

181 WEST HIGH STREET SOMERVILLE, NJ 08876

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# TRAFFIC IMPACT ASSESSMENT

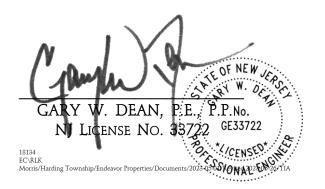
# FOR

# THE ESTATES AT HURSTMONT

# PROPOSED AGE RESTRICTED DEVELOPMENT

Block 27, Lot 2 Harding Township, Morris County New Jersey

> May 1, 2023 Revised: May 26, 2023



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TRAFFIC ENGINEERING PARKING STUDIES HIGHWAY DESIGN DOT ACCESS PERMITS MUNICIPAL CONSULTING

#### INTRODUCTION

This Traffic Impact Assessment is being submitted in connection with the preliminary and final site plan and minor subdivision application submitted to The Harding Township Planning Board for an age-restricted, independent and continuing care residential development to be located along Mount Kemble Avenue (Figure 1 in the Technical Appendix).

The proposed development includes a Senior Living Facility consisting of 210 units that will include a mix of independent living units, assisted living units, and memory care units. In addition, 28 age restricted townhouse units are also proposed divided among 11 buildings, with 12 age-restricted apartment units within 3 buildings. Site access is proposed via one full-movement driveway located along Mount Kemble Avenue.

Dolan & Dean Consulting Engineers, LLC (D&D) has been commissioned by the applicant to prepare this Traffic Impact Assessment to evaluate the impacts of new site traffic on Mount Kemble Avenue and its intersection with Tempe Wick Road/Glen Alpin Road. Based on this analysis, the unique characteristics of the proposed development will ensure that the site traffic will not be of such a volume to negatively affect overall traffic operations.

Finally, the site suitability for the proposed development has been reviewed based on a traffic engineering and safety evaluation. Accordingly, this analysis includes the following information:

- A review of the existing roadway and current traffic conditions in the site vicinity, including roadway configuration, on-street traffic volumes and operations, roadway capacities, and adjacent land uses;
- > Estimation of the new traffic volume expected to be generated by proposed development;
- Evaluation of the future roadway operations including an impact assessment resulting from the additional traffic generated by the proposed development; and,
- A review of the Site Plan focusing on the access design, interior circulation, and parking adequacy.



#### EXISTING CONDITIONS

As noted, the subject property is located along Mount Kemble Avenue (aka, US Route 202) north of the intersection with Tempe Wick Road/Glen Alpin Road in Harding Township. The site is located adjacent to the grounds of the Glen Alpin Conservatory. Through the development proposal, The Hurstmont property will be subdivided to accommodate the proposed development.

#### EXISTING ROADWAY CONDITIONS

<u>Mount Kemble Avenue</u> is under NJDOT jurisdiction, designated as US Route 202 and has a north/south orientation. Within the general site vicinity, Mount Kemble Avenue provides one travel lane in each direction with a posted speed limit of 45 miles per hour. The roadway runs parallel to Interstate 287, which is accessible by way of Maple Avenue, located 1.8 miles south of the site. There is a traffic signal immediately south of the site at Mount Kemble Avenue and Tempe Wick Road/Glen Alpin Road.

<u>Tempe Wick Road/Glen Alpin Road</u> has an east/west orientation within the general site vicinity and is designated as Morris County Route 646. The roadway provides one travel lane in each direction, with a posted speed limit of 40 miles per hour.

The Mount Kemble Avenue intersection with Tempe Wick Road/Glen Alpin Road is a signalized, 4-leg intersection. The northbound, southbound and westbound approaches to the intersections provide one shared lane for left/thru/right movements, while the westbound Glen Alpin Road approach provides a shared through/left lane, and a right turn only lane.

Adjacent property to the intersection has recently been acquired by Morris County to facilitate widening of the northbound and eastbound lanes for an eastbound right turn only, and northbound left turn only lane additions. Due to chronic, existing operational constraints at the intersection, the widening will provide significant operational improvements, particularly during peak traffic hours and safety enhancements with dedicated turning lanes.



#### EXISTING TRAFFIC VOLUMES

To examine the existing traffic conditions in the site vicinity that could be impacted by new site traffic, manual turning movement counts were conducted during weekday morning and evening periods when area traffic is typically at peak levels. Because of the function that Mount Kemble Avenue serves during peak commuting hours, traffic volumes are typically heaviest and serve as a time of focus for this analysis. To address the traffic conditions during peak traffic periods, vehicular traffic counts were conducted on Wednesday March 8, 2023 from 7:00 a.m. to 9:00 a.m. and from 3:00 p.m. to 6:00 p.m.

The traffic counts show a one-hour interval during each time period when overall street traffic in the area reaches its highest levels. Figure 2 in the Technical Appendix illustrates the existing peak hour traffic volumes on the subject roadway network. For reference, the morning peak hour occurred from 7:45 a.m. to 8:45 a.m., and from 4:15 p.m. to 5:15 p.m. in the evening.

#### EXISTING TRAFFIC CONDITIONS

While traffic volumes provide a measure of activity on the area roadway system, it is also important to evaluate how well that system can accommodate those volumes – i.e., a comparison of peak hour traffic volumes with available roadway capacity. By definition capacity represents the maximum number of vehicles that can be accommodated given the constraints of roadway geometry, environment, traffic characteristics, and controls.

Intersections are usually the critical point in any road network since it is at such points that conflicts exist between through, crossing, and turning traffic. It is at these locations where congestion is most likely to occur. A description of intersection Levels of Service is noted on the following page:



Level of Service	Signalized Delay per Vehicle (seconds)	Unsignalized Delay per Vehicle
		(seconds)
A	< 10.0	<0-10
В	>10 and <20	>10 to <15
С	>20 and < 35	>15 to <25
D	>35 and < 55	> 25 to <35
E	>55 and < 80	> 35 to <50
F	> 80	>50

#### INTERSECTION LEVELS OF SERVICE AND DELAY

A volume/capacity analysis was conducted using Highway Capacity Software for the study intersections during the morning and evening peak hours. The existing traffic conditions and operations were evaluated at the subject intersection. Appended Figure 3 depicts the existing Level of Service results.

All movements at the signalized intersection are calculated to operate at Level of Service "D" or better during the morning peak hour, and Level of Service "C" or better during the evening peak hour. However, from prior analyses and observations made via "drone" during peak hours, eastbound backups on Tempe Wick Road are frequent, often requiring multiple signal cycles to clear. Because the traffic was counted only at the intersection and not indicative of additional "unmet" demand, the current conditions of certain approaches at peak hour can be characterized as Level Service F. These are the conditions the County/DOT project are intended to remedy with the additional lane widening.



#### TRAFFIC CHARACTERISTICS OF THE PROPOSED DEVELOPMENT

#### PROJECTED TRIP GENERATION

The potential traffic generation from any use is directly related to the type, size, and characteristic of the use itself. The specific location of a particular use may also affect trip generation such as volumes of passing street traffic and competing uses. Lacking specific site operational data, trip generation projections are customarily made using estimates as compiled by the Institute of Transportation Engineers (ITE) in the <u>Trip Generation Manual</u>, 11<sup>th</sup> Edition, 2019 for uses that closely resemble the anticipated operation.

In the current edition of the <u>Trip Generation Manual</u>, there is a land use category that relates to the proposed overall site use. Land Use 255 – "Continuing Care Retirement Facility" is defined as the following:

"a land use that provides multiple elements of senior adult living. A CCRC enables a resident to transition in place from independent living to increased care as the medical needs of the resident change. Housing options may include various combinations of senior adult housing (both single-family and multifamily), congregate care, assisted living, and nursing home."

Alternatively, trip generation for each individual site component could be calculated separately using the following Land Use Codes: 252 - Senior Adult Housing (Multifamily), 254 – Assisted Living, and 251 – Senior Adult Housing (Single Family).

Table I summarizes the projected trip generation for the subject development forecasted using both methodologies.



Land Use	Size	Morning Peak Hour		Evening Peak Hour			
Land Ose	SIZE	Enter	Exit	Total	Enter	Exit	Total
Continuing Care Retirement Facility	250 Units	35	19	54	34	54	88
Assisted Living	81 Units	9	б	15	8	12	20
Senior Adult Housing (Single Family)	28 Units	5	10	15	11	7	18
Senior Adult Housing (Multifamily)	141 Units	10	18	28	20	15	35
Total		24	34	58	39	34	73

Table I Estimated Trip Generation

As shown, the CCRC land use produces slightly lower volumes during the morning peak hour, and higher volumes during the evening peak hour, when compared to the sum of the individual land use components. For a conservative traffic analysis, the individual component trip generation was used for the morning peak hour, and the CCRC facility trip generation was used for the evening peak hour.

#### DISTRIBUTION OF SITE GENERATED TRAFFIC

For the new traffic expected the proximity to nearby retail/downtown areas and major roadways will largely influence the orientation of future site traffic. As most residents will not be commuting but would typically travel at peak hours to nearby retail, dining, recreational or medical facilities, the traffic patterns will be influenced by accessibility to the local highway system. As such it is expected that the proposed site traffic will adhere to the following traffic distribution along Mount Kemble Avenue and Tempe Wick Road:

- 35% to/from the north via Mount Kemble Avenue
- 35% to/from the south via Mount Kemble Avenue
- 20% originates from the west via Tempe Wick Road
- 10% to/from the East via Glen Alpin Road

The site generated traffic volumes are shown on appended Figure 4.



## FUTURE TRAFFIC CONDITIONS

#### FUTURE "BUILD" TRAFFIC VOLUMES

It is recognized that traffic routinely fluctuates along various state and county roadways, as well as local streets, and varies not only day-to-day, but also on a monthly and yearly basis. As a result of both normal "background" traffic increases, (attributed to continued regional growth and changes in driver demographics), as well as new traffic generated by specific projects, traffic demands on the roadways in the vicinity of the site may increase over current demands (at least to some degree), even if no changes were to occur on the subject property, irrespective of the uses permitted.

Regional traffic growth patterns as compiled by the New Jersey Department of Transportation (NJDOT) were examined for this analysis. Based on NJDOT growth patterns for Morris County, traffic volumes are conservatively projected to annually increase by 1.5% during peak traffic hours. In addition to background growth, traffic from the approved, but not yet constructed S/K Mt. Kemble Associates, LLC Residential Development on Block 23.02, Lot 5, and Block 6101, Lot 4 of Harding/Morris Townships, was included to develop the future "nobuild" traffic volumes shown on Figure 5.

While a traffic growth rate was used in this analysis, from data collected in 2019 when the project was first under consideration, there has been an actual decrease in peak hour traffic of approximately 13.5% and 11.5% during the morning and evening peak hours, respectively. Potentially attributed to the long-term effects of the COVID pandemic with more "remote" workplace options, increased use of "e-commerce" and changes in population demographics with increased retirement, the use of an assumed traffic growth factor results in an inherently conservative traffic analysis.

To then gauge the cumulative effects of the additional traffic generated by the proposal, it is necessary to develop composite future traffic volumes that include new site activity. The future



"build" traffic volumes were calculated by adding the estimated development trip generation to the "no-build" volumes. The total future peak hour traffic volumes are depicted on Figure 6. FUTURE "BUILD" TRAFFIC ANALYSIS

An analysis of future driveway operations was completed with the new traffic added by the proposed development. Based on this analysis, movements entering and exiting the site onto Mt Kemble Road will operate at <u>favorable Level of Service "B" or better</u> during both peak hours.

Movements at the Mount Kemble Avenue intersection with Tempe Wick Road/Glen Alpin Road were analyzed for both the interim condition based on existing intersection geometry, as well as an improved condition that includes the County's pending mitigation. As shown on the appended worksheets, site traffic will have a minimal impact on intersection operating conditions, where overall intersection delay is expected to increase by only 1.1 and 2.1 seconds for the morning and evening build conditions based on the existing intersection geometry, respectively. The site traffic will have an insignificant effect on operating conditions and will not measurably change the current operations at the intersection.

With the implementation of the County improvements, all movements are projected to operate at Level of Service "D" or better during the morning peak hour, and Level of Service "C" or better during the evening peak hour.

As a result, it is concluded that the proposed development of the subject site will not have a measurable or significant impact on adjacent street traffic or operations at the off-tract intersection of Glen Alpin/Tempe Wick Road and Mt Kemble Road.



