

## APPENDIX A – TRAFFIC DATA

**Location.....** Pelham Street @ Quaker Road

**GeolD.....** 00488

**Municipality.** PELHAM

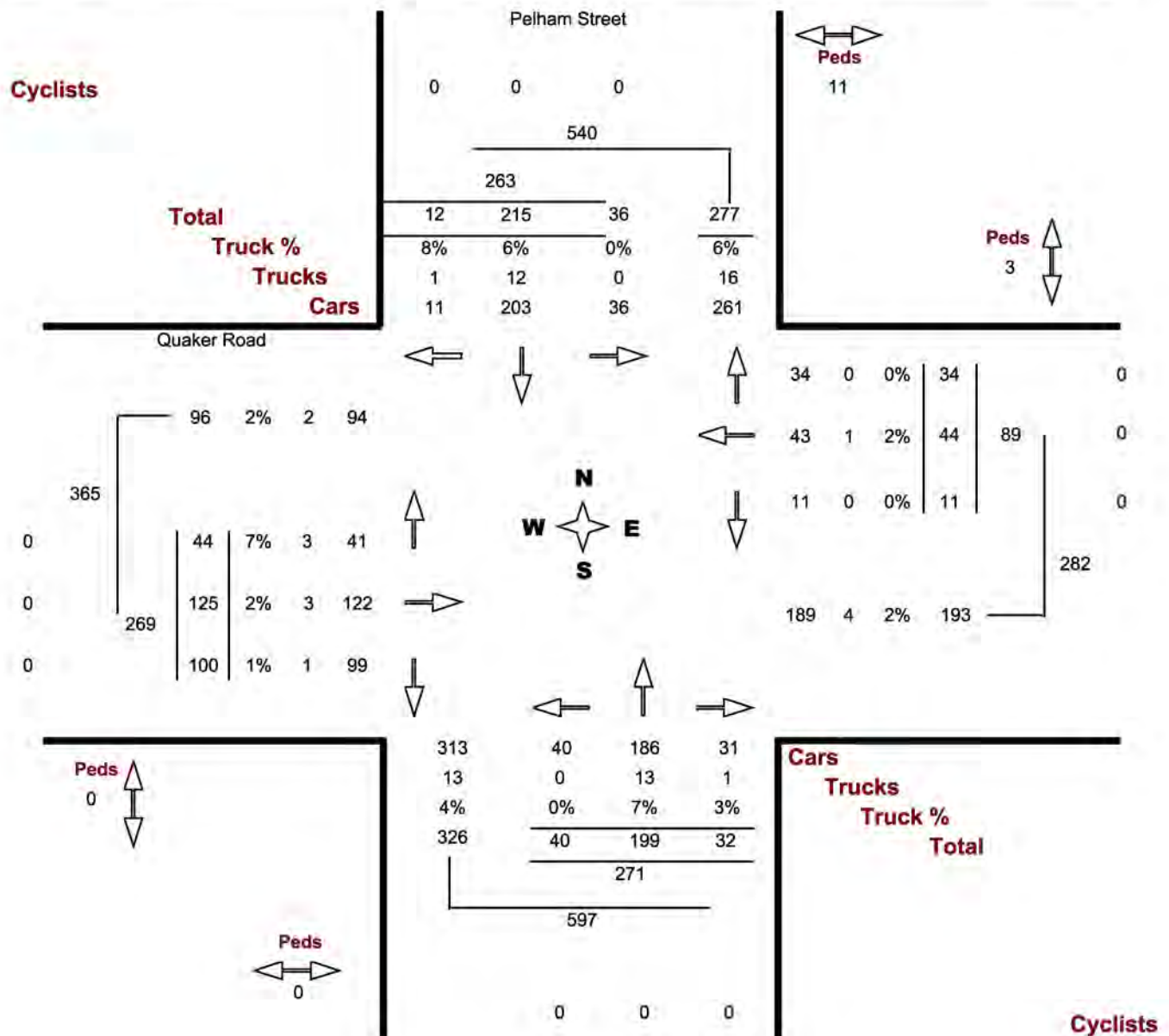
**Count Date.** Monday, 23 July, 2012

**Traffic Cont.** Traffic signal

**Count Time.** 07:00 AM — 09:00 AM

**Major Dir.....** None

**Peak Hour..** 08:00 AM — 09:00 AM



**Location.....** Pelham Street @ Quaker Road

**GeoID.....** 00488

**Municipality.** PELHAM

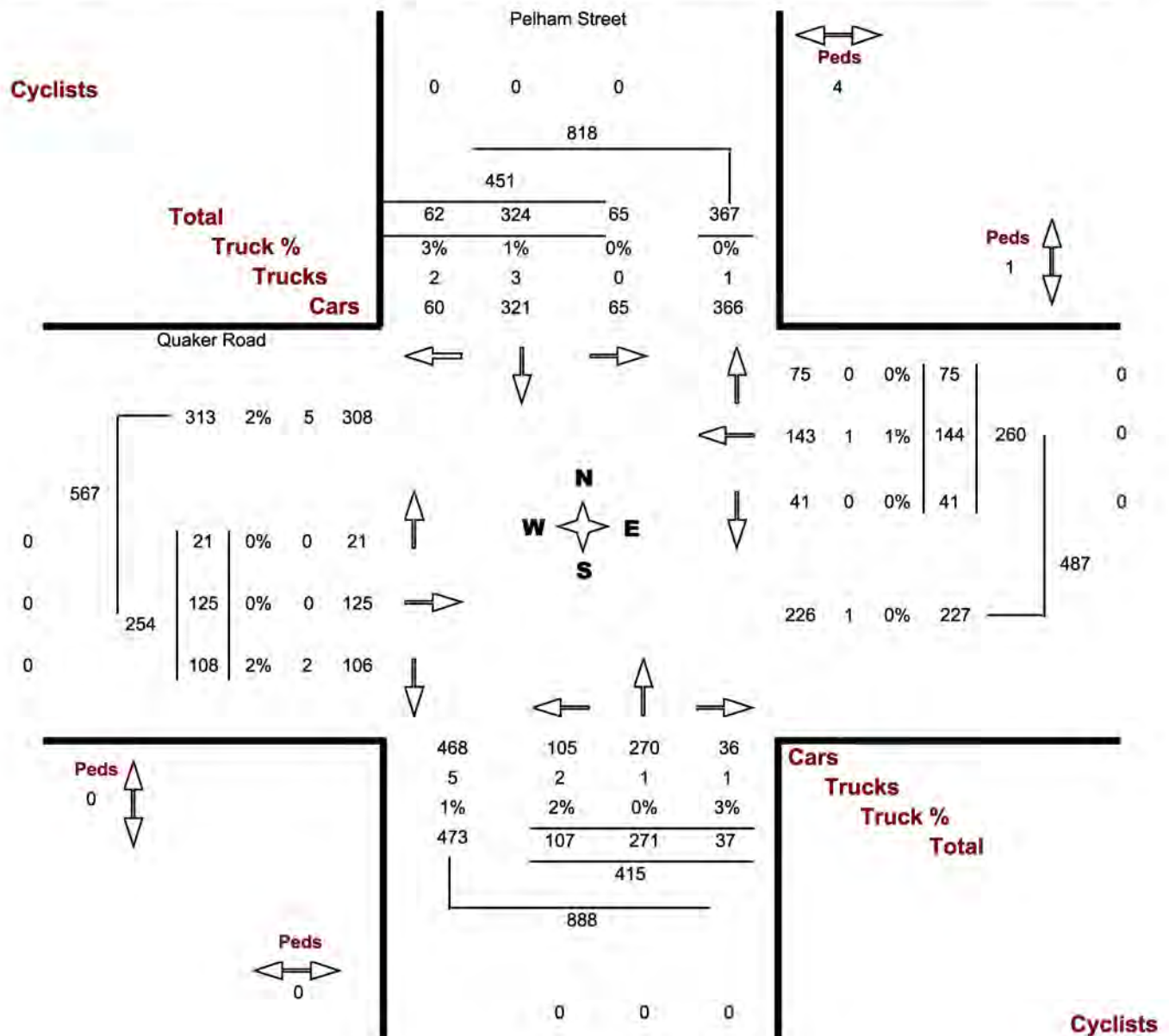
**Count Date.** Monday, 23 July, 2012

**Traffic Cont.** Traffic signal

**Count Time.** 03:00 PM — 06:00 PM

**Major Dir.....** None

**Peak Hour..** 05:00 PM — 06:00 PM



# Quaker Rd @ Rice Rd

## Morning Peak Diagram

### Specified Period

From: 7:00:00

To: 9:00:00

### One Hour Peak

From: 8:00:00

To: 9:00:00

**Municipality:** Welland

**Site #:** 0000000004

**Intersection:** Rice Rd & Quaker Rd

**TFR File #:** 4

**Count date:** 14-Sep-2022

### Weather conditions:

Clear/Dry

### Person(s) who counted:

Cam

### \*\* Non-Signalized Intersection \*\*

**Major Road:** Rice Rd runs N/S

North Leg Total: 682

North Entering: 332

North Peds: 0

Peds Cross:  $\times$

Heavys	7	9	2	18
Trucks	1	1	0	2
Cars	41	246	25	312
Totals	49	256	27	

Heavys	5
Trucks	4
Cars	341
Totals	350

East Leg Total: 416

East Entering: 160

East Peds: 0

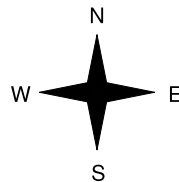
Peds Cross:  $\times$

Heavys	Trucks	Cars	Totals
12	1	153	166



Quaker Rd

Heavys	Trucks	Cars	Totals
