual, Release Date 7/1/2018

Michael Baker INTERNATIONAL

Project Name:	Indianola Ave Road Diet	Analysis Date:	6/28/2021
Intersection:	Indianola Ave & North Broadway ALT	Movement:	NBL
			2044 AM Peak Build

Design Speed =	35	(Speed in mph)
Turn Demand Volume =	High	(High or Low)
Type of Traffic Control =	Signalized	(Signalized, Unsignalized Stopped Crossroad, or Unsignalized Through Road)
Condition =	A	(A, B, or C obtained from Table 401-9E)

BASIS FOR COMPUTING LENGTH OF TURN LANES — **401-9E** **REFERENCE SECTIONS 401.6.1, 401.6.3**

TYPE OF TRAFFIC CONTROL	DESIGN SPEED (mph)					
	30 - 35		40 - 45		50 - 60	
	TURN DEMAND VOLUME					
	HIGH	LOW[1]	HIGH	LOW[1]	HIGH	LOW[1]
SIGNALIZED	A	A	B or C[2]	B or C[2]	B or C[2]	B or C[2]
UNSIGNALIZED STOPPED CROSSROAD	A	A	A	A	A	A
UNSIGNALIZED THROUGH ROAD	A	A	C	B	B or C[2]	B

1 LOW is considered 10% or less of approach traffic volume.
2 Whichever is greater

Turn Demand Volume (1)=	130
Approach Volume =	550
Turn / Approach =	24%
(1) PM Peak (highest volume).	

Note: Based on L&D Manual guidance, left turn lane recommended to not exceed 600 feet (storage).

Storage Length at Intersections: 401-10E

Average No. of Vehicles/Cycle	Required Length		Average No. of Vehicles/Cycle	Required Length
1	50	ft	17	600 ft
2	100	ft	18	625 ft
3	150	ft	19	650 ft
4	175	ft	20	675 ft
5	200	ft	21	725 ft
6	250	ft	22	750 ft
7	275	ft	23	775 ft
8	325	ft	24	800 ft
9	350	ft	25	825 ft
10	375	ft	30	975 ft
11	400	ft	35	1125 ft
12	450	ft	40	1250 ft
13	475	ft	45	1400 ft
14	500	ft	50	1550 ft
15	525	ft	55	1700 ft
16	550	ft	60	1850 ft

Left Turn Storage Lane Length Calculation

DHV (Turning Lane) =	130	If Cycles are unknown, assume:	Unsignalized or 2 Phase - 60 Cycles/Hr
Cycle Length =	117		3 Phase - 40 Cycles/Hr
Cycles per Hour =	31		4 Phase - 30 Cycles/Hr
Average Vehicles per Cycle=	4	Required Turn Lane Storage Length =	175 ft (from Figure 401-10)

Adjacent Through Lane Storage Calculation

Adjacent Lane(s) Volume =	420	Number of Lanes	2
Average Vehicles per Cycle=	14	Required Length (per lane) =	250 ft
Required Length (total) =	500 ft (from Figure 401-10)		

Condition A **Storage Only**
Length = 50 ft (diverging taper) + 175 ft (Storage Length, Figure 401-10) **Length = 225 ft**

Condition B **High Speed Deceleration Only**

Design Speed	Length (including 50' Diverging Taper)
40	125 ft
45	175 ft
50	225 ft
55	285 ft
60	345 ft

Length = #N/A ft

Condition C **Moderate Speed Deceleration and Storage**

Design Speed	Length (including 50' Diverging Taper)			(Storage Length, Figure 401-10)
40	290 ft	115 ft	+	175 ft
45	300 ft	125 ft	+	175 ft
50	320 ft	145 ft	+	175 ft
55	340 ft	165 ft	+	175 ft
60	360 ft	185 ft	+	175 ft

Length = #N/A ft

Minimum Required Storage Lane Length (including 50' diverging taper) Per Lane = 225 feet
Perferred Storage Lane Length (including 50' diverging taper) Per Lane = 300 feet

Note: Minimum required storage lane length reflects required storage of vehicles calculated using volume and cycle length. Preferred storage length varies from minimum storage lane length when adjacent through lane queue is projected to be greater than the minimum required storage length.

Length of Turn Lane Calculation Worksheet

Based on ODOT L&D Manual, Release Date 7/1/2018

Michael Baker INTERNATIONAL

Project Name:	Indianola Ave Road Diet	Analysis Date:	6/28/2021
Intersection:	Indianola Ave & North Broadway ALT	Movement:	SBL
			2044 AM Peak Build

Design Speed =	35	(Speed in mph)
Turn Demand Volume =	High	(High or Low)
Type of Traffic Control =	Signalized	(Signalized, Unsignalized Stopped Crossroad, or Unsignalized Through Road)
Condition =	A	(A, B, or C obtained from Table 401-9E)

BASIS FOR COMPUTING LENGTH OF TURN LANES — **401-9E** REFERENCE SECTIONS 401.6.1, 401.6.3

TYPE OF TRAFFIC CONTROL	DESIGN SPEED (mph) 30 - 35		40 - 45		50 - 60	
	TURN DEMAND VOLUME					
	HIGH	LOW[1]	HIGH	LOW[1]	HIGH	LOW[1]
SIGNALIZED	A	A	B or C[2]	B or C[2]	B or C[2]	B or C[2]
UNSIGNALIZED STOPPED CROSSROAD	A	A	A	A	A	A
UNSIGNALIZED THROUGH ROAD	A	A	C	B	B or C[2]	B

1 LOW is considered 10% or less of approach traffic volume.
2 Whichever is greater

Turn Demand Volume (1)=	410
Approach Volume =	860
Turn / Approach =	48%
(1) PM Peak (highest volume).	

Note: Based on L&D Manual guidance, left turn lane recommended to not exceed 600 feet (storage).

Storage Length at Intersections: 401-10E

Average No. of Vehicles/Cycle	Required Length	Average No. of Vehicles/Cycle	Required Length
1	50 ft	17	600 ft
2	100 ft	18	625 ft
3	150 ft	19	650 ft
4	175 ft	20	675 ft
5	200 ft	21	725 ft
6	250 ft	22	750 ft
7	275 ft	23	775 ft
8	325 ft	24	800 ft
9	350 ft	25	825 ft
10	375 ft	30	975 ft
11	400 ft	35	1125 ft
12	450 ft	40	1250 ft
13	475 ft	45	1400 ft
14	500 ft	50	1550 ft
15	525 ft	55	1700 ft
16	550 ft	60	1850 ft

Left Turn Storage Lane Length Calculation

DHV (Turning Lane) =	410	If Cycles are unknown, assume:	Unsignalized or 2 Phase - 60 Cycles/Hr
Cycle Length =	117		3 Phase - 40 Cycles/Hr
Cycles per Hour =	31		4 Phase - 30 Cycles/Hr
Average Vehicles per Cycle=	13	Required Turn Lane Storage Length =	475 ft (from Figure 401-10)

Adjacent Through Lane Storage Calculation

Adjacent Lane(s) Volume =	450	Number of Lanes	2
Average Vehicles per Cycle=	15	Required Length (per lane) =	263 ft
Required Length (total) =	525 ft (from Figure 401-10)		

Condition A **Storage Only**

Length = 50 ft (diverging taper) + 475 ft (Storage Length, Figure 401-10) **Length = 525 ft**

Condition B **High Speed Deceleration Only**

Design Speed	Length (including 50' Diverging Taper)
40	125 ft
45	175 ft
50	225 ft
55	285 ft
60	345 ft

Length = #N/A ft

Condition C **Moderate Speed Deceleration and Storage**

Design Speed	Length (including 50' Diverging Taper)			(Storage Length, Figure 401-10)
40	590 ft	115 ft	+	475 ft
45	600 ft	125 ft	+	475 ft
50	620 ft	145 ft	+	475 ft
55	640 ft	165 ft	+	475 ft
60	660 ft	185 ft	+	475 ft

Length = #N/A ft

Minimum Required Storage Lane Length (including 50' diverging taper) Per Lane = 525 feet

Perferred Storage Lane Length (including 50' diverging taper) Per Lane = 525 feet

Note: Minimum required storage lane length reflects required storage of vehicles calculated using volume and cycle length. Preferred storage length varies from minimum storage lane length when adjacent through lane queue is projected to be greater than the minimum required storage length.

Length of Turn Lane Calculation Worksheet
Based on ODOT L&D Manual, Release Date 7/1/2018

Michael Baker INTERNATIONAL

Project Name:	Indianola Ave Road Diet	Analysis Date:	6/28/2021
Intersection:	Indianola Ave & North Broadway ALT	Movement:	EBL
			2044 AM Peak Build
Design Speed =	35	(Speed in mph)	
Turn Demand Volume =	High	(High or Low)	
Type of Traffic Control =	Signalized	(Signalized, Unsignalized Stopped Crossroad, or Unsignalized Through Road)	
Condition =	A	(A, B, or C obtained from Table 401-9E)	

BASIS FOR COMPUTING LENGTH OF TURN LANES — 401-9E REFERENCE SECTIONS 401.6.1, 401.6.3

TYPE OF TRAFFIC CONTROL	DESIGN SPEED (mph)					
	30 - 35		40 - 45		50 - 60	
	TURN DEMAND VOLUME					
	HIGH	LOW[1]	HIGH	LOW[1]	HIGH	LOW[1]
SIGNALIZED	A	A	B or C[2]	B or C[2]	B or C[2]	B or C[2]
UNSIGNALIZED STOPPED CROSSROAD	A	A	A	A	A	A
UNSIGNALIZED THROUGH ROAD	A	A	C	B	B or C[2]	B

1 LOW is considered 10% or less of approach traffic volume.
2 Whichever is greater

Turn Demand Volume (1)=	120
Approach Volume =	680
Turn / Approach =	18%

(1) PM Peak (highest volume).

Note: Based on L&D Manual guidance, left turn lane recommended to not exceed 600 feet (storage).

Storage Length at Intersections: 401-10E

Average No. of Vehicles/Cycle	Required Length	Average No. of Vehicles/Cycle	Required Length
1	50 ft	17	600 ft
2	100 ft	18	625 ft
3	150 ft	19	650 ft
4	175 ft	20	675 ft
5	200 ft	21	725 ft
6	250 ft	22	750 ft
7	275 ft	23	775 ft
8	325 ft	24	800 ft
9	350 ft	25	825 ft
10	375 ft	30	975 ft
11	400 ft	35	1125 ft
12	450 ft	40	1250 ft
13	475 ft	45	1400 ft
14	500 ft	50	1550 ft
15	525 ft	55	1700 ft
16	550 ft	60	1850 ft

Left Turn Storage Lane Length Calculation

DHV (Turning Lane) =	120	If Cycles are unknown, assume:	Unsignalized or 2 Phase - 60 Cycles/Hr
Cycle Length =	117		3 Phase - 40 Cycles/Hr
Cycles per Hour =	31		4 Phase - 30 Cycles/Hr
Average Vehicles per Cycle=	4	Required Turn Lane Storage Length =	175 ft (from Figure 401-10)

Adjacent Through Lane Storage Calculation

Adjacent Lane(s) Volume =	420	Number of Lanes	2
Average Vehicles per Cycle=	14	Required Length (per lane) =	250 ft
Required Length (total) =	500 ft (from Figure 401-10)		

Condition A **Storage Only**
Length = 50 ft (diverging taper) + 175 ft (Storage Length, Figure 401-10) — **Length = 225 ft**

Condition B **High Speed Deceleration Only**

Design Speed	Length (including 50' Diverging Taper)
40	125 ft
45	175 ft
50	225 ft
55	285 ft
60	345 ft

Length = #N/A ft

Condition C **Moderate Speed Deceleration and Storage**

Design Speed	Length (including 50' Diverging Taper)			(Storage Length, Figure 401-10)
40	290 ft	115 ft	+	175 ft
45	300 ft	125 ft	+	175 ft
50	320 ft	145 ft	+	175 ft
55	340 ft	165 ft	+	175 ft
60	360 ft	185 ft	+	175 ft

Length = #N/A ft

Minimum Required Storage Lane Length (including 50' diverging taper) Per Lane = 225 feet
Perferred Storage Lane Length (including 50' diverging taper) Per Lane = 300 feet

Note: Minimum required storage lane length reflects required storage of vehicles calculated using volume and cycle length. Preferred storage length varies from minimum storage lane length when adjacent through lane queue is projected to be greater than the minimum required storage length.

