

### MEMO

DATE RE	July 16, 2019 6136-6588 Ninth Line, City of Mississaug Draft Plan of Subdivision Ninth Line Pre-Widening Improvements	<b>FILE NO.</b> a	780-5227
ТО	Craig Scarlett Senior Land Development Manager Mattamy Homes David Hegarty Land Development Coordinator Mattamy Homes	сс	
FROM	Alexander Fleming, MBA., P.Eng. Associate Darren J. Loro, C.E.T. Transportation Technologist		

Dear Craig and David,

We were retained by Mattamy Homes to prepare a Traffic Impact Study for the Draft Plan of Subdivision application for the proposed residential development located at 6136-6588 Ninth Line in the City of Mississauga. The Traffic Impact Study (herein referred to as the Crozier TIS) was submitted in June 2019.

The development proposal consists of two separate Draft Plans, with the build-out of the North Draft Plan anticipated for 2022 and the build-out of the South Draft Plan anticipated for 2026. Attachment A contains the Concept Plan.

While the target year of build-out for the North Draft Plan is now 2022, the target year of build-out at the time the Crozier TIS was prepared was 2023. Accordingly, the Crozier TIS analyzed the 2023 horizon year for build-out of the North Draft Plan.

As the City of Mississauga will be undergoing a Municipal Class Environmental Assessment for the widening of Ninth Line targeted for completion by 2023, the Crozier TIS analyzed mitigation measures to support the North Draft Plan without the Ninth Line widening, and mitigation measures to support the full build-out of the development following the Ninth Line widening.

We have been requested to analyze the full build-out of the proposed development without the Ninth Line widening to determine what mitigation measures are required to support the proposed development without relying on the Ninth Line improvements. This memo summarizes the results of our analysis of required mitigation measures to support full build-out pre-widening.

#### 1.0 SCOPE OF ANALYSIS

The North Draft Plan is expected to be built-out by 2022 and the South Draft Plan is expected to be builtout by 2026. It is understood that Mattamy expects to service the internal subdivisions beginning in Fall 2020 for the North Draft Plan. House closings are anticipated to begin in Summer 2021 at a rate of approximately 225 units per year.

The North Draft Plan build-out was analyzed in the Crozier TIS during the 2023 horizon year for mitigation measures without the Ninth Line widening. The full build-out of the development (North and South Draft Plans) was analyzed in the Crozier TIS for mitigation measures under the ultimate 2036 future total scenario with the Ninth Line widening.

This memo analyzes the site connections under the 2026 future total scenario (estimated time of full buildout of the entire development) for mitigation measures required pre-widening, with Mattamy closing approximately 225 units per year beginning in Summer 2021.

#### 2.0 FULL BUILD-OUT MITIGATION MEASURES (PRE-WIDENING)

Mitigation measures were analyzed at the site connections on Ninth Line under 2026 future total conditions pre-widening using the same methodologies from the Crozier TIS. The 2026 future total traffic volumes from the Crozier TIS are illustrated in Figure 1.

#### 2.1 Signal Warrant Analysis

A signal warrant analysis was conducted for the unsignalized site connections to Ninth Line (Street "B", Street "K", and Street "O" opposite Foxwood Avenue) under 2026 future total conditions. Our results indicate that **traffic signals are not warranted at the proposed unsignalized site connections to Ninth Line** under 2026 future total conditions pre-widening.

Attachment B contains the signal warrant sheets.

#### 2.2 Auxiliary Left-Turn Lane Analysis – Unsignalized Intersections

Auxiliary left-turn lane analysis was conducted at the proposed unsignalized site connections to Ninth Line (Street "B", Street "K", and Street "O" opposite Foxwood Avenue) under 2026 future total conditions pre-widening. Our results indicate that an auxiliary northbound left-turn lane is not warranted at the Street "B" site connection, but that an auxiliary northbound left-turn lane is warranted at the Street "K" and Street "O" site connections.

Attachment C contains the auxiliary left-turn lane warrant worksheets.

There is an existing 3.2-metre-wide continuous centre turn lane on Ninth Line south of Foxwood Avenue (future Street "O" connection) which can accommodate auxiliary northbound left-turn requirements from Ninth Line to the Street "O" site connection. However, the existing centre turn lane does not span to the Street "K" site connection. Therefore, a road widening is required at this location to provide an auxiliary northbound left-turn lane with over 25 metres of storage, a taper length of 85-95 metres and deceleration length of 95 metres.

#### 2.3 Auxiliary Left-Turn Lane Analysis – Signalized Intersections

Auxiliary northbound left-turn lane requirements were analyzed at the proposed site connections to the signalized intersections on Ninth Line at Doug Leavens Boulevard and Osprey Boulevard under 2026 future total conditions pre-widening.

The Crozier TIS concluded that an auxiliary northbound left-turn lane with a minimum of 15 metres storage is required on Ninth Line at Doug Leavens Boulevard to support the North Draft Plan build-out during the 2023 horizon year, but that this northbound left-turn lane requirement can be provided by repurposing the existing runout lane at the south approach of Ninth Line at Doug Leavens Boulevard via pavement marking revisions.

Under 2026 future total conditions pre-widening, **the required minimum storage length for the auxiliary northbound left-turn lane at Doug Leavens Boulevard increases from 15 metres to 35 metres**. The existing runout lane would have to be extended to accommodate the storage length and provide sufficient deceleration length (a storage length of 35 metres would reduce the effective deceleration length of the existing runout lane to 20 metres which is not supportable).

Our analysis indicates that **an auxiliary northbound left-turn lane on Ninth Line at Osprey Boulevard with a minimum of 15 metres of storage should be sufficient to accommodate northbound left-turn queues**. Additionally, the existing centre turn lane on Ninth Line spanning both north and south of Osprey Boulevard can accommodate auxiliary northbound left-turn requirements from Ninth Line to the Street "A" site connection.

2.4 Centre Turn Lane Extension on Ninth Line

As discussed in Sections 2.2 and 2.3 above, the widening of Ninth Line at the Doug Leavens Boulevard / Street "O" site connection and Street "K" site connection is required to accommodate auxiliary northbound left-turn lane requirements as the existing centre turn lane on Ninth Line does not span to these locations.

However, the widening of Ninth Line at these locations would result in a series of road widening and narrowing points on Ninth Line driving past the site connections north of Foxwood Avenue. This would result in design inconsistency along Ninth Line.

Accordingly, the City may request that the existing centre turn lane on Ninth Line south of Foxwood Avenue be extended northerly to connect to the existing runout lane south of Doug Leavens Boulevard. This would result in an extension of approximately 600-650 metres.