2	1	72	75
2	0	151	153
5	0	67	72
9	1	290	



Rice Rd

Cars	Trucks	Heavys	Totals
19	0	1	20
79	0	1	80
58	0	2	60
156	0	4	

Quaker Rd



Cars	Trucks	Heavys	Totals
247	1	8	256

Peds Cross:  $\times$

West Peds: 0

West Entering: 300

West Leg Total: 466

Cars	371	Cars	33	250	71	354
Trucks	1	Trucks	0	3	1	4
Heavys	16	Heavys	4	2	4	10
Totals	388	Totals	37	255	76	



Peds Cross:  $\times$

South Peds: 0

South Entering: 368

South Leg Total: 756

### Comments

# Quaker Rd @ Rice Rd

## Afternoon Peak Diagram

### Specified Period

From: 15:00:00

To: 18:00:00

### One Hour Peak

From: 16:00:00

To: 17:00:00

**Municipality:** Welland

**Site #:** 0000000004

**Intersection:** Rice Rd & Quaker Rd

**TFR File #:** 4

**Count date:** 14-Sep-2022

### Weather conditions:

Clear/Dry

### Person(s) who counted:

Cam

### \*\* Non-Signalized Intersection \*\*

**Major Road:** Rice Rd runs N/S

North Leg Total: 736

North Entering: 367

North Peds: 0

Peds Cross:  $\times$

Heavys	0	4	0	4
Trucks	1	2	0	3
Cars	55	283	22	360
Totals	56	289	22	



Heavys	4
Trucks	1
Cars	364
Totals	369

East Leg Total: 620

East Entering: 332

East Peds: 0

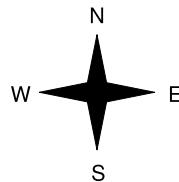
Peds Cross:  $\times$

Heavys	Trucks	Cars	Totals
4	4	362	370



Quaker Rd

Heavys	Trucks	Cars	Totals
1	0	92	93
1	0	201	202
2	0	51	53
4	0	344	



Rice Rd



Cars	Trucks	Heavys	Totals
33	0	0	33
224	2	2	228
71	0	0	71
328	2	2	

Quaker Rd



Cars	Trucks	Heavys	Totals
287	0	1	288