Length of Turn Lane Calculation Worksheet

Based on ODOT L&D Manual, Release Date 7/1/2018

Michael Baker INTERNATIONAL

Project Name: Indianola Ave Road Diet
Intersection: Indianola Ave & North Broadway ALT

Analysis Date: 6/28/2021
Movement: WBL
2044 AM Peak Build

Design Speed = 35 (Speed in mph)
Turn Demand Volume = High (High or Low)
Type of Traffic Control = Signalized (Signalized, Unsignalized Stopped Crossroad, or Unsignalized Through Road)
Condition = A (A, B, or C obtained from Table 401-9E)

BASIS FOR COMPUTING LENGTH OF TURN LANES

401-9E REFERENCE SECTIONS 401.6.1, 401.6.3

TYPE OF TRAFFIC CONTROL	DESIGN SPEED (mph)					
	30 - 35		40 - 45		50 - 60	
	TURN DEMAND VOLUME					
	HIGH	LOW[1]	HIGH	LOW[1]	HIGH	LOW[1]
SIGNALIZED	A	A	B or C[2]	B or C[2]	B or C[2]	B or C[2]
UNSIGNALIZED STOPPED CROSSROAD	A	A	A	A	A	A
UNSIGNALIZED THROUGH ROAD	A	A	C	B	B or C[2]	B

1 LOW is considered 10% or less of approach traffic volume.
2 Whichever is greater

Turn Demand Volume (1)= 140
Approach Volume = 1,210
Turn / Approach = 12%
(1) PM Peak (highest volume).

Note: Based on L&D Manual guidance, left turn lane recommended to not exceed 600 feet (storage).

Storage Length at Intersections: 401-10E

Average No. of Vehicles/Cycle	Required Length		Average No. of Vehicles/Cycle	Required Length
1	50	**ft**	17	600 ft
2	100	ft	18	625 ft
3	150	ft	19	650 ft
4	175	ft	20	675 ft
5	200	ft	21	725 ft
6	250	ft	22	750 ft
7	275	ft	23	775 ft
8	325	ft	24	800 ft
9	350	ft	25	825 ft
10	375	ft	30	975 ft
11	400	ft	35	1125 ft
12	450	ft	40	1250 ft
13	475	ft	45	1400 ft
14	500	ft	50	1550 ft
15	525	ft	55	1700 ft
16	550	ft	60	1850 ft

Left Turn Storage Lane Length Calculation

DHV (Turning Lane) = 140
Cycle Length = 117
Cycles per Hour = 31
Average Vehicles per Cycle= 5

If Cycles are unknown, assume: Unsignalized or 2 Phase - 60 Cycles/Hr
3 Phase - 40 Cycles/Hr
4 Phase - 30 Cycles/Hr

Required Turn Lane Storage Length = 200 ft (from Figure 401-10)

Adjacent Through Lane Storage Calculation

Adjacent Lane(s) Volume = 450
Average Vehicles per Cycle= 15
Required Length (total) = 525 ft (from Figure 401-10)

Number of Lanes 2
Required Length (per lane) = 263 ft

Condition A **Storage Only**
Length = 50 ft (diverging taper) + (Storage Length, Figure 401-10) 200 ft
Length = 250 ft

Condition B **High Speed Deceleration Only**

Design Speed	Length (including 50' Diverging Taper)	
40	125	ft
45	175	ft
50	225	ft
55	285	ft
60	345	ft

Length = #N/A ft

Condition C **Moderate Speed Deceleration and Storage**

Design Speed	Length (including 50' Diverging Taper)					(Storage Length, Figure 401-10)
40	315	ft	115	ft	+	200 ft
45	325	ft	125	ft	+	200 ft
50	345	ft	145	ft	+	200 ft
55	365	ft	165	ft	+	200 ft
60	385	ft	185	ft	+	200 ft

Length = #N/A ft

Minimum Required Storage Lane Length (including 50' diverging taper) Per Lane = 250 feet

Perferred Storage Lane Length (including 50' diverging taper) Per Lane = 313 feet

Note: Minimum required storage lane length reflects required storage of vehicles calculated using volume and cycle length. Preferred storage length varies from minimum storage lane length when adjacent through lane queue is projected to be greater than the minimum required storage length.

Length of Turn Lane Calculation Worksheet
Based on ODOT L&D Manual, Release Date 7/1/2018

Michael Baker INTERNATIONAL

Project Name:	Indianola Ave Road Diet	Analysis Date:	6/28/2021
Intersection:	Indianola Ave & North Broadway ALT	Movement:	NBL
			2044 PM Peak Build
Design Speed =	35	(Speed in mph)	
Turn Demand Volume =	High	(High or Low)	
Type of Traffic Control =	Signalized	(Signalized, Unsignalized Stopped Crossroad, or Unsignalized Through Road)	
Condition =	A	(A, B, or C obtained from Table 401-9E)	

BASIS FOR COMPUTING LENGTH OF TURN LANES — 401-9E REFERENCE SECTIONS 401.6.1, 401.6.3

TYPE OF TRAFFIC CONTROL	DESIGN SPEED (mph) 30 - 35		40 - 45		50 - 60	
	TURN DEMAND VOLUME					
	HIGH	LOW[1]	HIGH	LOW[1]	HIGH	LOW[1]
SIGNALIZED	A	A	B or C[2]	B or C[2]	B or C[2]	B or C[2]
UNSIGNALIZED STOPPED CROSSROAD	A	A	A	A	A	A
UNSIGNALIZED THROUGH ROAD	A	A	C	B	B or C[2]	B

1 LOW is considered 10% or less of approach traffic volume.
2 Whichever is greater

Turn Demand Volume (1)=	100
Approach Volume =	550
Turn / Approach =	18%
(1) PM Peak (highest volume).	

Note: Based on L&D Manual guidance, left turn lane recommended to not exceed 600 feet (storage).

Storage Length at Intersections: 401-10E

Average No. of Vehicles/Cycle	Required Length	Average No. of Vehicles/Cycle	Required Length
1	50 ft	17	600 ft
2	100 ft	18	625 ft
3	150 ft	19	650 ft
4	175 ft	20	675 ft
5	200 ft	21	725 ft
6	250 ft	22	750 ft
7	275 ft	23	775 ft
8	325 ft	24	800 ft
9	350 ft	25	825 ft
10	375 ft	30	975 ft
11	400 ft	35	1125 ft
12	450 ft	40	1250 ft
13	475 ft	45	1400 ft
14	500 ft	50	1550 ft
15	525 ft	55	1700 ft
16	550 ft	60	1850 ft

Left Turn Storage Lane Length Calculation

DHV (Turning Lane) =	100	If Cycles are unknown, assume:	Unsignalized or 2 Phase - 60 Cycles/Hr
Cycle Length =	163		3 Phase - 40 Cycles/Hr
Cycles per Hour =	22		4 Phase - 30 Cycles/Hr
Average Vehicles per Cycle=	5	Required Turn Lane Storage Length =	200 ft (from Figure 401-10)

Adjacent Through Lane Storage Calculation

Adjacent Lane(s) Volume =	450	Number of Lanes	2
Average Vehicles per Cycle=	20	Required Length (per lane) =	338 ft
Required Length (total) =	675 ft (from Figure 401-10)		

Condition A **Storage Only**
Length = 50 ft (diverging taper) + 200 ft (Storage Length, Figure 401-10) **Length = 250 ft**

Condition B **High Speed Deceleration Only**

Design Speed	Length (including 50' Diverging Taper)
40	125 ft
45	175 ft
50	225 ft
55	285 ft
60	345 ft

Length = #N/A ft

Condition C **Moderate Speed Deceleration and Storage**

Design Speed	Length (including 50' Diverging Taper)			(Storage Length, Figure 401-10)
40	315 ft	115 ft	+	200 ft
45	325 ft	125 ft	+	200 ft
50	345 ft	145 ft	+	200 ft
55	365 ft	165 ft	+	200 ft
60	385 ft	185 ft	+	200 ft

Length = #N/A ft

Minimum Required Storage Lane Length (including 50' diverging taper) Per Lane = 250 feet
Perferred Storage Lane Length (including 50' diverging taper) Per Lane = 388 feet

Note: Minimum required storage lane length reflects required storage of vehicles calculated using volume and cycle length. Preferred storage length varies from minimum storage lane length when adjacent through lane queue is projected to be greater than the minimum required storage length.

Length of Turn Lane Calculation Worksheet
Based on ODOT L&D Manual, Release Date 7/1/2018

Michael Baker INTERNATIONAL

Project Name:	Indianola Ave Road Diet	Analysis Date:	6/28/2021
Intersection:	Indianola Ave & North Broadway ALT	Movement:	SBL
			2044 PM Peak Build

Design Speed =	35	(Speed in mph)
Turn Demand Volume =	High	(High or Low)
Type of Traffic Control =	Signalized	(Signalized, Unsignalized Stopped Crossroad, or Unsignalized Through Road)
Condition =	A	(A, B, or C obtained from Table 401-9E)

BASIS FOR COMPUTING LENGTH OF TURN LANES — **401-9E REFERENCE SECTIONS 401.6.1, 401.6.3**

TYPE OF TRAFFIC CONTROL	DESIGN SPEED (mph) 30 - 35		40 - 45		50 - 60	
	TURN DEMAND VOLUME					
	HIGH	LOW[1]	HIGH	LOW[1]	HIGH	LOW[1]
SIGNALIZED	A	A	B or C[2]	B or C[2]	B or C[2]	B or C[2]
UNSIGNALIZED STOPPED CROSSROAD	A	A	A	A	A	A
UNSIGNALIZED THROUGH ROAD	A	A	C	B	B or C[2]	B

[1] LOW is considered 10% or less of approach traffic volume.
[2] Whichever is greater

Turn Demand Volume (1)=	390
Approach Volume =	910
Turn / Approach =	43%
(1) PM Peak (highest volume).	

Note: Based on L&D Manual guidance, left turn lane recommended to not exceed 600 feet (storage).

Storage Length at Intersections: 401-10E

Average No. of Vehicles/Cycle	Required Length	Average No. of Vehicles/Cycle	Required Length
1	50 ft	17	600 ft
2	100 ft	18	625 ft
3	150 ft	19	650 ft
4	175 ft	20	675 ft
5	200 ft	21	725 ft
6	250 ft	22	750 ft
7	275 ft	23	775 ft
8	325 ft	24	800 ft
9	350 ft	25	825 ft
10	375 ft	30	975 ft
11	400 ft	35	1125 ft
12	450 ft	40	1250 ft
13	475 ft	45	1400 ft
14	500 ft	50	1550 ft
15	525 ft	55	1700 ft
16	550 ft	60	1850 ft

Left Turn Storage Lane Length Calculation

DHV (Turning Lane) =	390	If Cycles are unknown, assume:	Unsignalized or 2 Phase - 60 Cycles/Hr
Cycle Length =	163		3 Phase - 40 Cycles/Hr
Cycles per Hour =	22		4 Phase - 30 Cycles/Hr
Average Vehicles per Cycle=	18	Required Turn Lane Storage Length =	625 ft (from Figure 401-10)

Adjacent Through Lane Storage Calculation

Adjacent Lane(s) Volume =	520	Number of Lanes	2
Average Vehicles per Cycle=	24	Required Length (per lane) =	400 ft
Required Length (total) =	800 ft (from Figure 401-10)		

Condition A **Storage Only** (Storage Length, Figure 401-10)
Length = 50 ft (diverging taper) + 625 ft **Length = 675 ft**

Condition B **High Speed Deceleration Only**

Design Speed	Length (including 50' Diverging Taper)
40	125 ft
45	175 ft
50	225 ft
55	285 ft
60	345 ft

Length = #N/A ft

Condition C **Moderate Speed Deceleration and Storage**

Design Speed	Length (including 50' Diverging Taper)			(Storage Length, Figure 401-10)
40	740 ft	115 ft	+	625 ft
45	750 ft	125 ft	+	625 ft
50	770 ft	145 ft	+	625 ft
55	790 ft	165 ft	+	625 ft
60	810 ft	185 ft	+	625 ft

Length = #N/A ft

Minimum Required Storage Lane Length (including 50' diverging taper) Per Lane = 675 feet
Perferred Storage Lane Length (including 50' diverging taper) Per Lane = 675 feet

Note: Minimum required storage lane length reflects required storage of vehicles calculated using volume and cycle length. Preferred storage length varies from minimum storage lane length when adjacent through lane queue is projected to be greater than the minimum required storage length.