#### SITE ACCESS, CIRCULATION & PARKING

A traffic engineering review has been made of the Site Plans prepared by Gladstone Design with particular attention focused on the site circulation scheme and overall site access. The following items address on-site design characteristics:

- Site access will be provided via one full-movement driveway along Mount Kemble Avenue. A maintenance driveway will be provided south of the primary access, servicing a sewer treatment building. A highway access permit will be required from NJDOT. From the initial review, all geometric dimensions of the access and location meet the criteria of the State High way Access Management Code.
- Parking will be provided via 9 feet wide by 18 feet deep parking spaces served by minimum width 22-foot interior two-way access aisles. With this design, complete two-way flow will be provided throughout the parking fields and will afford convenient circulation through the sites for all vehicle types.
- The proposal requires 265 parking spaces for the overall facility at a rate of one-half space per memory care or assisted living unit, one space per independent living unit, 2.4 spaces per 4-bedroom townhouse, and 2.3 spaces per 2-bedroom townhouse. The site plan provides 54 surface parking spaces, 151 underbuilding spaces, and 120 driveway/garage combo spaces, for a total supply of 325 parking spaces. The proposed supply leaves a surplus of approximately 22% more than the required parking.



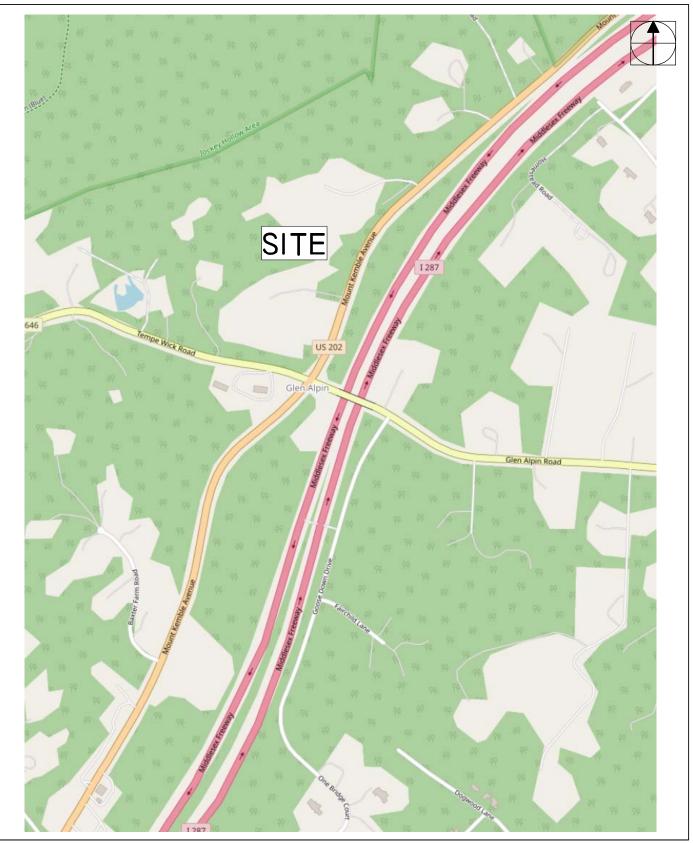
#### CONCLUSIONS

In summary, this analysis of projected future traffic conditions has confirmed that the proposed development for a senior living community would not generate significant new traffic increases that would result in deficient operating conditions in the adjacent roadway network.

The site layout will also provide safe and efficient access and circulation for the types of vehicles anticipated to frequent the site. Based on these findings, it is concluded that the site is particularly well suited for the proposed development.