Peds Cross:  $\times$

West Peds: 0

West Entering: 348

West Leg Total: 718

Cars	405
Trucks	2
Heavys	6
Totals	413



Cars	83	239	64	386
Trucks	1	1	0	2
Heavys	2	3	0	5
Totals	86	243	64	

Peds Cross:  $\times$

South Peds: 0

South Entering: 393

South Leg Total: 806

### Comments

# Quaker Rd @ First Ave

## Morning Peak Diagram

### Specified Period

From: 7:00:00

To: 9:00:00

### One Hour Peak

From: 8:00:00

To: 9:00:00

**Municipality:** Welland

**Site #:** 0000000001

**Intersection:** Quaker Rd & First Ave

**TFR File #:** 1

**Count date:** 2-Nov-2022

### Weather conditions:

Cloudy/Dry

### Person(s) who counted:

Cam

### \*\* Non-Signalized Intersection \*\*

**Major Road:** Quaker Rd runs W/E

North Leg Total: 304

North Entering: 161

North Peds: 0

Peds Cross:  $\times$

Heavys	0	0	1	1
Trucks	0	1	0	1
Cars	16	137	6	159
Totals	16	138	7	



Heavys 3

Trucks 0

Cars 140

Totals 143

East Leg Total: 636

East Entering: 311

East Peds: 0

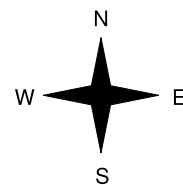
Peds Cross:  $\times$

Heavys	Trucks	Cars	Totals
10	2	222	234



Quaker Rd

Heavys	Trucks	Cars	Totals
0	0	25	25
9	2	195	206
4	0	33	37
13	2	253	



First Ave

Cars	Trucks	Heavys	Totals
6	0	1	7
154	2	8	164
132	0	8	140
292	2	17	

Quaker Rd



Cars	Trucks	Heavys	Totals
306	3	16	325

Peds Cross:  $\times$

West Peds: 0

West Entering: 268

West Leg Total: 502

Cars	302	Cars	52	109	105	266
Trucks	1	Trucks	0	0	1	1
Heavys	12	Heavys	2	2	6	10
Totals	315	Totals	54	111	112	