Length of Turn Lane Calculation Worksheet
Based on ODOT L&D Manual, Release Date 7/1/2018

Michael Baker INTERNATIONAL

Project Name:	Indianola Ave Road Diet	Analysis Date:	6/28/2021
Intersection:	Indianola Ave & North Broadway ALT	Movement:	EBL
			2044 PM Peak Build
Design Speed =	35	(Speed in mph)	
Turn Demand Volume =	High	(High or Low)	
Type of Traffic Control =	Signalized	(Signalized, Unsignalized Stopped Crossroad, or Unsignalized Through Road)	
Condition =	A	(A, B, or C obtained from Table 401-9E)	

BASIS FOR COMPUTING LENGTH OF TURN LANES	401-9E REFERENCE SECTIONS 401.6.1, 401.6.3

TYPE OF TRAFFIC CONTROL	DESIGN SPEED (mph)					
	30 - 35		40 - 45		50 - 60	
	TURN DEMAND VOLUME					
	HIGH	LOW[1]	HIGH	LOW[1]	HIGH	LOW[1]
SIGNALIZED	A	A	B or C[2]	B or C[2]	B or C[2]	B or C[2]
UNSIGNALIZED STOPPED CROSSROAD	A	A	A	A	A	A
UNSIGNALIZED THROUGH ROAD	A	A	C	B	B or C[2]	B

[1] LOW is considered 10% or less of approach traffic volume.
[2] Whichever is greater

Turn Demand Volume (1)=	130
Approach Volume =	910
Turn / Approach =	14%
(1) PM Peak (highest volume).	

Note: Based on L&D Manual guidance, left turn lane recommended to not exceed 600 feet (storage).

Storage Length at Intersections: 401-10E

Average No. of Vehicles/Cycle	Required Length		Average No. of Vehicles/Cycle	Required Length
1	50	ft	17	600 ft
2	100	ft	18	625 ft
3	150	ft	19	650 ft
4	175	ft	20	675 ft
5	200	ft	21	725 ft
6	250	ft	22	750 ft
7	275	ft	23	775 ft
8	325	ft	24	800 ft
9	350	ft	25	825 ft
10	375	ft	30	975 ft
11	400	ft	35	1125 ft
12	450	ft	40	1250 ft
13	475	ft	45	1400 ft
14	500	ft	50	1550 ft
15	525	ft	55	1700 ft
16	550	ft	60	1850 ft

Left Turn Storage Lane Length Calculation

DHV (Turning Lane) =	130	If Cycles are unknown, assume: Unsignalized or 2 Phase - 60 Cycles/Hr
Cycle Length =	163	3 Phase - 40 Cycles/Hr
Cycles per Hour =	22	4 Phase - 30 Cycles/Hr
Average Vehicles per Cycle=	6	Required Turn Lane Storage Length = 250 ft (from Figure 401-10)

Adjacent Through Lane Storage Calculation

Adjacent Lane(s) Volume =	450	Number of Lanes 2
Average Vehicles per Cycle=	20	Required Length (per lane) = 338 ft
Required Length (total) =	675	ft (from Figure 401-10)

Condition A **Storage Only** (Storage Length, Figure 401-10)
Length = 50 ft (diverging taper) + 250 ft **Length = 300 ft**

Condition B **High Speed Deceleration Only**

Design Speed	Length (including 50' Diverging Taper)	
40	125	ft
45	175	ft
50	225	ft
55	285	ft
60	345	ft

Length = #N/A ft

Condition C **Moderate Speed Deceleration and Storage**

Design Speed	Length (including 50' Diverging Taper)					(Storage Length, Figure 401-10)
40	365	ft	115	ft	+	250 ft
45	375	ft	125	ft	+	250 ft
50	395	ft	145	ft	+	250 ft
55	415	ft	165	ft	+	250 ft
60	435	ft	185	ft	+	250 ft

Length = #N/A ft

Minimum Required Storage Lane Length (including 50' diverging taper) Per Lane = 300 feet
Perferred Storage Lane Length (including 50' diverging taper) Per Lane = 388 feet

Note: Minimum required storage lane length reflects required storage of vehicles calculated using volume and cycle length. Preferred storage length varies from minimum storage lane length when adjacent through lane queue is projected to be greater than the minimum required storage length.

Length of Turn Lane Calculation Worksheet
Based on ODOT L&D Manual, Release Date 7/1/2018

Michael Baker INTERNATIONAL

Project Name:	Indianola Ave Road Diet	Analysis Date:	6/28/2021
Intersection:	Indianola Ave & North Broadway ALT	Movement:	WBL
			2044 PM Peak Build
Design Speed =	35	(Speed in mph)	
Turn Demand Volume =	High	(High or Low)	
Type of Traffic Control =	Signalized	(Signalized, Unsignalized Stopped Crossroad, or Unsignalized Through Road)	
Condition =	A	(A, B, or C obtained from Table 401-9E)	

BASIS FOR COMPUTING LENGTH OF TURN LANES — **401-9E REFERENCE SECTIONS 401.6.1, 401.6.3**

TYPE OF TRAFFIC CONTROL	DESIGN SPEED (mph) 30 - 35		40 - 45		50 - 60	
	TURN DEMAND VOLUME HIGH	LOW[1]	HIGH	LOW[1]	HIGH	LOW[1]
SIGNALIZED	A	A	B or C[2]	B or C[2]	B or C[2]	B or C[2]
UNSIGNALIZED STOPPED CROSSROAD	A	A	A	A	A	A
UNSIGNALIZED THROUGH ROAD	A	A	C	B	B or C[2]	B

Turn Demand Volume (1)=	130
Approach Volume =	1,140
Turn / Approach =	11%
(1) PM Peak (highest volume).	

Note: Based on L&D Manual guidance, left turn lane recommended to not exceed 600 feet (storage).

1 LOW is considered 10% or less of approach traffic volume.
2 Whichever is greater

Storage Length at Intersections: 401-10E

Average No. of Vehicles/Cycle	Required Length	Average No. of Vehicles/Cycle	Required Length
1	50 ft	17	600 ft
2	100 ft	18	625 ft
3	150 ft	19	650 ft
4	175 ft	20	675 ft
5	200 ft	21	725 ft
6	250 ft	22	750 ft
7	275 ft	23	775 ft
8	325 ft	24	800 ft
9	350 ft	25	825 ft
10	375 ft	30	975 ft
11	400 ft	35	1125 ft
12	450 ft	40	1250 ft
13	475 ft	45	1400 ft
14	500 ft	50	1550 ft
15	525 ft	55	1700 ft
16	550 ft	60	1850 ft

Left Turn Storage Lane Length Calculation

DHV (Turning Lane) =	130	If Cycles are unknown, assume:	Unsignalized or 2 Phase - 60 Cycles/Hr
Cycle Length =	163		3 Phase - 40 Cycles/Hr
Cycles per Hour =	22		4 Phase - 30 Cycles/Hr
Average Vehicles per Cycle=	6	Required Turn Lane Storage Length =	250 ft (from Figure 401-10)

Adjacent Through Lane Storage Calculation

Adjacent Lane(s) Volume =	520	Number of Lanes	2
Average Vehicles per Cycle=	24	Required Length (per lane) =	400 ft
Required Length (total) =	800 ft (from Figure 401-10)		

Condition A **Storage Only** (Storage Length, Figure 401-10)
Length = 50 ft (diverging taper) + 250 ft **Length = 300 ft**

Condition B **High Speed Deceleration Only**

Design Speed	Length (including 50' Diverging Taper)
40	125 ft
45	175 ft
50	225 ft
55	285 ft
60	345 ft

Length = #N/A ft

Condition C **Moderate Speed Deceleration and Storage**

Design Speed	Length (including 50' Diverging Taper)			(Storage Length, Figure 401-10)
40	365 ft	115 ft	+	250 ft
45	375 ft	125 ft	+	250 ft
50	395 ft	145 ft	+	250 ft
55	415 ft	165 ft	+	250 ft
60	435 ft	185 ft	+	250 ft

Length = #N/A ft

Minimum Required Storage Lane Length (including 50' diverging taper) Per Lane = 300 feet
Perferred Storage Lane Length (including 50' diverging taper) Per Lane = 450 feet

Note: Minimum required storage lane length reflects required storage of vehicles calculated using volume and cycle length. Preferred storage length varies from minimum storage lane length when adjacent through lane queue is projected to be greater than the minimum required storage length.

Michael Baker
INTERNATIONAL

We Make a Difference

Indianola & Oakland Park

Turn Lane Calculations

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Length of Turn Lane Calculation Worksheet
Based on ODOT L&D Manual, Release Date 7/1/2018

Michael Baker INTERNATIONAL

Project Name:	Indianola Ave Road Diet	Analysis Date:	6/28/2021
Intersection:	Indianola Ave & Oakland Park Avenue	Movement:	NBL
			2024 AM Peak Build
Design Speed =	35	(Speed in mph)	
Turn Demand Volume =	Low	(High or Low)	
Type of Traffic Control =	Signalized	(Signalized, Unsignalized Stopped Crossroad, or Unsignalized Through Road)	
Condition =	A	(A, B, or C obtained from Table 401-9E)	

BASIS FOR COMPUTING LENGTH OF TURN LANES — 401-9E REFERENCE SECTIONS 401.6.1, 401.6.3

TYPE OF TRAFFIC CONTROL	DESIGN SPEED (mph) 30 - 35		40 - 45		50 - 60	
	TURN DEMAND VOLUME					
	HIGH	LOW[1]	HIGH	LOW[1]	HIGH	LOW[1]
SIGNALIZED	A	A	B or C[2]	B or C[2]	B or C[2]	B or C[2]
UNSIGNALIZED STOPPED CROSSROAD	A	A	A	A	A	A
UNSIGNALIZED THROUGH ROAD	A	A	C	B	B or C[2]	B

1 LOW is considered 10% or less of approach traffic volume.
2 Whichever is greater

Turn Demand Volume (1)=	50
Approach Volume =	640
Turn / Approach =	8%
(1) PM Peak (highest volume).	

Note: Based on L&D Manual guidance, left turn lane recommended to not exceed 600 feet (storage).

Storage Length at Intersections: 401-10E

Average No. of Vehicles/Cycle	Required Length	Average No. of Vehicles/Cycle	Required Length
1	50 ft	17	600 ft
2	100 ft	18	625 ft
3	150 ft	19	650 ft
4	175 ft	20	675 ft
5	200 ft	21	725 ft
6	250 ft	22	750 ft
7	275 ft	23	775 ft
8	325 ft	24	800 ft
9	350 ft	25	825 ft
10	375 ft	30	975 ft
11	400 ft	35	1125 ft
12	450 ft	40	1250 ft
13	475 ft	45	1400 ft
14	500 ft	50	1550 ft
15	525 ft	55	1700 ft
16	550 ft	60	1850 ft

Left Turn Storage Lane Length Calculation

DHV (Turning Lane) =	50	If Cycles are unknown, assume:	Unsignalized or 2 Phase - 60 Cycles/Hr
Cycle Length =	39		3 Phase - 40 Cycles/Hr
Cycles per Hour =	92		4 Phase - 30 Cycles/Hr
Average Vehicles per Cycle=	1	Required Turn Lane Storage Length =	50 ft (from Figure 401-10)

Adjacent Through Lane Storage Calculation

Adjacent Lane(s) Volume =	590	Number of Lanes	1
Average Vehicles per Cycle=	6	Required Length (per lane) =	250 ft
Required Length (total) =	250 ft (from Figure 401-10)		

Condition A **Storage Only**
Length = 50 ft (diverging taper) + 50 ft (Storage Length, Figure 401-10) **Length = 100 ft**

Condition B **High Speed Deceleration Only**

Design Speed	Length (including 50' Diverging Taper)
40	125 ft
45	175 ft
50	225 ft
55	285 ft
60	345 ft

Length = #N/A ft

Condition C **Moderate Speed Deceleration and Storage**

Design Speed	Length (including 50' Diverging Taper)			(Storage Length, Figure 401-10)
40	165 ft	115 ft	+	50 ft
45	175 ft	125 ft	+	50 ft
50	195 ft	145 ft	+	50 ft
55	215 ft	165 ft	+	50 ft
60	235 ft	185 ft	+	50 ft

Length = #N/A ft

Minimum Required Storage Lane Length (including 50' diverging taper) Per Lane = 100 feet
Perferred Storage Lane Length (including 50' diverging taper) Per Lane = 300 feet

Note: Minimum required storage lane length reflects required storage of vehicles calculated using volume and cycle length. Preferred storage length varies from minimum storage lane length when adjacent through lane queue is projected to be greater than the minimum required storage length.