TECHNICAL APPENDIX

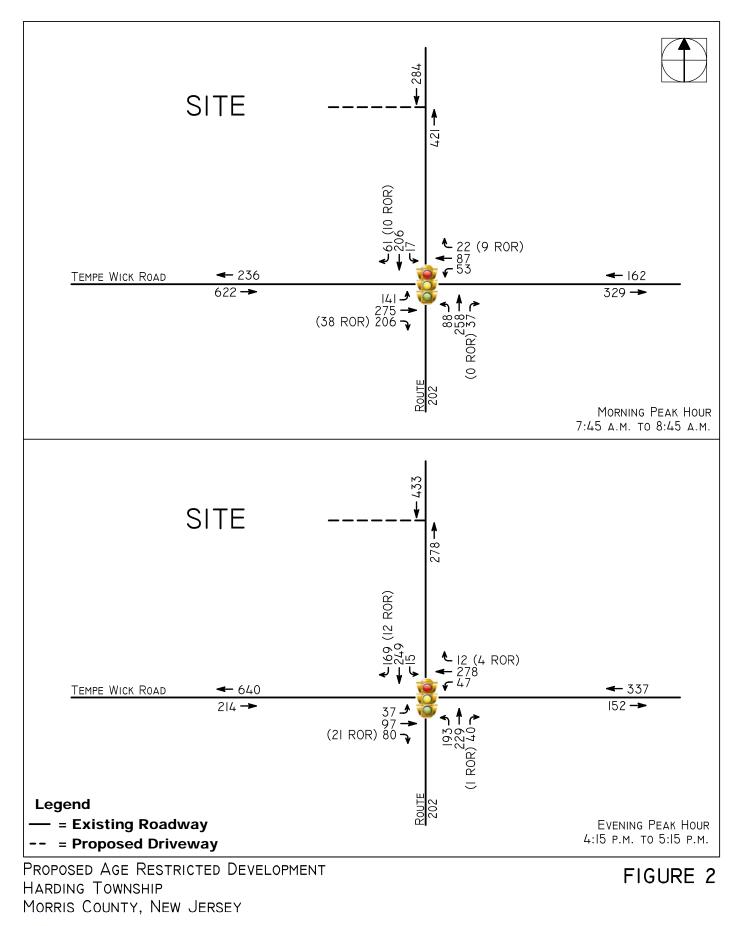


PROPOSED AGE RESTRICTED DEVELOPMENT HARDING TOWNSHIP MORRIS COUNTY, NEW JERSEY



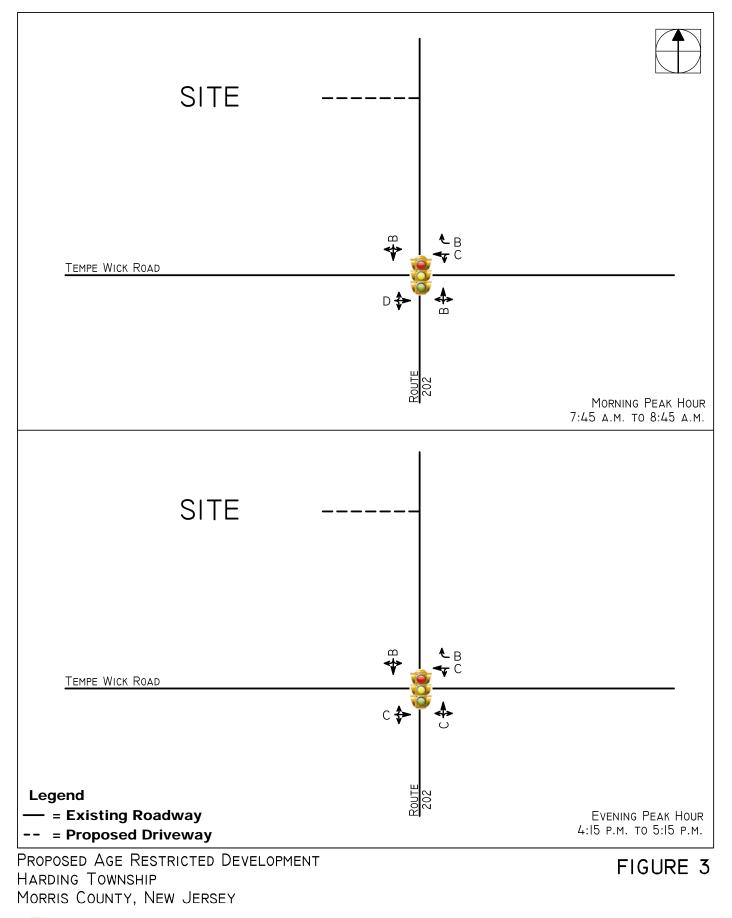
FIGURE I

SITE LOCATION MAP



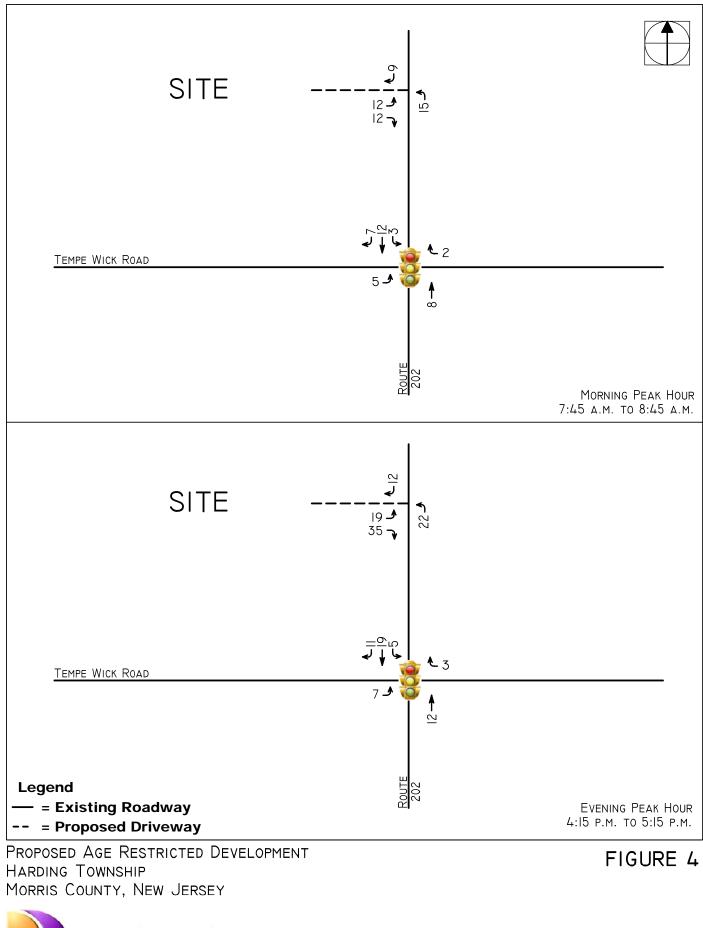


EXISTING TRAFFIC VOLUMES



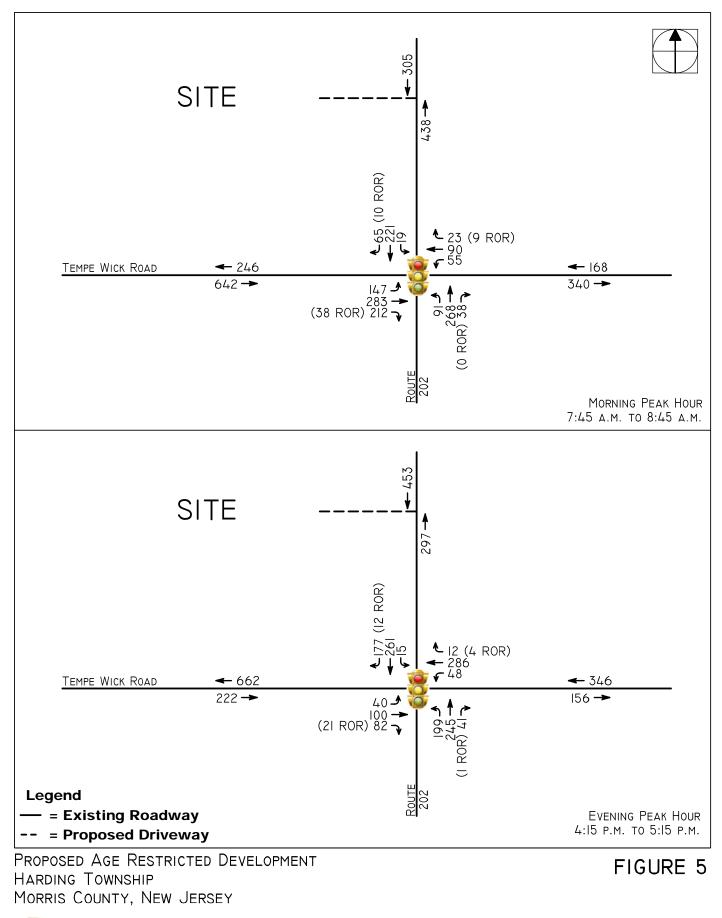


## EXISTING LEVELS OF SERVICE



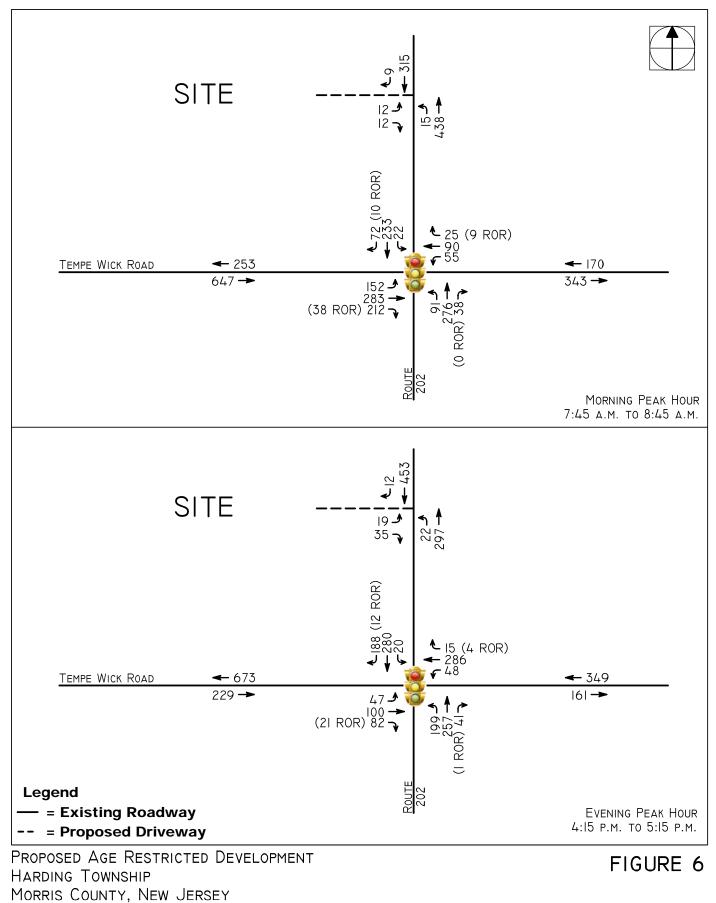
CONSULTING ENGINEERS, LLC SITE

SITE GENERATED TRAFFIC VOLUMES



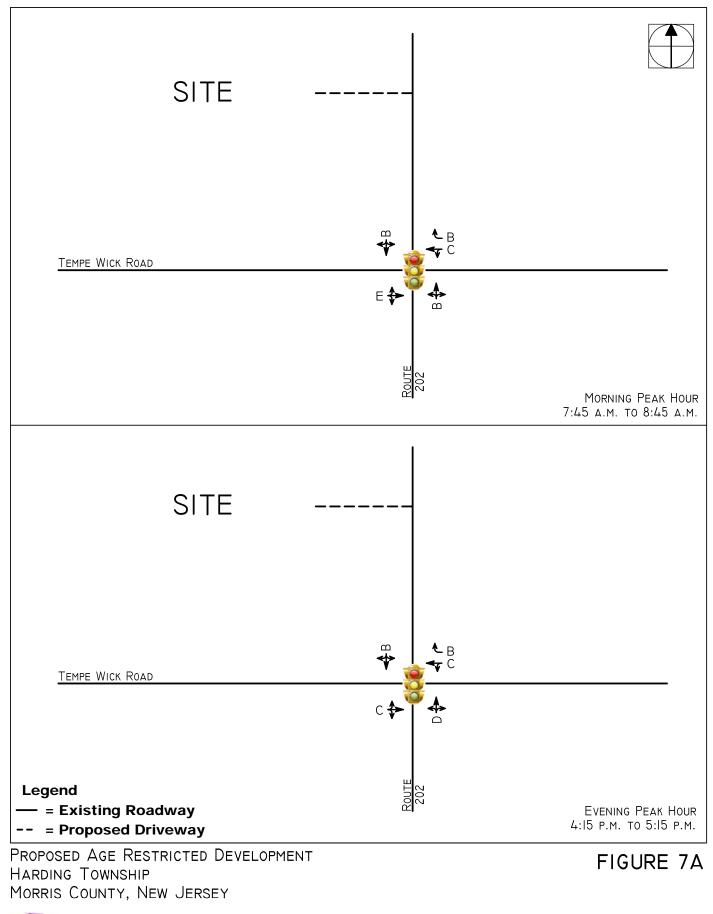


## NO BUILD TRAFFIC VOLUMES



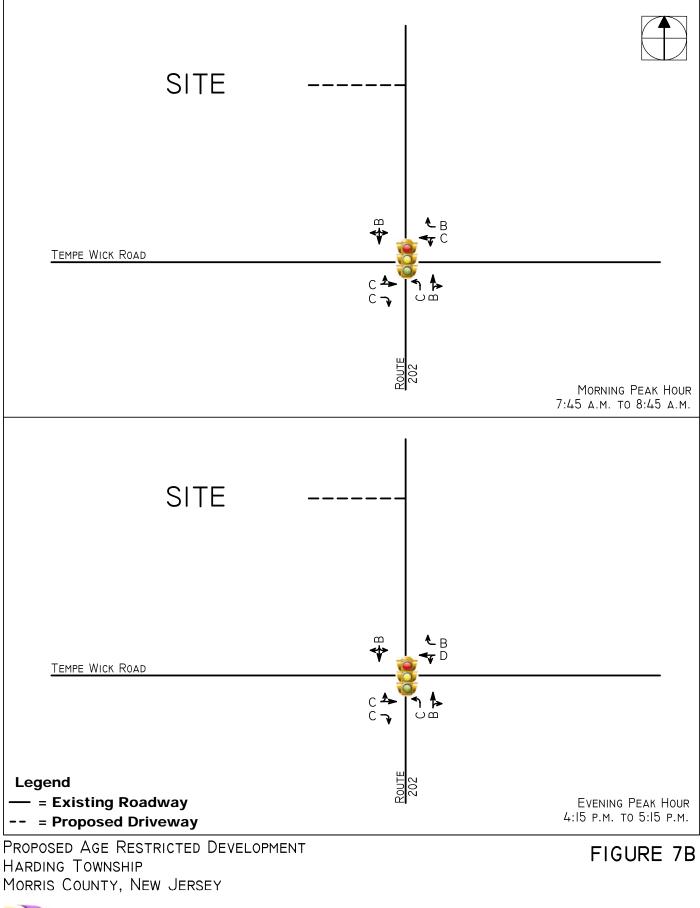
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BUILD TRAFFIC VOLUMES



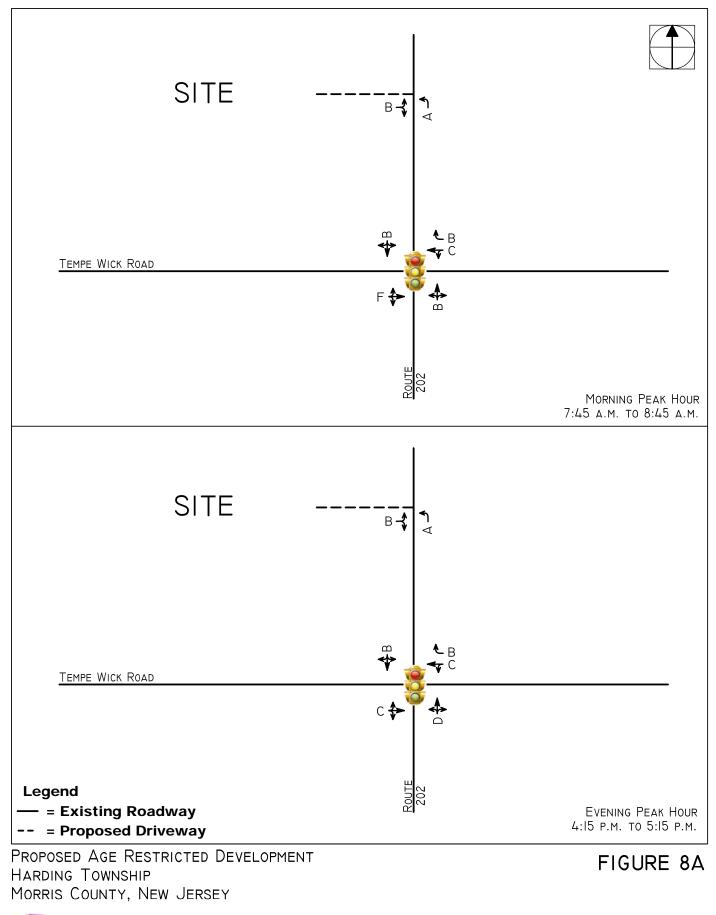


### NO BUILD LEVELS OF SERVICE



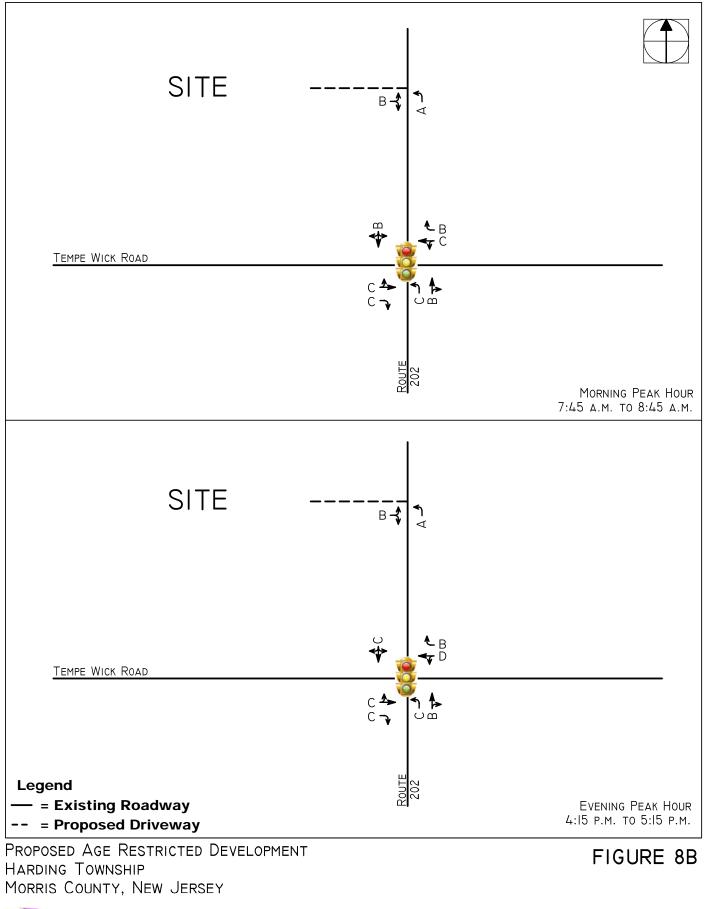
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### NO BUILD LEVELS OF SERVICE WITH MITIGATION





## BUILD LEVELS OF SERVICE





## BUILD LEVELS OF SERVICE WITH MITIGATION

# **Continuing Care Retirement Community**

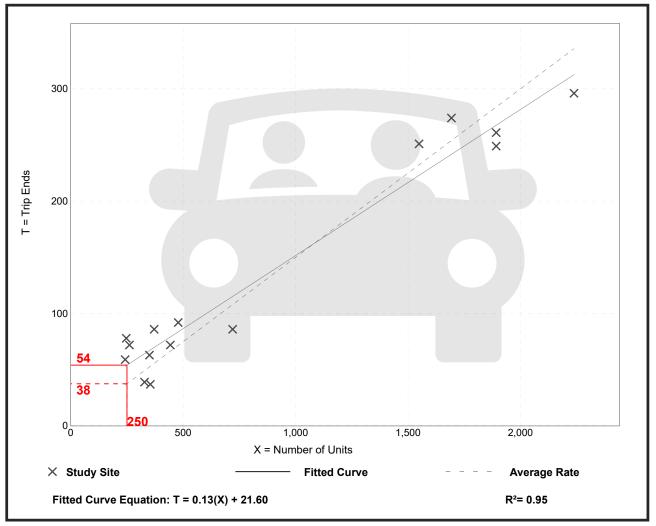
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Setting/Location: General Urban/Suburban Number of Studies: 15 Avg. Num. of Units: 871	Vehicle Trip Ends vs: On a:	Units Weekday, Peak Hour of Adjacent Street Traffic, One Hour Between 7 and 9 a.m.
Avg. Num. of Units: 871	Setting/Location:	General Urban/Suburban
	Number of Studies:	15
Directional Distributions CE0( antoning 2E0( aviting	Avg. Num. of Units:	871
Directional Distribution: 65% entering, 35% exiting	Directional Distribution:	65% entering, 35% exiting

#### Vehicle Trip Generation per Unit

Average Rate	Range of Rates	Standard Deviation
0.15	0.10 - 0.32	0.04

#### **Data Plot and Equation**



• Institute of Transportation Engineers

# **Continuing Care Retirement Community**

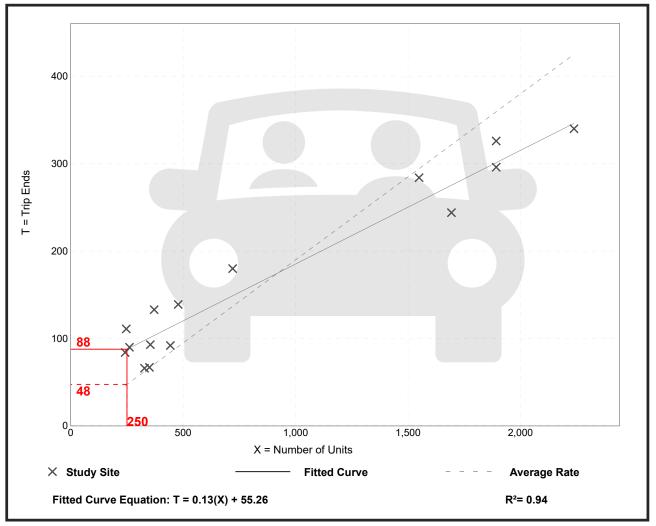
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	One Hour Between 4 and 6 p.m.
Setting/Location: G	General Urban/Suburban
Number of Studies: 1	15
Avg. Num. of Units: 8	871
Directional Distribution: 3	39% entering, 61% exiting