Peds Cross:  $\times$

South Peds: 0

South Entering: 277

South Leg Total: 592

## Comments

# Quaker Rd @ First Ave

## Afternoon Peak Diagram

### Specified Period

From: 14:00:00

To: 19:00:00

### One Hour Peak

From: 16:15:00

To: 17:15:00

**Municipality:** Welland

**Site #:** 0000000001

**Intersection:** Quaker Rd & First Ave

**TFR File #:** 1

**Count date:** 2-Nov-2022

### Weather conditions:

Cloudy/Dry

### Person(s) who counted:

Cam

### \*\* Non-Signalized Intersection \*\*

**Major Road:** Quaker Rd runs W/E

North Leg Total: 368

North Entering: 196

North Peds: 0

Peds Cross:  $\nlessgtr$

Heavys	0	0	0	0
Trucks	1	1	0	2
Cars	35	147	12	194
Totals	36	148	12	



Heavys 0

Trucks 1

Cars 171

Totals 172

East Leg Total: 845

East Entering: 425

East Peds: 0

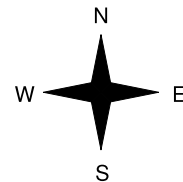
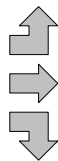
Peds Cross:  $\nlessgtr$

Heavys	Trucks	Cars	Totals
0	2	345	347



Quaker Rd

Heavys	Trucks	Cars	Totals
0	0	26	26
1	1	243	245
0	0	35	35
1	1	304	



First Ave



Cars	Trucks	Heavys	Totals
15	0	0	15
281	1	0	282
121	0	7	128
417	1	7	

Quaker Rd



Cars	Trucks	Heavys	Totals
412	2	6	420

Peds Cross:  $\nlessgtr$

West Peds: 0

West Entering: 306

West Leg Total: 653

Cars	303	Cars	29	130	157	316
Trucks	1	Trucks	0	1	1	2
Heavys	7	Heavys	0	0	5	5
Totals	311	Totals	29	131	163	