Length of Turn Lane Calculation Worksheet
Based on ODOT L&D Manual, Release Date 7/1/2018

Michael Baker INTERNATIONAL

Project Name:	Indianola Ave Road Diet	Analysis Date:	6/28/2021
Intersection:	Indianola Ave & Oakland Park Avenue	Movement:	SBL
			2024 AM Peak Build
Design Speed =	35	(Speed in mph)	
Turn Demand Volume =	Low	(High or Low)	
Type of Traffic Control =	Signalized	(Signalized, Unsignalized Stopped Crossroad, or Unsignalized Through Road)	
Condition =	A	(A, B, or C obtained from Table 401-9E)	

BASIS FOR COMPUTING LENGTH OF TURN LANES — 401-9E REFERENCE SECTIONS 401.6.1, 401.6.3

TYPE OF TRAFFIC CONTROL	DESIGN SPEED (mph) 30 - 35		40 - 45		50 - 60	
	TURN DEMAND VOLUME					
	HIGH	LOW[1]	HIGH	LOW[1]	HIGH	LOW[1]
SIGNALIZED	A	A	B or C[2]	B or C[2]	B or C[2]	B or C[2]
UNSIGNALIZED STOPPED CROSSROAD	A	A	A	A	A	A
UNSIGNALIZED THROUGH ROAD	A	A	C	B	B or C[2]	B

1 LOW is considered 10% or less of approach traffic volume.
2 Whichever is greater

Turn Demand Volume (1)=	20
Approach Volume =	700
Turn / Approach =	3%

(1) PM Peak (highest volume).

Note: Based on L&D Manual guidance, left turn lane recommended to not exceed 600 feet (storage).

Storage Length at Intersections: 401-10E

Average No. of Vehicles/Cycle	Required Length	Average No. of Vehicles/Cycle	Required Length
1	50 ft	17	600 ft
2	100 ft	18	625 ft
3	150 ft	19	650 ft
4	175 ft	20	675 ft
5	200 ft	21	725 ft
6	250 ft	22	750 ft
7	275 ft	23	775 ft
8	325 ft	24	800 ft
9	350 ft	25	825 ft
10	375 ft	30	975 ft
11	400 ft	35	1125 ft
12	450 ft	40	1250 ft
13	475 ft	45	1400 ft
14	500 ft	50	1550 ft
15	525 ft	55	1700 ft
16	550 ft	60	1850 ft

Left Turn Storage Lane Length Calculation

DHV (Turning Lane) =	20	If Cycles are unknown, assume:	Unsignalized or 2 Phase - 60 Cycles/Hr
Cycle Length =	39		3 Phase - 40 Cycles/Hr
Cycles per Hour =	92		4 Phase - 30 Cycles/Hr
Average Vehicles per Cycle=	1	Required Turn Lane Storage Length =	50 ft (from Figure 401-10)

Adjacent Through Lane Storage Calculation

Adjacent Lane(s) Volume =	680	Number of Lanes	1
Average Vehicles per Cycle=	7	Required Length (per lane) =	275 ft
Required Length (total) =	275 ft (from Figure 401-10)		

Condition A **Storage Only** (Storage Length, Figure 401-10)
Length = 50 ft (diverging taper) + 50 ft — **Length = 100 ft**

Condition B **High Speed Deceleration Only**

Design Speed	Length (including 50' Diverging Taper)
40	125 ft
45	175 ft
50	225 ft
55	285 ft
60	345 ft

Length = #N/A ft

Condition C **Moderate Speed Deceleration and Storage**

Design Speed	Length (including 50' Diverging Taper)			(Storage Length, Figure 401-10)
40	165 ft	115 ft	+	50 ft
45	175 ft	125 ft	+	50 ft
50	195 ft	145 ft	+	50 ft
55	215 ft	165 ft	+	50 ft
60	235 ft	185 ft	+	50 ft

Length = #N/A ft

Minimum Required Storage Lane Length (including 50' diverging taper) Per Lane = 100 feet
Perferred Storage Lane Length (including 50' diverging taper) Per Lane = 325 feet

Note: Minimum required storage lane length reflects required storage of vehicles calculated using volume and cycle length. Preferred storage length varies from minimum storage lane length when adjacent through lane queue is projected to be greater than the minimum required storage length.

Length of Turn Lane Calculation Worksheet

Based on ODOT L&D Manual, Release Date 7/1/2018

Michael Baker INTERNATIONAL

Project Name:	Indianola Ave Road Diet	Analysis Date:	6/28/2021
Intersection:	Indianola Ave & Oakland Park Avenue	Movement:	EBL
			2024 AM Peak Build
Design Speed =	35	(Speed in mph)	
Turn Demand Volume =	High	(High or Low)	
Type of Traffic Control =	Signalized	(Signalized, Unsignalized Stopped Crossroad, or Unsignalized Through Road)	
Condition =	A	(A, B, or C obtained from Table 401-9E)	

BASIS FOR COMPUTING LENGTH OF TURN LANES	401-9E REFERENCE SECTIONS 401.6.1, 401.6.3

TYPE OF TRAFFIC CONTROL	DESIGN SPEED (mph) 30 - 35 HIGH	30 - 35 LOW[1]	40 - 45 HIGH	40 - 45 LOW[1]	50 - 60 HIGH	50 - 60 LOW[1]
	TURN DEMAND VOLUME					
SIGNALIZED	A	A	B or C[2]	B or C[2]	B or C[2]	B or C[2]
UNSIGNALIZED STOPPED CROSSROAD	A	A	A	A	A	A
UNSIGNALIZED THROUGH ROAD	A	A	C	B	B or C[2]	B

1 LOW is considered 10% or less of approach traffic volume.

2 Whichever is greater

Turn Demand Volume (1)=	50
Approach Volume =	140
Turn / Approach =	36%
(1) PM Peak (highest volume).	

Note: Based on L&D Manual guidance, left turn lane recommended to not exceed 600 feet (storage).

Storage Length at Intersections: 401-10E

Average No. of Vehicles/Cycle	Required Length	Average No. of Vehicles/Cycle	Required Length
1	50 ft	17	600 ft
2	100 ft	18	625 ft
3	150 ft	19	650 ft
4	175 ft	20	675 ft
5	200 ft	21	725 ft
6	250 ft	22	750 ft
7	275 ft	23	775 ft
8	325 ft	24	800 ft
9	350 ft	25	825 ft
10	375 ft	30	975 ft
11	400 ft	35	1125 ft
12	450 ft	40	1250 ft
13	475 ft	45	1400 ft
14	500 ft	50	1550 ft
15	525 ft	55	1700 ft
16	550 ft	60	1850 ft

Left Turn Storage Lane Length Calculation

DHV (Turning Lane) =	50	If Cycles are unknown, assume:	Unsignalized or 2 Phase - 60 Cycles/Hr
Cycle Length =	39		3 Phase - 40 Cycles/Hr
Cycles per Hour =	92		4 Phase - 30 Cycles/Hr
Average Vehicles per Cycle=	1	Required Turn Lane Storage Length =	50 ft (from Figure 401-10)

Adjacent Through Lane Storage Calculation

Adjacent Lane(s) Volume =	590	Number of Lanes	1
Average Vehicles per Cycle=	6	Required Length (per lane) =	250 ft
Required Length (total) =	250 ft (from Figure 401-10)		

Condition A **Storage Only**

Length = 50 ft (diverging taper) + 50 ft (Storage Length, Figure 401-10) **Length = 100 ft**

Condition B **High Speed Deceleration Only**

Design Speed	Length (including 50' Diverging Taper)
40	125 ft
45	175 ft
50	225 ft
55	285 ft
60	345 ft

Length = #N/A ft

Condition C **Moderate Speed Deceleration and Storage**

Design Speed	Length (including 50' Diverging Taper)			(Storage Length, Figure 401-10)
40	165 ft	115 ft	+	50 ft
45	175 ft	125 ft	+	50 ft
50	195 ft	145 ft	+	50 ft
55	215 ft	165 ft	+	50 ft
60	235 ft	185 ft	+	50 ft

Length = #N/A ft

Minimum Required Storage Lane Length (including 50' diverging taper) Per Lane = 100 feet

Perferred Storage Lane Length (including 50' diverging taper) Per Lane = 300 feet

Note: Minimum required storage lane length reflects required storage of vehicles calculated using volume and cycle length. Preferred storage length varies from minimum storage lane length when adjacent through lane queue is projected to be greater than the minimum required storage length.

Length of Turn Lane Calculation Worksheet
Based on ODOT L&D Manual, Release Date 7/1/2018

Michael Baker INTERNATIONAL

Project Name:	Indianola Ave Road Diet	Analysis Date:	6/28/2021
Intersection:	Indianola Ave & Oakland Park Avenue	Movement:	WBL
			2024 AM Peak Build
Design Speed =	35	(Speed in mph)	
Turn Demand Volume =	High	(High or Low)	
Type of Traffic Control =	Signalized	(Signalized, Unsignalized Stopped Crossroad, or Unsignalized Through Road)	
Condition =	A	(A, B, or C obtained from Table 401-9E)	

BASIS FOR COMPUTING LENGTH OF TURN LANES	401-9E REFERENCE SECTIONS 401.6.1, 401.6.3

TYPE OF TRAFFIC CONTROL	DESIGN SPEED (mph) 30 - 35		40 - 45		50 - 60	
	TURN DEMAND VOLUME					
	HIGH	LOW[1]	HIGH	LOW[1]	HIGH	LOW[1]
SIGNALIZED	A	A	B or C[2]	B or C[2]	B or C[2]	B or C[2]
UNSIGNALIZED STOPPED CROSSROAD	A	A	A	A	A	A
UNSIGNALIZED THROUGH ROAD	A	A	C	B	B or C[2]	B

1 LOW is considered 10% or less of approach traffic volume.
2 Whichever is greater

Turn Demand Volume (1)=	50
Approach Volume =	80
Turn / Approach =	63%
(1) PM Peak (highest volume).	

Note: Based on L&D Manual guidance, left turn lane recommended to not exceed 600 feet (storage).

Storage Length at Intersections: 401-10E

Average No. of Vehicles/Cycle	Required Length	Average No. of Vehicles/Cycle	Required Length
1	50 ft	17	600 ft
2	100 ft	18	625 ft
3	150 ft	19	650 ft
4	175 ft	20	675 ft
5	200 ft	21	725 ft
6	250 ft	22	750 ft
7	275 ft	23	775 ft
8	325 ft	24	800 ft
9	350 ft	25	825 ft
10	375 ft	30	975 ft
11	400 ft	35	1125 ft
12	450 ft	40	1250 ft
13	475 ft	45	1400 ft
14	500 ft	50	1550 ft
15	525 ft	55	1700 ft
16	550 ft	60	1850 ft

Left Turn Storage Lane Length Calculation

DHV (Turning Lane) =	50
Cycle Length =	39
Cycles per Hour =	92
Average Vehicles per Cycle=	1

If Cycles are unknown, assume: Unsignalized or 2 Phase - 60 Cycles/Hr; 3 Phase - 40 Cycles/Hr; 4 Phase - 30 Cycles/Hr

Required Turn Lane Storage Length = 50 ft (from Figure 401-10)

Adjacent Through Lane Storage Calculation

Adjacent Lane(s) Volume =	680
Average Vehicles per Cycle=	7
Required Length (total) =	275 ft (from Figure 401-10)

Number of Lanes 1
Required Length (per lane) = 275 ft

Condition A **Storage Only**

Length = 50 ft (diverging taper) + 50 ft (Storage Length, Figure 401-10) **Length = 100 ft**

Condition B **High Speed Deceleration Only**

Design Speed	Length (including 50' Diverging Taper)
40	125 ft
45	175 ft
50	225 ft
55	285 ft
60	345 ft

Length = #N/A ft

Condition C **Moderate Speed Deceleration and Storage**

Design Speed	Length (including 50' Diverging Taper)			(Storage Length, Figure 401-10)
40	165 ft	115 ft	+	50 ft
45	175 ft	125 ft	+	50 ft
50	195 ft	145 ft	+	50 ft
55	215 ft	165 ft	+	50 ft
60	235 ft	185 ft	+	50 ft

Length = #N/A ft

Minimum Required Storage Lane Length (including 50' diverging taper) Per Lane = 100 feet
Perferred Storage Lane Length (including 50' diverging taper) Per Lane = 325 feet

Note: Minimum required storage lane length reflects required storage of vehicles calculated using volume and cycle length. Preferred storage length varies from minimum storage lane length when adjacent through lane queue is projected to be greater than the minimum required storage length.