From a traffic operations and design perspective, this request would not be considered unreasonable. The provision of a centre turn lane on Ninth Line at the site connections would accommodate auxiliary left-turn lane requirements and result in design consistency on Ninth Line at the site frontage.

# Therefore, we are recommending that the existing existing centre turn lane on Ninth Line south of Foxwood Avenue be extended northerly to connect to the existing runout lane south of Doug Leavens Boulevard to support the full build-out of the development (2026).

#### 2.5 Right-Turn Lane Warrant Analysis

Auxiliary right-turn lane warrant analysis was conducted at the proposed site connections to Ninth Line under 2026 future total conditions pre-widening.

Under the pre-widening scenario with only one southbound lane, **auxiliary southbound right-turn lanes should be provided at the Street "B", Street "F" and Street "K" site connections** given that the southbound right-turn volumes at these accesses are approximately 50 vehicles per hour or greater during the weekday p.m. peak hour. As the critical southbound right-turn volume at the Street "A" site connection is only 24 vehicles per hour, an auxiliary southbound right-turn lane is not considered necessary at this location. These right-turn lanes should be implemented in conjunction with the construction of the respective site accesses. The Street "B", Street "F" and Street "K" southbound right-turn lanes will require a minimum of 15 metres of storage. The Street "O" southbound right-turn lane will require a minimum of 30 metres of storage. The recommended auxiliary southbound right-turn lanes at the site connections will also require a deceleration length of 150-195 metres and a taper length of 80 metres.

#### 3.0 SENSITIVITY ANALYSIS

Mattamy Homes has requested that Crozier analyze an additional scenario under 2026 future total conditions pre-widening with the removal of the Street "B" connection to Ninth Line for the North Draft Plan. Figure 2 illustrates the 2026 future total traffic volumes without the Street "B" connection.

Auxiliary northbound left-turn lane analysis at Doug Leavens Boulevard indicates that **the recommended** storage length of 35 metres should still be sufficient to accommodate the additional northbound leftturning site traffic diverted from Street "B" to Street "F." The reasoning for no change in storage length is that the forecasted northbound left-turn volumes at the Street "B" connection were low.

Auxiliary southbound right-turn lane analysis at Doug Leavens Boulevard indicates that **the recommended storage length of 15 metres would increase to 30 metres to accommodate the additional southbound right-turning site traffic diverted from Street "B" to Street "F."** The reasoning for the increase in storage length is that the forecasted southbound right-turn volume at the Street "B" connection was 57 vehicles per hour which would divert to Street "F."

#### 4.0 SUMMARY OF REQUIRED IMPROVEMENTS

The conclusion from the Crozier TIS that no external roadway widenings are required to support the North Draft Plan build-out remains valid.

The analysis contained within this memo has resulted in the following recommended external improvements to support full build-out of the proposed development under 2026 future total conditions pre-widening summarized in Table 1.

Segment / Intersection	Improvement	Estimated Dimensions	Timing
Ninth Line between Doug Leavens Boulevard and Foxwood Avenue	Widen to extend existing centre turn lane on Ninth Line	Extension of approximately 600-650 metres	Full Build-Out of Development (2026)
Ninth Line at Street "B"	Widen to provide auxiliary southbound right-turn lane	15 metres storage 80 metres taper 150-195 metres deceleration	Construction of Street "B" Site Connection
Ninth Line at Street "F" opposite Doug Leavens Boulevard (with Street "B" connection)	Widen to provide auxiliary southbound right-turn lane	15 metres storage 80 metres taper 150-195 metres deceleration	Construction of Street "F" Site Connection
Ninth Line at Street "F" opposite Doug Leavens Boulevard (without Street "B" connection)	Widen to provide auxiliary southbound right-turn lane	30 metres storage 80 metres taper 150-195 metres deceleration	Construction of Street "F" Site Connection
Ninth Line at Street "K"	Widen to provide auxiliary southbound right-turn lane	15 metres storage 80 metres taper 150-195 metres deceleration	Construction of Street "K" Site Connection
Ninth Line at Street "O" opposite Foxwood Avenue	Widen to provide auxiliary southbound right-turn lane	30 metres storage 80 metres taper 150-195 metres deceleration	Construction of Street "O" Site Connection

Table 1: Recommended External Roadway Improvements – 2026 Pre-Widening

The improvements outlined in Table 1 are illustrated on the conceptual drawings contained in Attachment D.

The improvements outlined in Table 1 would result in a total road widening ranging from approximately 1.5 km – 1.8 km of lane widening (depending on the provision of the Street "B" site connection).

We trust that this traffic analysis is satisfactory. Should you have any questions or require any further information, please feel free to give us a call.

Yours truly,

#### C.F. CROZIER & ASSOCIATES INC.

Alexander Fleming, MBA., P.Eng. Associate

C.F. CROZIER & ASSOCIATES INC.

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Darren J. Loro, C.E.T. Transportation Technologist

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Encl.

Attachment A – Concept Plan Attachment B – Signal Warrant Worksheets Attachment C – Left-Turn Lane Warrant Worksheets Attachment D – Recommended External Roadway Improvements

Figure 1 – 2026 Future Total Traffic Volumes Figure 2 – 2026 Future Total Traffic Volumes (no Street "B" connection)

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## ATTACHMENT A

CONCEPT PLAN



## DRAFT PLAN OF SUBDIVISION **DERRY BRITANNIA DEVELOPMENTS LIMITED**

PART OF LOTS 6,7,8 & 9, CONCESSION 9, N.S. CITY OF MISSISSAUGA **REGIONAL MUNICIPALITY OF PEEL** 

### **OWNERS CERTIFICATE**

I HEREBY AUTHORIZE GLEN SCHNARR & ASSOCIATES INC. TO PREPARE AND SUBMIT THIS DRAFT PLAN OF SUBDIVISION TO THE CITY OF MISSISSAUGA FOR APPROVAL.

SIGNED TIM WARNER, A.S.O.

DERRY BRITANNIA DEVELOPMENTS LIMITED

DATE: <u>MAY 9, 2019</u>

### SURVEYORS CERTIFICATE

I HEREBY CERTIFY THAT THE BOUNDARIES OF THE LANDS TO BE SUBDIVIDED AS SHOWN ON THIS PLAN AND THEIR RELATIONSHIP TO ADJACENT LANDS ARE CORRECTLY AND ACCURATELY SHOWN.

SUNIL PERERA, O.L.S.