Peds Cross:  $\nlessgtr$

South Peds: 0

South Entering: 323

South Leg Total: 634

## Comments

**Location.....** Niagara Street @ Quaker Road

**GeolD.....** 00838

**Municipality.** WELLAND

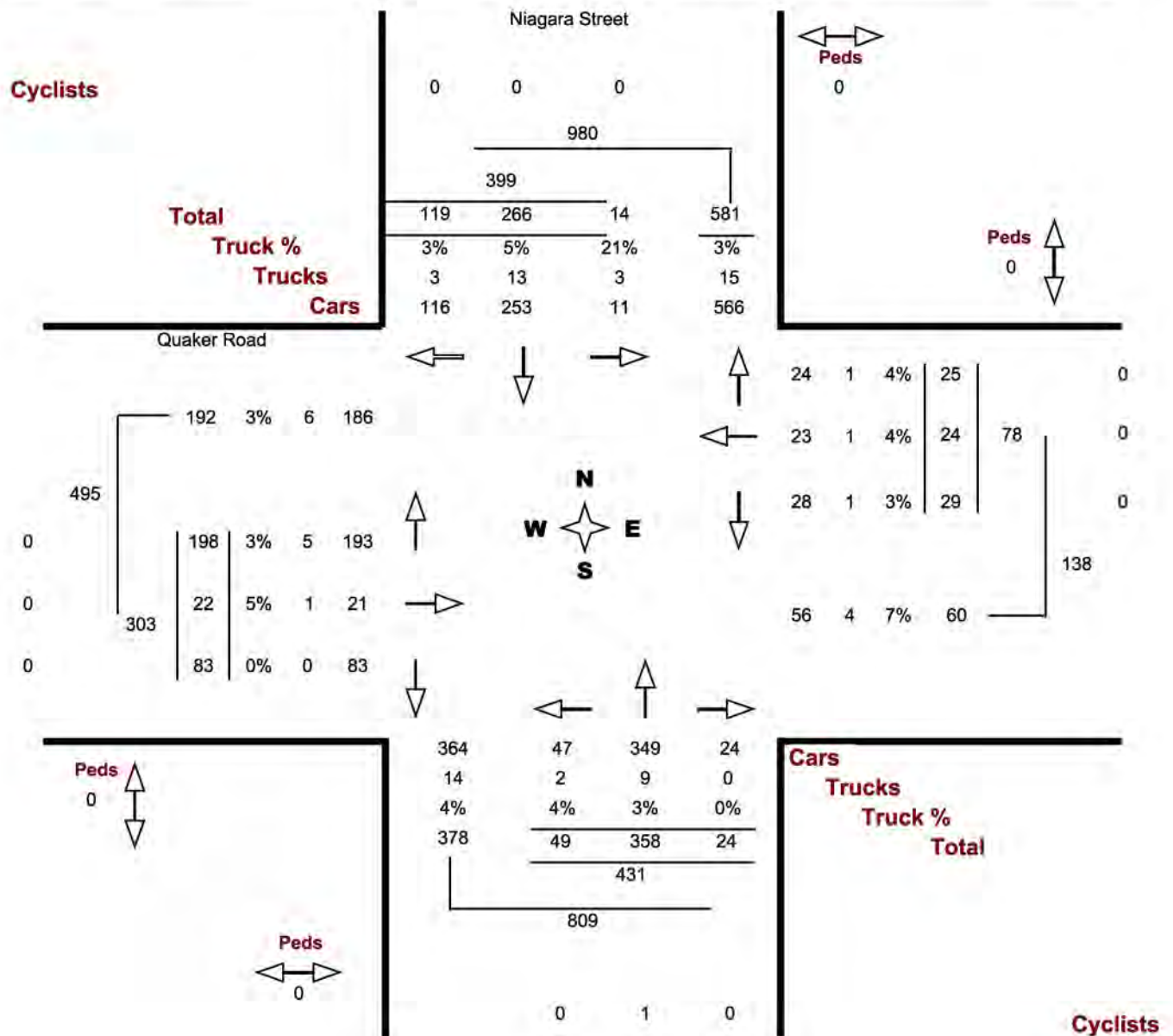
**Count Date.** Tuesday, 08 August, 2023

**Traffic Cont.**

**Count Time.** 07:00 AM — 09:00 AM

**Major Dir.....** North south

**Peak Hour..** 08:00 AM — 09:00 AM





### Turning Movements Report - PM Period

**Location.....** Niagara Street @ Quaker Road

**GeolD.....** 00838

**Municipality.** WELLAND

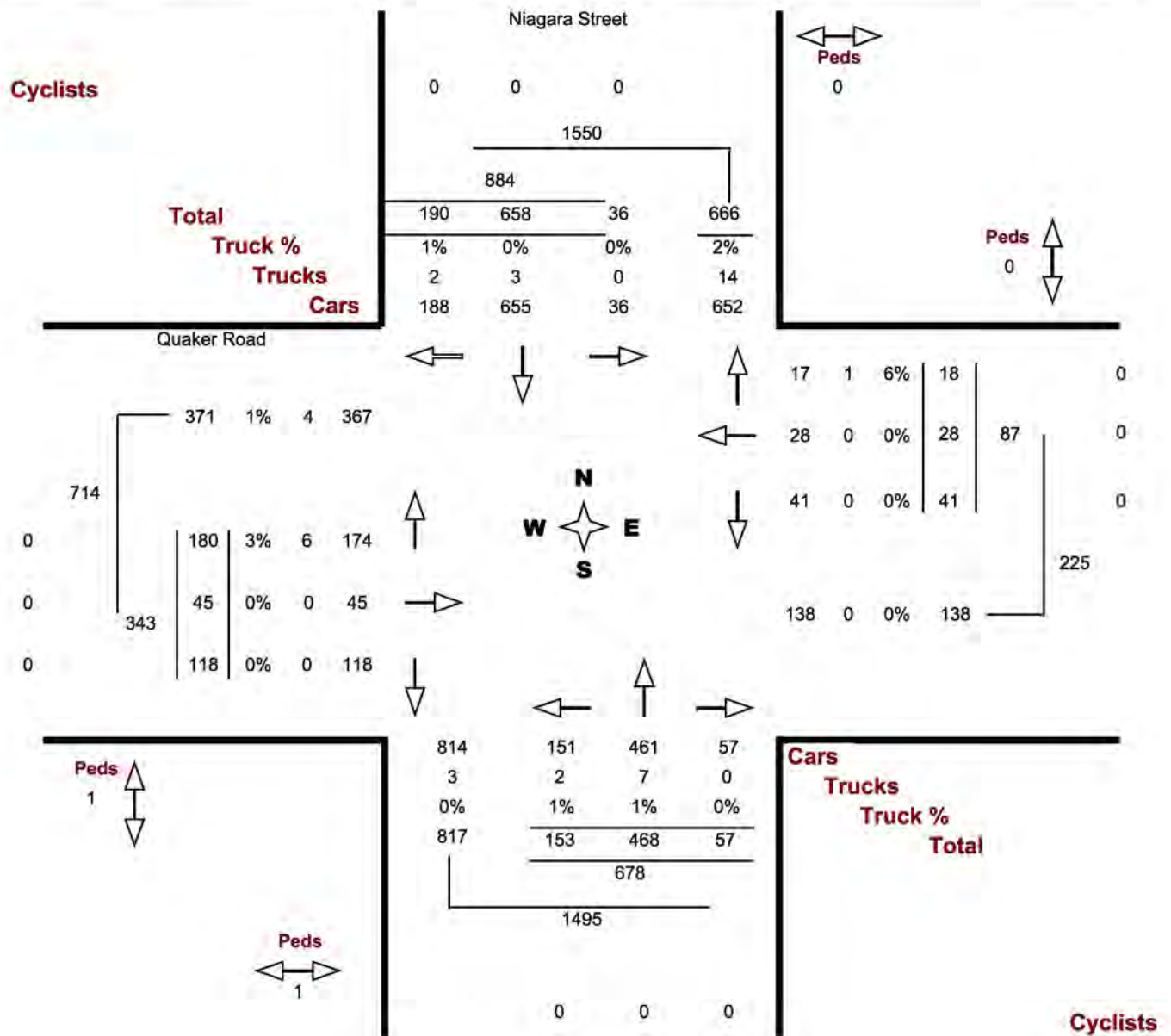
**Count Date.** Tuesday, 08 August, 2023