Length of Turn Lane Calculation Worksheet
Based on ODOT L&D Manual, Release Date 7/1/2018

Michael Baker INTERNATIONAL

Project Name:	Indianola Ave Road Diet	Analysis Date:	6/28/2021
Intersection:	Indianola Ave & Oakland Park Avenue	Movement:	NBL
			2024 PM Peak Build

Design Speed =	35	(Speed in mph)
Turn Demand Volume =	Low	(High or Low)
Type of Traffic Control =	Signalized	(Signalized, Unsignalized Stopped Crossroad, or Unsignalized Through Road)
Condition =	A	(A, B, or C obtained from Table 401-9E)

BASIS FOR COMPUTING LENGTH OF TURN LANES — 401-9E REFERENCE SECTIONS 401.6.1, 401.6.3

TYPE OF TRAFFIC CONTROL	DESIGN SPEED (mph) 30 - 35		40 - 45		50 - 60	
	TURN DEMAND VOLUME					
	HIGH	LOW[1]	HIGH	LOW[1]	HIGH	LOW[1]
SIGNALIZED	A	A	B or C[2]	B or C[2]	B or C[2]	B or C[2]
UNSIGNALIZED STOPPED CROSSROAD	A	A	A	A	A	A
UNSIGNALIZED THROUGH ROAD	A	A	C	B	B or C[2]	B

1 LOW is considered 10% or less of approach traffic volume.
2 Whichever is greater

Turn Demand Volume (1)=	50
Approach Volume =	800
Turn / Approach =	6%

(1) PM Peak (highest volume).

Note: Based on L&D Manual guidance, left turn lane recommended to not exceed 600 feet (storage).

Storage Length at Intersections: 401-10E

Average No. of Vehicles/Cycle	Required Length	Average No. of Vehicles/Cycle	Required Length
1	50 ft	17	600 ft
2	100 ft	18	625 ft
3	150 ft	19	650 ft
4	175 ft	20	675 ft
5	200 ft	21	725 ft
6	250 ft	22	750 ft
7	275 ft	23	775 ft
8	325 ft	24	800 ft
9	350 ft	25	825 ft
10	375 ft	30	975 ft
11	400 ft	35	1125 ft
12	450 ft	40	1250 ft
13	475 ft	45	1400 ft
14	500 ft	50	1550 ft
15	525 ft	55	1700 ft
16	550 ft	60	1850 ft

Left Turn Storage Lane Length Calculation

DHV (Turning Lane) =	50
Cycle Length =	40
Cycles per Hour =	90
Average Vehicles per Cycle=	1

If Cycles are unknown, assume: Unsignalized or 2 Phase - 60 Cycles/Hr; 3 Phase - 40 Cycles/Hr; 4 Phase - 30 Cycles/Hr

Required Turn Lane Storage Length = 50 ft (from Figure 401-10)

Adjacent Through Lane Storage Calculation

Adjacent Lane(s) Volume =	750
Average Vehicles per Cycle=	8
Required Length (total) =	325 ft (from Figure 401-10)

Number of Lanes: 1
Required Length (per lane) = 325 ft

Condition A **Storage Only**
Length = 50 ft (diverging taper) + 50 ft (Storage Length, Figure 401-10)
Length = 100 ft

Condition B **High Speed Deceleration Only**

Design Speed	Length (including 50' Diverging Taper)
40	125 ft
45	175 ft
50	225 ft
55	285 ft
60	345 ft

Length = #N/A ft

Condition C **Moderate Speed Deceleration and Storage**

Design Speed	Length (including 50' Diverging Taper)			(Storage Length, Figure 401-10)
40	165 ft	115 ft	+	50 ft
45	175 ft	125 ft	+	50 ft
50	195 ft	145 ft	+	50 ft
55	215 ft	165 ft	+	50 ft
60	235 ft	185 ft	+	50 ft

Length = #N/A ft

Minimum Required Storage Lane Length (including 50' diverging taper) Per Lane = 100 feet
Perferred Storage Lane Length (including 50' diverging taper) Per Lane = 375 feet

Note: Minimum required storage lane length reflects required storage of vehicles calculated using volume and cycle length. Preferred storage length varies from minimum storage lane length when adjacent through lane queue is projected to be greater than the minimum required storage length.

Length of Turn Lane Calculation Worksheet
Based on ODOT L&D Manual, Release Date 7/1/2018

Michael Baker INTERNATIONAL

Project Name:	Indianola Ave Road Diet	Analysis Date:	6/28/2021
Intersection:	Indianola Ave & Oakland Park Avenue	Movement:	SBL
			2024 PM Peak Build
Design Speed =	35	(Speed in mph)	
Turn Demand Volume =	Low	(High or Low)	
Type of Traffic Control =	Signalized	(Signalized, Unsignalized Stopped Crossroad, or Unsignalized Through Road)	
Condition =	A	(A, B, or C obtained from Table 401-9E)	

BASIS FOR COMPUTING LENGTH OF TURN LANES	**401-9E REFERENCE SECTIONS 401.6.1, 401.6.3**					
TYPE OF TRAFFIC CONTROL	DESIGN SPEED (mph)					
	30 - 35		40 - 45		50 - 60	
	TURN DEMAND VOLUME					
	HIGH	LOW[1]	HIGH	LOW[1]	HIGH	LOW[1]
SIGNALIZED	A	A	B or C[2]	B or C[2]	B or C[2]	B or C[2]
UNSIGNALIZED STOPPED CROSSROAD	A	A	A	A	A	A
UNSIGNALIZED THROUGH ROAD	A	A	C	B	B or C[2]	B

[1] LOW is considered 10% or less of approach traffic volume.
[2] Whichever is greater

Turn Demand Volume (1)=	40
Approach Volume =	760
Turn / Approach =	5%
(1) PM Peak (highest volume).	

Note: Based on L&D Manual guidance, left turn lane recommended to not exceed 600 feet (storage).

Storage Length at Intersections: 401-10E

Average No. of Vehicles/Cycle	Required Length		Average No. of Vehicles/Cycle	Required Length
1	50	ft	17	600 ft
2	100	ft	18	625 ft
3	150	ft	19	650 ft
4	175	ft	20	675 ft
5	200	ft	21	725 ft
6	250	ft	22	750 ft
7	275	ft	23	775 ft
8	325	ft	24	800 ft
9	350	ft	25	825 ft
10	375	ft	30	975 ft
11	400	ft	35	1125 ft
12	450	ft	40	1250 ft
13	475	ft	45	1400 ft
14	500	ft	50	1550 ft
15	525	ft	55	1700 ft
16	550	ft	60	1850 ft

Left Turn Storage Lane Length Calculation

DHV (Turning Lane) =	40	If Cycles are unknown, assume:	Unsignalized or 2 Phase - 60 Cycles/Hr
Cycle Length =	40		3 Phase - 40 Cycles/Hr
Cycles per Hour =	90		4 Phase - 30 Cycles/Hr
Average Vehicles per Cycle=	1	Required Turn Lane Storage Length =	50 ft (from Figure 401-10)

Adjacent Through Lane Storage Calculation

Adjacent Lane(s) Volume =	720	Number of Lanes	1
Average Vehicles per Cycle=	8	Required Length (per lane) =	325 ft
Required Length (total) =	325	ft (from Figure 401-10)	

Condition A **Storage Only** (Storage Length, Figure 401-10)
Length = 50 ft (diverging taper) + 50 ft **Length = 100 ft**

Condition B **High Speed Deceleration Only**

Design Speed	Length (including 50' Diverging Taper)	
40	125	ft
45	175	ft
50	225	ft
55	285	ft
60	345	ft

Length = #N/A ft

Condition C **Moderate Speed Deceleration and Storage**

Design Speed	Length (including 50' Diverging Taper)					(Storage Length, Figure 401-10)
40	165	ft	115	ft	+	50 ft
45	175	ft	125	ft	+	50 ft
50	195	ft	145	ft	+	50 ft
55	215	ft	165	ft	+	50 ft
60	235	ft	185	ft	+	50 ft

Length = #N/A ft

Minimum Required Storage Lane Length (including 50' diverging taper) Per Lane = 100 feet

Perferred Storage Lane Length (including 50' diverging taper) Per Lane = 375 feet

Note: Minimum required storage lane length reflects required storage of vehicles calculated using volume and cycle length. Preferred storage length varies from minimum storage lane length when adjacent through lane queue is projected to be greater than the minimum required storage length.

Length of Turn Lane Calculation Worksheet

Based on ODOT L&D Manual, Release Date 7/1/2018

Michael Baker INTERNATIONAL

Project Name:	Indianola Ave Road Diet	Analysis Date:	6/28/2021
Intersection:	Indianola Ave & Oakland Park Avenue	Movement:	EBL
			2024 PM Peak Build
Design Speed =	35	(Speed in mph)	
Turn Demand Volume =	High	(High or Low)	
Type of Traffic Control =	Signalized	(Signalized, Unsignalized Stopped Crossroad, or Unsignalized Through Road)	
Condition =	A	(A, B, or C obtained from Table 401-9E)	

BASIS FOR COMPUTING LENGTH OF TURN LANES						
	401-9E REFERENCE SECTIONS 401.6.1, 401.6.3					
TYPE OF TRAFFIC CONTROL	DESIGN SPEED (mph)					
	30 - 35		40 - 45		50 - 60	
	TURN DEMAND VOLUME					
	HIGH	LOW[1]	HIGH	LOW[1]	HIGH	LOW[1]
SIGNALIZED	A	A	B or C[2]	B or C[2]	B or C[2]	B or C[2]
UNSIGNALIZED STOPPED CROSSROAD	A	A	A	A	A	A
UNSIGNALIZED THROUGH ROAD	A	A	C	B	B or C[2]	B

1 LOW is considered 10% or less of approach traffic volume.
2 Whichever is greater

Turn Demand Volume (1)=	30
Approach Volume =	90
Turn / Approach =	33%
(1) PM Peak (highest volume).	

Note: Based on L&D Manual guidance, left turn lane recommended to not exceed 600 feet (storage).

Storage Length at Intersections: 401-10E

Average No. of Vehicles/Cycle	Required Length	Average No. of Vehicles/Cycle	Required Length
1	50 **ft**	17	600 ft
2	100 ft	18	625 ft
3	150 ft	19	650 ft
4	175 ft	20	675 ft
5	200 ft	21	725 ft
6	250 ft	22	750 ft
7	275 ft	23	775 ft
8	325 ft	24	800 ft
9	350 ft	25	825 ft
10	375 ft	30	975 ft
11	400 ft	35	1125 ft
12	450 ft	40	1250 ft
13	475 ft	45	1400 ft
14	500 ft	50	1550 ft
15	525 ft	55	1700 ft
16	550 ft	60	1850 ft

Left Turn Storage Lane Length Calculation

DHV (Turning Lane) =	30	If Cycles are unknown, assume:	Unsignalized or 2 Phase - 60 Cycles/Hr
Cycle Length =	40		3 Phase - 40 Cycles/Hr
Cycles per Hour =	90		4 Phase - 30 Cycles/Hr
Average Vehicles per Cycle=	1	Required Turn Lane Storage Length =	50 ft (from Figure 401-10)

Adjacent Through Lane Storage Calculation

Adjacent Lane(s) Volume =	750	Number of Lanes	1
Average Vehicles per Cycle=	8	Required Length (per lane) =	325 ft
Required Length (total) =	325 ft (from Figure 401-10)		

Condition A **Storage Only**

Length = 50 ft (diverging taper) + (Storage Length, Figure 401-10) 50 ft — **Length = 100 ft**

Condition B **High Speed Deceleration Only**

Design Speed	Length (including 50' Diverging Taper)
40	125 ft
45	175 ft
50	225 ft
55	285 ft
60	345 ft

Length = #N/A ft

Condition C **Moderate Speed Deceleration and Storage**

Design Speed	Length (including 50' Diverging Taper)			(Storage Length, Figure 401-10)
40	165 ft	115 ft	+	50 ft
45	175 ft	125 ft	+	50 ft
50	195 ft	145 ft	+	50 ft
55	215 ft	165 ft	+	50 ft
60	235 ft	185 ft	+	50 ft

Length = #N/A ft

Minimum Required Storage Lane Length (including 50' diverging taper) Per Lane = 100 feet

Perferred Storage Lane Length (including 50' diverging taper) Per Lane = 375 feet

Note: Minimum required storage lane length reflects required storage of vehicles calculated using volume and cycle length. Preferred storage length varies from minimum storage lane length when adjacent through lane queue is projected to be greater than the minimum required storage length.