J.D. BARNES LIMITED

ADDITIONAL INFORMATION

SIGNED

DATE: <u>MAY 23, 2019</u>

### LAND USE SCHEDULE - NORTH DRAFT PLAN

### LAND USE

REAR LANE DETACHED - 10.7m (35') REAR LANE TOWNHOUSE - 6.05m (2 STREET TOWNHOUSE - 6.0m (20') ONDO APARTMENTS / TOWNS / ST **RESIDENTIAL RESERVE** PARK / WALKWAY PUBLIC ELEMENTARY SCHOOL 5m BUFFERS ROAD WIDENINGS 0.3m RESERVES 10.0m LANEWAY (445m LENGTH) 17.0m LOCAL ROW (1,021m LENGTH) 20.0m LOCAL ROW (184m LENGTH) TOTAL

### NOTES

-ALL DAYLIGHT ROUNDINGS ARE 5m UNLESS OTHERWISE NOTED

(UNDER SECTION 51(17) OF THE PLANNING ACT) INFORMATION REQUIRED BY CLAUSES A,B,C,D,E,F,G,J & L ARE SHOWN ON THE DRAFT AND KEY PLANS.

H) MUNICIPAL AND PIPED WATER TO BE PROVIDED I) SANDY LOAM AND CLAY LOAM K) SANITARY AND STORM SEWERS TO BE PROVIDED

	78	8.94	22.09	338-398	84.9-100
		0.38	0.94		
		1.75	4.32		
		0.46	1.14		
	N77,N78	0.00	0.00		
	N75,N76	0.18	0.44		
	N72-N74	0.13	0.32		
	N71	0.43	1.06		
	N63-N70	1.13	2.79		
	N62	0.50	1.24		
CKS	N61	0.85	2.10	140-200	164.7-235.3
	N43-N60	1.70	4.20	101	59.4
	N31-N42	0.77	1.90	67	87.0
	N1-N30	0.66	1.63	30	45.5
	LOTS / BLOCKS	AREA (ha)	AREA (ac)	UNITS	(UPNHA)

### LAND USE SCHEDULE - SOUTH DRAFT PLAN

LAND USE	BLOCKS	AREA (ha)	AREA (ac)	TOTAL UNITS	DENSITY (UPNHA)
REAR LANE TOWNHOUSE - 6.05m (20')	S1-S17	1.29	3.19	109	84.5
STREET TOWNHOUSE - 6.0m (20')	S18-S36	1.73	4.27	94	54.3
CONDOMINIUM DUPLEX	S37-S62	1.71	4.23	148	86.5
CONDO APARTMENTS / TOWNS / STACKS	S63	4.52	11.17	350-1,360	77.4-300.9
RESIDENTIAL RESERVE	S64-S69	0.49	1.21		
PARK / WALKWAY / TRAIL	S70-S80	2.10	5.19		
PUBLIC ELEMENTARY SCHOOL	S81	0.22	0.54		
SWM POND	S82	2.87	7.09		
GREENLANDS	S83,S84	8.62	21.30		
TRANSITWAY / TRANSITWAY BUFFER	S85-S89	7.09	17.52		
ROAD WIDENINGS	S90-S92	0.65	1.61		
0.3m RESERVES	S93-S99	0.00	0.00		
10.0m LANEWAY (813m LENGTH)		0.81	2.00		
17.0m LOCAL ROW (1,299m LENGTH)		2.25	5.56		
20.0m LOCAL ROW (943m LENGTH)		1.80	4.45		
TOTAL	99	36.15	89.33	701-1,711	75.8-185

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AND USE	SCHEDULE	<b>3001</b> Π	.AN

LAND USE	AREA (ha)	AREA (ac)	TOTAL UNITS	DENSITY (UPNHA)
REAR LANE DETACHED - 10.7m (35')	0.66	1.63	30	45.5
REAR LANE TOWNHOUSE - 6.05m (20')	2.06	5.09	176	85.4
STREET TOWNHOUSE - 6.0m (20')	3.43	8.48	195	56.9
CONDOMINIUM DUPLEX	1.71	4.23	148	86.5
CONDO APARTMENTS / TOWNS / STACKS	5.37	13.27	490-1,560	91.4-290.5
RESIDENTIAL RESERVE	0.99	2.45		
PARK / WALKWAY / TRAIL	3.23	7.98		
PUBLIC ELEMENTARY SCHOOL	0.65	1.61		
SWM POND	2.87	7.09		
GREENLANDS	8.62	21.30		
TRANSITWAY / TRANSITWAY BUFFER	7.09	17.52		
5m BUFFERS	0.13	0.32		
ROAD WIDENINGS	0.83	2.05		
0.3m RESERVES	0.00	0.00		
10.0m LANEWAY (1,258m LENGTH)	1.27	3.14		
17.0m LOCAL ROW (2,320m LENGTH)	4.00	9.88		
20.0m LOCAL ROW (1,127m LENGTH)	2.18	5.39		
TOTAL	45.09	111.42	1,039-2,109	78.5-159.4





SCALE: 1:2000 *(24" x 45")* JUNE 6, 2019



### ATTACHMENT **B**

SIGNAL WARRANT WORKSHEETS

Input Data Sheet	Analysis Sheet	Pro	posed Collision	
What are the intersecting roadways?   N     What is the direction of the Main Road street?	inth Line and Street "B" North-South		Results Sheet 2026 (Future Total)	
Justification 1 - 4: Volume Warrants				
a Number of lanes on the Main Road?	1 -			
b Number of lanes on the Minor Road?	1			
c How many approaches? 3				
d What is the operating environment?	Urban 💌	Population >= 10,000 AN	ID Speed < 70 km/hr	
e What is the eight hour vehicle volume at the	intersection? (Please fill in	n table below)		

Hour Ending	Main LT	Nor	thbound TH	Appro	ach  RT	Mi	Minor Eastbound Approach LT I TH I RT				Main Southbound Approach				-	Minor Westbound Approach				Po	edestri ossing Road	ans Main							
7:00	3		682		0	8	3		0		3			0		642			19		0		0			0		0	
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9.00	3	- TL	682	ΥT	0	T - 3	2 -	T -	0	- r		_	<u> </u>	<u> </u>	Т. (°.)	642		,	10							<u> </u>	т —		
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Total	24	1	5,456	1	0	6	4	I	0	1	24	4		0	1	5,136	5 Î	1	52		0	1	0	1		0		0	

#### **Justification 5: Collision Experience**

Preceding Months	Number of Collisions*
1-12	0
13-24	0 0
25-36	0 0

\* Include only collisions that are susceptable to correction through the installation of traffic signal control

#### **Justification 6: Pedestrian Volume**

a.- Please fill in table below summarizing total pedestrians crossing major roadway at the intersection or in proximity to the intersection (zones). Please reference Section 4.8 of the Manual for further explanation and graphical representation.