Traffic Cont.

Count Time. 03:00 PM — 06:00 PM

**Major Dir.....** North south

**Peak Hour..** 04:15 PM — 05:15 PM



**Location.....** Merritt Road @ Merrittville Highway/Niagara Street

**GeoID.....** 00424

**Municipality.** WELLAND

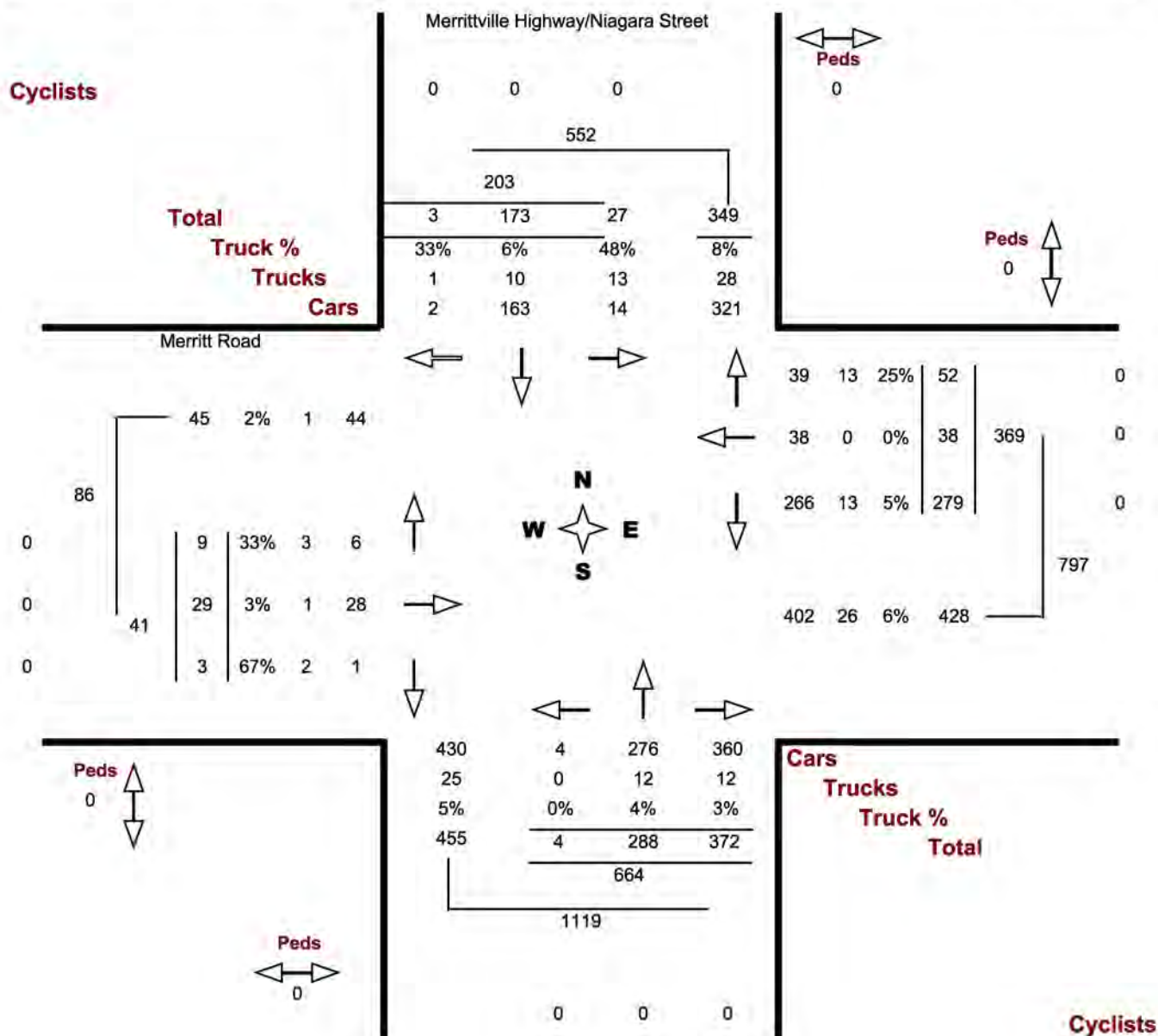
**Count Date.** Tuesday, 16 November, 2021

