

**New York City  
Department of Transportation**



**INTERSECTION  
CONTROL ANALYSIS**

**DORCHESTER ROAD @ WESTMINSTER ROAD**

**LOCATION**

**REF#: CK21-0723**



**I.C.U.**

**(REGULAR STUDY)**



# ELECTED OFFICIAL ACKNOWLEDGEMENTS

Location: DORCHESTER ROAD @ WESTMINSTER ROAD

Borough: BROOKLYN

Reference #: CK21-0723

CB#: 14

DOT Case #: 498678-J0K0

Date notification was Sent out \_\_\_\_\_

**BOROUGH PRESIDENT** \_\_\_\_\_

**CONGRESS MEMBER** \_\_\_\_\_

**STATE SENATOR** \_\_\_\_\_

**ASSEMBLY MEMBER** \_\_\_\_\_

**COUNCIL MEMBER** \_\_\_\_\_

**C.B. MANAGER** \_\_\_\_\_

**REQUESTOR**

MICHAEL SEDILLO

# Traffic Signal Approval

DORCHESTER ROAD @ WESTMINSTER ROAD

Location

---

APPROVAL

DENIAL

ROUMANY WASEF, P.E.

Traffic Operation- ICU

Date

---

APPROVAL

DENIAL

JAMES CELENTANO, P.E.

Traffic Operation-ITS Engineering

Date

---

## Intersection Control Unit

**Location:** DORCHESTER ROAD @ WESTMINSTER ROAD

**File#:** CK21-0723

**DOT Case#:** 498678-J0K0

**Request:** ALL WAY STOP(A/W)

**Requestor:** MICHAEL SEDILLO

**Determination Date:** \_\_\_\_\_

**Determination:** \_\_\_\_\_

**Comments:** **Based upon our evaluation of data collected, It is our judgment that a traffic signal be approved under Warrant.** \_\_\_\_\_

\_\_\_\_\_  
**WASEF, ROUMANY, P.E.**

## THE STUDY SHOULD INCLUDE THE FOLLOWING:

### CHECK LIST

---

- Data Warehouse map with legend & measurements**  
*(Location of required Traffic Control Device to be highlighted with a red circle.)*
- School Map (If required)**  
*(Location of required Traffic Control Device to be highlighted with a red circle.)*
- Condition diagram (and proposed mitigations, markings, etc.)**
- Block Front Survey. ( if required)**
- Field observation report**
- Volume counts**
- Gap (if required)**
- Speed (& memorandums in speed enforcement- if required)**
- Analysis Factor Sheet**
- Memorandums (on proposed mitigations, pavement markings)**





# FIELD OBSERVATION REPORT

LOCATION : DORCHESTER ROAD @ WESTMINSTER ROAD

BOROUGH: BROOKLYN

REF: CK21-0723

DATE: 7/26/2021

OBSERVER: JOSEPH CANCEMI

**OPERATIONAL CHECKLIST:**

**NO / YES**

**WHERE AND WHAT ?**

1. Are there any obstructions blocking the view of opposing or conflicting vehicles?

NO

2. Are drivers complying with intersection controls?

YES

3. Are Speed limit signs posted?

NO

NYC SPEED LIMIT (25 MPH)

4. Is vehicle delay causing a safety problem?

NO

5. Is the approach grade causing safety problems?

NO

6. Do you recommend more stringent enforcement?

NO

7. Are signs faded, turned or defaced?

NO

8. Do pavement markings have to be refurbished?  
(e.g.: STOP Messages, STOP lines, Lane lines, Crosswalks, etc.)

NO

9. Is there a need to install channelization to reduce conflict areas?

NO

10. Do signs existing in field match current C-order?

YES

11. Do signs existing in field match current SC-order?

N/A

12. Other

YES

SEE BELOW.

**NOTE: (N/A) NOT APPLICABLE**

***12. TREE BRANCHES BLOCKING THE VIEW OF THR R6-1 & R1-1 ON THE N/W C E-MAILED FORESTRY TO PRUNE THE TREE BRANCHES.***



# VOLUME CLASSIFICATION AND TURNING COUNTS

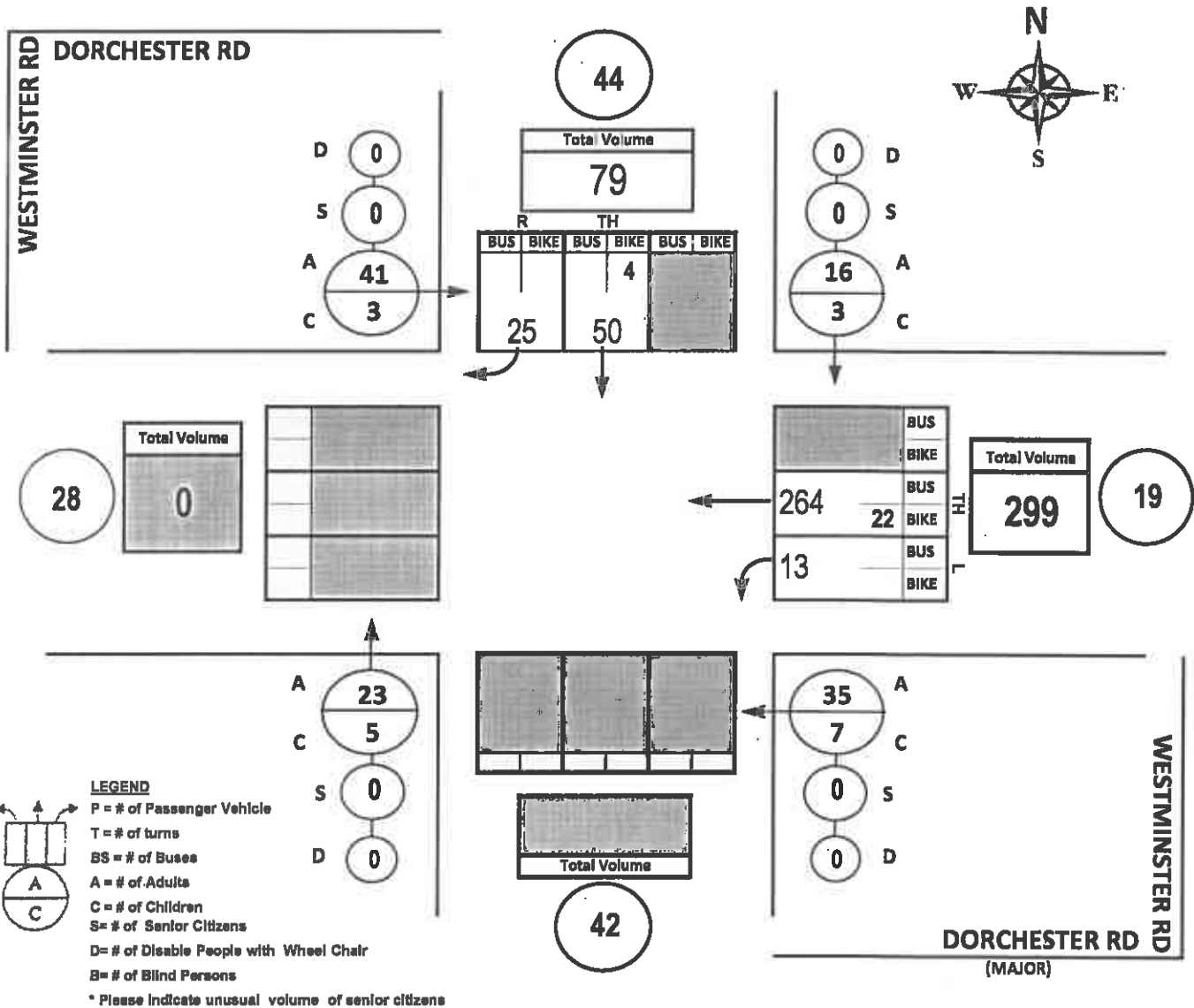
Date: 7/26/2021

Time: 7:30 AM - 8:30 AM (1 Hr)

Day: MONDAY

Inspector: J.C.

Ref#: CK21-0723



| COMMENTS                       | VEHS VS VEHs  | VEHS VS PEDS |
|--------------------------------|---------------|--------------|
|                                | <b>MAJOR</b>  | <b>299</b>   |
|                                | <b>MINOR</b>  | <b>79</b>    |
|                                | <b>PEDS</b>   | <b>47</b>    |
|                                | <b>SC</b>     | <b>8</b>     |
| <b>GAPS IN 60 MINUTES: 131</b> | <b>Others</b> | <b>0</b>     |

Note: Bikes in Crosswalks are assumed as pedestrians, While Bikes in roads and in bike-lanes are assumed as Vehicles

*JOE CANNESMA*

NEW YORK CITY DEPARTMENT OF TRANSPORTATION  
Your City, State, Zip Code

File Name : Not Nam  
Site Code : 00210723  
Start Date : 7/26/2021  
Page No : 1

Directions Printed: Direction 1 - Direction 2 - Combined

| Start Time  | Volume | 2 - 3 | 4 - 5 | 6 - 7 | 8 - 9 | 10 - 11 | 12 - 13 | 14 - 15 | 16 - 17 | 18 - 19 | 20 - 21 | 22 - 23 | 24 - 25 | 26 - 27 | 28 - 29 | >29  | Int. Total | Average |
|-------------|--------|-------|-------|-------|-------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|------|------------|---------|
| Factor      | 1.0    | 0.0   | 0.0   | 0.0   | 0.0   | 0.0     | 0.0     | 1.0     | 1.0     | 1.0     | 1.0     | 1.5     | 1.5     | 1.5     | 2.0     | 2.0  |            |         |
| 07:30 AM    | 0      | 0     | 0     | 0     | 0     | 0       | 0       | 1       | 1       | 2       | 1       | 2       | 0       | 3       | 6       | 18   | 33         | >29     |
| 07:45 AM    | 0      | 0     | 0     | 0     | 0     | 0       | 0       | 6       | 3       | 2       | 5       | 3       | 0       | 3       | 0       | 12   | 34         | 22 - 23 |
| Total       | 0      | 0     | 0     | 0     | 0     | 0       | 0       | 7       | 4       | 4       | 6       | 5       | 0       | 6       | 6       | 30   | 67         | 28 - 29 |
| 08:00 AM    | 0      | 0     | 0     | 0     | 0     | 0       | 0       | 8       | 2       | 0       | 1       | 2       | 2       | 2       | 0       | 12   | 28         | 24 - 25 |
| 08:15 AM    | 0      | 0     | 0     | 0     | 0     | 0       | 0       | 4       | 6       | 5       | 0       | 2       | 6       | 0       | 2       | 12   | 36         | 24 - 25 |
| Grand Total | 0      | 0     | 0     | 0     | 0     | 0       | 0       | 19      | 12      | 9       | 7       | 9       | 8       | 8       | 8       | 54   | 131        | 26 - 27 |
| Total %     | 0.0    | 0.0   | 0.0   | 0.0   | 0.0   | 0.0     | 0.0     | 14.2    | 9.0     | 6.7     | 5.2     | 6.7     | 6.0     | 6.0     | 6.0     | 40.3 |            |         |

*West Leg 34'*

# JOE DANEGEM

NEW YORK CITY DEPARTMENT OF TRANSPORTATION  
Your City, State, Zip Code

File Name : Not Named 2  
Site Code : 00210723  
Start Date : 7/26/2021  
Page No : 1