	Zone 1 Assisted Unassisted	Zone 2 Assisted Unassisted	Zone 3 (if needed) Assisted Unassisted	Zone 4 (if needed) Assisted Unassisted	Total
Total 8 hour pedestrian volume	10,000 <sup> </sup> 5	10   5	0 0	0 0	
Factored 8 hour pedestrian volume	20,005	25	0	0	
% Assigned to crossing rate	23%	34%	30%	100%	
Net 8 Hour Pedestrian Volume at Cross	sing				4,610
Net 8 Hour Vehicular Volume on Street	Being Crossed				2,000

b.- Please fill in table below summarizing delay to pedestrians crossing major roadway at the intersection or in proximity to the intersection (zones). Please reference Section 4.8 of the Manual for further explanation and graphical representation.

	Zone 1	Zone 2	Zone 3 (if needed)	Zone 4 (if needed)	Tatal
	Assisted   Unassisted	Assisted   Unassisted	Assisted Unassisted	Assisted Unassisted	rotal
Total 8 hour pedestrian volume	10,000 5	10 5	0 0	0 0	
Total 8 hour pedestrians delayed greater than 10 seconds	10   10	1 <sup> </sup> 6	2 4	0 0	
Factored volume of total pedestrians	20,005	25	0	0	
Factored volume of delayed pedestrians	30	8	8	0	
% Assigned to Crossing Rate	23%	34%	30%	100%	
Net 8 Hour Volume of Total Pedestrians	5				4,610
Net 8 Hour Volume of Delayed Pedestri	ans				12

Intersection: Ninth Line and Street "B"

Count Date: 2026 (Future Total)

#### **Justification 1: Minimum Vehicle Volumes**

**Restricted Flow Urban Conditions** 

luctification	Gi	uidance Ap	proach Lan	es	Percentage Warrant								Total	Section
Justification	1 La	nes	2 or Mor	e Lanes		Hour Ending								
Flow Condition	FREE FLOW	RESTR. FLOW	FREE FLOW	RESTR. FLOW	7:00	8:00	9:00	12:00	13:00	16:00	17:00	18:00		
14	480	720	600	900	1,357	1,357	1,357	1,357	1,357	1,357	1,357	1,357		
14		COMPL	IANCE %		100	100	100	100	100	100	100	100 I	800	100
48	180	255	180	255	11	11	l 11	11	11	11	11	   11		
ю		COMPL	IANCE %		4	4	4 	4	4	4	4	4 	35	4
Restricted Flow Signal Justification 1:				Both 1A and 1 Lesser of 1A o	Both 1A and 1B 100% Fulfilled each of 8 hours Yes N Lesser of 1A or 1B at least 80% fulfilled each of 8 hours Yes N									

Results Sheet

#### Justification 2: Delay to Cross Traffic

#### **Restricted Flow Urban Conditions**

lustification	Guidance Approach Lanes				Percentage Warrant							Total	Section	
Justification	1 lai	nes	Approach Lanes   Percentage Warrant     2 or More lanes   Hour Ending     REEE FLOW   RESTR. FLUW   7:00   8:00   9:00   12:00   13:00   16:00 </th <th></th> <th></th> <th>Across</th> <th>Percent</th>			Across	Percent							
Flow Condition		RESTR. FLOW	FREE FLOW	RESTR. FLOW	7:00	8:00	9:00	12:00	13:00	16:00	17:00	18:00		
	480	720	600	900	1,346	1,346	1,346	1,346	1,346	1,346	1,346	1,346		
24		COMPLI	IANCE %		100	100	100	100	100	100	1,346 i 1,346 i 1,346 100 i 100 i 100 8 i 8 i 8 	800	100	
28	50	75	50	75	8	8	8	8	8	8	8	8		
28		COMPLI	IANCE %		11	11	11	11	11	11	11	i	8  11 85	11
Restricted Flow				Both 2A and 2B 100% Fullfilled each of 8 hours Yes					No	•				
	Signal Justification 2:				Lesser of 2A o	r 2B at least 8	30% fulfilled	each of 8 hou	urs	Yes No			$\checkmark$	

#### **Justification 3: Combination**

#### Combination Justification 1 and 2

	Justification Satisfied 80% or Mo	Two Justifications Satisfied 80% or More			
Justification 1	Minimun Vehicular Volume	YES 🗖	NO 🔽	YES	NO 🔽
Justification 2	Delay Cross Traffic	YES	NO 🔽	1	NOT JUSTIFIED

#### **Justification 4: Four Hour Volume**

Justification	Time Period	Total Volume of Both Approaches (Main) X	Heaviest Minor Approach Y (actual)	Required Value	Average % Compliance	Overall % Compliance	
	7:00	1,346	11	80	14 %		
luctification 4	8:00	1,346	11	80	14 %	14.0/	
Justification 4	9:00	1,346	11	80	14 %	14 70	
	12:00	1,346	11	80	14 %		

Analysis Sheet

Ana	lysis	Sheet	
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Intersection: Ninth Line and Street "B"

Count Date: 2026 (Future Total)

Proposed Collision

#### **Justification 5: Collision Experience**

Justification Preceding Months		% Fulfillment	Overall % Compliance
	1-12	0 %	
Justification 5	13-24	0 %	0 %
	25-36	0 %	

#### **Justification 6: Pedestrian Volume**

#### Pedestrian Volume Analysis

	8 Hour Vehicular	Net 8 Hour Pedestrian Volume							
	Volume V <sub>8</sub>	< 200	200 - 275	276 - 475	476 - 1000	>1000			
	< 1440								
Justification	1440 - 2600					Justified			
6A	2601 - 7000								
	> 7000	+							

#### Pedestrian Delay Analysis

Net Total 8 Hour Volume		Net Total 8 Hour Volume of Delayed Pedestrians								
	of Total Pedestrians	< 75	75 - 130	> 130						
	< 200									
Justification 6B	200 - 300									
	> 300	Not Justified								

Input Sheet Results Sheet

<b>Results</b>	Sheet
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Analysis Sheet Input Sheet

**Proposed Collision** 

Intersection: Ninth Line and Street "B"

ure Total)

Summary	Results
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Justification		Compliance	Signal .	Justified?
			YES	NO
A	Total Volume	100 %		
в	Crossing Volume	4 %		
A	Main Road	100 %		
в	Crossing Road	11 %		
A	Justificaton 1	4 %		
в	Justification 2	<u> </u>		
		14 %		
		1		1
ienc	e	0 %		$\checkmark$
		1		1
A	Volume	Justification met		
B	Delay	Justification not met		•
	usti  A  B  A  A  A  B  A  A  A  B	ustification	Ustification Compliance   IA Total Volume 100 %   IB Crossing Volume 4 %   IA Main Road 100 %   IB Crossing Road 111 %   IA Justification 1 4 %   IB Justification 2 111 %   IA Justification 2 114 %   IB O %   IB Justification net Justification met   IB Justification net Justification net   IB Justification 1 Justification met   ID ID Justification met   ID Justification net Justification met   ID ID Justification not met	ustification Compliance Signal   IA Total Volume 100 %   IB Crossing Volume 4 %   IA Main Road 100 %   IA Main Road 100 %   IA Main Road 1100 %   IA Justificaton 1 4 %   IA Justification 2 11 %   IB Justification 2 11 %   Ience 0 % 1   Ience Justification met 1 1   Ience Justification not met 1 1