Length of Turn Lane Calculation Worksheet
Based on ODOT L&D Manual, Release Date 7/1/2018

Michael Baker INTERNATIONAL

Project Name:	Indianola Ave Road Diet	Analysis Date:	6/28/2021
Intersection:	Indianola Ave & Oakland Park Avenue	Movement:	WBL
			2024 PM Peak Build
Design Speed =	35	(Speed in mph)	
Turn Demand Volume =	High	(High or Low)	
Type of Traffic Control =	Signalized	(Signalized, Unsignalized Stopped Crossroad, or Unsignalized Through Road)	
Condition =	A	(A, B, or C obtained from Table 401-9E)	

BASIS FOR COMPUTING LENGTH OF TURN LANES — **401-9E REFERENCE SECTIONS 401.6.1, 401.6.3**

TYPE OF TRAFFIC CONTROL	DESIGN SPEED (mph)					
	30 - 35		40 - 45		50 - 60	
	TURN DEMAND VOLUME					
	HIGH	LOW[1]	HIGH	LOW[1]	HIGH	LOW[1]
SIGNALIZED	A	A	B or C[2]	B or C[2]	B or C[2]	B or C[2]
UNSIGNALIZED STOPPED CROSSROAD	A	A	A	A	A	A
UNSIGNALIZED THROUGH ROAD	A	A	C	B	B or C[2]	B

[1] LOW is considered 10% or less of approach traffic volume.
[2] Whichever is greater

Turn Demand Volume (1)=	70
Approach Volume =	130
Turn / Approach =	54%
(1) PM Peak (highest volume).	

Note: Based on L&D Manual guidance, left turn lane recommended to not exceed 600 feet (storage).

Storage Length at Intersections: 401-10E

Average No. of Vehicles/Cycle	Required Length	Average No. of Vehicles/Cycle	Required Length
1	50 ft	17	600 ft
2	100 ft	18	625 ft
3	150 ft	19	650 ft
4	175 ft	20	675 ft
5	200 ft	21	725 ft
6	250 ft	22	750 ft
7	275 ft	23	775 ft
8	325 ft	24	800 ft
9	350 ft	25	825 ft
10	375 ft	30	975 ft
11	400 ft	35	1125 ft
12	450 ft	40	1250 ft
13	475 ft	45	1400 ft
14	500 ft	50	1550 ft
15	525 ft	55	1700 ft
16	550 ft	60	1850 ft

Left Turn Storage Lane Length Calculation

DHV (Turning Lane) =	70	If Cycles are unknown, assume:	Unsignalized or 2 Phase - 60 Cycles/Hr
Cycle Length =	40		3 Phase - 40 Cycles/Hr
Cycles per Hour =	90		4 Phase - 30 Cycles/Hr
Average Vehicles per Cycle=	1	Required Turn Lane Storage Length =	50 ft (from Figure 401-10)

Adjacent Through Lane Storage Calculation

Adjacent Lane(s) Volume =	720	Number of Lanes	1
Average Vehicles per Cycle=	8	Required Length (per lane) =	325 ft
Required Length (total) =	325 ft (from Figure 401-10)		

Condition A **Storage Only**

Length = 50 ft (diverging taper) + 50 ft (Storage Length, Figure 401-10) **Length = 100 ft**

Condition B **High Speed Deceleration Only**

Design Speed	Length (including 50' Diverging Taper)
40	125 ft
45	175 ft
50	225 ft
55	285 ft
60	345 ft

Length = #N/A ft

Condition C **Moderate Speed Deceleration and Storage**

Design Speed	Length (including 50' Diverging Taper)			(Storage Length, Figure 401-10)
40	165 ft	115 ft	+	50 ft
45	175 ft	125 ft	+	50 ft
50	195 ft	145 ft	+	50 ft
55	215 ft	165 ft	+	50 ft
60	235 ft	185 ft	+	50 ft

Length = #N/A ft

Minimum Required Storage Lane Length (including 50' diverging taper) Per Lane = 100 feet

Perferred Storage Lane Length (including 50' diverging taper) Per Lane = 375 feet

Note: Minimum required storage lane length reflects required storage of vehicles calculated using volume and cycle length. Preferred storage length varies from minimum storage lane length when adjacent through lane queue is projected to be greater than the minimum required storage length.

Length of Turn Lane Calculation Worksheet
Based on ODOT L&D Manual, Release Date 7/1/2018

Michael Baker INTERNATIONAL

Project Name:	Indianola Ave Road Diet	Analysis Date:	6/28/2021
Intersection:	Indianola Ave & Oakland Park Avenue	Movement:	NBL
			2044 AM Peak Build
Design Speed =	35	(Speed in mph)	
Turn Demand Volume =	Low	(High or Low)	
Type of Traffic Control =	Signalized	(Signalized, Unsignalized Stopped Crossroad, or Unsignalized Through Road)	
Condition =	A	(A, B, or C obtained from Table 401-9E)	

BASIS FOR COMPUTING LENGTH OF TURN LANES — 401-9E REFERENCE SECTIONS 401.6.1, 401.6.3

TYPE OF TRAFFIC CONTROL	DESIGN SPEED (mph) 30 - 35		40 - 45		50 - 60	
	TURN DEMAND VOLUME					
	HIGH	LOW[1]	HIGH	LOW[1]	HIGH	LOW[1]
SIGNALIZED	A	A	B or C[2]	B or C[2]	B or C[2]	B or C[2]
UNSIGNALIZED STOPPED CROSSROAD	A	A	A	A	A	A
UNSIGNALIZED THROUGH ROAD	A	A	C	B	B or C[2]	B

1 LOW is considered 10% or less of approach traffic volume.
2 Whichever is greater

Turn Demand Volume (1)=	50
Approach Volume =	740
Turn / Approach =	7%
(1) PM Peak (highest volume).	

Note: Based on L&D Manual guidance, left turn lane recommended to not exceed 600 feet (storage).

Storage Length at Intersections: 401-10E

Average No. of Vehicles/Cycle	Required Length		Average No. of Vehicles/Cycle	Required Length
1	50	ft	17	600 ft
2	100	ft	18	625 ft
3	150	ft	19	650 ft
4	175	ft	20	675 ft
5	200	ft	21	725 ft
6	250	ft	22	750 ft
7	275	ft	23	775 ft
8	325	ft	24	800 ft
9	350	ft	25	825 ft
10	375	ft	30	975 ft
11	400	ft	35	1125 ft
12	450	ft	40	1250 ft
13	475	ft	45	1400 ft
14	500	ft	50	1550 ft
15	525	ft	55	1700 ft
16	550	ft	60	1850 ft

Left Turn Storage Lane Length Calculation

DHV (Turning Lane) =	50	If Cycles are unknown, assume:	Unsignalized or 2 Phase - 60 Cycles/Hr
Cycle Length =	40		3 Phase - 40 Cycles/Hr
Cycles per Hour =	90		4 Phase - 30 Cycles/Hr
Average Vehicles per Cycle=	1	Required Turn Lane Storage Length =	50 ft (from Figure 401-10)

Adjacent Through Lane Storage Calculation

Adjacent Lane(s) Volume =	670	Number of Lanes	1
Average Vehicles per Cycle=	7	Required Length (per lane) =	275 ft
Required Length (total) =	275	ft (from Figure 401-10)	

Condition A **Storage Only** (Storage Length, Figure 401-10)
Length = 50 ft (diverging taper) + 50 ft **Length = 100 ft**

Condition B **High Speed Deceleration Only**

Design Speed	Length (including 50' Diverging Taper)	
40	125	ft
45	175	ft
50	225	ft
55	285	ft
60	345	ft

Length = #N/A ft

Condition C **Moderate Speed Deceleration and Storage**

Design Speed	Length (including 50' Diverging Taper)					(Storage Length, Figure 401-10)
40	165	ft	115	ft	+	50 ft
45	175	ft	125	ft	+	50 ft
50	195	ft	145	ft	+	50 ft
55	215	ft	165	ft	+	50 ft
60	235	ft	185	ft	+	50 ft

Length = #N/A ft

Minimum Required Storage Lane Length (including 50' diverging taper) Per Lane = 100 feet
Perferred Storage Lane Length (including 50' diverging taper) Per Lane = 325 feet

Note: Minimum required storage lane length reflects required storage of vehicles calculated using volume and cycle length. Preferred storage length varies from minimum storage lane length when adjacent through lane queue is projected to be greater than the minimum required storage length.

Length of Turn Lane Calculation Worksheet
Based on ODOT L&D Manual, Release Date 7/1/2018

Michael Baker INTERNATIONAL

Project Name:	Indianola Ave Road Diet	Analysis Date:	6/28/2021
Intersection:	Indianola Ave & Oakland Park Avenue	Movement:	SBL
			2044 AM Peak Build
Design Speed =	35	(Speed in mph)	
Turn Demand Volume =	Low	(High or Low)	
Type of Traffic Control =	Signalized	(Signalized, Unsignalized Stopped Crossroad, or Unsignalized Through Road)	
Condition =	A	(A, B, or C obtained from Table 401-9E)	

BASIS FOR COMPUTING LENGTH OF TURN LANES — **401-9E** **REFERENCE SECTIONS 401.6.1, 401.6.3**

TYPE OF TRAFFIC CONTROL	DESIGN SPEED (mph) 30 - 35		40 - 45		50 - 60	
	TURN DEMAND VOLUME					
	HIGH	LOW[1]	HIGH	LOW[1]	HIGH	LOW[1]
SIGNALIZED	A	A	B or C[2]	B or C[2]	B or C[2]	B or C[2]
UNSIGNALIZED STOPPED CROSSROAD	A	A	A	A	A	A
UNSIGNALIZED THROUGH ROAD	A	A	C	B	B or C[2]	B

1 LOW is considered 10% or less of approach traffic volume.
2 Whichever is greater

Turn Demand Volume (1)=	20
Approach Volume =	800
Turn / Approach =	3%
(1) PM Peak (highest volume).	

Note: Based on L&D Manual guidance, left turn lane recommended to not exceed 600 feet (storage).

Storage Length at Intersections: 401-10E

Average No. of Vehicles/Cycle	Required Length		Average No. of Vehicles/Cycle	Required Length
1	50	ft	17	600 ft
2	100	ft	18	625 ft
3	150	ft	19	650 ft
4	175	ft	20	675 ft
5	200	ft	21	725 ft
6	250	ft	22	750 ft
7	275	ft	23	775 ft
8	325	ft	24	800 ft
9	350	ft	25	825 ft
10	375	ft	30	975 ft
11	400	ft	35	1125 ft
12	450	ft	40	1250 ft
13	475	ft	45	1400 ft
14	500	ft	50	1550 ft
15	525	ft	55	1700 ft
16	550	ft	60	1850 ft

Left Turn Storage Lane Length Calculation

DHV (Turning Lane) =	20	If Cycles are unknown, assume:	Unsignalized or 2 Phase - 60 Cycles/Hr
Cycle Length =	40		3 Phase - 40 Cycles/Hr
Cycles per Hour =	90		4 Phase - 30 Cycles/Hr
Average Vehicles per Cycle=	1	Required Turn Lane Storage Length =	50 ft (from Figure 401-10)

Adjacent Through Lane Storage Calculation

Adjacent Lane(s) Volume =	780	Number of Lanes	1
Average Vehicles per Cycle=	9	Required Length (per lane) =	350 ft
Required Length (total) =	350	ft (from Figure 401-10)	

Condition A **Storage Only**
Length = 50 ft (diverging taper) + (Storage Length, Figure 401-10) 50 ft **Length = 100 ft**

Condition B **High Speed Deceleration Only**

Design Speed	Length (including 50' Diverging Taper)	
40	125	ft
45	175	ft
50	225	ft
55	285	ft
60	345	ft

Length = #N/A ft

Condition C **Moderate Speed Deceleration and Storage**

Design Speed	Length (including 50' Diverging Taper)					(Storage Length, Figure 401-10)
40	165	ft	115	ft	+	50 ft
45	175	ft	125	ft	+	50 ft
50	195	ft	145	ft	+	50 ft
55	215	ft	165	ft	+	50 ft
60	235	ft	185	ft	+	50 ft

Length = #N/A ft

Minimum Required Storage Lane Length (including 50' diverging taper) Per Lane =	**100 feet**
Perferred Storage Lane Length (including 50' diverging taper) Per Lane =	**400 feet**

Note: Minimum required storage lane length reflects required storage of vehicles calculated using volume and cycle length. Preferred storage length varies from minimum storage lane length when adjacent through lane queue is projected to be greater than the minimum required storage length.