## Groups Printed- Unshifted

|             | From North |      |      | From East |      |      | From South |      |      | From West |      |      | Int Total |      |     |
|-------------|------------|------|------|-----------|------|------|------------|------|------|-----------|------|------|-----------|------|-----|
|             | Right      | Thru | Left | Right     | Thru | Left | Right      | Thru | Left | Right     | Thru | Left |           | Peds |     |
| Start Time  |            |      |      |           |      |      |            |      |      |           |      |      |           |      |     |
| 07:30 AM    | 5          | 13   | 0    | 0         | 53   | 1    | 0          | 0    | 0    | 0         | 0    | 0    | 2         | 0    | 3   |
| 07:45 AM    | 10         | 8    | 0    | 0         | 71   | 2    | 0          | 0    | 0    | 0         | 0    | 0    | 9         | 0    | 10  |
| Total       | 15         | 21   | 0    | 0         | 124  | 3    | 0          | 0    | 0    | 0         | 0    | 0    | 11        | 0    | 13  |
| 08:00 AM    | 6          | 18   | 0    | 0         | 71   | 4    | 0          | 0    | 0    | 0         | 0    | 0    | 17        | 0    | 7   |
| 08:15 AM    | 4          | 11   | 0    | 0         | 69   | 6    | 0          | 0    | 0    | 0         | 0    | 0    | 7         | 0    | 3   |
| Grand Total | 25         | 50   | 0    | 0         | 264  | 13   | 0          | 0    | 0    | 0         | 0    | 0    | 35        | 0    | 23  |
| Approch %   | 21.6       | 43.1 | 0    | 0         | 90.1 | 4.4  | 0          | 0    | 0    | 0         | 0    | 0    | 100       | 0    | 100 |
| Total %     | 5.4        | 10.7 | 0    | 0         | 56.5 | 2.8  | 0          | 0    | 0    | 0         | 0    | 0    | 7.5       | 0    | 4.9 |

# JOE CANNON

NEW YORK CITY DEPARTMENT OF TRANSPORTATION  
Your City, State, Zip Code

File Name : Not Named 2  
Site Code : 00210723  
Start Date : 7/26/2021  
Page No : 1

## Groups Printed- BIKES

| Start Time  | From North |      |      | From East |      |      | From South |      |      | From West |      |      | Int Total |      |
|-------------|------------|------|------|-----------|------|------|------------|------|------|-----------|------|------|-----------|------|
|             | Right      | Thru | Left | Right     | Thru | Left | Right      | Thru | Left | Right     | Thru | Left |           | Peds |
| 07:30 AM    | 0          | 1    | 0    | 0         | 5    | 0    | 0          | 0    | 0    | 0         | 0    | 0    | 0         | 6    |
| 07:45 AM    | 0          | 1    | 0    | 0         | 5    | 0    | 0          | 0    | 0    | 0         | 0    | 0    | 0         | 9    |
| Total       | 0          | 2    | 0    | 0         | 10   | 0    | 0          | 0    | 0    | 0         | 0    | 0    | 0         | 15   |
| 08:00 AM    | 0          | 1    | 0    | 0         | 6    | 0    | 0          | 0    | 0    | 0         | 0    | 0    | 6         | 18   |
| 08:15 AM    | 0          | 1    | 0    | 0         | 6    | 0    | 0          | 0    | 0    | 0         | 0    | 0    | 1         | 11   |
| Grand Total | 0          | 4    | 0    | 0         | 22   | 0    | 0          | 0    | 0    | 0         | 0    | 0    | 7         | 44   |
| Apprch %    | 0          | 57.1 | 0    | 0         | 88   | 0    | 0          | 0    | 0    | 0         | 0    | 0    | 100       |      |
| Total %     | 0          | 9.1  | 0    | 0         | 50   | 0    | 0          | 0    | 0    | 0         | 0    | 0    | 15.9      | 11.4 |

# VOLUME CLASSIFICATION AND TURNING COUNTS

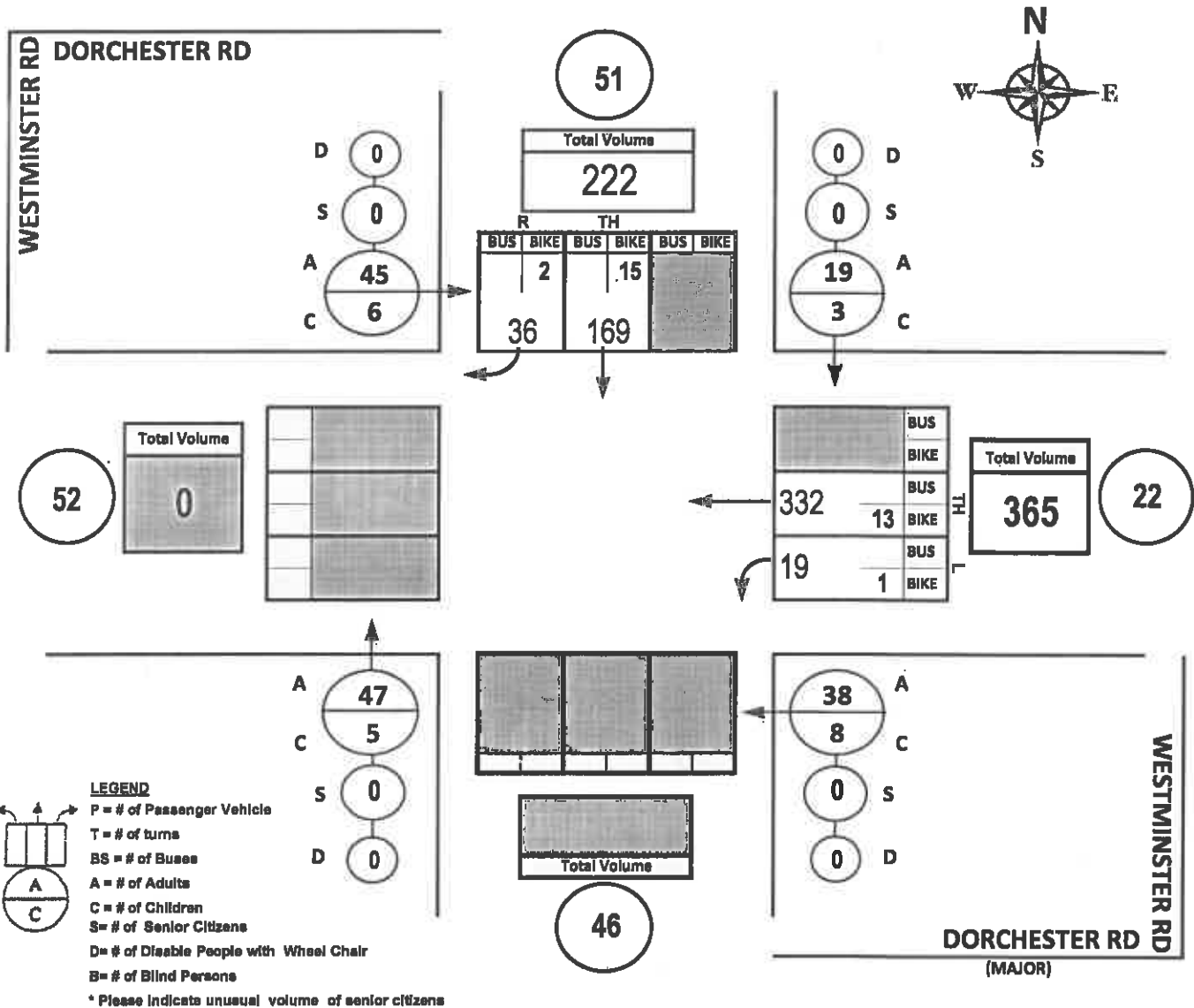
Date: 7/26/2021

Time: 4:30 PM - 5:30 PM (1 Hr)

Day: MONDAY

Inspector: J.C.

Ref#: CK21-0723



| COMMENTS               |        | VEHS VS VEHs | VEHS VS PEDS |
|------------------------|--------|--------------|--------------|
|                        | MAJOR  | 365          |              |
|                        | MINOR  | 222          |              |
|                        | PEDS   | 74           |              |
|                        | SC     | 8            |              |
| GAPS IN 60 MINUTES: 99 | Others | 0            |              |

Note: Bikes in Crosswalks are assumed as pedestrians, While Bikes in roads and in bike-lanes are assumed as Vehicles

# JOE CANNEMO

NEW YORK CITY DEPARTMENT OF TRANSPORTATION  
Your City, State, Zip Code

File Name : Not Nam  
Site Code : 00210723  
Start Date : 7/26/2021  
Page No : 1

## Directions Printed: Direction 1 - Direction 2 - Combined

| Start Time  | Volume | 2 - 3 | 4 - 5 | 6 - 7 | 8 - 9 | 10 - 11 | 12 - 13 | 14 - 15 | 16 - 17 | 18 - 19 | 20 - 21 | 22 - 23 | 24 - 25 | 26 - 27 | 28 - 29 | >29  | Int<br>Total | Average |
|-------------|--------|-------|-------|-------|-------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|------|--------------|---------|
| Factor      | 1.0    | 0.0   | 0.0   | 0.0   | 0.0   | 0.0     | 0.0     | 1.0     | 1.0     | 1.0     | 1.0     | 1.5     | 1.5     | 1.5     | 2.0     | 2.0  | 20           | 26 - 27 |
| 04:30 PM    | 0      | 0     | 0     | 0     | 0     | 0       | 0       | 3       | 3       | 1       | 1       | 0       | 2       | 4       | 2       | 4    | 20           | 26 - 27 |
| 04:45 PM    | 0      | 0     | 0     | 0     | 0     | 0       | 0       | 1       | 1       | 4       | 1       | 0       | 6       | 2       | 0       | 8    | 22           | 24 - 25 |
| Total       | 0      | 0     | 0     | 0     | 0     | 0       | 0       | 4       | 4       | 5       | 2       | 0       | 8       | 6       | 2       | 12   | 42           | 24 - 25 |
| 05:00 PM    | 0      | 0     | 0     | 0     | 0     | 0       | 0       | 2       | 4       | 3       | 1       | 2       | 6       | 3       | 2       | 10   | 33           | 24 - 25 |
| 05:15 PM    | 0      | 0     | 0     | 0     | 0     | 0       | 0       | 1       | 3       | 4       | 1       | 3       | 2       | 2       | 8       | 24   | 24 - 25      |         |
| Grand Total | 0      | 0     | 0     | 0     | 0     | 0       | 0       | 7       | 11      | 12      | 4       | 5       | 16      | 11      | 4       | 30   | 59           | 24 - 25 |
| Total %     | 0.0    | 0.0   | 0.0   | 0.0   | 0.0   | 0.0     | 0.0     | 7.0     | 11.0    | 12.0    | 4.0     | 5.0     | 16.0    | 11.0    | 4.0     | 30.0 | 59.0         | 24 - 25 |

*West Leg 34'*

# JOE CARVEEM

NEW YORK CITY DEPARTMENT OF TRANSPORTATION  
Your City, State, Zip Code

File Name : Not Named 3  
Site Code : 00210723  
Start Date : 7/26/2021  
Page No : 1