**Traffic Cont.**

**Count Time.** 07:00 AM — 09:00 AM

**Major Dir.....** North south

**Peak Hour..** 07:30 AM — 08:30 AM



# Turning Movements Report - PM Period

**Location.....** Merritt Road @ Merrittville Highway/Niagara Street

**GeolD.....** 00424

**Municipality.** WELLAND

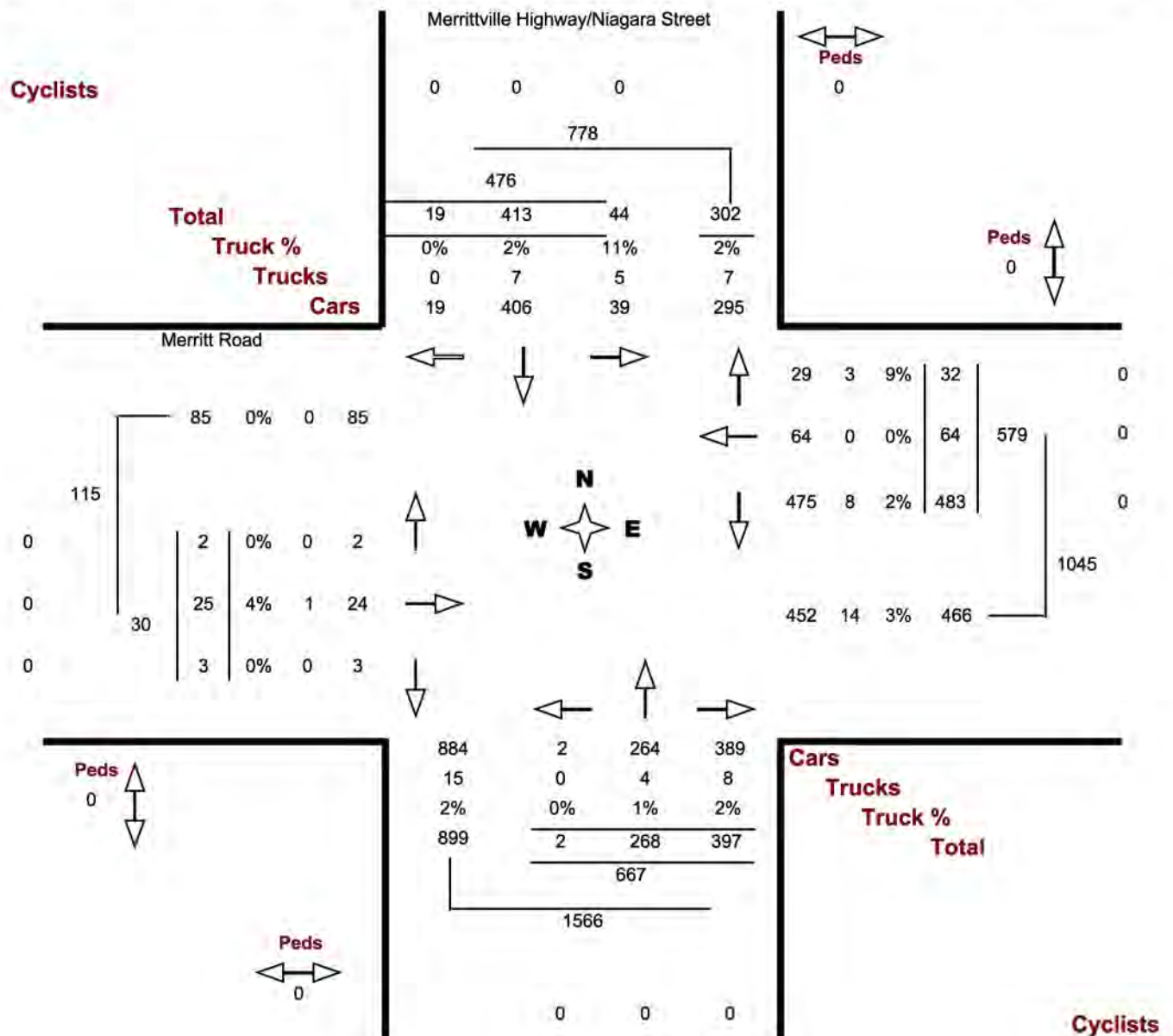
**Count Date.** Tuesday, 16 November, 2021