Length of Turn Lane Calculation Worksheet
Based on ODOT L&D Manual, Release Date 7/1/2018

Michael Baker INTERNATIONAL

Project Name:	Indianola Ave Road Diet		Analysis Date:	6/28/2021
Intersection:	Indianola Ave & Oakland Park Avenue		Movement:	EBL
				2044 AM Peak Build
Design Speed =	35	(Speed in mph)		
Turn Demand Volume =	High	(High or Low)		
Type of Traffic Control =	Signalized	(Signalized, Unsignalized Stopped Crossroad, or Unsignalized Through Road)		
Condition =	A	(A, B, or C obtained from Table 401-9E)		

BASIS FOR COMPUTING LENGTH OF TURN LANES — 401-9E — REFERENCE SECTIONS 401.6.1, 401.6.3

TYPE OF TRAFFIC CONTROL	DESIGN SPEED (mph) 30 - 35		40 - 45		50 - 60	
	TURN DEMAND VOLUME					
	HIGH	LOW[1]	HIGH	LOW[1]	HIGH	LOW[1]
SIGNALIZED	A	A	B or C[2]	B or C[2]	B or C[2]	B or C[2]
UNSIGNALIZED STOPPED CROSSROAD	A	A	A	A	A	A
UNSIGNALIZED THROUGH ROAD	A	A	C	B	B or C[2]	B

1 LOW is considered 10% or less of approach traffic volume.
2 Whichever is greater

Turn Demand Volume (1)=	50
Approach Volume =	140
Turn / Approach =	36%
(1) PM Peak (highest volume).	

Note: Based on L&D Manual guidance, left turn lane recommended to not exceed 600 feet (storage).

Storage Length at Intersections: 401-10E

Average No. of Vehicles/Cycle	Required Length	Average No. of Vehicles/Cycle	Required Length
1	50 ft	17	600 ft
2	100 ft	18	625 ft
3	150 ft	19	650 ft
4	175 ft	20	675 ft
5	200 ft	21	725 ft
6	250 ft	22	750 ft
7	275 ft	23	775 ft
8	325 ft	24	800 ft
9	350 ft	25	825 ft
10	375 ft	30	975 ft
11	400 ft	35	1125 ft
12	450 ft	40	1250 ft
13	475 ft	45	1400 ft
14	500 ft	50	1550 ft
15	525 ft	55	1700 ft
16	550 ft	60	1850 ft

Left Turn Storage Lane Length Calculation

DHV (Turning Lane) =	50	If Cycles are unknown, assume:	Unsignalized or 2 Phase - 60 Cycles/Hr
Cycle Length =	40		3 Phase - 40 Cycles/Hr
Cycles per Hour =	90		4 Phase - 30 Cycles/Hr
Average Vehicles per Cycle=	1	Required Turn Lane Storage Length =	50 ft (from Figure 401-10)

Adjacent Through Lane Storage Calculation

Adjacent Lane(s) Volume =	670	Number of Lanes	1
Average Vehicles per Cycle=	7	Required Length (per lane) =	275 ft
Required Length (total) =	275 ft (from Figure 401-10)		

Condition A **Storage Only**
Length = 50 ft (diverging taper) + 50 ft (Storage Length, Figure 401-10)
Length = 100 ft

Condition B **High Speed Deceleration Only**

Design Speed	Length (including 50' Diverging Taper)
40	125 ft
45	175 ft
50	225 ft
55	285 ft
60	345 ft

Length = #N/A ft

Condition C **Moderate Speed Deceleration and Storage**

Design Speed	Length (including 50' Diverging Taper)			(Storage Length, Figure 401-10)
40	165 ft	115 ft	+	50 ft
45	175 ft	125 ft	+	50 ft
50	195 ft	145 ft	+	50 ft
55	215 ft	165 ft	+	50 ft
60	235 ft	185 ft	+	50 ft

Length = #N/A ft

Minimum Required Storage Lane Length (including 50' diverging taper) Per Lane = 100 feet

Perferred Storage Lane Length (including 50' diverging taper) Per Lane = 325 feet

Note: Minimum required storage lane length reflects required storage of vehicles calculated using volume and cycle length. Preferred storage length varies from minimum storage lane length when adjacent through lane queue is projected to be greater than the minimum required storage length.

Length of Turn Lane Calculation Worksheet

Based on ODOT L&D Manual, Release Date 7/1/2018

Michael Baker INTERNATIONAL

Project Name:	Indianola Ave Road Diet	Analysis Date:	6/28/2021
Intersection:	Indianola Ave & Oakland Park Avenue	Movement:	WBL
			2044 AM Peak Build
Design Speed =	35	(Speed in mph)	
Turn Demand Volume =	High	(High or Low)	
Type of Traffic Control =	Signalized	(Signalized, Unsignalized Stopped Crossroad, or Unsignalized Through Road)	
Condition =	A	(A, B, or C obtained from Table 401-9E)	

BASIS FOR COMPUTING LENGTH OF TURN LANES — 401-9E REFERENCE SECTIONS 401.6.1, 401.6.3

TYPE OF TRAFFIC CONTROL	DESIGN SPEED (mph) 30 - 35		40 - 45		50 - 60	
	TURN DEMAND VOLUME					
	HIGH	LOW[1]	HIGH	LOW[1]	HIGH	LOW[1]
SIGNALIZED	A	A	B or C[2]	B or C[2]	B or C[2]	B or C[2]
UNSIGNALIZED STOPPED CROSSROAD	A	A	A	A	A	A
UNSIGNALIZED THROUGH ROAD	A	A	C	B	B or C[2]	B

1 LOW is considered 10% or less of approach traffic volume.
2 Whichever is greater

Turn Demand Volume (1)=	50
Approach Volume =	80
Turn / Approach =	63%
(1) PM Peak (highest volume).	

Note: Based on L&D Manual guidance, left turn lane recommended to not exceed 600 feet (storage).

Storage Length at Intersections: 401-10E

Average No. of Vehicles/Cycle	Required Length	Average No. of Vehicles/Cycle	Required Length
1	50 **ft**	17	600 ft
2	100 ft	18	625 ft
3	150 ft	19	650 ft
4	175 ft	20	675 ft
5	200 ft	21	725 ft
6	250 ft	22	750 ft
7	275 ft	23	775 ft
8	325 ft	24	800 ft
9	350 ft	25	825 ft
10	375 ft	30	975 ft
11	400 ft	35	1125 ft
12	450 ft	40	1250 ft
13	475 ft	45	1400 ft
14	500 ft	50	1550 ft
15	525 ft	55	1700 ft
16	550 ft	60	1850 ft

Left Turn Storage Lane Length Calculation

DHV (Turning Lane) =	50	If Cycles are unknown, assume:	Unsignalized or 2 Phase - 60 Cycles/Hr
Cycle Length =	40		3 Phase - 40 Cycles/Hr
Cycles per Hour =	90		4 Phase - 30 Cycles/Hr
Average Vehicles per Cycle=	1	Required Turn Lane Storage Length =	50 ft (from Figure 401-10)

Adjacent Through Lane Storage Calculation

Adjacent Lane(s) Volume =	780	Number of Lanes	1
Average Vehicles per Cycle=	9	Required Length (per lane) =	350 ft
Required Length (total) =	350 ft (from Figure 401-10)		

Condition A **Storage Only** (Storage Length, Figure 401-10)
Length = 50 ft (diverging taper) + 50 ft **Length = 100 ft**

Condition B **High Speed Deceleration Only**

Design Speed	Length (including 50' Diverging Taper)
40	125 ft
45	175 ft
50	225 ft
55	285 ft
60	345 ft

Length = #N/A ft

Condition C **Moderate Speed Deceleration and Storage**

Design Speed	Length (including 50' Diverging Taper)			(Storage Length, Figure 401-10)
40	165 ft	115 ft	+	50 ft
45	175 ft	125 ft	+	50 ft
50	195 ft	145 ft	+	50 ft
55	215 ft	165 ft	+	50 ft
60	235 ft	185 ft	+	50 ft

Length = #N/A ft

Minimum Required Storage Lane Length (including 50' diverging taper) Per Lane = 100 feet

Perferred Storage Lane Length (including 50' diverging taper) Per Lane = 400 feet

Note: Minimum required storage lane length reflects required storage of vehicles calculated using volume and cycle length. Preferred storage length varies from minimum storage lane length when adjacent through lane queue is projected to be greater than the minimum required storage length.

Length of Turn Lane Calculation Worksheet
Based on ODOT L&D Manual, Release Date 7/1/2018

Michael Baker INTERNATIONAL

Project Name:	Indianola Ave Road Diet	Analysis Date:	6/28/2021
Intersection:	Indianola Ave & Oakland Park Avenue	Movement:	NBL
			2044 PM Peak Build

Design Speed =	35	(Speed in mph)
Turn Demand Volume =	Low	(High or Low)
Type of Traffic Control =	Signalized	(Signalized, Unsignalized Stopped Crossroad, or Unsignalized Through Road)
Condition =	A	(A, B, or C obtained from Table 401-9E)

BASIS FOR COMPUTING LENGTH OF TURN LANES

401-9E
REFERENCE SECTIONS 401.6.1, 401.6.3

TYPE OF TRAFFIC CONTROL	DESIGN SPEED (mph)					
	30 - 35		40 - 45		50 - 60	
	TURN DEMAND VOLUME					
	HIGH	LOW[1]	HIGH	LOW[1]	HIGH	LOW[1]
SIGNALIZED	A	A	B or C[2]	B or C[2]	B or C[2]	B or C[2]
UNSIGNALIZED STOPPED CROSSROAD	A	A	A	A	A	A
UNSIGNALIZED THROUGH ROAD	A	A	C	B	B or C[2]	B

1 LOW is considered 10% or less of approach traffic volume.
2 Whichever is greater

Turn Demand Volume (1)=	50
Approach Volume =	860
Turn / Approach =	6%
(1) PM Peak (highest volume).	

Note: Based on L&D Manual guidance, left turn lane recommended to not exceed 600 feet (storage).

Storage Length at Intersections: 401-10E

Average No. of Vehicles/Cycle	Required Length		Average No. of Vehicles/Cycle	Required Length
1	50	**ft**	17	600 ft
2	100	ft	18	625 ft
3	150	ft	19	650 ft
4	175	ft	20	675 ft
5	200	ft	21	725 ft
6	250	ft	22	750 ft
7	275	ft	23	775 ft
8	325	ft	24	800 ft
9	350	ft	25	825 ft
10	375	ft	30	975 ft
11	400	ft	35	1125 ft
12	450	ft	40	1250 ft
13	475	ft	45	1400 ft
14	500	ft	50	1550 ft
15	525	ft	55	1700 ft
16	550	ft	60	1850 ft

Left Turn Storage Lane Length Calculation

DHV (Turning Lane) =	50	If Cycles are unknown, assume:	Unsignalized or 2 Phase - 60 Cycles/Hr
Cycle Length =	44		3 Phase - 40 Cycles/Hr
Cycles per Hour =	82		4 Phase - 30 Cycles/Hr
Average Vehicles per Cycle=	1	Required Turn Lane Storage Length =	50 ft (from Figure 401-10)

Adjacent Through Lane Storage Calculation

Adjacent Lane(s) Volume =	810	Number of Lanes	1
Average Vehicles per Cycle=	10	Required Length (per lane) =	375 ft
Required Length (total) =	375 ft (from Figure 401-10)		

Condition A **Storage Only** (Storage Length, Figure 401-10)
Length = 50 ft (diverging taper) + 50 ft **Length = 100 ft**

Condition B **High Speed Deceleration Only**

Design Speed	Length (including 50' Diverging Taper)
40	125 ft
45	175 ft
50	225 ft
55	285 ft
60	345 ft

Length = #N/A ft

Condition C **Moderate Speed Deceleration and Storage**

Design Speed	Length (including 50' Diverging Taper)			(Storage Length, Figure 401-10)
40	165 ft	115 ft	+	50 ft
45	175 ft	125 ft	+	50 ft
50	195 ft	145 ft	+	50 ft
55	215 ft	165 ft	+	50 ft
60	235 ft	185 ft	+	50 ft

Length = #N/A ft

Minimum Required Storage Lane Length (including 50' diverging taper) Per Lane = 100 feet
Perferred Storage Lane Length (including 50' diverging taper) Per Lane = 425 feet

Note: Minimum required storage lane length reflects required storage of vehicles calculated using volume and cycle length. Preferred storage length varies from minimum storage lane length when adjacent through lane queue is projected to be greater than the minimum required storage length.