Groups Printed- Unshifted

| Start Time  | From North |      |      |      |           | From East |      |      |      |           | From South |      |      |      |           | From West |      |      |      |           | Int Total |
|-------------|------------|------|------|------|-----------|-----------|------|------|------|-----------|------------|------|------|------|-----------|-----------|------|------|------|-----------|-----------|
|             | Right      | Thru | Left | Peds | Approch % | Right     | Thru | Left | Peds | Approch % | Right      | Thru | Left | Peds | Approch % | Right     | Thru | Left | Peds | Approch % |           |
| 04:30 PM    | 9          | 44   | 0    | 8    |           | 0         | 87   | 5    | 2    |           | 0          | 0    | 0    | 8    |           | 0         | 0    | 0    | 0    |           | 171       |
| 04:45 PM    | 6          | 39   | 0    | 13   |           | 0         | 76   | 8    | 8    |           | 0          | 0    | 0    | 11   |           | 0         | 0    | 0    | 0    |           | 173       |
| Total       | 15         | 83   | 0    | 21   |           | 0         | 163  | 13   | 10   |           | 0          | 0    | 0    | 19   |           | 0         | 0    | 0    | 0    |           | 344       |
| 05:15 PM    | 9          | 41   | 0    | 13   |           | 0         | 73   | 3    | 7    |           | 0          | 0    | 0    | 13   |           | 0         | 0    | 0    | 0    |           | 168       |
| Grand Total | 12         | 45   | 0    | 11   |           | 0         | 96   | 3    | 2    |           | 0          | 0    | 0    | 6    |           | 0         | 0    | 0    | 0    |           | 193       |
| Approch %   | 14.4       | 67.6 | 0    | 45   |           | 0         | 332  | 19   | 19   |           | 0          | 0    | 0    | 38   |           | 0         | 0    | 0    | 0    |           | 705       |
| Total %     | 5.1        | 24   | 0    | 18   |           | 0         | 47.1 | 2.7  | 2.7  |           | 0          | 0    | 0    | 5.4  |           | 0         | 0    | 0    | 0    |           | 6.7       |

# JOE CAWCEM

NEW YORK CITY DEPARTMENT OF TRANSPORTATION  
Your City, State, Zip Code

File Name : Not Named 3  
Site Code : 00210723  
Start Date : 7/26/2021  
Page No : 1

## Groups Printed- BIKES

| Start Time  | From North |      |      |      |       | From East |      |      |      |       | From South |      |      |      |       | From West |      |      |      |       | Int. Total |
|-------------|------------|------|------|------|-------|-----------|------|------|------|-------|------------|------|------|------|-------|-----------|------|------|------|-------|------------|
|             | Right      | Thru | Left | Peds | Total | Right     | Thru | Left | Peds | Total | Right      | Thru | Left | Peds | Total | Right     | Thru | Left | Peds | Total |            |
| 04:30 PM    | 0          | 4    | 0    | 2    | 6     | 0         | 3    | 1    | 2    | 6     | 0          | 0    | 0    | 0    | 0     | 0         | 0    | 0    | 0    | 0     | 12         |
| 04:45 PM    | 0          | 3    | 0    | 1    | 4     | 0         | 1    | 0    | 0    | 1     | 0          | 0    | 0    | 0    | 0     | 0         | 0    | 0    | 0    | 0     | 14         |
| Total       | 0          | 7    | 0    | 3    | 10    | 0         | 4    | 1    | 2    | 7     | 0          | 0    | 0    | 6    | 6     | 0         | 0    | 0    | 0    | 3     | 26         |
| 05:00 PM    | 0          | 4    | 0    | 2    | 6     | 1         | 1    | 0    | 1    | 3     | 0          | 0    | 0    | 1    | 1     | 0         | 0    | 0    | 0    | 0     | 9          |
| 05:15 PM    | 2          | 4    | 0    | 1    | 7     | 0         | 8    | 0    | 0    | 8     | 0          | 0    | 0    | 1    | 1     | 0         | 0    | 0    | 0    | 2     | 18         |
| Grand Total | 2          | 15   | 0    | 6    | 23    | 13        | 13   | 1    | 3    | 27    | 0          | 0    | 0    | 8    | 8     | 0         | 0    | 0    | 0    | 5     | 53         |
| Approch %   | 8.7        | 65.2 | 0    | 26.1 | 11.3  | 76.5      | 5.9  | 17.6 | 5.7  | 100   | 0          | 0    | 0    | 100  | 100   | 0         | 0    | 0    | 0    | 100   |            |
| Total %     | 3.8        | 28.3 | 0    | 11.3 | 11.3  | 24.5      | 1.9  | 5.7  | 5.7  | 15.1  | 0          | 0    | 0    | 15.1 | 15.1  | 0         | 0    | 0    | 0    | 9.4   |            |



Dorchester Rd

(W/B)

(MAJOR)

REF: CK21-0703

LOCATION: Ave Kester Rd / W Dorchester Rd

DATE: 7-23-21

DAY: FRIDAY

WEATHER:  Sunny  Clear  Cloudy  
 Partly Cloudy  Others:

SPEED LIMIT:  25 MPH

POSTED:  UNPOSTED: NYC Speed Limit

DIRECTION: West START: 11:00 AM END: 11:30 AM

|    |    |    |    |    |    |    |    |    |    |  |  |  |  |  |  |  |  |  |  |
|----|----|----|----|----|----|----|----|----|----|--|--|--|--|--|--|--|--|--|--|
| 23 | 26 | 28 | 25 | 28 | 23 | 20 | 23 | 21 | 23 |  |  |  |  |  |  |  |  |  |  |
| 20 | 24 | 27 | 32 | 27 | 24 | 28 | 16 | 23 | 20 |  |  |  |  |  |  |  |  |  |  |
| 25 | 21 | 29 | 27 | 24 | 26 | 23 | 19 | 22 | 20 |  |  |  |  |  |  |  |  |  |  |
| 24 | 23 | 35 | 36 | 29 |    |    |    |    |    |  |  |  |  |  |  |  |  |  |  |

( / B)

(MAJOR)

DIRECTION: START: END:

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|

\* Study should be done 30 minutes or 100 vehicles. \* Count only platoon Commander from a large group of vehicles in each lane.

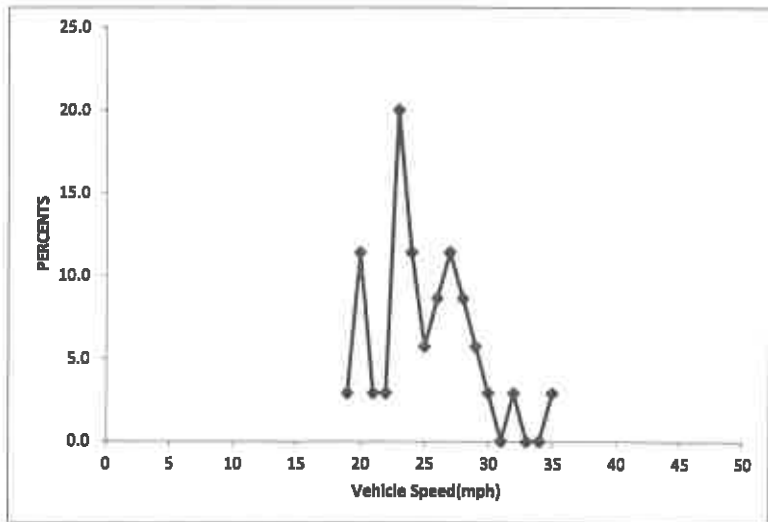
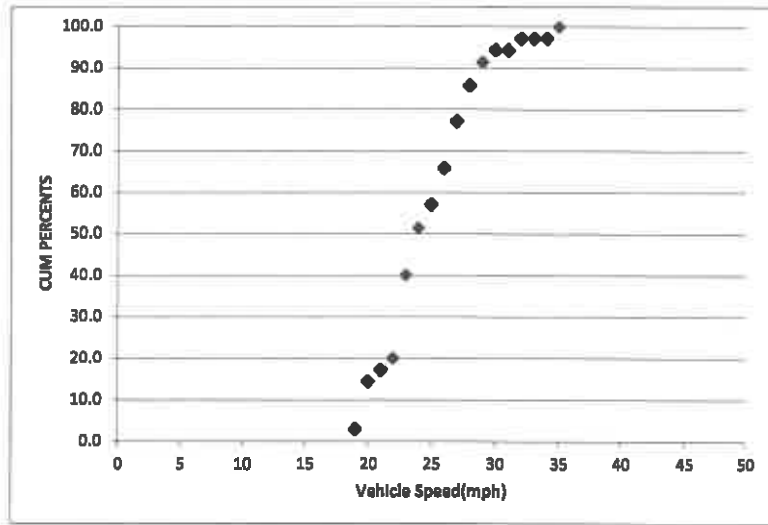
NYCDOT - Speed Study Analysis

STREET: DORCHESTER RD @ WESTMINSTER AVE

LIMITS:  
 DIRECTION(S): West Bound  
 DATE: Friday, July 23, 2021  
 TIME: 1100-1130 AM  
 POSTED SPEED: UNPOSTED-NYC SPEED LIMIT

50TH PERCENTILE SPEED: 24 MPH  
 85TH PERCENTILE SPEED: 28 MPH  
 RANGE OF SPEEDS: 19 to 35  
 VEHICLES OBSERVED: 35  
 AVERAGE SPEED: 25 MPH

| Speed | No. | PCT  | CUM PCT |
|-------|-----|------|---------|
| 19    | 1   | 2.9  | 2.9     |
| 20    | 4   | 11.4 | 14.3    |
| 21    | 1   | 2.9  | 17.1    |
| 22    | 1   | 2.9  | 20.0    |
| 23    | 7   | 20.0 | 40.0    |
| 24    | 4   | 11.4 | 51.4    |
| 25    | 2   | 5.7  | 57.1    |
| 26    | 3   | 8.6  | 65.7    |
| 27    | 4   | 11.4 | 77.1    |
| 28    | 3   | 8.6  | 85.7    |
| 29    | 2   | 5.7  | 91.4    |
| 30    | 1   | 2.9  | 94.3    |
| 31    | 0   | 0.0  | 94.3    |
| 32    | 1   | 2.9  | 97.1    |
| 33    | 0   | 0.0  | 97.1    |
| 34    | 0   | 0.0  | 97.1    |
| 35    | 1   | 2.9  | 100.0   |



## INTERSECTION CONTROL DATA COLLECTION ANALYSIS (FACTOR) SHEET

|   |                                    |              |                |   |  |              |      |                                |                         |      |  |
|---|------------------------------------|--------------|----------------|---|--|--------------|------|--------------------------------|-------------------------|------|--|
| <b>LOC.</b>   | DORCHESTER ROAD @ WESTMINSTER ROAD |              |                |   | <b>GAP STUDY (For Warrant #'s 4 and 5)</b> |              |      | <b>Totals # of Gaps</b>        | <b>VS. # of Minutes</b> |      |  |
| <b>REF#:</b>  | CK21-0723                          | <b>INSP:</b> | JOSEPH CANCEMI |   | 7/26/2021                                  | 7:30-8:30 AM |      | 131                            | 60                      | Min. |  |
| <b>UNPOSTED</b>   | Posted Speed Limit                 | 25           | MPH            | <b>RADAR STUDY</b> (Warrants 1A, 1B, 2, 3, 4 & 9C Location) | 7/26/2021                                  | 4:30-5:30 PM |      | 99                             | 60                      | Min. |  |
| DISTANCE TO THE NEAREST TRAFFIC CONTROL DEVICE ON MAJOR ST. <b>WARRANT # 6</b><br>( > 1000' both Direction) |                                    |              |                | <b>85% SPEED</b>  | W/B: 28                                    | N/A          |      |                                |                         |      |  |
|   |                                    |              |                | Warrant # 5 & California Warrant                            |  |              |      |                                |                         |      |  |
|   |                                    |              |                | School X-Walk?  |  |              |      | NO                             |                         |      |  |
|   |                                    |              |                | School X-Ing Guard?   |  |              |      | NO                             |                         |      |  |
| 512   |                                    | Ft. to       | T/S            | 296   |  | Ft. to       | R1-1 | Does A/W Stop Exist? <b>NO</b> |                         |      |  |