#### Vehicle Trip Generation per Unit

Average Rate	Range of Rates	Standard Deviation
0.19	0.14 - 0.45	0.07

#### **Data Plot and Equation**



• Institute of Transportation Engineers

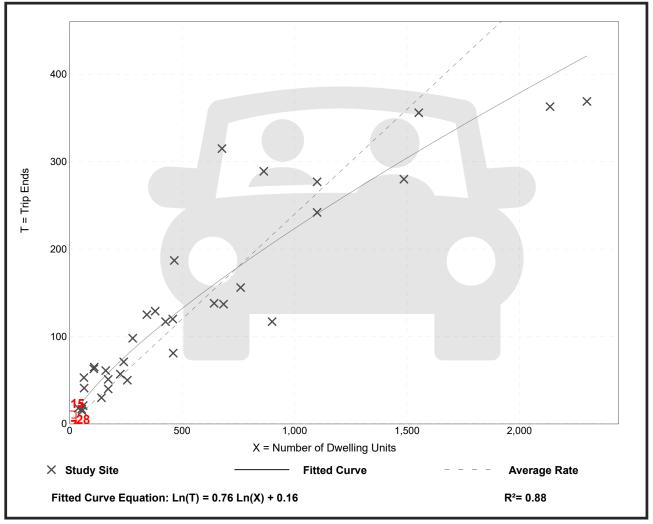
# Senior Adult Housing - Single-Family (251)

Vehicle Trip Ends vs: On a:	Dwelling Units Weekday, Peak Hour of Adjacent Street Traffic, One Hour Between 7 and 9 a.m.
Setting/Location:	General Urban/Suburban
Number of Studies:	34
Avg. Num. of Dwelling Units:	557
Directional Distribution:	33% entering, 67% exiting

#### Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.24	0.13 - 0.84	0.10

#### **Data Plot and Equation**



• Institute of Transportation Engineers

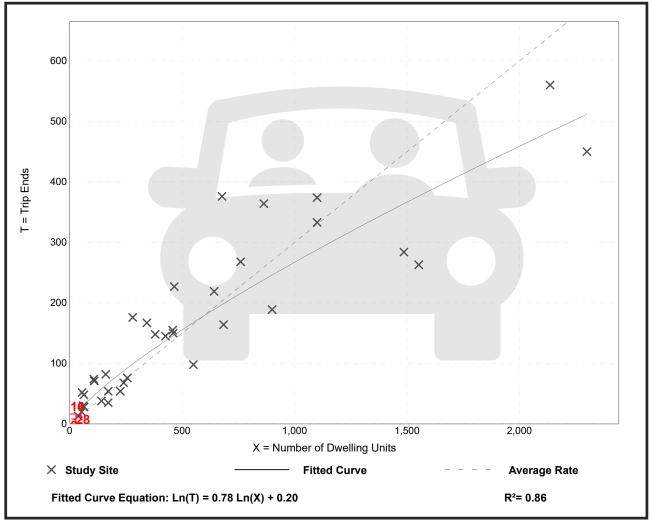
# Senior Adult Housing - Single-Family (251)

Vehicle Trip Ends vs: On a:	Dwelling Units Weekday, Peak Hour of Adjacent Street Traffic, One Hour Between 4 and 6 p.m.
Setting/Location:	General Urban/Suburban
Number of Studies:	35
Avg. Num. of Dwelling Units:	556
Directional Distribution:	61% entering, 39% exiting

#### Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.30	0.17 - 0.95	0.12

#### **Data Plot and Equation**



• Institute of Transportation Engineers

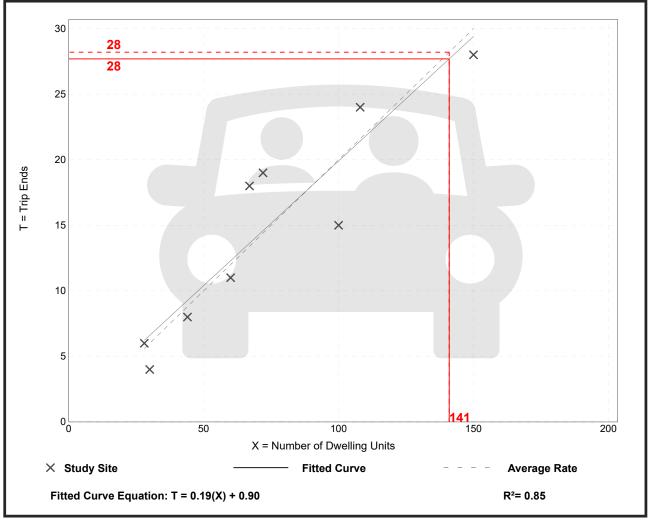
# Senior Adult Housing - Multifamily (252)

Vehicle Trip Ends vs: On a:	Dwelling Units Weekday, Peak Hour of Adjacent Street Traffic, One Hour Between 7 and 9 a.m.
Setting/Location:	General Urban/Suburban
Number of Studies:	9
Avg. Num. of Dwelling Units:	73
Directional Distribution:	34% entering, 66% exiting

#### Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.20	0.13 - 0.27	0.04

#### **Data Plot and Equation**



• Institute of Transportation Engineers

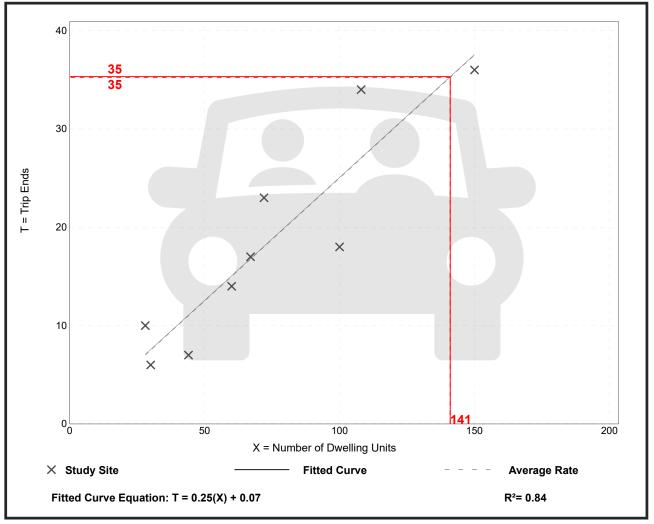
# Senior Adult Housing - Multifamily (252)

Vehicle Trip Ends vs: On a:	Dwelling Units Weekday, Peak Hour of Adjacent Street Traffic, One Hour Between 4 and 6 p.m.
Setting/Location:	General Urban/Suburban
Number of Studies:	9
Avg. Num. of Dwelling Units:	73
Directional Distribution:	56% entering, 44% exiting

#### Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.25	0.16 - 0.36	0.06

#### **Data Plot and Equation**



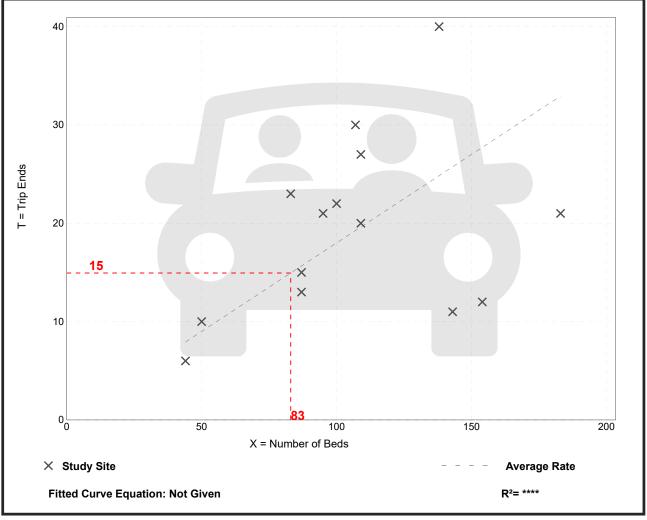
• Institute of Transportation Engineers

	<b>ed Living</b> 54)
Vehicle Trip Ends vs:	Beds
On a:	Weekday,
	Peak Hour of Adjacent Street Traffic,
	One Hour Between 7 and 9 a.m.
Setting/Location:	General Urban/Suburban
Number of Studies:	14
Avg. Num. of Beds:	106
Directional Distribution:	60% entering, 40% exiting

#### Vehicle Trip Generation per Bed

Average Rate	Range of Rates	Standard Deviation
0.18	0.08 - 0.29	0.08

### **Data Plot and Equation**



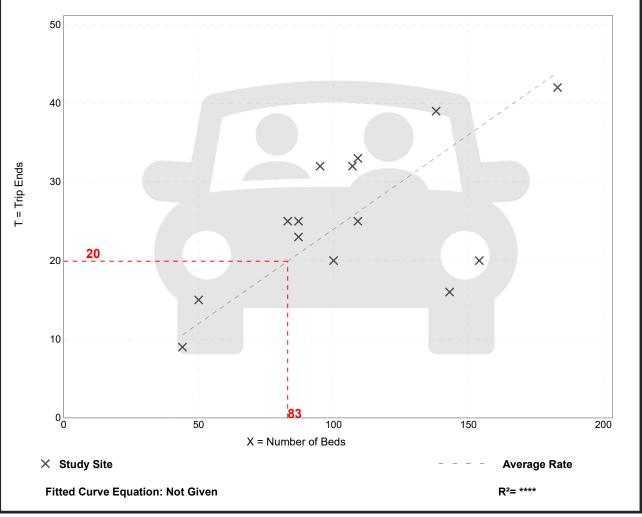
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	<b>ed Living</b> 54)
Vehicle Trip Ends vs:	Beds
On a:	Weekday,
	Peak Hour of Adjacent Street Traffic,
	One Hour Between 4 and 6 p.m.
Setting/Location:	General Urban/Suburban
Number of Studies:	14
Avg. Num. of Beds:	106
Directional Distribution:	39% entering, 61% exiting