### Proposed Collision Justification (Justification 5A)

Return to Justifications 1-6

INPUT

a.- Intersection type (no input required):

3 –

b.- What year is the intersection being considered for traffic signals?

c.- What is the collision history and annual average daily traffic over the past few years? (Please fill in table below)

2004

		Traffic Volume	Impact Type/Year
	Year	Major Minor AADT AADT	Approach-I Angle Rear end Sideswipe SMV Other
ľ	2000	21626 3893	
ľ	2001	22059 3971	
ľ	2002	22500 4050	
	2003	23300 4200	
	2004	23648 6528	

If known, please enter the expected traffic volume after signals are introduced. Otherwise, leave the cell blank. Year Main AADT Minor AADT

2004 I

#### ANALYSIS

d.-

**Reducible Collisions** 

	2000	2001	2002	2003	2004	1	2004 (Signal)
Total Number of Crashes Per Year	8	9	9	10	10	I	
Parameter k	0.81	0.81	0.81	0.81	0.81	т — — — I	0.60
Model Prediction	1.46	1.50	1.53	1.59	2.15	1	2.15
Ci,y	0.680	0.696	0.712	0.741	1.000		1.000
Comp. Ratio for Period			3.8	329			1.000

#### Non-reducible Collisions

	2000	2001	2002	2003	2004	2004 (Signal)
Total Number of Crashes Per Year	6	7	8	7	4	
Parameter k	1.47	1.47	1.47	1.47	1.47	1.19
Model Prediction	1.17	1.18	1.20	1.23	1.38	1.38
C <sub>i,y</sub>	0.849	0.860	0.870	0.890	1.000	1.000
Comp. Ratio for Period			4.4	469		 1.000

	Reducible Collisions	Non- reducible Collisions
Total Number of Historical Crashes	46	32
Expected Annual Crashes without Signalization based on SPF	2.150	1.377
Expected Annual Crashes without Signalization	11.131	6.046
Variance of Expected Annual Crashes without Signalization	2.647	1.092
Expected Annual Crashes after Signalization based on SPF	2.089	3.286
Expected Annual Crashes after Signalization	10.813	14.425
Variance of Expected Annual Crashes after Signalization	194.857	174.867

	Reducible Collisions	Non- reducible Collisions
Weights for Unsignalized Intersections	0.27	0.18
Weights for Signalized Intersections	0.29	0.25

#### RESULTS

	Justification	I I	Compliance	-	Signa YES	Just	ified?
5. C E	ollision xperience	 	Net Safety Change 2.648 Total Collisions will <b>Increase</b> after this intersection is signalized	 : 		1	•

Input Data Sheet			Proposed Collision		
What are the intersecting roadways? Ni	r		Results Shee	t	
What is the direction of the Main Road street?			20	26 (Future Total)	
					ļ
Justification 1 - 4: Volume Warrants					
a Number of lanes on the Main Road?	1 -				
b Number of lanes on the Minor Road?	1				
c How many approaches? 3					
d What is the operating environment?	Urban 🔻	Population >= 10,000	AND Speed < 70 km	/hr	
e What is the eight hour vehicle volume at the i	ntersection? (Please fil	ll in table below)			

Hour Ending	-	Main LT	Nor	rthbound TH	l Apr	oroaci RT	h . — -	Mi	nor T	East	boun TH	d Ap	opro	ach RT	_	N	lain LT	Sout	hboun TH	d Ap	pro	ach RT		Min	or We	estbo T	und / H	Appro	RT	- c	Pedes rossii Ro	trians ng Main ad
7:00		9		638		0		1	7		0			10			0		651			16		0	1	(	)	1	0	Т	(	)
8:00	-	9	П.	638	Υ.	0		1	7	T I	0	_	6.7	10	-  -	_	0	7.0	651	-		16	- -	0		(	) <sup>—</sup>	η –	0	Ť	· - (	5
9:00	-	9	$\square$	638	ТС.	- 0		1	7	$\mathcal{T}$	0	- 1	C 1	10	-  -		0	7.0	651			16	- -	0		(	) —	7 7	0	† -	· - (	
12:00	-	9	$\square$	638	ΠĽ.	0		1	7	T i	- 0	_	C 7	10	-  -		0	7 0	651	-		16	- -	0			) —	-i -	0	+ -	· - (	
13:00	-	-9-	$\mathbb{T}$	638	Π.	- 0		1	7	Τ.	- 0	_	C 7	10	-  -		0	7.0	651	-		16	- -	0		(	-	η Ξ	0	+ -	· - (	
16:00	-	- <u>`</u> -	1	638	Π.			1	7	Π.		- 1	C	10	-  -		0	- C	651	-		16	- -				-			† -	· - (	<u> </u>
17:00	-	-ğ-	$\overline{\mathbf{n}}$	638	11			$-\frac{1}{1}$		10.0	- 0	- 1	<u>, s</u>	10	-  -		0	7.0	651	-		16	- -	·			<u>_</u>		<u> </u>	+ -	· - )	<u> </u>
18:00	-	-9 -	÷.	638	÷Ŷ.			$-\frac{1}{1}$	7 -	Ť.	- 0	- 1	<u> </u>	10	-  -		0	- 6	651	-		16	- -	· _0	i		<u>_</u>	÷-	-0-	+ -	· - )	5
Total		72	1	5,104	1	0		13	36	Ι	0	I		80			0	1	5,20	8		128		0	I		)	1	0		(	)

#### **Justification 5: Collision Experience**

Preceding Months	Number of Collisions*
1-12	0
13-24	0 0
25-36	0 0

\* Include only collisions that are susceptable to correction through the installation of traffic signal control

#### **Justification 6: Pedestrian Volume**

a.- Please fill in table below summarizing total pedestrians crossing major roadway at the intersection or in proximity to the intersection (zones). Please reference Section 4.8 of the Manual for further explanation and graphical representation.