| DATE | TIME | OBSERVED VOLUMES   |                       |   |   |   | WARRANT CRITERIA               |                              |                            |                             |                               |
|------|------|--|-----------------------|---|---|---|--------------------------------|------------------------------|----------------------------|-----------------------------|-------------------------------|
|      |      | VEHICULAR VOLUMES<br><small>(OBSERVED) Warrants 1A, 1B, 2, 3</small> |                       | PEDESRIAN VOLUMES (OBSERVED)<br>Warrant # 4 |   |   | WARRANT # 5<br>School Crossing |                              | California Warrant         |                             |                               |
|      |      | MAJOR Observed   | Higher MINOR Observed | All PEDS observed                           | <small>80% volume reduction if Ped speed &lt; 3.8 fps</small> | <small>70% Factor if 85th percentile speed on major &gt; 35 mph</small> | All Senior Citizens observed   | All School Children observed | 20 or More School Children | 100 or more School Children | 500 or more Vehicles on Major |

| MAJOR STREET                                     |                     |     | MINOR STREET     |                     |     | MAJOR STREET VOLUMES ARE THE TOTAL OF BOTH APPROACHES |                      |          |         |         |                      | ATR.s    |         |         |          |                |       |       |
|--|---------------------|-----|------------------|---------------------|-----|---|----------------------|----------|---------|---------|----------------------|----------|---------|---------|----------|----------------|-------|-------|
| DORCHESTER ROAD                                  |                     |     | WESTMINSTER ROAD |                     |     | MINOR STREET VOLUMES ARE FOR THE HIGHER APPROACH ONLY |                      |          |         |         |                      |          |         |         |          |                |       |       |
| ATR'S Ordered?                                   | EACH MAJOR APPROACH |     |                  | EACH MINOR APPROACH |     |   | MAJOR STREET VOLUMES |          |         |         | MINOR STREET VOLUMES |          |         |         | ATR.s    |                |       |       |
|  | NO                  | HAS | 1                | Lanes               | HAS | 1   | Lanes                | 100% abs | 80% acc | 70% spd | OBSERVED             | 100% abs | 80% acc | 70% spd | OBSERVED | 8th Highest HR | Major | Minor |
| WARRANT-1A<br>Minimum Vehicular Volume           | 1 LANE              |     |                  | 1 LANE              |     |   | 500                  | 400      | 350     | 365     | 150                  | 120      | 105     | 222     |          |                |       |       |
|  | 2 OR MORE LANE      |     |                  | 1 LANE              |     |   | 600                  | 480      | 420     |         | 150                  | 120      | 105     |         |          |                |       |       |
|  | 2 OR MORE LANE      |     |                  | 2 OR MORE LANE      |     |   | 600                  | 480      | 420     |         | 200                  | 160      | 140     |         |          |                |       |       |
|  | 1 LANE              |     |                  | 2 OR MORE LANE      |     |   | 500                  | 400      | 350     |         | 200                  | 160      | 140     |         |          |                |       |       |
| WARRANT-1B<br>Interruption of Conditions Traffic | 1 LANE              |     |                  | 1 LANE              |     |   | 750                  | 600      | 525     | 365     | 75                   | 60       | 53      | 222     |          |                |       |       |
|  | 2 OR MORE LANE      |     |                  | 1 LANE              |     |   | 900                  | 720      | 630     |         | 75                   | 60       | 53      |         |          |                |       |       |
|  | 2 OR MORE LANE      |     |                  | 2 OR MORE LANE      |     |   | 900                  | 720      | 630     |         | 100                  | 80       | 70      |         |          |                |       |       |
|  | 1 LANE              |     |                  | 2 OR MORE LANE      |     |   | 750                  | 600      | 525     |         | 100                  | 80       | 70      |         |          |                |       |       |

*Abs= absolute basic minimum hourly volume. Acc= W/5 Preventable accidents= 80% of abs. spd= w/ speed of 40 mph = 70% of abs*

| ACC. Time Period   | Were Accidents Ordered? |                | WARRANT # 7. CRASH EXPERIENCE- ACCIDENT TYPES |  |  |  |  |  |  |  |  |  | Actual Preventable after Accidents Received |  |  |
|--------------------|-------------------------|----------------|---|--|--|--|--|--|--|--|--|--|---|--|--|
| 12/36 Month Period | Total Acc's             | Total Received |   |  |  |  |  |  |  |  |  |  |   |  |  |
| 8/2015 to 8/2018   | 1                       | 1              |   |  |  |  |  |  |  |  |  |  |   |  |  |
| to                 |                         |                |   |  |  |  |  |  |  |  |  |  |   |  |  |
| to                 |                         |                |   |  |  |  |  |  |  |  |  |  |   |  |  |

Highest # of Preventable in any 12/36 month period: - # Of Prev. Acc. -

Do You Have 5 or more Preventable and 300 ft or less to a T/S on the Major? NO If Yes, Possible Crash Warrant. -

Do adjacent coordinated signals on major provide sufficient gaps? N/A If Yes, Traffic Signal may not be needed -

\*Count Classification is needed for L/T and LPI Study .

Comments:

Improvements/changes:

# WARRANT ANALYSIS

## Warrant 1, Eight-Hour Vehicular Volume

| Condition A – Minimum Vehicular Volume              |               |  |   |   |                                       |   |   |   |                                       |
|---|---------------|--|---|---|---------------------------------------|---|---|---|---------------------------------------|
| Number of Lanes for moving traffic on each approach |               | MAJOR STREET VOLUMES<br>Vehicles per hour on major street (total of both approaches) |   |   |                                       | MINOR STREET VOLUMES<br>Vehicles per hour on higher volume minor-street approach (one direction only) |   |   |                                       |
| Major Street  | Minor Street  | 100% <sup>a</sup><br>Absolute Minimum Required                                       | 80% <sup>b</sup><br>of minimum Reduction for 5 Acc. | 70% <sup>c</sup><br>of minimum Reduction for 40+MPH | ATR'S 8 <sup>TH</sup><br>Highest Hour | 100% <sup>a</sup><br>Absolute Minimum Required  | 80% <sup>b</sup><br>of minimum Reduction for 5 Acc. | 70% <sup>c</sup><br>of minimum Reduction for 40+MPH | ATR'S 8 <sup>TH</sup><br>Highest Hour |
| 1.....  | 1.....        | 500  | 400   | 350   |                                       | 150   | 120   | 105   |                                       |
| 2 or more....                                       | 1.....        | 600  | 480   | 420   |                                       | 150   | 120   | 105   |                                       |
| 2 or more....                                       | 2 or more.... | 600  | 480   | 420   |                                       | 200   | 160   | 140   |                                       |
| 1.....  | 2 or more.... | 500  | 400   | 350   |                                       | 200   | 160   | 140   |                                       |

| Condition B – Interruption of Continuous Traffic    |               |  |   |   |                                       |   |   |   |                                       |
|---|---------------|--|---|---|---------------------------------------|---|---|---|---------------------------------------|
| Number of Lanes for moving traffic on each approach |               | MAJOR STREET VOLUMES<br>Vehicles per hour on major street (total of both approaches) |   |   |                                       | MINOR STREET VOLUMES<br>Vehicles per hour on higher volume minor-street approach (one direction only) |   |   |                                       |
| Major Street  | Minor Street  | 100% <sup>a</sup><br>Absolute Minimum Required                                       | 80% <sup>b</sup><br>of minimum Reduction for 5 Acc. | 70% <sup>c</sup><br>of minimum Reduction for 40+MPH | ATR'S 8 <sup>TH</sup><br>Highest Hour | 100% <sup>a</sup><br>Absolute Minimum Required  | 80% <sup>b</sup><br>of minimum Reduction for 5 Acc. | 70% <sup>c</sup><br>of minimum Reduction for 40+MPH | ATR'S 8 <sup>TH</sup><br>Highest Hour |
| 1.....  | 1.....        | 750  | 600   | 525   |                                       | 75  | 60  | 53  |                                       |
| 2 or more....                                       | 1.....        | 900  | 720   | 630   |                                       | 75  | 60  | 53  |                                       |
| 2 or more....                                       | 2 or more.... | 900  | 720   | 630   |                                       | 100   | 80  | 70  |                                       |
| 1.....  | 2 or more.... | 750  | 600   | 525   |                                       | 100   | 80  | 70  |                                       |

<sup>a</sup> Basic minimum hourly volume

<sup>b</sup> Used for combination of Condition A and B after adequate trial of other remedial measures.

<sup>c</sup> May be used when the major street speed exceeds 40 mph(70km/h) or in an isolated community with a population of less than 10,000.

**Accident Reduction Table for Warrant 1: Eight-Hour Vehicular Volume**

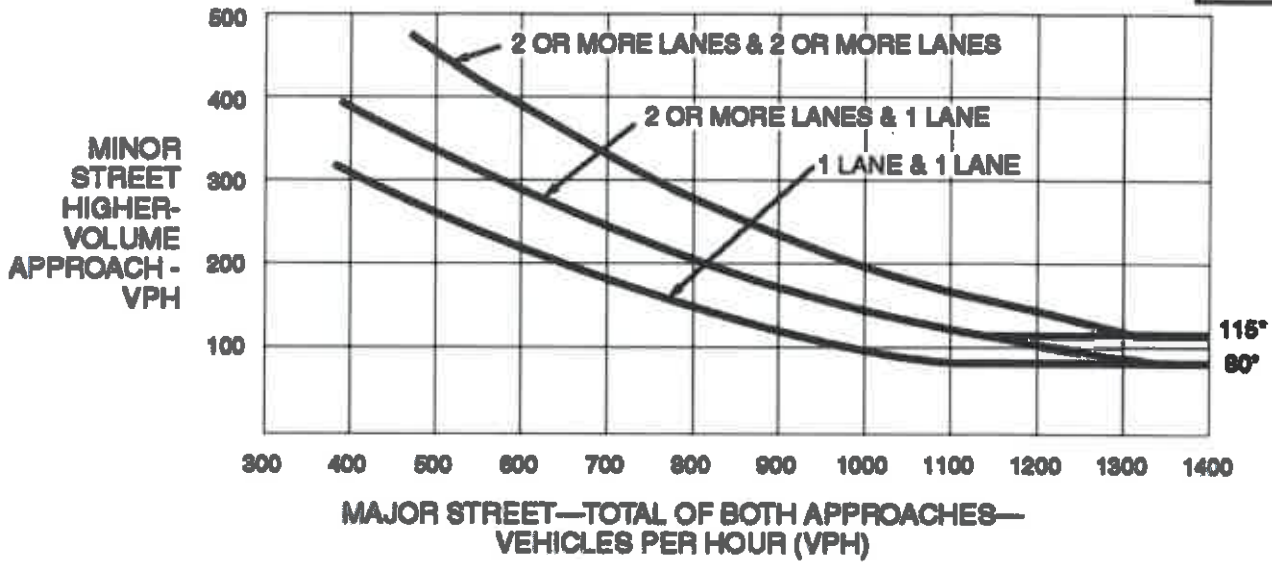


| <b>Condition A – Minimum Vehicular Volume</b>              |                     |   |          |          |          |          |          |          |  |          |          |          |          |          |          |
|--|---------------------|---|----------|----------|----------|----------|----------|----------|--|----------|----------|----------|----------|----------|----------|
|  |                     | <b>MAJOR STREET VOLUMES</b>   |          |          |          |          |          |          | <b>MINOR STREET VOLUMES</b>  |          |          |          |          |          |          |
| <b>Number of Lanes for moving traffic on each approach</b> |                     | <b>Vehicles per hour on major street (total of both approaches)</b> |          |          |          |          |          |          | <b>Vehicles per hour on higher volume minor-street approach (one direction only)</b> |          |          |          |          |          |          |
| <b>Major Street</b>  | <b>Minor Street</b> | 100%<br>a   | 96%<br>b | 92%<br>c | 88%<br>d | 84%<br>e | 80%<br>f | 70%<br>g | 100%<br>a  | 96%<br>b | 92%<br>c | 88%<br>d | 84%<br>e | 80%<br>f | 70%<br>g |
| 1.....   | 1.....              | 500   | 480      | 460      | 440      | 420      | 400      | 350      | 150  | 144      | 138      | 132      | 126      | 120      | 105      |
| 2 or more  | 1.....              | 600   | 576      | 552      | 528      | 504      | 480      | 420      | 150  | 144      | 138      | 132      | 126      | 120      | 105      |
| 2 or more  | 2 or more           | 600   | 576      | 552      | 528      | 504      | 480      | 420      | 200  | 192      | 184      | 176      | 168      | 160      | 140      |
| 1.....   | 2 or more           | 500   | 480      | 460      | 440      | 420      | 400      | 350      | 200  | 192      | 184      | 176      | 168      | 160      | 140      |