#### Vehicle Trip Generation per Bed

Average Rate	Range of Rates	Standard Deviation
0.24	0.11 - 0.34	0.07

### Data Plot and Equation



• Institute of Transportation Engineers

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Volume-to-Capacity R	atio (X)			0.953			0.370			0.498			0.325			
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Incremental Delay ( <i>d i</i> ), s				23.6			0.2	0.0		2.1			0.9			
Initial Queue Delay ( a				0.0			0.2	0.0		0.0			0.0	<u> </u>		
Control Delay ( d ), s/v	,			54.8			21.6	19.4		18.6			15.9			
Level of Service (LOS				D			C	B		B			B			
			54.8		D	21.4		C	18.6		B	15.9		В		
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Agency									Duration, h 0.250					*	
Analyst									Area Type Other				 		N. 2
Jurisdiction				Time F		0/1/20	13		PHF		0.94		_→ +>+>	w‡e	×
Urban Street						r 2019			Analysis	Doriod	1> 7:0	0			•
Intersection Route 202 & Tempe Wick				File Na		Pm Ex			Analysis	renou	1-7.0				
Project Descriptio		Pm Existing	F VVICK				K.XUS						- 4	** ****	te (*
Project Descriptio															
Demand Informa	ation				EB			WE	3		NB			SB	
Approach Movement				L	Т	R	L	Т	R	L	Т	R	L	Т	R
Demand ( v ), veh	n/h			37	97	80	47	278	8 12	193	229	40	15	249	169
	<u></u>					- F	_			_					
Signal Informatio	1	Deference Dhees	-									sta l		~	
	00.0	Reference Phase	2		<u>5</u> †	۳R ٹ						1	2	3	
Offset, s	0	Reference Point	End	Green		38.0	0.0	0.0		0.0					5
	No	Simult. Gap E/W	On	Yellow		3.0	0.0	0.0		0.0	_		X I		V
Force Mode F	Fixed	Simult. Gap N/S	On	Red	2.0	2.0	0.0	0.0	0.0	0.0		5	6	7	8
Timer Results	_		_	EBL		EBT	WB	1	WBT	NBI		NBT	SBI		SBT
Assigned Phase						4			8			2			6
Case Number						8.0			7.0			8.0			8.0
Phase Duration, s	 S					43.0			43.0			57.0			57.0
Change Period, (		) s				5.0			5.0			7.0			7.0
Max Allow Headway ( <i>MAH</i> ), s						3.2			3.2			0.0			0.0
Queue Clearance		·			+	10.4		16.6							
Green Extension <sup>-</sup>	Time (	(ge), s				1.1			1.1			0.0			0.0
Phase Call Proba	ability					1.00			1.00						
Max Out Probabili	lity					0.00			0.00						
Manager 4 Orean		- 14 -			50								_	00	
Movement Group	•	uits			EB T	R	L	WB T	R	1	NB T	R		SB T	R
Assigned Moveme				L 7	4	14	3	8	18	L 5	2	12	L 1	6	16
		) yeh/h			4 205	14	3	346		5	490	12		448	10
Adjusted Flow Ra		·	n				<u> </u>	-						-	
		w Rate ( s ), veh/h/li	n		1585			1759			1188			1755	
Queue Service Tir Cycle Queue Clea		·			0.0 8.4			4.1 14.6	0.4		20.4 37.5			0.0 17.2	
Green Ratio ( g/C		e filme ( <i>g</i> c), s			0.4 0.38			0.38			0.50			0.50	
Capacity ( c ), veh	,				645			710			645			915	
Volume-to-Capaci		tio (X)			0.318	:		0.487			0.760			0.490	
	-	In (85 th percentile)			135			220.1			364.9			246.4	
		h/ln ( 85 th percenti			5.2			8.6	0.2		14.4			9.7	<u> </u>
		RQ) (85 th percent	,		0.00			0.00			0.00			0.00	
Uniform Delay ( d		,, ,	,		21.8			23.7			23.0			16.8	
Incremental Delay	,				0.1			0.2	0.0		8.2			1.9	
Initial Queue Dela	ay ( <i>d</i> 3	), s/veh			0.0			0.0	0.0		0.0			0.0	
Control Delay ( <i>d</i> ), s/veh					21.9			23.8	19.4		31.2			18.7	
Control Delay ( d	Level of Service (LOS)				С			С	В		С			В	
	Approach Delay, s/veh / LOS			21.9		С	23.7	7	С	31.2			18.7	7	В
Level of Service (I	· ,	LOS		21.9	21.9 0 23.7					0 01.					
Level of Service (I	s/veh /			21.9			1.4						0		
Level of Service (I Approach Delay, s Intersection Delay	s/veh / y, s/vel			21.9			1.4						C		
Level of Service (I Approach Delay, s Intersection Delay Multimodal Resu	s/veh / y, s/vel ults	h / LOS		21.9	EB		1.4	WB			NB		C	SB	
Level of Service (I Approach Delay, s Intersection Delay	s/veh / y, s/vel u <b>lts</b> Score /	h / LOS / LOS		21.9			1.4	WB			NB				

		HCS	7 Sig	nalize	d In	terse	cti	ion R	lesu	lts Sur	nmar	у					
General Inform	nation								Intersect		╎┥┵┿┾	te la					
Agency	nation	1							Duration,		*						
											0.250 Other						
Analyst				Analysis Date 5/7/2019 Time Period						Area Typ	e			→ 	w↓e	~	
Jurisdiction							<u> </u>			PHF	Daniad	0.92	20			T	
Urban Street		Deute 000 8 Terrer				ar 2019				Analysis	Period	1> 7:(	00				
Intersection	4:	Route 202 & Tempe	e vvick	File Na	ame	Am I	ND.	.xus						-	<b>†</b>	1- 1	
Project Descrip	otion	Am NoBuild													<u>141</u> 497	r	
Demand Infor	mation				EE	3			W	3		NB			SB		
Approach Movement				L	Т	R		L	Т	R	L	Т	R	L	Т	R	
Demand ( v ), v	/eh/h			147	283	3 21	2	55	90	) 23	91	268	38	19	221	65	
				l)							-						
Signal Informa	1/		-	144		Ł							<b>r†</b>				
Cycle, s	100.0	Reference Phase	2		<u>*</u>	rR.	E						1		3	<b>-</b> € ,	
Offset, s	0	Reference Point	End	Green			)	0.0	0.0	0.0	0.0					<u> </u>	
Uncoordinated	No	Simult. Gap E/W	On	Yellow	5.0	3.0		0.0	0.0		0.0					Z	
Force Mode	Fixed	Simult. Gap N/S	On	Red	2.0	2.0		0.0	0.0	0.0	0.0		5	6	7	5	
Timer Results				EBL		EBT	T	WBI		WBT	NB	1	NBT	SB		SBT	
Assigned Phas	e				-	4	t		-	8		_	2		_	6	
Case Number	-					8.0	╉			7.0			8.0			8.0	
Phase Duration					-	43.0	t		-	43.0			57.0			57.0	
						5.0	╈		+	5.0			7.0			7.0	
Change Period, ( Y+R c ), s Max Allow Headway ( MAH ), s					-	3.3	t		-	3.3						0.0	
Queue Clearan	<b>2</b> 1	·				40.0	1		-	11.4							
Green Extensio	on Time	(ge), s				0.0	Т		2.0				0.0			0.0	
Phase Call Pro	bability					1.00	T			1.00							
Max Out Proba	bility					1.00	Ι			0.00							
Movement Gro		aulte			EB		7		WB			NB			SB		
Approach Move	-	Suits			T	R	÷	L	T	R	L	T	R	L	T	R	
Assigned Move				7	4	14	╉	3	8	18	5	2	12	1	6	16	
Adjusted Flow		) veh/h			657		÷	-	158	15		432	12	<u> </u>	321		
-		ow Rate ( <i>s</i> ), veh/h/l	n		1626	_	╈		954	1434		1577		<u> </u>	1751		
Queue Service					28.6	_	÷		0.0	0.7		7.0			0.0		
Cycle Queue C		- ,			38.0	_	╉		9.4	0.7		17.8			10.9		
Green Ratio ( g		e fille ( <i>g c</i> ), s			0.38		÷		0.38			0.50			0.50		
Capacity ( c ), v	. ,				663		╉		412			833			914		
Volume-to-Cap		utio (X)			0.99		╉		0.382		-	0.518			0.351	<u> </u>	
· ·		/In ( 85 th percentile)			667.	_	╉		110.2	_		247			170.8	_	
		eh/ln ( 85 th percenti			26.3	_	÷		4.2	0.4		9.5			6.7		
	. ,	RQ) (85 th percent			0.00		╉		4.Z			0.00			0.00		
Uniform Delay		,, ,			32.0		÷		21.5			16.7			15.2		
Incremental De	· /				32.0		╉		0.2	0.0		2.3			1.1		
Initial Queue D	• •				0.0		╉		0.2	0.0		0.0			0.0		
Control Delay (	• •	,			64.5		╉		21.7			19.0			16.3		
Level of Service					04.0 E	,	÷		21.7 C	B				<u> </u>	B		
Approach Dela	· /			64.5		E	╉	21.5		C	19.0		B		<u> </u>	B	
				04.5	,		37.		,	U	19.0		В	16.3	5	<u>ں</u>	
Intersection De	iay, s/ve	, 17 LUS 					37.	.0						D			
Multimodal Re	sults				EB				WB			NB			SB		
Pedestrian LOS		/LOS					T										
Bicycle LOS So							1										
													_				

		HCS	7 Sig	nalize	d Int	ersec	tion R	Resu	lts Sur	nmar	У				_
General Inform	action								Intersec	tion Inf	ormatic		1 1	╵╺╡╷╱╡╺┝	ել
	ation									- 1	*				
Agency				Analyz	in Dat	- E/Z/00	10		Duration		0.250				N.
Analyst				Analys		e 5/7/20	19		Area Typ	e	Other		→	w Î ∈	~_
Jurisdiction				Time F		. 0010			PHF	Deviad	0.92	20		8	* <b>*</b>
Urban Street						r 2019			Analysis	Period	1> 7:(	00			
Intersection		Route 202 & Tempe		File Na	ame	Am N	o - With	Mit.xu	IS				_ Ц	<u>ነ ት</u>	
Project Descrip	tion	Am NoBuild - With	Mitigatio	on										14141	1 1
Demand Inform	nation				EB			W	3		NB			SB	
Approach Movement				L	Т	R	L	Т	R	L	Т	R	L	Т	R
Demand ( v ), v	/eh/h			147	283	212	55	90	) 23	91	268	38	19	221	65
								<u> </u>							
Signal Informa	Ir	1	r			3	1						-+-		_
Cycle, s	100.0	Reference Phase	2			²₩ °	~					1	$\mathbf{Y}_{2}$	3	-€.
Offset, s	0	Reference Point	End	Green		38.0	0.0	0.0	0.0	0.0					K
Uncoordinated	No	Simult. Gap E/W	On	Yellow	5.0	3.0	0.0	0.0	0.0	0.0					7
Force Mode	Fixed	Simult. Gap N/S	On	Red	2.0	2.0	0.0	0.0	0.0	0.0	_	5	6	7	8
Timer Results			_	EBL		EBT	WB	1	WBT	NBI		NBT	SB		SBT
Assigned Phase						4		-	8		_	2		_	6
Case Number						7.0			7.0			6.0			8.0
Phase Duration, s						43.0			43.0			57.0			57.0
Change Period, $(Y+Rc)$ , s				<u> </u>		5.0			5.0			7.0		7	
Max Allow Headway ( <i>MAH</i> ), s						3.2			3.2			0.0		0.0	
Queue Clearance Time ( $g_s$ ), s						27.2			9.9			0.0			0.0
Green Extensio		, _ ,				1.5			1.8		0.0				0.0
Phase Call Pro		(3-),-				1.00		1.00							
Max Out Proba	-					0.05			0.00						
-															
Movement Gro	-	sults			EB			WB		<u> </u>	NB		<u> </u>	SB	
Approach Move					Т	R	L	Т	R	L	T	R		T	R
Assigned Move		<u> </u>		7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow I	· ·				467	189		158	15	99	333			321	<u> </u>
•		ow Rate ( <i>s</i> ), veh/h/l	In		1619			1268		1096	1786			1751	<u> </u>
Queue Service		- ,			17.4	8.3		0.0	0.7	6.0	11.4			0.0	<u> </u>
Cycle Queue C		e Time ( <i>g c</i> ), s			25.2	8.3		7.9	0.7	16.9	11.4			10.9	<u> </u>
Green Ratio (g	· ·				0.38	0.38		0.38		0.50	0.50			0.50	<u> </u>
Capacity ( c ), v					664	612		532	545	501	893			914	<u> </u>
Volume-to-Cap	· ·	· · /			0.704	_		0.296		0.198	0.372			0.351	<u> </u>
		(In (85 th percentile)			331.3			108.6		73.2	181.2			171.1	
	. ,	eh/In ( 85 th percenti	,		13.0	4.9		4.1	0.4	2.9	7.0			6.7	<u> </u>
		RQ) (85 th percent	tile)		0.00	0.00		0.00		0.00	0.00			0.00	
Uniform Delay					27.1	21.8		21.3		20.4	15.4			15.2	
Incremental De	2 1	,			2.9	0.1		0.1	0.0	0.9	1.2			1.1	
Initial Queue De	• •	,			0.0	0.0		0.0	0.0	0.0	0.0			0.0	
Control Delay (					29.9	21.9		21.4	_	21.3	16.6			16.3	
Level of Service	. ,				С	С		С	В	С	В			B	
Approach Delay	-			27.6	6	С	21.3	3	С	17.6	6	В	16.3	3	В
Intersection De	lay, s/ve	eh / LOS				21	.9						С		
Multimodal Re	sulte				EB			WB			NB			SB	
Pedestrian LOS		/1.05						VVB			IND			30	
Bicycle LOS Sc															
Dicycle LOS SC	Joie / LC														