Length of Turn Lane Calculation Worksheet

Based on ODOT L&D Manual, Release Date 7/1/2018

Michael Baker INTERNATIONAL

Project Name:	Indianola Ave Road Diet	Analysis Date:	6/28/2021
Intersection:	Indianola Ave & Oakland Park Avenue	Movement:	SBL
			2044 PM Peak Build

Design Speed =	35	(Speed in mph)
Turn Demand Volume =	Low	(High or Low)
Type of Traffic Control =	Signalized	(Signalized, Unsignalized Stopped Crossroad, or Unsignalized Through Road)
Condition =	A	(A, B, or C obtained from Table 401-9E)

BASIS FOR COMPUTING LENGTH OF TURN LANES — **401-9E REFERENCE SECTIONS 401.6.1, 401.6.3**

TYPE OF TRAFFIC CONTROL	DESIGN SPEED (mph) 30 - 35		40 - 45		50 - 60	
	TURN DEMAND VOLUME					
	HIGH	LOW[1]	HIGH	LOW[1]	HIGH	LOW[1]
SIGNALIZED	A	A	B or C[2]	B or C[2]	B or C[2]	B or C[2]
UNSIGNALIZED STOPPED CROSSROAD	A	A	A	A	A	A
UNSIGNALIZED THROUGH ROAD	A	A	C	B	B or C[2]	B

[1] LOW is considered 10% or less of approach traffic volume.
[2] Whichever is greater

Turn Demand Volume (1)=	40
Approach Volume =	830
Turn / Approach =	5%

(1) PM Peak (highest volume).

Note: Based on L&D Manual guidance, left turn lane recommended to not exceed 600 feet (storage).

Storage Length at Intersections: 401-10E

Average No. of Vehicles/Cycle	Required Length	Average No. of Vehicles/Cycle	Required Length
1	50 ft	17	600 ft
2	100 ft	18	625 ft
3	150 ft	19	650 ft
4	175 ft	20	675 ft
5	200 ft	21	725 ft
6	250 ft	22	750 ft
7	275 ft	23	775 ft
8	325 ft	24	800 ft
9	350 ft	25	825 ft
10	375 ft	30	975 ft
11	400 ft	35	1125 ft
12	450 ft	40	1250 ft
13	475 ft	45	1400 ft
14	500 ft	50	1550 ft
15	525 ft	55	1700 ft
16	550 ft	60	1850 ft

Left Turn Storage Lane Length Calculation

DHV (Turning Lane) =	40
Cycle Length =	44
Cycles per Hour =	82
Average Vehicles per Cycle=	1

If Cycles are unknown, assume: Unsignalized or 2 Phase - 60 Cycles/Hr; 3 Phase - 40 Cycles/Hr; 4 Phase - 30 Cycles/Hr

Required Turn Lane Storage Length = 50 ft (from Figure 401-10)

Adjacent Through Lane Storage Calculation

Adjacent Lane(s) Volume =	790
Average Vehicles per Cycle=	10
Required Length (total) =	375 ft (from Figure 401-10)

Number of Lanes 1
Required Length (per lane) = 375 ft

Condition A **Storage Only**
Length = 50 ft (diverging taper) + 50 ft (Storage Length, Figure 401-10)
Length = 100 ft

Condition B **High Speed Deceleration Only**

Design Speed	Length (including 50' Diverging Taper)
40	125 ft
45	175 ft
50	225 ft
55	285 ft
60	345 ft

Length = #N/A ft

Condition C **Moderate Speed Deceleration and Storage**

Design Speed	Length (including 50' Diverging Taper)			(Storage Length, Figure 401-10)
40	165 ft	115 ft	+	50 ft
45	175 ft	125 ft	+	50 ft
50	195 ft	145 ft	+	50 ft
55	215 ft	165 ft	+	50 ft
60	235 ft	185 ft	+	50 ft

Length = #N/A ft

Minimum Required Storage Lane Length (including 50' diverging taper) Per Lane = 100 feet

Perferred Storage Lane Length (including 50' diverging taper) Per Lane = 425 feet

Note: Minimum required storage lane length reflects required storage of vehicles calculated using volume and cycle length. Preferred storage length varies from minimum storage lane length when adjacent through lane queue is projected to be greater than the minimum required storage length.

Length of Turn Lane Calculation Worksheet
Based on ODOT L&D Manual, Release Date 7/1/2018

Michael Baker INTERNATIONAL

Project Name:	Indianola Ave Road Diet	Analysis Date:	6/28/2021
Intersection:	Indianola Ave & Oakland Park Avenue	Movement:	EBL
			2044 PM Peak Build
Design Speed =	35	(Speed in mph)	
Turn Demand Volume =	High	(High or Low)	
Type of Traffic Control =	Signalized	(Signalized, Unsignalized Stopped Crossroad, or Unsignalized Through Road)	
Condition =	A	(A, B, or C obtained from Table 401-9E)	

BASIS FOR COMPUTING LENGTH OF TURN LANES

401-9E REFERENCE SECTIONS 401.6.1, 401.6.3

TYPE OF TRAFFIC CONTROL	DESIGN SPEED (mph)					
	30 - 35		40 - 45		50 - 60	
	TURN DEMAND VOLUME					
	HIGH	LOW[1]	HIGH	LOW[1]	HIGH	LOW[1]
SIGNALIZED	A	A	B or C[2]	B or C[2]	B or C[2]	B or C[2]
UNSIGNALIZED STOPPED CROSSROAD	A	A	A	A	A	A
UNSIGNALIZED THROUGH ROAD	A	A	C	B	B or C[2]	B

[1] LOW is considered 10% or less of approach traffic volume.
[2] Whichever is greater

Turn Demand Volume (1)=	30
Approach Volume =	90
Turn / Approach =	33%
(1) PM Peak (highest volume).	

Note: Based on L&D Manual guidance, left turn lane recommended to not exceed 600 feet (storage).

Storage Length at Intersections: 401-10E

Average No. of Vehicles/Cycle	Required Length	Average No. of Vehicles/Cycle	Required Length
1	50 ft	17	600 ft
2	100 ft	18	625 ft
3	150 ft	19	650 ft
4	175 ft	20	675 ft
5	200 ft	21	725 ft
6	250 ft	22	750 ft
7	275 ft	23	775 ft
8	325 ft	24	800 ft
9	350 ft	25	825 ft
10	375 ft	30	975 ft
11	400 ft	35	1125 ft
12	450 ft	40	1250 ft
13	475 ft	45	1400 ft
14	500 ft	50	1550 ft
15	525 ft	55	1700 ft
16	550 ft	60	1850 ft

Left Turn Storage Lane Length Calculation

DHV (Turning Lane) =	30	If Cycles are unknown, assume:	Unsignalized or 2 Phase - 60 Cycles/Hr
Cycle Length =	44		3 Phase - 40 Cycles/Hr
Cycles per Hour =	82		4 Phase - 30 Cycles/Hr
Average Vehicles per Cycle=	1	Required Turn Lane Storage Length =	50 ft (from Figure 401-10)

Adjacent Through Lane Storage Calculation

Adjacent Lane(s) Volume =	810	Number of Lanes	1
Average Vehicles per Cycle=	10	Required Length (per lane) =	375 ft
Required Length (total) =	375 ft (from Figure 401-10)		

Condition A **Storage Only**

Length = 50 ft (diverging taper) + 50 ft (Storage Length, Figure 401-10) **Length = 100 ft**

Condition B **High Speed Deceleration Only**

Design Speed	Length (including 50' Diverging Taper)
40	125 ft
45	175 ft
50	225 ft
55	285 ft
60	345 ft

Length = #N/A ft

Condition C **Moderate Speed Deceleration and Storage**

Design Speed	Length (including 50' Diverging Taper)			(Storage Length, Figure 401-10)
40	165 ft	115 ft	+	50 ft
45	175 ft	125 ft	+	50 ft
50	195 ft	145 ft	+	50 ft
55	215 ft	165 ft	+	50 ft
60	235 ft	185 ft	+	50 ft

Length = #N/A ft

Minimum Required Storage Lane Length (including 50' diverging taper) Per Lane = 100 feet

Perferred Storage Lane Length (including 50' diverging taper) Per Lane = 425 feet

Note: Minimum required storage lane length reflects required storage of vehicles calculated using volume and cycle length. Preferred storage length varies from minimum storage lane length when adjacent through lane queue is projected to be greater than the minimum required storage length.

Length of Turn Lane Calculation Worksheet
Based on ODOT L&D Manual, Release Date 7/1/2018

Michael Baker INTERNATIONAL

Project Name:	Indianola Ave Road Diet		Analysis Date:	6/28/2021
Intersection:	Indianola Ave & Oakland Park Avenue		Movement:	WBL
				2044 PM Peak Build
Design Speed =	35	(Speed in mph)		
Turn Demand Volume =	High	(High or Low)		
Type of Traffic Control =	Signalized	(Signalized, Unsignalized Stopped Crossroad, or Unsignalized Through Road)		
Condition =	A	(A, B, or C obtained from Table 401-9E)		

BASIS FOR COMPUTING LENGTH OF TURN LANES — 401-9E REFERENCE SECTIONS 401.6.1, 401.6.3

TYPE OF TRAFFIC CONTROL	DESIGN SPEED (mph) 30 - 35		40 - 45		50 - 60	
	TURN DEMAND VOLUME					
	HIGH	LOW[1]	HIGH	LOW[1]	HIGH	LOW[1]
SIGNALIZED	A	A	B or C[2]	B or C[2]	B or C[2]	B or C[2]
UNSIGNALIZED STOPPED CROSSROAD	A	A	A	A	A	A
UNSIGNALIZED THROUGH ROAD	A	A	C	B	B or C[2]	B

[1] LOW is considered 10% or less of approach traffic volume.
[2] Whichever is greater

Turn Demand Volume (1)=	70
Approach Volume =	130
Turn / Approach =	54%
(1) PM Peak (highest volume).	

Note: Based on L&D Manual guidance, left turn lane recommended to not exceed 600 feet (storage).

Storage Length at Intersections: 401-10E

Average No. of Vehicles/Cycle	Required Length		Average No. of Vehicles/Cycle	Required Length
1	50	ft	17	600 ft
2	100	ft	18	625 ft
3	150	ft	19	650 ft
4	175	ft	20	675 ft
5	200	ft	21	725 ft
6	250	ft	22	750 ft
7	275	ft	23	775 ft
8	325	ft	24	800 ft
9	350	ft	25	825 ft
10	375	ft	30	975 ft
11	400	ft	35	1125 ft
12	450	ft	40	1250 ft
13	475	ft	45	1400 ft
14	500	ft	50	1550 ft
15	525	ft	55	1700 ft
16	550	ft	60	1850 ft

Left Turn Storage Lane Length Calculation

DHV (Turning Lane) =	70	If Cycles are unknown, assume:	Unsignalized or 2 Phase - 60 Cycles/Hr
Cycle Length =	44		3 Phase - 40 Cycles/Hr
Cycles per Hour =	82		4 Phase - 30 Cycles/Hr
Average Vehicles per Cycle=	1	Required Turn Lane Storage Length =	50 ft (from Figure 401-10)

Adjacent Through Lane Storage Calculation

Adjacent Lane(s) Volume =	790	Number of Lanes	1
Average Vehicles per Cycle=	10	Required Length (per lane) =	375 ft
Required Length (total) =	375 ft (from Figure 401-10)		

Condition A **Storage Only**
Length = 50 ft (diverging taper) + 50 ft (Storage Length, Figure 401-10) **Length = 100 ft**

Condition B **High Speed Deceleration Only**

Design Speed	Length (including 50' Diverging Taper)
40	125 ft
45	175 ft
50	225 ft
55	285 ft
60	345 ft

Length = #N/A ft

Condition C **Moderate Speed Deceleration and Storage**

Design Speed	Length (including 50' Diverging Taper)			(Storage Length, Figure 401-10)
40	165 ft	115 ft	+	50 ft
45	175 ft	125 ft	+	50 ft
50	195 ft	145 ft	+	50 ft
55	215 ft	165 ft	+	50 ft
60	235 ft	185 ft	+	50 ft

Length = #N/A ft

Minimum Required Storage Lane Length (including 50' diverging taper) Per Lane = 100 feet
Perferred Storage Lane Length (including 50' diverging taper) Per Lane = 425 feet

Note: Minimum required storage lane length reflects required storage of vehicles calculated using volume and cycle length. Preferred storage length varies from minimum storage lane length when adjacent through lane queue is projected to be greater than the minimum required storage length.