| <b>Condition B – Interruption of Continuous Traffic</b>    |                     |   |          |          |          |          |          |          |  |          |          |          |          |          |          |
|--|---------------------|---|----------|----------|----------|----------|----------|----------|--|----------|----------|----------|----------|----------|----------|
|  |                     | <b>MAJOR STREET VOLUMES</b>   |          |          |          |          |          |          | <b>MINOR STREET VOLUMES</b>  |          |          |          |          |          |          |
| <b>Number of Lanes for moving traffic on each approach</b> |                     | <b>Vehicles per hour on major street (total of both approaches)</b> |          |          |          |          |          |          | <b>Vehicles per hour on higher volume minor-street approach (one direction only)</b> |          |          |          |          |          |          |
| <b>Major Street</b>  | <b>Minor Street</b> | 100%<br>a   | 96%<br>b | 92%<br>c | 88%<br>d | 84%<br>e | 80%<br>f | 70%<br>g | 100%<br>a  | 96%<br>b | 92%<br>c | 88%<br>d | 84%<br>e | 80%<br>f | 70%<br>g |
| 1.....   | 1.....              | 750   | 720      | 690      | 660      | 630      | 600      | 525      | 75   | 72       | 69       | 66       | 63       | 60       | 53       |
| 2 or more  | 1.....              | 900   | 864      | 828      | 762      | 756      | 720      | 630      | 75   | 72       | 69       | 66       | 63       | 60       | 53       |
| 2 or more  | 2 or more           | 900   | 864      | 828      | 792      | 756      | 720      | 630      | 100  | 96       | 92       | 88       | 84       | 80       | 70       |
| 1.....   | 2 or more           | 750   | 720      | 690      | 660      | 630      | 600      | 525      | 100  | 96       | 92       | 88       | 84       | 80       | 70       |

- a Absolute minimum hourly volume
- b 4% reduction for 1 preventable accident
- c 8% reduction for 2 preventable accidents
- d 12% reduction for 3 preventable accidents
- e 16% reduction for 4 preventable accidents
- f 20% traffic volume reduction for 5 preventable accidents
- g 30% traffic volume reduction may be used when the 85<sup>th</sup> percentile major street speed exceeds 40 mph (70 km/h) or in an isolated community with a population of less than 10,000.

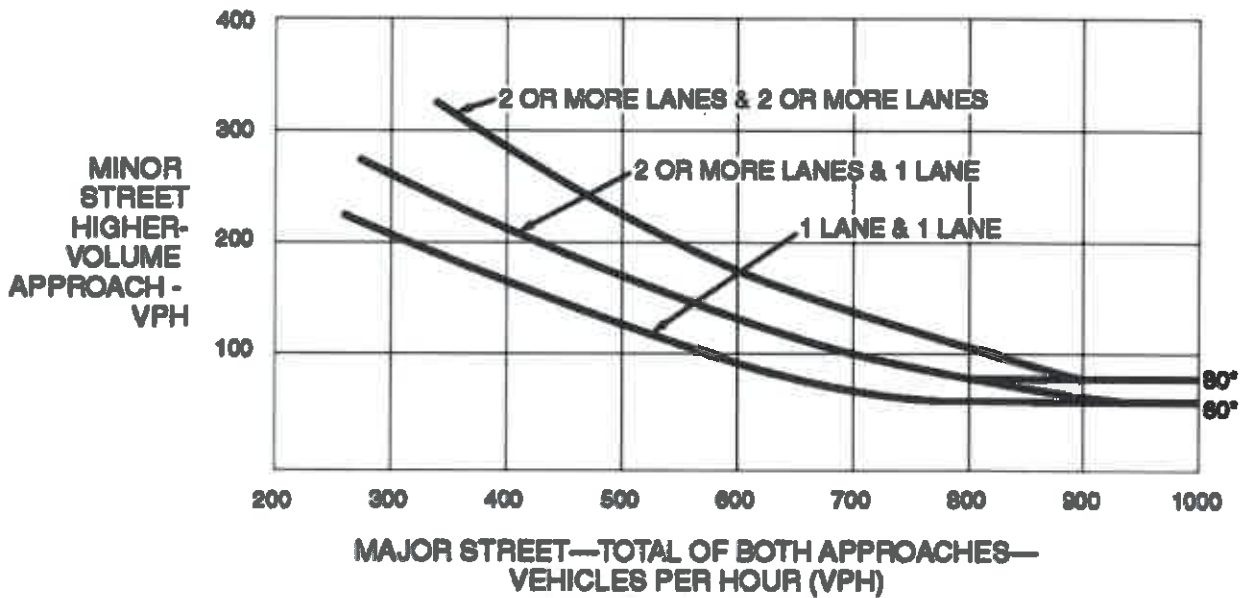
**Figure 4C-1. Warrant 2, Four-Hour Vehicular Volume**



\*Note: 115 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 80 vph applies as the lower threshold volume for a minor-street approach with one lane.

**Figure 4C-2. Warrant 2, Four-Hour Vehicular Volume (70% Factor)**

(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 40 MPH ON MAJOR STREET)



\*Note: 80 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 60 vph applies as the lower threshold volume for a minor-street approach with one lane.

**WARRANT 3, PEAK HOUR:**



**WARRANT # 3 condition A**

**Total volume for Intersection W/3 Approaches = 650 or more VPH ( )**

**Total volume for Intersection W/4 Approaches = 800 or more VPH ( )**

**Higher Minor Approach W/1 Lane = 100 or more VPH ( )**

**Higher Minor Approach W/2 Lane = 150 or more VPH ( )**

**INTERSECTION DELAY STUDY**

**TOTAL DELAY = TOTAL VEHICLES STOPPED X SAMPLING INTERVAL**

= \_\_\_\_\_ X 15 = \_\_\_\_\_ Veh. Sec.

**AVERAGE DELAY PER APPROACH VEHICLE =  $\frac{\text{TOTAL DELAY}}{\text{APPROACH VOLUME}}$  = \_\_\_\_\_**

= \_\_\_\_\_ Sec.

**AVERAGE DELAY FOR WARRANT 3 = AVERAGE DELAY X PEAK HOUR VOLUME FROM MACHINE COUNTS**

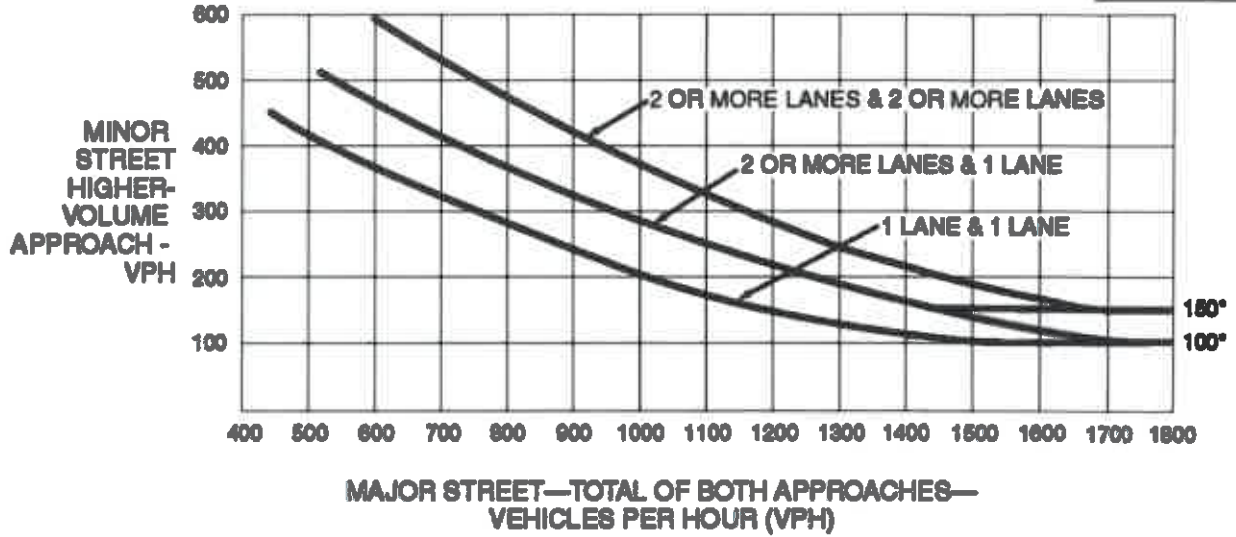
= \_\_\_\_\_ X \_\_\_\_\_

= \_\_\_\_\_ Veh. -Sec.

**NOTE:**

The above information will be used for Warrant 3 – Peak Hour analysis.

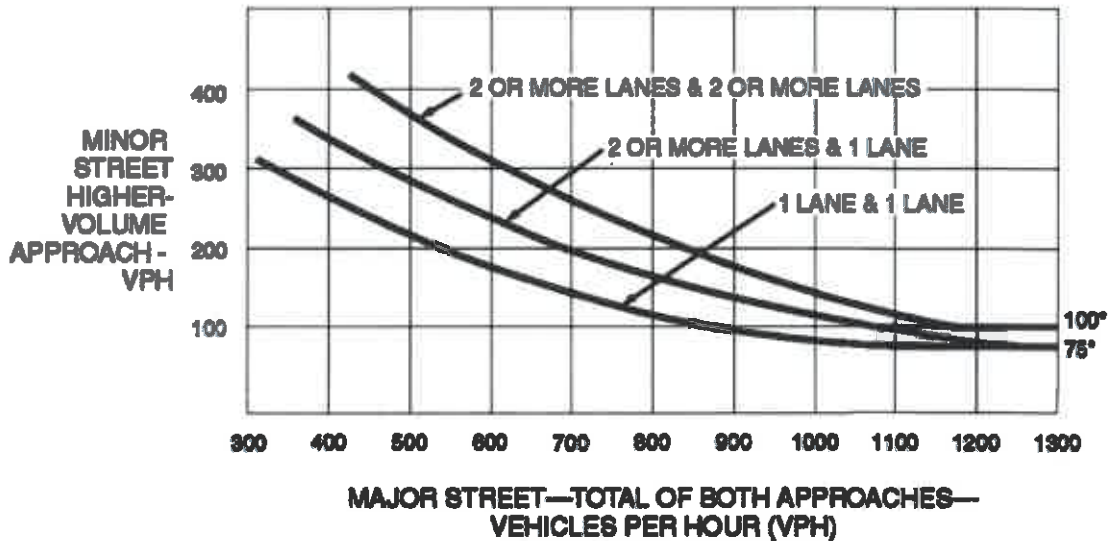
**Figure 4C-3. Warrant 3, Peak Hour**



\*Note: 150 vph applies as the lower threshold volumes for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane.

**Figure 4C-4. Warrant 3, Peak Hour (70% Factor)**

(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 40 MPH ON MAJOR STREET)



\*Note: 100 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 75 vph applies as the lower threshold volume for a minor-street approach with one lane.