**Traffic Cont.**

**Count Time.** 03:00 PM — 06:00 PM

**Major Dir.....** North south

**Peak Hour..** 04:15 PM — 05:15 PM



## **APPENDIX B – LEVEL OF SERVICE DEFINITIONS**

## **LEVEL OF SERVICE ANALYSIS AT SIGNALIZED INTERSECTIONS**

To assist in clarifying the arithmetic analysis associated with traffic engineering, it is often useful to refer to “Level of Service”. The term Level of Service implies a qualitative measure of traffic flow at an intersection. It is dependent upon vehicle delay and vehicle queue lengths at the approaches. Specifically, Level of Service criteria are stated in terms of the average stopped delay per vehicle for a 15-minute analysis period. The following table describes the characteristics of each level:

<u>Level of Service</u>	<u>Features</u>	<u>Stopped Delay per Vehicle (sec)</u>
A	At this level of service, almost no signal phase is fully utilized by traffic. Very seldom does a vehicle wait longer than one red indication. The approach appears open, turning movements are easily made and drivers have freedom of operation.	$\leq 5.0$
B	At this level, an occasional signal phase is fully utilized and many phases approach full use. Many drivers begin to feel somewhat restricted within platoons of vehicles approaching the intersection.	$> 5.0 \text{ and } \leq 15.0$
C	At this level, the operation is stable though with more frequent fully utilized signal phases. Drivers feel more restricted and occasionally may have to wait more than one red signal indication, and queues may develop behind turning vehicles. This level is normally employed in urban intersection design.	$> 15.0 \text{ and } \leq 25.0$
D	At this level, the motorist experiences increasing restriction and instability of flow. There are substantial delays to approaching vehicles during short peaks within the peak period, but there are enough cycles with lower demand to permit occasional clearance of developing queues and prevent excessive backups.	$> 25.0 \text{ and } \leq 40.0$
E	At this level, capacity is reached. There are long queues of vehicles waiting upstream of the intersection and delays to vehicles may extend to several signal cycles.	$> 40.0 \text{ and } \leq 60.0$
F	At this level, saturation occurs, with vehicle demand exceeding the available capacity.	$> 60.0$

## LEVEL OF SERVICE ANALYSIS AT UNSIGNALIZED INTERSECTIONS<sup>(1)</sup>

The term "level of service" implies a qualitative measure of traffic flow at an intersection. It is dependent upon the vehicle delay and vehicle queue lengths at approaches. The level of service at unsignalized intersections is often related to the delay accumulated by flows on the minor streets, caused by all other conflicting movements. The following table describes the characteristics of each level.

Level of Service	Features
A	Little or no traffic delay occurs. Approaches appear open, turning movements are easily made, and drivers have freedom of operation.
B	Short traffic delays occur. Many drivers begin to feel somewhat restricted in terms of freedom of operation.
C	Average traffic delays occur. Operations are generally stable, but drivers emerging from the minor street may experience difficulty in completing their movement. This may occasionally impact on the stability of flow on the major street.
D	Long traffic delays occur. Motorists emerging from the minor street experience significant restriction and frustration. Drivers on the major street will experience congestion and delay as drivers emerging from the minor street interfere with the major through movements.
E	Very long traffic delays occur. Operations approach the capacity of the intersection.
F	Saturation occurs, with vehicle demand exceeding the available capacity. Very long traffic delays occur.

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<sup>(1)</sup> Highway Capacity Manual - Special Report No. 209, Transportation Research Board, 1985.