		HCS	7 Sig	nalize	d Int	tersec	tion F	kesu	Its Su	nmar	у				
General Inform	nation								Intersec	tion Inf	ormatio	on	×	╡┵┿	te l <u>e</u>
Agency									Duration		0.250			*	
Analyst				Analys	is Dat	e 5/7/20	10		Area Typ		Other		 		K
Jurisdiction				Time F		0,1720	/15		PHF		0.94		- → 	w‡e	×_ 2
Urban Street						r 2019			Analysis	Period	1> 7:0	າດ			* * *
Intersection		Route 202 & Tempe	Wick	File Na		Pm Ex			Analysis	i enou	1-1.	50			
Project Descrip	tion	Pm NoBuild	VICK				k.xus						-	** ****	17 (*
Project Descrip	nion														
Demand Inform	nation				EB			W	В		NB			SB	
Approach Move	ement			L	Т	R	L	Т	R	L	Т	R	L	Т	R
Demand ( v ), v	/eh/h			40	100	82	48	28	6 12	199	245	41	15	261	177
O'mu al lu famu	41			1	1 116				_	-					
Signal Informa	Ir		0	-	<u>1</u> 44		<u> </u>						KT Z		
Cycle, s	100.0	Reference Phase	2		51	۳R '						1		3	➡ ₄
Offset, s	0	Reference Point	End	Green		38.0	0.0	0.0		0.0					5
Uncoordinated	No	Simult. Gap E/W	On	Yellow		3.0	0.0	0.0		0.0					Y
Force Mode	Fixed	Simult. Gap N/S	On	Red	2.0	2.0	0.0	0.0	0.0	0.0		5	6	7	8
Timer Results	_	EBL		EBT	WB	1	WBT	NB		NBT	SBI		SBT		
Assigned Phas			-	4		-	8		-	2		-	6		
Case Number						8.0		+	7.0			8.0			8.0
Case Number Phase Duration, s						43.0			43.0			57.0			57.0
Change Period		c) S				5.0			5.0			7.0		-	7.0
Max Allow Hea					3.2				3.2			0.0			0.0
Queue Clearan	<b>2</b> 1	·				10.8		-	17.1			0.0			
Green Extensio	on Time	(ge),s				1.1			1.1			0.0			0.0
Phase Call Pro	bability					1.00			1.00						
Max Out Proba	bility					0.00			0.00						
	-	И			ED						ND			0.0	
Movement Gro	-	suits			EB T	R	L	WE T	R	1	NB T	R	L	SB T	R
Assigned Move				L 7	4	14	3	8	18	L 5	2	12	1	6	16
Adjusted Flow		)		1	4 214	14	3			5	 515	12		469	10
-		,					<u> </u>	355	_						
		w Rate ( <i>s</i> ), veh/h/l	n		1571		<u> </u>	1758	_		1156			1760	
Queue Service		- /			0.0			4.9			23.8			0.0	
Cycle Queue C Green Ratio ( g		e filme ( <i>g</i> c), s			8.8 0.38		<u> </u>	15.1 0.38			42.1 0.50		<u> </u>	18.3 0.50	
Capacity ( c ), v					640			709			629			917	<u> </u>
Volume-to-Cap		itio (X)			0.334			0.50			0.819		<u> </u>	0.512	
		/In ( 85 th percentile)			140.2			226.	_		410			260.2	
	. ,	eh/In ( 85 th percenti			5.4			8.8	_		16.1			10.2	
		RQ) (85 th percent	,		0.00			0.00			0.00			0.00	
Uniform Delay		, , ,	-,		21.9			23.8			24.6			17.1	<u> </u>
Incremental De	· ,				0.1			0.2			11.4			2.0	
Initial Queue D			0.0			0.0			0.0			0.0			
Control Delay ( <i>d</i> ), s/veh					22.0			24.0	_		36.0			19.1	
Level of Service (LOS)					С			С	В		D			В	
Approach Delay, s/veh / LOS				22.0		С	23.9	9	С	36.0	0	D	19.1	Î	В
Intersection Delay, s/veh / LOS						26	6.2						С		
Multimodal Re					EB			WE	3		NB			SB	
Pedestrian LOS															
Bicycle LOS So	core / LC	DS													
				-			_								

Assigned Phase   4   8   2   1     Case Number   7.0   7.0   7.0   6.0   8     Phase Duration, s   43.0   43.0   57.0   57.0   57.0     Change Period, $(Y+R_c)$ , s   5.0   5.0   5.0   7.0   7.0   7.0     Max Allow Headway (MAH), s   3.1   3.1   0.0   0.0   0.0   0.0     Green Extension Time (g_c), s   1.1   1.1   0.0   0.0   0.0   0.0   0.0   0.0     Max Out Probability   0.00   0.00   0.00   0.00   0.00   1.00			HCS	7 Sig	nalize	ed Int	ersec	tion F	Resul	ts Sur	nmar	у				
Agency   Durable   Control   Durable   Other   Other     Analysis   Imme Period   PHF   0.84   Other   0.94     Urban Street   Roule 202 & Tempe Wick   File Name   Pm Nb - With Mit xus   Phereotech   0.94     Intersection   Pm NoBuild - With Mitigation   Pm Nb - With Mit xus   Phereotech   0.94   1   0.94     Demand Information   EB   EB   WS   NB   NB   SB     Approach Movement   L   T   R   L   T   R   L   T   R   L   T   R   L   T   R   L   T   R   L   T   R   L   T   R   L   T   R   L   T   R   L   T   R   L   T   R   L   T   R   L   T   R   L   T   R   L   T   R   L   T   R   L   T   T   L   T   R   L   T   R   L   T   T   L   T   R	General Inform	nation								ntersec	tion Inf	ormatio			┙┥┵┿╷	با بر
Analysis   Analysis   Date   Avalysis   Other		lation										W.		- 1		
Jurisdiction   Time Pariod   PT   0.4   0.4     Urban Street   Analysis Year   2019   Analysis Period   1>7.0   I     Intersection   Route 202 & Tempe Wick   File Name   Pm Nb - With Mitigation   Nb -					Apoly	nio Doto	5/7/20	10						<u>_</u>		۲. ۲.
Outboals     Individe     Analysis Period     Intersection     Route 202 & Tempe Wick     File Name     Pm Nb - With Mitzus       Project Description     Pm NoBuild - With Mitigaton     Pm Nb - With Mitzus       Project Description     Pm NoBuild - With Mitigaton     L     T     R     L     T	-						; 5/7/20	119						- <u>→</u> _→	, w⊥r	
Intersection     Route 202 & Tempe Wick     File Name     Pm Nb - With Mitxuis     Pm Nb - With Mitxuis       Demand Information     EB     WB     NB     SB       Apprach Movement     L     T     R     L							2010				Dariad		00			* <b>*</b>
Project Description   Pm NoBuil - With Mitigation   KB   NB   SB     Approach Movement   L   T   R   R   L   T   R   L   T   R   L   T   R   L   T			Deute 202 8 Terrer	- \A/ial/	-				1	-	Period	>7:	00			
Demand Information     L     T     R		4:	·			ame	Pm N	d - vvitn	MIIT.XU	s				_ [	ጎ የ	1- 1
Approach Movement   L   T   R	Project Descrip	tion	Pm NoBuild - With I	Mitigatio	on											
Demand (v), veh/h     40     100     82     48     286     12     199     245     41     15     261       Signal Information Cycle, s     100.0     Reference Pnase     2       Offset, s     0     Reference Pnase     2       Offset, s     0     Reference Pnase     2       Velow M     Simult. Gap E/V     On     Red     2.0     0.0     0.0     0.0     0.0       Force Mode     Fixed     Simult. Gap E/V     On     Red     2.0     2.0     0.0	Demand Inform	nation				EB			WE	;		NB			SB	
Signal Information     Cycle, s   100.0   Reference Pnase   2     Green Kad   Reference Pnase   2     Green Kad   N     Green Kad   N     Fixed Simult. Gap I/V   On     Reference Pnase   EBL   Colspan="5">Colspan="5"C	Approach Move	ement			L	Т	R	L	Т	R	L	Т	R	L	Т	R
Cycle, s     100.0     Reference Phase     2     Cree     500     38.0     0.0     0.0     0.0     0.0       Corcent And     No Simult. Gap EW     On     Reference Phoint     End     Simult. Gap EW     On     Reference Phoint     Fixed     Simult. Gap EW     On     Red     2.0     0.0<	Demand ( v ), v	/eh/h			40	100	82	48	286	6 12	199	245	41	15	261	177
						1.11-										
Offset, s   0   Reference Point   End   Time   Second   Sol   0   0.0   0	-	1		1	_	144	a 6	-						-+-		_
Offset     S     U     Reference Point     End     Greem     5.0     3.0     0.0     0.0     0.0     0.0       Uncoordinated     No     Simult Gap EW     On     Reference Note     No     Simult Gap XIS     On     Reference Note     No     0.0				<u> </u>		NT	•₿°						1	$\mathbf{Y}_{2}$	3	4
$ \begin{array}{                                    $	·			End	Green			0.0	0.0	0.0	0.0					ĸ
Timer Results   EBL   EBL   EBL   WBL   NBL   NBL   NBT   SBL   SBL     Assigned Phase   4   8   2   5     Case Number   7.0   7.0   6.0   8     Phase Duration, s   43.0   57.0   50     Change Period, (YHz), s   5.0   5.0   7.0   7.0     Max Allow Headway (MAH), s   3.1   3.1   0.0   0.0     Queue Clearance Time (g_s), s   7.7   17.0						5.0										
Assigned Phase   4   8   7.0   7.0   7.0   6.0   8     Phase Duration, s   43.0   43.0   57.0<	Force Mode	On	Red	2.0	2.0	0.0	0.0	0.0	0.0		5	6	7	8		
Assigned Phase   4   8   2   1     Case Number   7.0   7.0   7.0   6.0   57.0   57.0     Phase Duration, s   43.0   43.0   57.0   57.0   57.0   57.0     Change Period (, Y+R $\circ$ ), s   5.0   5.0   5.0   7.7   17.0   0.0   70     Max Allow Headway (MAH), s   3.1   3.1   0.0   0.0   0.0   0.0   0.0   0.0     Green Extension Time (g $\circ$ ), s   1.1   1.1   1.1   0.0 </td <td>Timer Results</td> <td>_</td> <td>EBI</td> <td></td> <td>EBT</td> <td>WB</td> <td></td> <td>WBT</td> <td>NBI</td> <td></td> <td>NBT</td> <td>SB</td> <td></td> <td>SBT</td>	Timer Results	_	EBI		EBT	WB		WBT	NBI		NBT	SB		SBT		
Case Number   7.0   7.0   7.0   6.0   7.0   8.0     Phase Duration, s   43.0   43.0   57.0   57.0   57.0   57.0     Change Period, (Y+R c), s   5.0   5.0   7.0   7.0   7.0   7.0     Max Allow Headway (MAH), s   3.1   3.1   3.1   0.0   0.0   0.0     Green Extension Time (g e), s   1.1   1.1   1.1   0.0   0.0   0.0   0.0     Max Out Probability   0.00   0.00   0.00   0.00   0.00   0.00   0.00   0.00   0.00     Movement Group Results   E   F   WB   NB   1.2   1   6     Assigned Movement   7   4   14   3   8   18   2   12   1   6     Adjusted Flow Rate (v), veh/h   149   65   355   9   212   303   469     Adjusted Saturation Flow Rate (s), veh/h/ln   1493   1610   1773   1296   953   1824   17.5   17.5     Queue Service Time (g c), s   5.7   2.6 </td <td></td> <td></td> <td></td> <td>-</td> <td></td> <td></td> <td>-</td> <td></td> <td></td> <td>-</td> <td></td> <td></td> <td>-</td> <td>6</td>				-			-			-			-	6		
Phase Duration, s   43.0   43.0   43.0   57.0   5								-						8.0		
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $																57.0
Max Allow Headway (MAH), s3.10.00.00.0Queue Clearance Time ( $g \circ$ ), s7.717.00.00.00.00.0Green Extension Time ( $g \circ$ ), s1.01.001.000.00.00.00.0Phase Call Probability1.001.000.000.000.000.00.00.0Max Out Probability0.000.000.000.000.00.00.00.00.0Movement Group ResultsEVVNRLT <th< td=""><td></td><td></td><td>-) C</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>7.0</td></th<>			-) C													7.0
Queue Clearance Time ( $g \circ$ ), s   7.7   17.0   0.0   0.0   0.0   0.0     Green Extension Time ( $g \circ$ ), s   1.1   1.1   1.1   0.0   0.0   0.0   0.0   0.0   0.0     Max Out Probability   0.00   0	-															0.0
Green Extension Time (g e), s1.11.10.00.00.0Phase Call Probability1.001.001.001.00 $$													0.0			0.0
Phase Call Probability1.00													0.0			0.0
Max Out Probability   0.00   0.00   0.00   0.00   0.00   0.00     Movement Group Results   L   T   R   L   R   L   R   L   R   L   R   L   R			(3 )													
Approach MovementLTRLRLRLR </td <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>0.00</td> <td></td> <td></td> <td>0.00</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>							0.00			0.00						
Approach MovementLTRLRLRLR </td <td></td>																
Assigned Movement74143818521216Adjusted Flow Rate (v), veh/h1496535592123030469Adjusted Saturation Flow Rate (s), veh/h/ln1493161017731296953182401735Queue Service Time (gs), s0.02.64.80.419.510.000.018.3Green Ratio (g/C)0.380.380.380.380.380.500.5000.50Capacity (c), veh/h61461271549337491200.519Volume-to-Capacity Ratio (X)0.2430.1060.4970.0170.5660.33200.519Back of Queue (Q), th/ln (85 th percentile)10.0843.1226.56.6181.816000.000.00Queue Storage Ratio (RQ) (85 th percentile)0.000.000.000.000.000.000.000.000.000.00Uniform Delay (d 1), s/veh0.110.00.020.00.00.00.00.00.00.00.00.0Level Of Service (LOS)CCCBDBC19.211.211.319.2Approach Delay, s/veh / LOS20.7C23.9C13.410.00.010.010.010.010.010.0Initial Queue Delay, s/veh / LOS20.7CCB		-	sults			1			1			1			ir .	
Adjusted Flow Rate ( v ), veh/h   149   65   355   9   212   303   Image: transpondence t	· · ·					<u> </u>			<u> </u>			<u> </u>				R
Adjusted Saturation Flow Rate (s), veh/hln   1493   1610   1773   1296   953   1824   0   1735   1     Queue Service Time (g s), s   0.0   2.6   4.8   0.4   19.5   1.0.0   0.0   0.0   0.0   2.6   4.8   0.4   19.5   1.0.0   0.0   18.3   0.00	U U		· · · ·		/			3	<u> </u>				12	1	-	16
Queue Service Time (g s), s   Image: Constraint (G c), s   <	-	· ·				<u> </u>			<u> </u>			<u> </u>	<u> </u>			<u> </u>
Cycle Queue Clearance Time ( $g_c$ ), s   S.   S.   Z.6   IS.   IS. <td></td> <td></td> <td>· · · ·</td> <td>n</td> <td></td> <td><u> </u></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td><u> </u></td> <td></td> <td></td> <td></td> <td><u> </u></td>			· · · ·	n		<u> </u>						<u> </u>				<u> </u>
Green Ratio ( $g/C$ )Image:						<u> </u>						<u> </u>				<u> </u>
Capacity (c), veh/hImage: formatty of the state of the st			e Time ( <i>g c</i> ), s						<u> </u>							<u> </u>
Volume-to-Capacity Ratio (X)Image: Constraint of the probability of the probabilit	, =					<u> </u>			<u> </u>							<u> </u>
Back of Queue (Q), ft/ln (85 th percentile)II<			·· / <b>)</b> /						<u> </u>			<u> </u>	<u> </u>			<u> </u>
Back of Queue (Q), veh/ln (85 th percentile) $3.9$ $1.7$ $8.8$ $0.2$ $7.3$ $6.3$ $10.3$ Queue Storage Ratio (RQ) (85 th percentile) $0.00$	· · ·		( )													
Queue Storage Ratio ( RQ ) ( 85 th percentile)Image: Constraint of the percentile) <td></td> <td></td> <td><u>, , , , , , , , , , , , , , , , , , , </u></td> <td></td> <td></td> <td><u> </u></td> <td></td> <td></td> <td><u> </u></td> <td></td> <td></td> <td><u> </u></td> <td></td> <td></td> <td></td> <td></td>			<u>, , , , , , , , , , , , , , , , , , , </u>			<u> </u>			<u> </u>			<u> </u>				
Uniform Delay (d 1), s/vehImage: d 2 model matrix of 2 mod		. ,	· · ·						<u> </u>			<u> </u>				
Incremental Delay (d 2), s/vehImage: d 2 ), s/vehImage: d 3 ), s/vehIm									<u> </u>							
Initial Queue Delay (d 3), s/vehImage: d 3 d 3 d 3 d 3 d 3 d 3 d 3 d 3 d 3 d						<u> </u>			<u> </u>			<u> </u>				
Control Delay (d), s/veh21.020.120.124.019.436.116.0Image: Control Delay (d), s/veh19.219.2Level of Service (LOS)CCCCBDBBBBBCC19.2C19.2CC </td <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td><u> </u></td> <td></td> <td></td> <td></td> <td><u> </u></td>										<u> </u>				<u> </u>		
Level of Service (LOS)   C   C   C   B   D   B   O   B   D   D <thd< th=""></thd<>							<u> </u>			<u> </u>						
Approach Delay, s/veh / LOS20.7C23.9C24.3C19.2Intersection Delay, s/veh / LOS22.2CC				<u> </u>			<u> </u>									
Intersection Delay, s/veh / LOS 22.2 C			20.7			23.9	<u> </u>				С	19.2		B		
										-						
Multimodel Beaulte								_								
	Multimodal Re	sults				EB			WB			NB			SB	
Pedestrian LOS Score / LOS	Pedestrian LOS	S Score	/LOS													
Bicycle LOS Score / LOS	Bicycle LOS So	core / LC	DS													