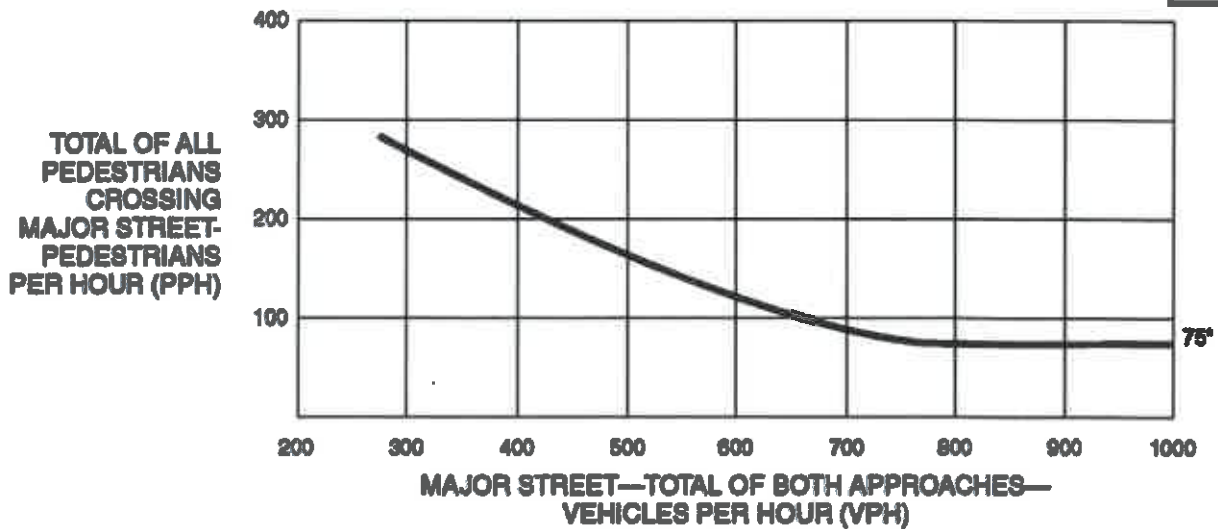


**Figure 4C-5. Warrant 4, Pedestrian Four-Hour Volume**



\*Note: 107 pph applies as the lower threshold volume.

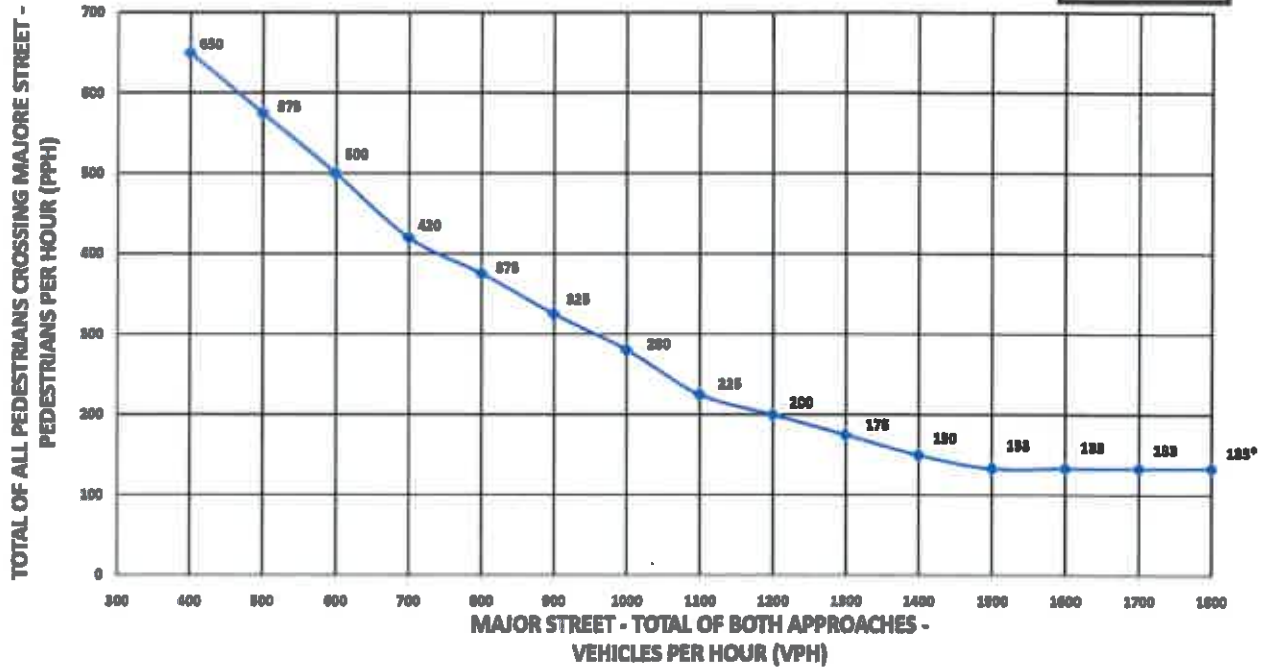
**Figure 4C-6. Warrant 4, Pedestrian Four-Hour Volume (70% Factor)**



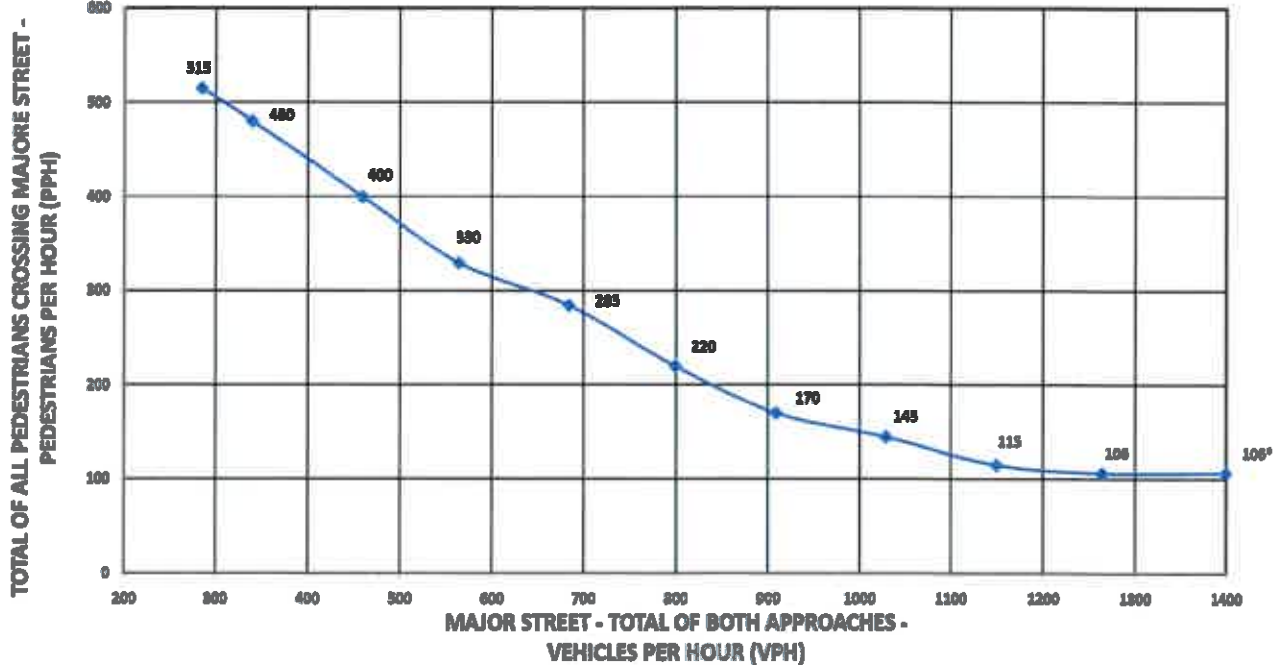
\*Note: 75 pph applies as the lower threshold volume.