	Zone 1 Assisted Unassisted	Zone 2 Assisted Unassisted	Zone 3 (if needed) Assisted Unassisted	Zone 4 (if needed) Assisted Unassisted	Total					
Total 8 hour pedestrian volume	10,000 <sup> </sup> 5	10   5	0 0	0 0						
Factored 8 hour pedestrian volume	20,005	25	0	0						
% Assigned to crossing rate	23%	34%	30%	100%						
Net 8 Hour Pedestrian Volume at Cross	sing			<u>.</u>	4,610					
Net 8 Hour Vehicular Volume on Street Being Crossed										

b.- Please fill in table below summarizing delay to pedestrians crossing major roadway at the intersection or in proximity to the intersection (zones). Please reference Section 4.8 of the Manual for further explanation and graphical representation.

	Zone 1	Zone 2	Zone 3 (if needed)	Zone 4 (if needed)	Total					
	Assisted   Unassisted	Assisted   Unassisted	Assisted   Unassisted	Assisted   Unassisted	Total					
Total 8 hour pedestrian volume	10,000 5	10 5	0 0	0 0						
Total 8 hour pedestrians delayed greater than 10 seconds	10 10	1 6	2 4	0 0						
Factored volume of total pedestrians	20,005	25	0	0						
Factored volume of delayed pedestrians	30	8	8	0						
% Assigned to Crossing Rate	23%	34%	30%	100%						
Net 8 Hour Volume of Total Pedestrian	5				4,610					
Net 8 Hour Volume of Delayed Pedestrians										

Intersection: Ninth Line and Street "K"

Count Date: 2026 (Future Total)

#### Justification 1: Minimum Vehicle Volumes

**Restricted Flow Urban Conditions** 

luctification	Gi	uidance Ap	proach Lan	es	Percentage Warrant									Section
Justineation	1 La	nes	2 or Mor	e Lanes				Hour Er	ding				Across	Percent
Flow Condition	FREE FLOW	RESTR. FLOW	FREE FLOW	RESTR. FLOW	7:00	8:00	9:00	12:00	13:00	16:00	17:00	18:00		
	480	720	600	900	1,341	1,341	1,341	1,341	1,341	1,341	1,341	1,341		
		COMPL	IANCE %		100	100	100	100	100	100	100	100 I	800	100
48	180	255	180	255	27	27	27	27	27	27	27	27		
в	COMPLIANCE %				11	11	11	11	11	11	11	1 11	85	11
Restricted Flow Signal Justification 1:				Both 1A and 1B 100% Fullfilled each of 8 hours Yes N Lesser of 1A or 1B at least 80% fulfilled each of 8 hours Yes N								2		

#### Justification 2: Delay to Cross Traffic

#### **Restricted Flow Urban Conditions**

lugtification	Gu	idance Ap	proach Lane	es	Percentage Warrant									Section
Justification	1 lanes 2 or More lanes Hour Ending										Across	Percent		
Flow Condition		RESTR. FLOW	FREE FLOW	RESTR. FLOW	7:00	8:00	9:00	12:00	13:00	16:00	17:00	18:00		
24	480	720	600	900	1,314	1,314	1,314	1,314	1,314	1,314	1,314	1,314		
24		COMPLI	IANCE %		100	100	100	100	100	100	100	100 I	800	100
28	50	75	50	75	17	17	17 17	17	17	17	17	   17		
26	COMPLIANCE %				23	23	23	23	23	23	23	23	181	23
Restricted Flow Signal Justification 2:					Both 2A and 2B 100% Fullfilled each of 8 hours Lesser of 2A or 2B at least 80% fulfilled each of 8 hours							No No	2	

#### **Justification 3: Combination**

#### Combination Justification 1 and 2

	Justification Satisfied 80% or Mo	Two Jus Satisfied 8	tifications 0% or More		
Justification 1	Minimun Vehicular Volume	YES 🗖	NO 🔽	YES	NO 🔽
Justification 2	Delay Cross Traffic	YES	NO 🔽	1	NOT JUSTIFIED

#### **Justification 4: Four Hour Volume**

Justification	Time Period	Total Volume of Both Approaches (Main)	Heaviest Minor Approach Y (actual)	Required Value	Average % Compliance	Overall % Compliance
	7:00	1,314	27	80	34 %	
luctification 4	8:00	1,314	27	80	34 %	24.9/
Justification 4	9:00	1,314	27	80	34 %	34 %
	12:00	1,314	27	80	34 %	

### **Analysis Sheet**

Input Sheet

GO TO Justification:

Intersection: Ninth Line and Street "K"

Count Date: 2026 (Future Total)

#### **Justification 5: Collision Experience**

Justification	Preceding Months	% Fulfillment	Overall % Compliance	
	1-12	0 %		
Justification 5	13-24	0 %	0 %	
	25-36	0 %		

#### **Justification 6: Pedestrian Volume**

#### Pedestrian Volume Analysis

8 Hour Vehicular Volume V <sub>8</sub>		Net 8 Hour Pedestrian Volume							
		< 200	200 - 275	276 - 475	476 - 1000	>1000			
	< 1440								
Justification 6A	1440 - 2600					Justified			
	2601 - 7000								
	> 7000								

#### Pedestrian Delay Analysis

Net Total 8 Hour Volume of Total Pedestrians		Net Total 8 Hour Volume of Delayed Pedestrians							
		< 75	75 - 130	> 130					
	< 200								
Justification 6B	200 - 300								
	> 300	Not Justified							

#### **Results Sheet**

Analysis Sheet Input Sheet

**Proposed Collision** 

Intersection: Ninth Line and Street "K"

ure Total)

#### **Summary Results**

Justification		Compliance	Signal J	ustified?
			YES	NO
<b>A</b>	Total Volume	100 %		
в	Crossing Volume	11 %		Ţ
A	Main Road	100 %		
в	Crossing Road	23 %		•
A	Justificaton 1	11 %		
в	Justification 2	<u> </u>		~
		34 %		<b>V</b>
		1		
ienc	e	0 %		✓
<b>A</b>	Volume	Justification met		
B	Delay	Justification not met		
	usti  A  B  A  A  B rrience  A  B  B	ustification	ustification Compliance   IA Total Volume 100 %   IB Crossing Volume 111 %   IA Main Road 100 %   IB Crossing Road 23 %   IB Crossing Road 23 %   IB Grossing Road 23 %   IB Justification 1 111 %   IB Justification 2 23 %   I 34 %   I 34 %   I Justification met Justification met   IB Delay Justification not met	Ustification Compliance Signal Jury (Signal Jury)   IA Total Volume 100 %   IB Crossing Volume 111 %   IA Main Road 100 %   IB Crossing Road 23 %   IA Justification 1 111 %   IB Grossing Road 23 %   IA Justification 2 23 %   IA Justification 2 34 %   IB Justification ret Justification ret   IB Justification ret Image: Signal Justification ret