		HCS	7 Sig	nalize	d In	tersec	tion F	Resu	lts Sur	nmar	у						
General Inform	nation								Intersect	tion Inf	ormatic			┙┥┵┿	ել		
	nation	1									0.250		- 1	4			
Agency				Austra	:- D-4		24.0		Duration,		_		- <b>F</b>		R.		
Analyst						te 5/7/20	519		Area Typ	e	Other		→ → ▲ _/	w∔e			
Jurisdiction				Time F		0010			PHF	<u> </u>	0.92			**+= 8	<b>₩</b>		
Urban Street						ar 2019			Analysis	Period	1> 7:0	00					
Intersection		Route 202 & Tempe	e Wick	File Na	ame	Am B	.xus						- Ц	*			
Project Descrip	otion	Am Build												। चै ी की भि	F C		
Demand Inform	mation				EB	;		W	В		NB			SB			
Approach Move	ement			L	Т	R	L	Т	R	L	Т	R	L	Т	R		
Demand ( v ), v	/eh/h			152	283	3 212	55	90	) 25	91	276	38	22	233	72		
															<u> </u>		
Signal Informa	1/	Y	1			्र ह	4								_		
Cycle, s	100.0	Reference Phase	2		51	r₿"						1	$\mathbf{Y}_{2}$	3	-€ ₄		
Offset, s	0	Reference Point	End	Green			0.0	0.0	0.0	0.0					<u> </u>		
Uncoordinated	No	Simult. Gap E/W	On	Yellow	5.0	3.0	0.0	0.0	0.0	0.0					7		
Force Mode Fixed Simult. Gap N/S On				Red	2.0	2.0	0.0	0.0	0.0	0.0		5	6	7	8		
Timer Results				EBL		EBT	WE		WBT	NB		NBT	SBI		SBT		
Assigned Phas		CDL		<u>ЕВТ</u> 4	VVE		8	INB		2	381	-	6				
Case Number				8.0			7.0			2			8.0				
Phase Duration			-	43.0		-				6.0 57.0	<u> </u>	_	57.0				
Change Period				<u> </u>	-	43.0 5.0	-		43.0 5.0				<u> </u>		7.0		
Max Allow Hea	-				-	3.3	-		3.3		_	7.0			0.0		
Queue Clearan	<b>2</b> 1	·			+	40.0			11.3			0.0			0.0		
Green Extensio		, = ,			-	0.0			2.0			0.0			0.0		
Phase Call Pro		(90),0			+	1.00			1.00			0.0			0.0		
Max Out Proba						1.00			0.00								
	,																
Movement Gro	-	sults			EB			WB			NB			SB			
Approach Move				L	Т	R	L	Т	R	L	Т	R	L	Т	R		
Assigned Move				7	4	14	3	8	18	5	2	12	1	6	16		
Adjusted Flow	Rate( <i>v</i>	), veh/h			662			158	17		440			345			
		ow Rate ( <i>s</i> ), veh/h/l	n		1621	_		965	1434		1574			1742			
Queue Service		- ,			28.7	_		0.0	0.8		6.5			0.0			
Cycle Queue C		e Time ( <i>g c</i> ), s			38.0			9.3	0.8		18.4			11.9			
Green Ratio ( g					0.38			0.38			0.50			0.50			
Capacity(c), v					661			416			831			910			
Volume-to-Cap	•	<b>X</b> <i>Y</i>			1.002	_		0.37			0.530			0.379			
		In (85 th percentile)			689.´			110.2	_		253.2			184.3			
	. ,	eh/In ( 85 th percenti			27.1			4.2	0.4		9.7			7.2			
		RQ) (85 th percent	tile)		0.00			0.00			0.00			0.00			
Uniform Delay	· ,				32.2	_		21.5			16.9			15.5			
Incremental De	• •				35.4			0.2	0.0		2.4			1.2			
Initial Queue Delay ( <i>d</i> ₃ ), s/veh					0.0			0.0	0.0		0.0			0.0			
Control Delay ( d ), s/veh					67.6			21.7			19.3			16.7			
Level of Service (LOS)					F			C	В		В			В			
Approach Delay, s/veh / LOS				67.6	;	E	21.	5	С	19.3	3	В	16.7	7	В		
Intersection De	Intersection Delay, s/veh / LOS					3	8.7						D				
Multimodel D-	eulte				EP						ND			<b>CD</b>			
Multimodal Re		/1.05			EB		-	WB			NB			SB			
	Bicycle LOS Score / LOS																

		HCS	7 Sig	nalize	d Int	ersec	tion F	Resu	lts Sur	nmar	у				
O an a well have for my						1 1	1 at 2 ata 1 1	b. L							
General Inform	nation	1							Intersec		W.		_	4	
Agency									Duration		0.250				R.
Analyst						e 5/7/20	019		Area Typ	e	Other			w‡e	<u>م</u>
Jurisdiction				Time F					PHF		0.92			W + E 8	*****
Urban Street						r 2019			Analysis	Period	1> 7:(	00	- <b>- -</b> -		*1 4
Intersection		Route 202 & Tempe		File Na	ame	Am B	- With N	/lit.xus						17	
Project Descrip	otion	Am Build - With Miti	igation											1 4 1 <del>4</del> 1 1	
Demand Inform	mation				EB			WE	3		NB			SB	
Approach Move	ement			L	Т	R	L	Т	R	L	Т	R	L	Т	R
Demand ( v ), v				152	283	212	55	90	_	91	276	38	22	233	72
											1				
Signal Informa	ation				244	. 2	_								
Cycle, s	100.0	Reference Phase	2		51	×₩ ĕ							$\Psi$	_	<b>-</b>
Offset, s	0	Reference Point	End	Green		38.0	0.0	0.0	0.0	0.0		1	2	3	<u> </u>
Uncoordinated	No	Simult. Gap E/W	On	Yellow		3.0	0.0	0.0	0.0	0.0	_				$\rightarrow$
Force Mode	orce Mode Fixed Simult. Gap N/S On				2.0	2.0	0.0	0.0	0.0	0.0		5	6	7	8
	_	EDI	_	EDT	14/5		MOT			NET	0.00				
Timer Results		EBI		EBT	WB		WBT	NB		NBT	SBI		SBT		
Assigned Phase						4		_	8			2			6
Case Number						7.0	<u> </u>		7.0	<u> </u>		6.0	<u> </u>		8.0
Phase Duration		```				43.0			43.0			57.0			57.0
Change Period					_	5.0			5.0		_	7.0		$\rightarrow$	7.0
Max Allow Hea	<b>2</b> 1	·		<u> </u>		3.2			3.2		_	0.0		$\rightarrow$	0.0
Queue Clearan						27.9			9.9					$\rightarrow$	
Green Extensio		(ge), S				1.5			1.8		_	0.0		$\rightarrow$	0.0
Phase Call Pro						1.00	<u> </u>		1.00	<u> </u>					
Max Out Proba	bility					0.07			0.00						
Movement Gro	oup Res	sults			EB			WB			NB			SB	
Approach Move	-			L	Т	R	L	Т	R	L	Т	R	L	Т	R
Assigned Move				7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow	Rate ( v	), veh/h			473	189		158	17	99	341			345	
		ow Rate ( <i>s</i> ), veh/h/l	n		1610	1610		1266	_	1076	1787			1742	
Queue Service					18.0	8.3		0.0	0.8	6.3	11.8			0.0	
Cycle Queue C		- ,			25.9	8.3		7.9	0.8	18.2	11.8			11.9	
Green Ratio ( g		(3 )			0.38	0.38		0.38	_	0.50	0.50			0.50	
Capacity ( c ), v	. ,				661	612		531	545	482	893			910	
Volume-to-Cap		itio (X)			0.716			0.297	_	0.205	0.382			0.379	
		/In ( 85 th percentile)	)		338.8			108.6	_	74.8	185.6			184.3	
	. ,	eh/In ( 85 th percenti			13.3	4.9		4.1	0.4	3.0	7.1			7.2	
	. ,	RQ) (85 th percent			0.00	0.00		0.00		0.00	0.00			0.00	
Uniform Delay			,		27.3	21.8		21.3		21.1	15.5			15.5	
Incremental De					3.2	0.1		0.1	0.0	1.0	1.2			1.2	
Initial Queue D			0.0	0.0		0.0	0.0	0.0	0.0			0.0			
Control Delay (			30.5	21.9		21.4		22.1	16.7			16.7			
Level of Service			C	C		C	B	C	B			B			
Approach Delay, s/veh / LOS				28.0		C	21.2	L	C	17.9		В	16.7		B
Approach Delay, s/veh / LOS Intersection Delay, s/veh / LOS				20.0		22							C		
													-		
Multimodal Re	sults				EB			WB			NB			SB	
Pedestrian LOS		/ LOS													
	Bicycle LOS Score / LOS					11007									