## Warrant #4 - Peak Hour Pedestrian Factor Tables

**Figure 4C-7, Warrant 4, Pedestrian Peak Hour (100% Factor)**

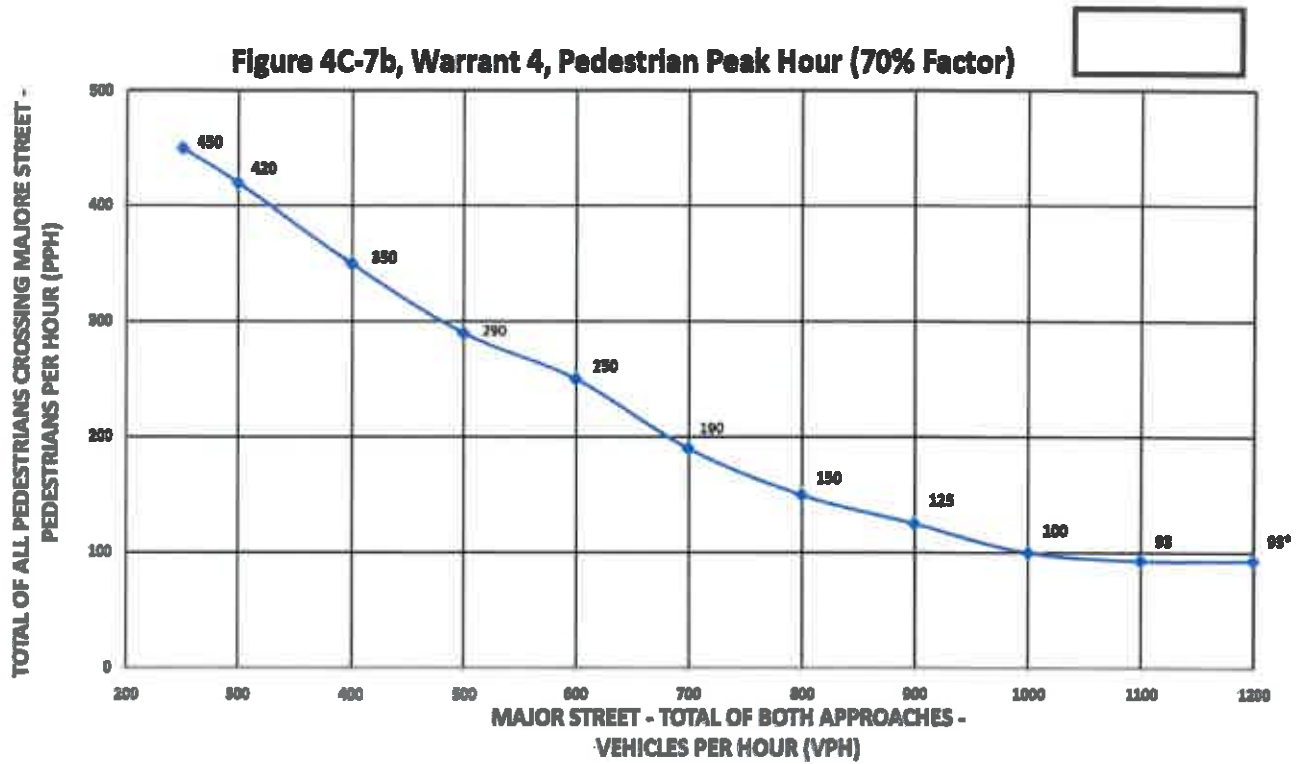


**Figure 4C-7a, Warrant 4, Pedestrian Peak Hour (80% Factor)**



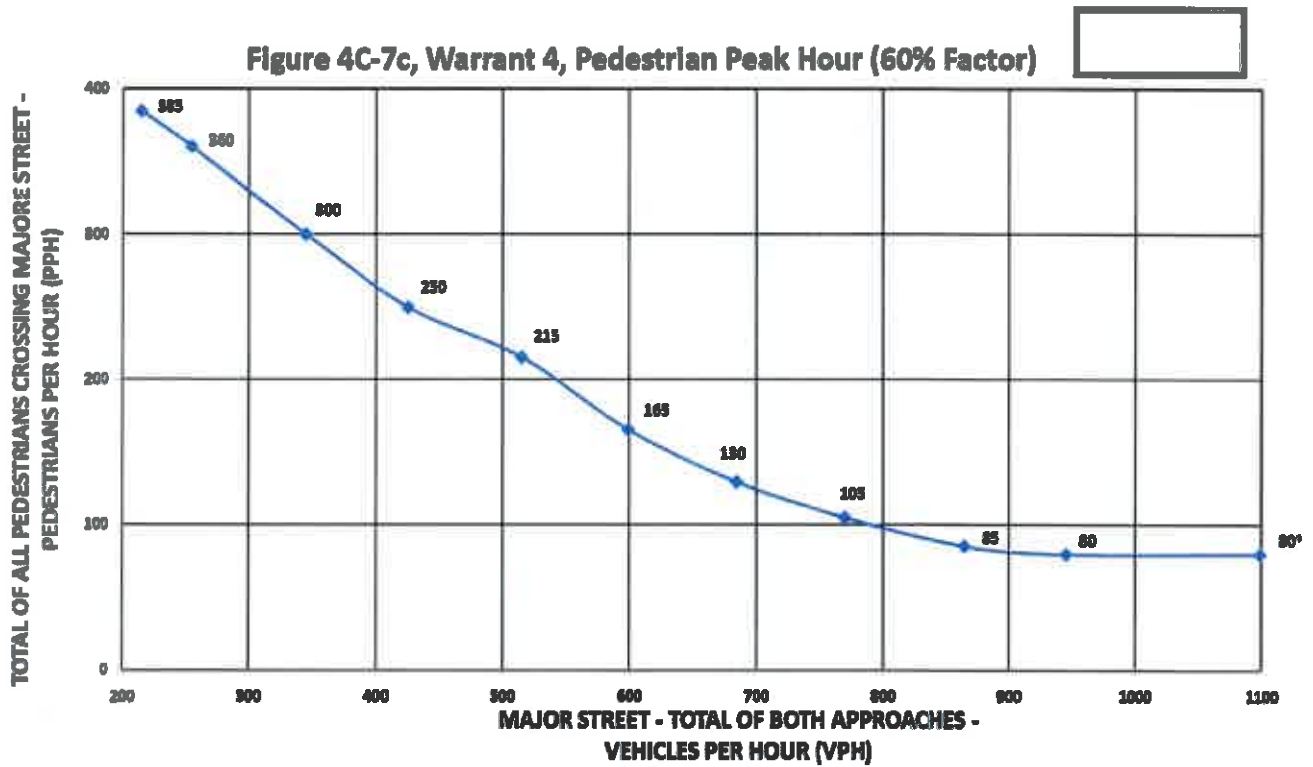
The 80% factor graph shall be used for intersections having 1-2 preventable crashes in a 12-month period.

**Figure 4C-7b, Warrant 4, Pedestrian Peak Hour (70% Factor)**



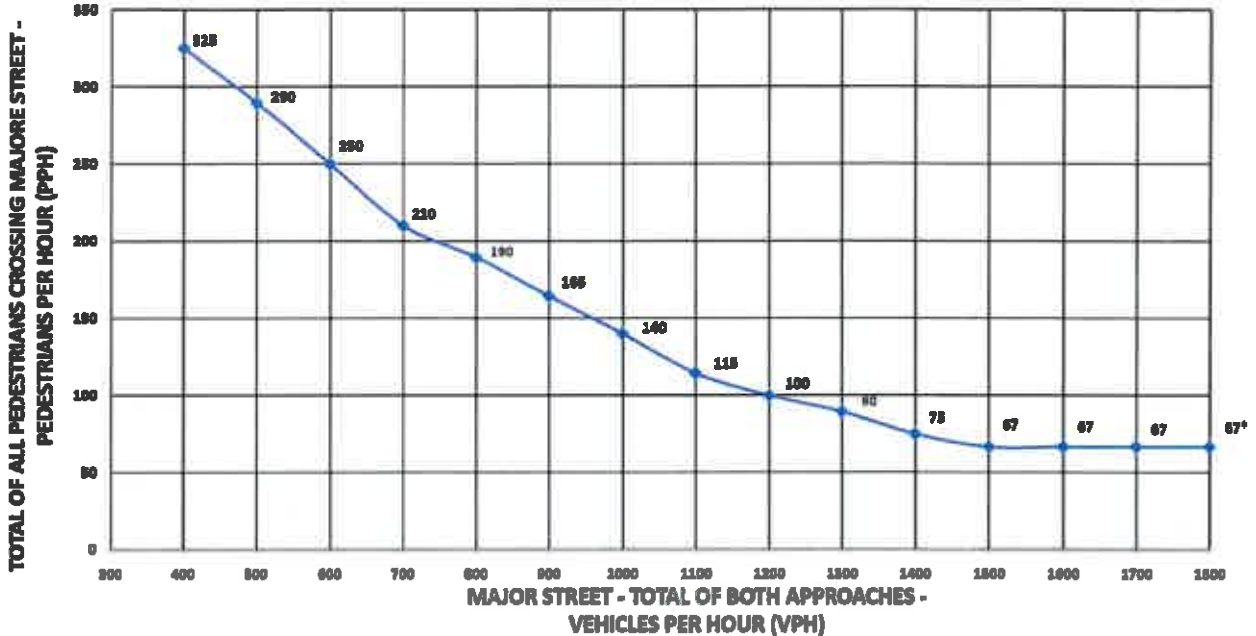
The 70% factor graph shall be used for intersections having 3-5 preventable crashes in a 12-month period or if the 85th percentile speed on the major street exceeds 35 mph.

**Figure 4C-7c, Warrant 4, Pedestrian Peak Hour (60% Factor)**



The 60% factor graph shall be used for intersections having at least 1 preventable crash and 1 KSI in a 12-month period or more than 5 preventable crashes in a 12-month period.

Figure 4C-7d, Warrant 4, Pedestrian Peak Hour (50% Factor)



The 50% factor graph shall be used if the 15th-percentile crossing speed of pedestrians is less than 3.5 fps or if 15% of the crossing population is school children and/or senior pedestrians.

**SECTION 4C.05 WARRANT 4, PEDESTRIAN VOLUME:**

Support:

01 The Pedestrian Volume signal warrant is intended for application where the traffic volume on a major street is so heavy that pedestrians experience excessive delay in crossing the major street.

Standard:

02 The need for a traffic control signal at an intersection or midblock crossing shall be considered if an engineering study finds that one of the following criteria is met:

A. For each of any 4 hours of an average day, the plotted points representing the vehicles per hour on the major street (total of both approaches) and the corresponding pedestrians per hour crossing the major street (total of all crossings) all fall above the curve in Figure 4C-5; or

B. For 1 hour (any four consecutive 15-minute periods) of an average day, the plotted point representing the vehicles per hour on the major street (total of both approaches) and the corresponding pedestrians per hour crossing the major street (total of all crossings) falls above the curve in any of Figure 4C-7, 4C-7a, 4C-7b, 4C-7c & 4C-7d.

Option:

03 If the posted or statutory speed limit or the 85th-percentile speed on the major street exceeds 35 mph, or if the intersection lies within the built-up area of an isolated community having a population of less than 10,000, Figure 4C-6 may be used in place of Figure 4C-5 to evaluate Criterion A in Paragraph 2, and Figure 4C-8 may be used in place of Figure 4C-7 to evaluate Criterion B in Paragraph 2.

**WARRANT 5. SCHOOL CROSSING:**



**Section 4C.06 Warrant 5, School Crossing**

The School Crossing signal warrant is intended for applications where the fact that Schoolchildren cross the major street is the principal reason to consider installing a traffic control signal.

*The word "Schoolchildren" includes elementary through High School students*

The need for a traffic control signal shall be considered when an engineering study of the frequency and adequacy of gaps in the vehicular traffic stream as related to the number and size of groups of school children at an established school crossing across the major street shows that the number of adequate gaps in the traffic stream during the period when the school children are using the crossing is less than the number of minutes in the same period and there are a minimum of 20 Schoolchildren during the highest crossing hour.

**School Crossing Warrant (California Warrant):**



The School Crossing Warrant (Warrant# 5) as contained in the federal Manual on Uniform Traffic Control Devices (MUTCD) is dependent on the frequency and adequacy of gaps in the traffic stream. At certain intersections with designated school crosswalks, gaps cannot be measured due to the presence of a school crossing guard, all way stop control, or other field conditions.

In such cases, if no other warrant contained in the MUTCD is satisfied, the engineer, upon review of the traffic conditions and physical characteristics of the intersection, can use guidelines outlined in the California Department of Transportation (CALTRANS) Traffic Manual. These guidelines are based on satisfying minimum vehicular and schoolchildren volume requirements. In an urban area, 500 vehicles (total in both directions on the major street) and 100 schoolchildren for each of any two hours (not necessarily consecutive) are required.

California Warrant = A School Crossing with All-Way stop or School Crossing Guard present and 500 vehicles on major street and 100 schoolchildren crossing major street for each of any two hours.

**WARRANT 6. COORDINATED SIGNAL SYSTEM:**



The need for a traffic control signal shall be considered if an engineering study finds that one of the following criteria is met:

**A. On a one-way street or a street that has traffic predominantly in one direction, the adjacent traffic control signals are so far apart that they do not provide the necessary degree of vehicular platooning.**

**B. On a two-way street, adjacent traffic control signals do not provide the necessary degree of platooning and the proposed and adjacent traffic control signals will collectively provide a progressive operation.**

*Note: The Coordinated Signal System signal warrant should not be applied where the resultant spacing of traffic control signals would be less than 300 m (1000 ft).*

## **WARRANT 7, CRASH EXPERIENCE:**



The crash experience signal warrant conditions are intended for applications where the severity and frequency of crashes are the principal reason to consider installing a traffic signal.

The need for a traffic control signal shall be considered if an engineering study finds that all of the following criteria are met:

- A. Adequate trial of alternatives with satisfactory observance and enforcement has failed to reduce the crash frequency; and
- B. One of the following conditions apply to the reported crash history (where each reported crash considered is related to the intersection and apparently exceeds the applicable requirements for a reportable crash):
  1. The number of reported angle crashes and pedestrian crashes within a one-year period equals or exceeds the threshold number in Table 4C-2 for total angle crashes and pedestrian crashes (all severities); or
  2. The number of reported fatal-and-injury angle crashes and pedestrian crashes within a one-year period equals or exceeds the threshold number in Table 4C-2 for total fatal-and-injury angle crashes and pedestrian crashes ; or
  3. The number of reported angle crashes and pedestrian crashes within a three-year period equals or exceeds the threshold number in Table 4C-3 for total angle crashes and pedestrian crashes (all severities); or
  4. The number of reported fatal-and-injury angle crashes and pedestrian crashes within a three-year period equals or exceeds the threshold number in Table 4C-3 for total fatal-and-injury angle crashes and pedestrian crashes; and
- C. For each of any 8 hours of an average day, the vehicles per hour (VPH) given in both of the 80 percent columns of Condition A or the VPH in both of the 80 percent columns of Condition B exists on the major-street and the higher-volume minor-street approach, respectively, to the intersection, or the volume of pedestrian traffic is not less than 80 percent of the requirements specified in the Pedestrian Volume warrant. These major-street and minor-street volumes shall be for the same 8 hours. On the minor street, the higher volume shall not be required to be on the same approach during each of the 8 hours.
- D. Crash experience should be applied when the resultant spacing of Traffic Control Signal would be 300ft or less & there are more preventable crashes as per table 4C-2 & 4C-3 below.