### Proposed Collision Justification (Justification 5A)

Return to Justifications 1-6

INPUT

a.- Intersection type (no input required):

3 –

b.- What year is the intersection being considered for traffic signals?

c.- What is the collision history and annual average daily traffic over the past few years? (Please fill in table below)

2004

		Traffic Volume	Impact Type/Year
	Year	Major Minor AADT AADT	Approach-I Angle Rear end Sideswipe SMV Other
ľ	2000	21626 3893	
ľ	2001	22059 3971	
ľ	2002	22500 4050	
	2003	23300 4200	
	2004	23648 6528	

If known, please enter the expected traffic volume after signals are introduced. Otherwise, leave the cell blank. Year Main AADT Minor AADT

2004 I

#### ANALYSIS

d.-

**Reducible Collisions** 

	2000	2001	2002	2003	2004	1	2004 (Signal)
Total Number of Crashes Per Year	8	9	9	10	10	I	
Parameter k	0.81	0.81	0.81	0.81	0.81	т — — — I	0.60
Model Prediction	1.46	1.50	1.53	1.59	2.15	1	2.15
Ci,y	0.680	0.696	0.712	0.741	1.000		1.000
Comp. Ratio for Period			3.8	329			1.000

#### Non-reducible Collisions

	2000	2001	2002	2003	2004	2004 (Signal)
Total Number of Crashes Per Year	6	7	8	7	4	
Parameter k	1.47	1.47	1.47	1.47	1.47	1.19
Model Prediction	1.17	1.18	1.20	1.23	1.38	1.38
C <sub>i,y</sub>	0.849	0.860	0.870	0.890	1.000	1.000
Comp. Ratio for Period			4.4	469		 1.000

	Reducible Collisions	Non- reducible Collisions
Total Number of Historical Crashes	46	32
Expected Annual Crashes without Signalization based on SPF	2.150	1.377
Expected Annual Crashes without Signalization	11.131	6.046
Variance of Expected Annual Crashes without Signalization	2.647	1.092
Expected Annual Crashes after Signalization based on SPF	2.089	3.286
Expected Annual Crashes after Signalization	10.813	14.425
Variance of Expected Annual Crashes after Signalization	194.857	174.867

	Reducible Collisions	Non- reducible Collisions
Weights for Unsignalized Intersections	0.27	0.18
Weights for Signalized Intersections	0.29	0.25

#### RESULTS

	Justification	I I	Compliance	-	Signa YES	Just	ified?
5. C E	ollision xperience	 	Net Safety Change 2.648 Total Collisions will <b>Increase</b> after this intersection is signalized	 : 		1	•

Input Data Sheet			Proposed Collision					
What are the intersecting roadways? Ni	n		Results She	et				
What is the direction of the Main Road street?				2026 (Future Total)				
Justification 1 - 4: Volume Warrants								
a Number of lanes on the Main Road?	1 -							
b Number of lanes on the Minor Road?	1							
c How many approaches? 4								
d What is the operating environment?	Urban 👻	Population >= 10,000	AND Speed < 70 k	m/hr				
e What is the eight hour vehicle volume at the intersection? (Please fill in table below)								

Hour Ending	Agence Approach	LT I TH RT	Main Southbound Approach LT I TH RT	Minor Westbound Approach TT	Pedestrians Crossing Main Road
7:00	11 617 26	12 0 17	20 614 40	19 0 23	0
8:00	11 617 26	12 0 17	20 614 40	19 0 23	0
9:00	11 617 26	12 0 17	20 614 40	19 0 23	0
12:00			20 614 40		0 0
13:00			20 614 40		0
16:00			20 614 40	19 0 23	0 0
17:00			20 614 40		0
18:00			20 614 40	19 0 23	0
Total	88   4,936   208	96 0 136	160   4,912   320	152 0 184	0

#### **Justification 5: Collision Experience**

Preceding Months	Number of Collisions*
1-12	0
13-24	0
25-36	0 0

\* Include only collisions that are susceptable to correction through the installation of traffic signal control

#### **Justification 6: Pedestrian Volume**

a.- Please fill in table below summarizing total pedestrians crossing major roadway at the intersection or in proximity to the intersection (zones). Please reference Section 4.8 of the Manual for further explanation and graphical representation.

	Zone 1 Assisted Unassisted	Zone 2 Assisted Unassisted	Zone 3 (if needed) Assisted Unassisted	Zone 4 (if needed) Assisted Unassisted	Total		
Total 8 hour pedestrian volume	10,000 <sup> </sup> 5	10   5	0 0	0 0			
Factored 8 hour pedestrian volume	20,005	25	0	0			
% Assigned to crossing rate	23%	34%	30%	100%			
Net 8 Hour Pedestrian Volume at Crossing							
Net 8 Hour Vehicular Volume on Street Being Crossed							

b.- Please fill in table below summarizing delay to pedestrians crossing major roadway at the intersection or in proximity to the intersection (zones). Please reference Section 4.8 of the Manual for further explanation and graphical representation.

	Zone 1	Zone 2	Zone 3 (if needed)	Zone 4 (if needed)	Tatal		
	Assisted   Unassisted	Assisted   Unassisted	Assisted Unassisted	Assisted Unassisted	Iotal		
Total 8 hour pedestrian volume	10,000 5	10 5	0 0	0 0			
Total 8 hour pedestrians delayed greater than 10 seconds	10   10	1 <sup> </sup> 6	2 4	0 0			
Factored volume of total pedestrians	20,005	25	0	0			
Factored volume of delayed pedestrians	30	8	8	0			
% Assigned to Crossing Rate	23%	34%	30%	100%			
Net 8 Hour Volume of Total Pedestrians							
Net 8 Hour Volume of Delayed Pedestri	ans				12		

### **Analysis Sheet**

Intersection: Ninth Line and Street "O" / Foxwood Avenue

Count Date: 2026 (Future Total)

Justification 1: Minimum Vehicle Volumes

Restricted Flow Urban Conditions

luctification	Gi	uidance Ap	proach Lan	es		Percentage Warrant						Total	Section	
Justification	1 Lanes 2 or More La		e Lanes	Hour Ending							Across	Percent		
Flow Condition	FREE FLOW	RESTR. FLOW	FREE FLOW	RESTR. FLOW	7:00	8:00	9:00	12:00	13:00	16:00	17:00	18:00		
1A	480	720	600	900	1,399	1,399	1,399	1,399	1,399	1,399	1,399	   1,399		
	COMPLIANCE %			100	100	100	100	100 IIII	100 IIII	100 IIII	100 I	800	100	
10	120	170	120	170	71	71	1 71	1 71	1 71	1 71	1 71	   71		
18	COMPLIANCE %			42	42	42	42	42	42	42	42	334	42	
Restricted Flow Signal Justification 1:			Both 1A and 1B 100% Fulfilled each of 8 hours Yes No Lesser of 1A or 1B at least 80% fulfilled each of 8 hours Yes No					2						