		Η	CS7	Two	-Way	' Sto	p-Co	ntrol	Rep	ort_									
General Information	_	_	_	_	_	_	Site	Inforr	natio	n	_	_	_	_	_				
Analyst	EIC							ection			Route	e 202 Site	e Dw						
Agency/Co.	DD							liction											
Date Performed	4/28/	2023						West Stre	eet		Site D	)w							
Analysis Year	2023							n/South S			Route	e 202							
Time Analyzed	Am B	uild					Peak Hour Factor 0.92												
Intersection Orientation	North	n-South					Analysis Time Period (hrs) 0.25												
Project Description	<u> </u>																		
Lanes																			
								1											
								J											
					Majo	r Street: No	rth-South												
Vehicle Volumes and Adj	ustme	nts																	
Approach	T	Eastb	ound			West	bound		North		bound			South	bound				
Movement	U	L	Т	R	U	L	Т	R	U	L	Т	R	U	L	Т	R			
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6			
Number of Lanes		0	1	0		0	0	0	0	0	1	0	0	0	1	0			
Configuration			LR							LT						TR			
Volume (veh/h)		12		12						15	438				315	9			
Percent Heavy Vehicles (%)		3		3						3									
Proportion Time Blocked																			
Percent Grade (%)			0																
Right Turn Channelized																			
Median Type   Storage				Undi	vided														
Critical and Follow-up H	eadwa	ys																	
Base Critical Headway (sec)	Τ	7.1		6.2						4.1									
Critical Headway (sec)		6.43		6.23						4.13									
Base Follow-Up Headway (sec)		3.5		3.3						2.2									
Follow-Up Headway (sec)		3.53		3.33						2.23									
Delay, Queue Length, an	d Leve	l of Se	ervice																
Flow Rate, v (veh/h)	T		26							16									
Capacity, c (veh/h)			439							1201									
v/c Ratio			0.06							0.01									
95% Queue Length, Q <sub>95</sub> (veh)			0.2							0.0									
Control Delay (s/veh)			13.7							8.0									
Level of Service (LOS)			В							A									
Approach Delay (s/veh)		- 13	3.7							. 0	.4								
Approach LOS			В																

		HCS	7 Sig	nalize	d Int	ersec	tion F	lesu	lts Sur	nmar	у						
General Inforn	nation					n		┙┵┷╴↓	þa l <u>a</u>								
Agency									Intersection,		0.250			4			
Analyst				Analys	ie Dat	e 5/7/20	10		Area Typ		Other				ľ		
Jurisdiction				Time P		5 3/1/20	19		PHF	C	0.94		→ ∻- <b>∻</b>	w‡e	~_		
Urban Street						r 2019			Analysis	Doriod	1> 7:0	0					
Intersection		Route 202 & Tempe	Mick	File Na		Pm B.	<u>vuo</u>		Allalysis	Fellou	1-1.		-		<u> </u>		
	tion	Pm Build	VVICK	File Na	ime		.xus										
Project Descrip	lion																
Demand Inform	mation				EB			WE	3		NB			SB			
Approach Move	ement			L	Т	R	L	Т	R	L	Т	R	L	Т	R		
Demand ( v ), v	/eh/h			47	100	82	48	28	6 15	199	257	41	20	280	188		
									-	_							
Signal Informa	1			-	144								rta				
Cycle, s	100.0	Reference Phase	2		5 T	ľ₿ ″						1		3	← ↔		
Offset, s	0	Reference Point	End	Green		38.0	0.0	0.0		0.0					<u> </u>		
Uncoordinated		Simult. Gap E/W	On	Yellow		3.0	0.0	0.0		0.0		4			Y		
Force Mode	Fixed	Simult. Gap N/S	On	Red	2.0	2.0	0.0	0.0	0.0	0.0	5		6	7	8		
Timer Results	er Results					EBT	WB		WBT	NB		NBT	SBI		SBT		
Assigned Phase		EBL		4		-	8		_	2			6				
Case Number				8.0			7.0			8.0			8.0				
Phase Duration				43.0			43.0			57.0			57.0				
Change Period		c).s			+	5.0			5.0			7.0			7.0		
Max Allow Hea						3.2			3.2			0.0			0.0		
Queue Clearan	<b>2</b> (	·				11.6			17.1								
Green Extensio	on Time	(ge),s			$\neg$	1.2			1.2			0.0			0.0		
Phase Call Pro	bability					1.00			1.00								
Max Out Proba	bility					0.00			0.00								
Mayamant Cr					E D									00			
Movement Gro	-	uits		L	EB T	R	L	WB T	R	L	NB T	R	L	SB T	R		
Assigned Move				7	4	14	3	8	18	5	2	12	1	6	16		
Adjusted Flow I		) voh/h		<u> </u>	221	14	5	355		5	528	12		506	10		
-		ow Rate ( <i>s</i> ), veh/h/li	n		1532	+	<u> </u>	1758			1112			1756			
Queue Service		. ,		<u>                                      </u>	0.0	+	<u> </u>	4.9	0.6	<u> </u>	26.0			0.0			
Cycle Queue C		- /			9.6	+		4.9			46.3			20.3			
Green Ratio ( g		5 mme ( y c ), S			9.0 0.38	+		0.38	_		46.3			0.50			
Capacity ( c ), v	. ,				626			709	493		606			916			
Volume-to-Cap		itio (X)			0.353			0.501			0.870			0.553			
•		(In ( 85 th percentile)			145.1			226.5			452.8			286.2			
	. ,	eh/In ( 85 th percentil			5.6			8.8	0.3		17.8			11.3			
	. ,	RQ) (85 th percent			0.00			0.00			0.00			0.00			
Uniform Delay		,, ,			22.1			23.8			26.1			17.6			
Incremental De	· ,				0.1			0.2	0.0		15.7			2.4			
Initial Queue De			0.0			0.0	0.0		0.0			0.0					
Control Delay (			22.2			24.0	19.4		41.8			20.0					
Level of Service			С			С	В		D			В					
Approach Delay, s/veh / LOS				22.2		С	23.9	)	С	41.8	3	D	20.0	)	В		
Intersection Delay, s/veh / LOS						28	3.3						С				
Multimodal Re					EB			WB			NB			SB			
Pedestrian LOS	Pedestrian LOS Score / LOS				$\rightarrow$												
Bicycle LOS Sc																	

	HCS	7 Sig	nalize	d Int	ersec	tion R	Resu	lts Sur	nmar	У				
Concreting								Interee	tion Inf	o rm otic			╵┥╎╬╸╎	ba L
General Information								Intersec		W		- 1	<i>.</i> ∳∗	
Agency					F 17 100	10		Duration		0.250				
Analyst			Analys		e 5/7/20	019		Area Typ	e	Other		→ 	w↓e	~
Jurisdiction			Time F		0010			PHF	<u> </u>	0.94			w + Е 8	7
Urban Street					r 2019			Analysis	Period	1> 7:(	00			
Intersection	Route 202 & Tempe		File Na	ame	Pm B	- With N	Ait.xus	;				-  1	ጎዮ	
Project Description	Pm Build - With Mit	igation											14144	P C
Demand Information	l			EB			W	В		NB			SB	
Approach Movement			L	Т	R	L	Т	R	L	Т	R	L	Т	R
Demand ( v ), veh/h			47	100	82	48	28	6 15	199	257	41	20	280	188
														1
Signal Information				11	a 6	_								_
Cycle, s 100.0	Reference Phase	2		51	₂₩°						1	$\mathbf{Y}$	-	÷
Offset, s 0	Reference Point	End	Green		38.0	0.0	0.0	0.0	0.0			-		<u> </u>
Uncoordinated No	Simult. Gap E/W Simult. Gap N/S	On	Yellow	5.0	3.0	0.0	0.0	0.0	0.0					7
Force Mode Fixed	On	Red	2.0	2.0	0.0	0.0	0.0	0.0		5	6	7	8	
Timer Results			EBL	_	EBT	WB		WBT	NBI		NBT	SB		SBT
Assigned Phase		EDI		4	VVD		8		-	2	30		6	
Case Number			+	7.0		$\rightarrow$	7.0			6.0			8.0	
Phase Duration, s				43.0		-	43.0			57.0			57.0	
Change Period, (Y+F				$\rightarrow$	43.0 5.0		-	43.0 5.0				<u> </u>		7.0
Max Allow Headway (					3.2			3.2		7.0		<u> </u>		0.0
Queue Clearance Tim	·				8.7			17.0			0.0			0.0
Green Extension Time	1 = 7				1.2			1.1		-	0.0			0.0
Phase Call Probability	,			+	1.00		-	1.00			0.0	<u> </u>		0.0
Max Out Probability	1		-		0.00	-		0.00	-				_	
Max Out Probability					0.00			0.00						
Movement Group Re	esults			EB			WB			NB			SB	
Approach Movement			L	Т	R	L	Т	R	L	Т	R	L	Т	R
Assigned Movement			7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (	<i>v</i> ), veh/h			156	65		355	12	212	316			506	
Adjusted Saturation F	low Rate ( s ), veh/h/l	ln		1441	1610		1773	3 1296	925	1826			1728	
Queue Service Time	(gs), s			0.0	2.6		4.8	0.6	20.9	10.5			0.0	
Cycle Queue Clearan	ce Time ( <i>g c</i> ), s			6.7	2.6		15.0	0.6	41.2	10.5			20.3	
Green Ratio(g/C)				0.38	0.38		0.38	0.38	0.50	0.50			0.50	
Capacity ( c ), veh/h				595	612		715	493	346	913			902	
Volume-to-Capacity F	Ratio ( X )			0.263	0.106		0.49	7 0.024	0.611	0.346			0.562	
Back of Queue (Q),	ft/In(85 th percentile	)		105.6	43.1		226.	59	191.2	166.8			287.3	
Back of Queue (Q),	· · ·	,		4.1	1.7		8.8	0.3	7.6	6.6			11.3	
Queue Storage Ratio		tile)		0.00	0.00		0.00	0.00	0.00	0.00			0.00	
Uniform Delay ( d 1 ),				21.1	20.0		23.8	19.4	32.1	15.1			17.6	
Incremental Delay ( d			0.1	0.0		0.2	0.0	7.8	1.0			2.5		
Initial Queue Delay (			0.0	0.0		0.0	0.0	0.0	0.0			0.0		
Control Delay ( d ), s/			21.2	20.1		24.0	19.4	39.9	16.2			20.1		
Level of Service (LOS			С	С		С	В	D	В			С		
Approach Delay, s/ve		20.8	5	С	23.9	9	С	25.7	7	С	20.1	1	С	
Intersection Delay, s/v				22	2.9						С			
Multimodal Results				EB			WB			NB			SB	
Pedestrian LOS Score														
Bicycle LOS Score / L														

		Н	CS7	Two	-Way	' Sto	p-Co	ntrol	Rep	ort_									
General Information	_	_	_	_	_	_	Site	Inforr	natio	n	_	_	_	_	_				
Analyst	EIC							ection			Route	e 202 Sit	e Dw						
Agency/Co.	DD							liction			Houte								
Date Performed	4/28/	2023						West Str	eet		Site D	Dw							
Analysis Year	2023							n/South :			Route								
Time Analyzed	Pm B	uild					Peak												
Intersection Orientation	North	n-South					Peak Hour Factor 0.92   Analysis Time Period (hrs) 0.25												
Project Description							,												
Lanes																			
								1											
								l											
					Majo	r Street: No	rth-South												
Vehicle Volumes and Adj	ustme	nts																	
Approach	Τ	Eastb	ound			West	bound		North		bound			South	bound				
Movement	U	L	Т	R	U	L	Т	R	U	L	Т	R	U	L	Т	R			
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6			
Number of Lanes		0	1	0		0	0	0	0	0	1	0	0	0	1	0			
Configuration			LR							LT						TR			
Volume (veh/h)		19		33						22	297				453	12			
Percent Heavy Vehicles (%)		2		2						2									
Proportion Time Blocked																			
Percent Grade (%)			0																
Right Turn Channelized																			
Median Type   Storage				Undi	vided														
Critical and Follow-up H	eadwa	ys																	
Base Critical Headway (sec)	Т	7.1		6.2						4.1									
Critical Headway (sec)		6.42		6.22						4.12									
Base Follow-Up Headway (sec)		3.5		3.3						2.2									
Follow-Up Headway (sec)		3.52		3.32						2.22									
Delay, Queue Length, an	d Leve	l of Se	ervice				-		-						-				
Flow Rate, v (veh/h)	T		57							24									
Capacity, c (veh/h)			439							1059									
v/c Ratio			0.13							0.02									
95% Queue Length, Q <sub>95</sub> (veh)			0.4							0.1									
Control Delay (s/veh)			14.4							8.5									
Level of Service (LOS)			В							A									
Approach Delay (s/veh)		14	1.4							. 0	.8								
Approach LOS			В																