**Table 4C-2. Minimum Number of Reported Crashes in a One Year Period**

| Urban Area                               |              |   |            |  |            |
|--|--------------|---|------------|--|------------|
| Number of through lanes on each approach |              | Total of Angle and Pedestrian Crashes (all severities) <sup>a</sup> |            | Total of Fatal-and -Injury Angle And Pedestrian Crashes <sup>a</sup> |            |
| Major Street                             | Minor Street | Four legs   | Three Legs | Four Legs  | Three Legs |
| 1  | 1            | 5   | 4          | 3  | 3          |
| 2 or more                                | 1            | 5   | 4          | 3  | 3          |
| 2 or more                                | 2 or more    | 5   | 4          | 3  | 3          |
| 1  | 2 or more    | 5   | 4          | 3  | 3          |
| Rural Area <sup>b</sup>                  |              |   |            |  |            |
| Number of through lanes on each approach |              | Total of Angle and Pedestrian Crashes (all severities) <sup>a</sup> |            | Total of Fatal-and -Injury Angle And Pedestrian Crashes <sup>a</sup> |            |
| Major Street                             | Minor Street | Four legs   | Three Legs | Four Legs  | Three Legs |
| 1  | 1            | 4   | 3          | 3  | 3          |
| 2 or more                                | 1            | 10  | 9          | 6  | 6          |
| 2 or more                                | 2 or more    | 10  | 9          | 6  | 6          |
| 1  | 2 or more    | 4   | 3          | 3  | 3          |

<sup>a</sup> Angle crashes include all crashes that occur at an angle and involve one or more vehicles on the major street and one or more vehicles on the minor street

<sup>b</sup> "Rural Area" value apply to intersections where the major-street speed exceeds 40 mph or intersections located in an isolated community with a population of less than 10,000.

**Table 4C-3. Minimum Number of Reported Crashes in a Three Year Period**

| Urban Area                               |              |   |            |  |            |
|--|--------------|---|------------|--|------------|
| Number of through lanes on each approach |              | Total of Angle and Pedestrian Crashes (all severities) <sup>a</sup> |            | Total of Fatal-and -Injury Angle And Pedestrian Crashes <sup>a</sup> |            |
| Major Street                             | Minor Street | Four legs   | Three Legs | Four Legs  | Three Legs |
| 1  | 1            | 6   | 5          | 4  | 4          |
| 2 or more                                | 1            | 6   | 5          | 4  | 4          |
| 2 or more                                | 2 or more    | 6   | 5          | 4  | 4          |
| 1  | 2 or more    | 6   | 5          | 4  | 4          |
| Rural Area <sup>b</sup>                  |              |   |            |  |            |
| Number of through lanes on each approach |              | Total of Angle and Pedestrian Crashes (all severities) <sup>a</sup> |            | Total of Fatal-and -Injury Angle And Pedestrian Crashes <sup>a</sup> |            |
| Major Street                             | Minor Street | Four legs   | Three Legs | Four Legs  | Three Legs |
| 1  | 1            | 6   | 5          | 4  | 4          |
| 2 or more                                | 1            | 16  | 13         | 9  | 9          |
| 2 or more                                | 2 or more    | 16  | 13         | 9  | 9          |
| 1  | 2 or more    | 6   | 5          | 4  | 4          |

<sup>a</sup> Angle crashes include all crashes that occur at an angle and involve one or more vehicles on the major street and one or more vehicles on the minor street

<sup>b</sup> "Rural Area" value apply to intersections where the major-street speed exceeds 40 mph or intersections located in an isolated community with a population of less than 10,000.

### **Section 4C.09 Warrant 8, Roadway Network:**



01 Installing a traffic control signal at some intersections might be justified to encourage concentration and organization of traffic flow on a roadway network.

#### **Standard:**

02 The need for a traffic control signal shall be considered if an engineering study finds that the common intersection of two or more major routes meets one or both of the following criteria:

A. The intersection has a total existing, or immediately projected, entering volume of at least 1,000 vehicles per hour during the peak hour of a typical weekday and has 5-year projected traffic volumes, based on an engineering study, that meet one or more of Warrants 1, 2, and 3 during an average weekday; or

B. The intersection has a total existing or immediately projected entering volume of at least 1,000 vehicles per hour for each of any 5 hours of a non-normal business day (Saturday or Sunday).

03 A major route as used in this signal warrant shall have at least one of the following characteristics:

A. It is part of the street or highway system that serves as the principal roadway network for through traffic flow.

B. It includes rural or suburban highways outside, entering, or traversing a city.

C. It appears as a major route on an official plan, such as a major street plan in an urban area traffic and transportation study.

### **Section 4C.10 Warrant 9, Intersection Near a Grade Crossing:**



#### **Support:**

01 The intersection near a Grade Crossing signal warrant is intended for use at a location where none of the conditions described in the other eight traffic signal warrants are met, but the proximity to the intersection of a grade crossing on an intersection approach controlled by a STOP or YIELD sign is the principal reason to consider installing a traffic control signal.

#### **Guidance:**

02 This signal warrant should be applied only after adequate consideration has been given to other alternatives or after a trial of an alternative has failed to alleviate the safety concerns associated with the grade crossing. Among the alternatives that should be considered or tried are:

A. Providing additional pavement that would enable vehicles to clear the track or that would provide space for an evasive maneuver, or

B. Reassigning the stop controls at the intersection to make the approach across the track a non-stopping approach.

#### **Standard:**

03 The need for a traffic control signal shall be considered if an engineering study finds that both of the following criteria are met:

A. A grade crossing exists on an approach controlled by a STOP or YIELD sign and the center of the track nearest to the intersection is within 140 feet of the stop line or yield line on the approach; and

B. During the highest traffic volume hour during which rail traffic uses the crossing, the plotted point representing the vehicles per hour on the major street (total of both approaches) and the corresponding vehicles per hour on the minor-street approach that crosses the track (one direction only, approaching the intersection) falls above the applicable curve in Figure 4C-9 or 4C-10 for the existing combination of approach lanes over the track and the distance D, which is the clear storage distance as defined in Section 1A.13.

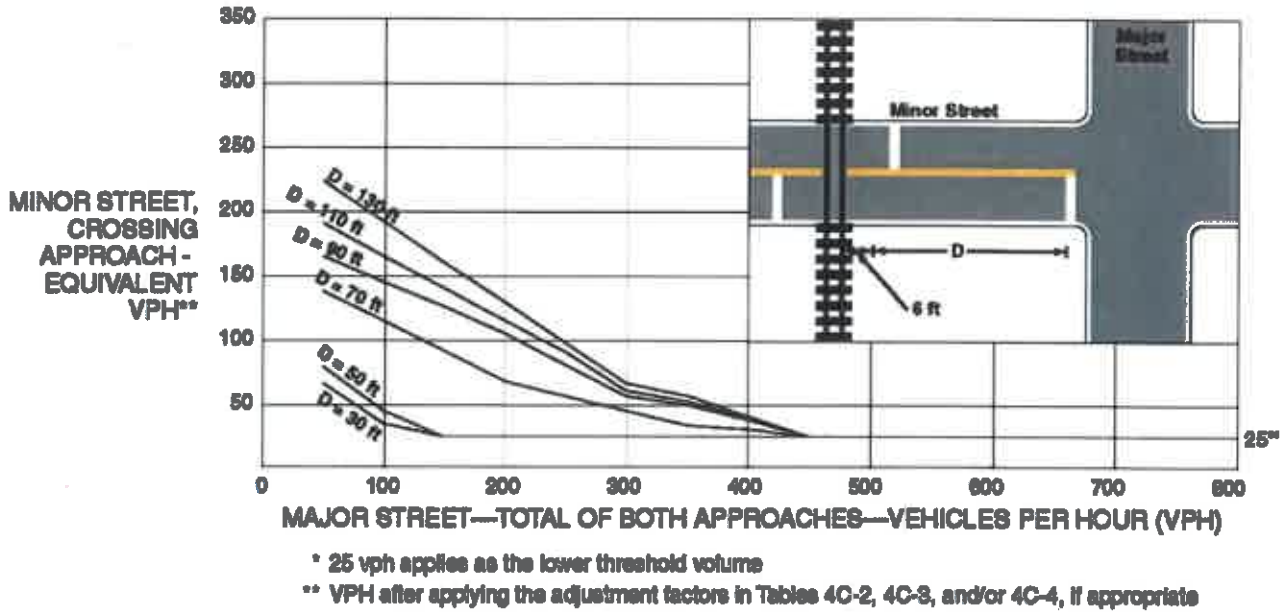
#### **Guidance:**

04 The following considerations apply when plotting the traffic volume data on Figure 4C-9 or 4C-10:

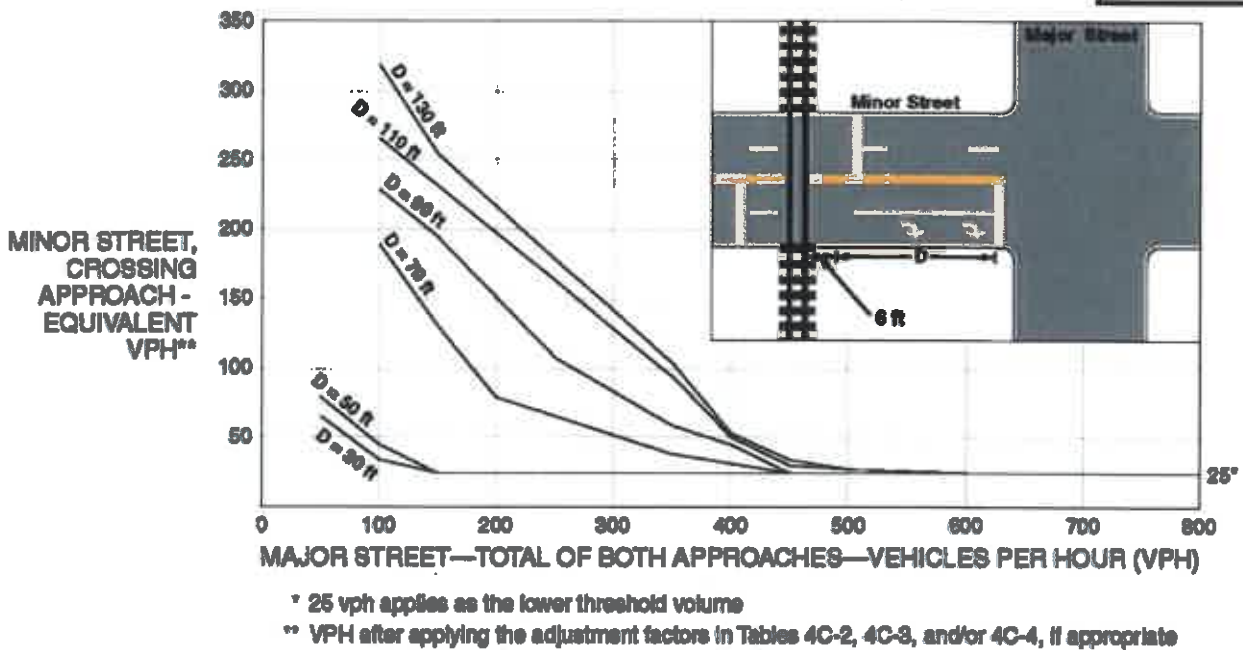
A. Figure 4C-9 should be used if there is only one lane approaching the intersection at the track crossing location and Figure 4C-10 should be used if there are two or more lanes approaching the intersection at the track crossing location.



**Figure 4C-9. Warrant 9, Intersection Near a Grade Crossing (One Approach Lane at the Track Crossing)**



**Figure 4C-10. Warrant 9, Intersection Near a Grade Crossing (Two or More Approach Lanes at the Track Crossing)**



# Attach all relevant crash reports and summaries

(Pedestrians hit by Vehicles crossing Major, Right Angle, and Left-Turn Crashes)



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