#### Justification 2: Delay to Cross Traffic

**Restricted Flow Urban Conditions** 

Justification -	Gi	uidance Ap	proach Lan	es		Percentage Warrant						Total	Section	
Justification	1 lanes		2 or Mo	2 or More lanes		Hour Ending							Across	Percent
Flow Condition	FREE FLOW	RESTR. FLOW	FREE FLOW	RESTR. FLOW	7:00	8:00	9:00	12:00	13:00	16:00	17:00	18:00		
2A	480	720	600	900	1,328	1,328	1,328	1,328	1,328	1,328	1,328	1,328		
	COMPLIANCE %			100	100	100	100	100	100	100	100	800	100	
28	50	75	50	75	31	31	31	31	31	31	31	31		
28	COMPLIANCE %			41	41	41	41	41	41	41	41	331	41	
Restricted Flow			Both 2A and 2B 100% Fullfilled each of 8 hours Yes				No	•						
	Signal Justification 2:			Lesser of 2A o	Lesser of 2A or 2B at least 80% fulfilled each of 8 hours			Yes No			$\checkmark$			

#### **Justification 3: Combination**

#### Combination Justification 1 and 2

	Justification Satisfied 80% or Mo	Two Just Satisfied 8	ifications 0% or More		
Justification 1	Minimun Vehicular Volume	YES 🗖	NO 🔽	YES	NO 🔽
Justification 2	Delay Cross Traffic	YES	NO 🔽	1	NOT JUSTIFIED

#### **Justification 4: Four Hour Volume**

Justification	Time Period	Total Volume of Both Approaches (Main)	Heaviest Minor Approach Y (actual)	Required Value	Average % Compliance	Overall % Compliance	
	7:00	1,341	42	80	53 %		
luctification 4	8:00	1,341	42	80	53 %	F2 9/	
Justification 4	9:00	1,341	42	80	53 %	53 %	
	12:00	1,341	42	80	53 %		

Input Sheet

GO TO Justification:

Intersection: Ninth Line and Street "O" / Foxwood Avenue

Count Date: 2026 (Future Total)

#### **Justification 5: Collision Experience**

Justification	Preceding Months	% Fulfillment	Overall % Compliance
	1-12	0 %	
Justification 5	13-24	0 %	0 %
	25-36	0 %	

#### **Justification 6: Pedestrian Volume**

#### Pedestrian Volume Analysis

8 Hour Vehicular Volume V <sub>8</sub>		Net 8 Hour Pedestrian Volume						
		< 200	200 - 275	276 - 475	476 - 1000	>1000		
	< 1440							
Justification	1440 - 2600		1			Justified		
6A	2601 - 7000		+	+				
	> 7000							

#### Pedestrian Delay Analysis

Net Total 8 Hour Volume of Total Pedestrians		Net Total 8 Hour Volume of Delayed Pedestrians						
		< 75	75 - 130	> 130				
	< 200							
Justification 6B	200 - 300							
	> 300	Not Justified						

Results Sheet		Analysis S	Analysis Sheet Proposed Collision					
Intersection: N	linth Line and Street "O" / F		lowert Ob and					
Summary Results								
	Justification							
1. Minimum Vehicular Volume	A Total Volume							
2. Delay to Cross	A Main Road							
3. Combination	B Crossing Road	41 % 42 %						
	B Justification 2	41 %						
4. 4-Hr Volume		53 %						
			I					
5. Collision Expe	erience	0 %						
		1						
6. Pedestrians	<sup>I</sup> A Volume I – – – – – – – – – – – – – – – – – – –	Justification met						
	-							

### Proposed Collision Justification (Justification 5A)

Return to Justifications 1-6

INPUT

a.- Intersection type (no input required):

3 –

b.- What year is the intersection being considered for traffic signals?

c.- What is the collision history and annual average daily traffic over the past few years? (Please fill in table below)

2004

		Traffic Volume	Impact Type/Year
	Year	Major Minor AADT AADT	Approach- Angle Rear end Sideswipe Turning SMV Other
ľ	2000	21626 3893	
ľ	2001	22059 3971	
ľ	2002	22500 4050	
	2003	23300 4200	
	2004	23648 6528	

If known, please enter the expected traffic volume after signals are introduced. Otherwise, leave the cell blank. Year Main AADT Minor AADT

2004 I

#### ANALYSIS

d.-

**Reducible Collisions** 

	2000	2001	2002	2003	2004	1	2004 (Signal)
Total Number of Crashes Per Year	8	9	9	10	10	I	
Parameter k	0.81	0.81	0.81	0.81	0.81	т — — — I	0.60
Model Prediction	1.46	1.50	1.53	1.59	2.15	1	2.15
Ci,y	0.680	0.696	0.712	0.741	1.000		1.000
Comp. Ratio for Period			3.8	329			1.000

#### Non-reducible Collisions

	2000	2001	2002	2003	2004	2004 (Signal)
Total Number of Crashes Per Year	6	7	8	7	4	
Parameter k	1.47	1.47	1.47	1.47	1.47	1.19
Model Prediction	1.17	1.18	1.20	1.23	1.38	1.38
C <sub>i,y</sub>	0.849	0.860	0.870	0.890	1.000	1.000
Comp. Ratio for Period			4.4	469		 1.000

	Reducible Collisions	Non- reducible Collisions
Total Number of Historical Crashes	46	32
Expected Annual Crashes without Signalization based on SPF	2.150	1.377
Expected Annual Crashes without Signalization	11.131	6.046
Variance of Expected Annual Crashes without Signalization	2.647	1.092
Expected Annual Crashes after Signalization based on SPF	2.089	3.286
Expected Annual Crashes after Signalization	10.813	14.425
Variance of Expected Annual Crashes after Signalization	194.857	174.867

	Reducible Collisions	Non- reducible Collisions
Weights for Unsignalized Intersections	0.27	0.18
Weights for Signalized Intersections	0.29	0.25

#### RESULTS

	Justification		Compliance	-	Signa YES	l Just	tified?
5. C E	ollision xperience	 	Net Safety Change 2.648 Total Collisions will <i>Increase</i> after this intersection is signalized	 : 			۷

## ATTACHMENT C

### LEFT-TURN LANE WARRANT WORKSHEETS



Figure EA-18



Figure EA-18



Figure EA-18

### ATTACHMENT D

RECOMMENDED EXTERNAL ROADWAY IMPROVEMENTS





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