

HARVARD STREET AND WINDSOR STREET
TRAFFIC SIGNAL
FEASIBILITY STUDY

PREPARED BY
CITY OF CAMBRIDGE
TRAFFIC AND PARKING DEPARTMENT
MARCH, 1990

HARVARD STREET & WINDSOR STREET
TRAFFIC SIGNAL
FEASIBILITY STUDY

A. PURPOSE

The purpose of this study was to determine the feasibility of installing traffic control signals at the intersection of Harvard Street and Windsor Street. The study which is required by state law to determine if the intersection meets the warrants set forth by the "Manual On Uniform Traffic Control Devices" included traffic volume counts both mechanical and manual as well as pedestrian counts. Every accident report had to be read and analyzed as to causes whenever possible. Speed checks were made to determine approach speeds and to determine if there is adequate sight distances on the approaches to Harvard Street.

The Traffic Department also will investigate other alternatives that could increase the safety of this intersection.

B. EXISTING CONDITIONS

The intersection of Harvard Street and Windsor Street is located in a heavily populated area with an elementary school located on one corner. Windsor Street is the major leg of this intersection and is 32' wide curb to curb with No Parking on one side of the northern approach and one side parking on the southern approach. Harvard Street is one way eastbound and is 32' wide curb to curb with parking allowed on one side. Windsor Street is free flowing traffic and Harvard Street is controlled by a red warning beacon and stop signs. There is a high volume of pedestrian traffic that crosses Harvard Street that is controlled by a school crossing guard. There is also a traffic control signal located at Broadway and Windsor Street which is 200' from Harvard Street and there is also a school crossing guard at that location.

C. VOLUME COUNTS

Mechanical counters were used to determine the average daily traffic (ADT) and at the same time manual counts were made to insure an accurate count.

The following average daily traffic volumes as well as the peak hour volumes were produced.

<u>STREET</u>	<u>DIRECTION</u>	<u>ADT</u>	<u>AM PEAK</u>	<u>PM PEAK</u>
Windsor St.	Northbound	1893	118	198
Windsor St.	Southbound	2689	205	221
Harvard St.	Eastbound	2283	183	235

Manual turning movement counts as well as pedestrian counts were conducted during the hours that students were arriving and leaving the school. These counts are as follows:

7:30 AM to 8:30 AM

<u>STREET</u>	<u>DIRECTION</u>	<u>LEFT TURN</u>	<u>THRU</u>	<u>RIGHT TURN</u>	<u>TRUCKS</u>	<u>BUSES</u>	<u>PEDESTRIAN CROSSINGS</u>
Windsor St.	Ncrth bd.	0	38	9	1	0	15
Windsor St.	South bd.	12	97	0	2	0	146
Harvard St.	East bd.	28	82	39	5	0	36
Harvard St.	West bd.	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>99</u>
	Totals	40	217	48	8	0	296

1:45 PM to 2:45 PM

Windsor St.	North bd.	0	77	14	4	0	0
Windsor St.	South bd.	12	129	0	10	0	125
Harvard St.	East bd.	38	52	45	0	0	26
Harvard St.	West bd.	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>86</u>
	Totals	50	258	59	14	0	238

D. SPEED DATA

Radar speed checks were made by checking 100 vehicles at random on all three approaches and the following speeds were recorded.

<u>STREET</u>	<u>AVE. SPEED</u>	<u>85% SPEED</u>
Windsor St. No. Bd.	29 MPH	32 MPH
Widnsor St. So. Bd.	28 MPH	32 MPH
Harvard St. E. Bd.	20 MPH	25 MPH

The speed checks revealed that the average speed on Windsor Street is below the 30 MPH legal limit and Harvard Street is 20 MPH.

E. ACCIDENT STUDY

All accidents reported at this intersection were analyzed by reading each report to try and determine causes. The study revealed that from Jan. 1, 1989 to Feb. 22, 1990 a total of seven (7) accidents were reported and three (3) of these involved personal injury. The accidents involved vehicles traveling east-bound on Harvard Street crossing Windsor Street.

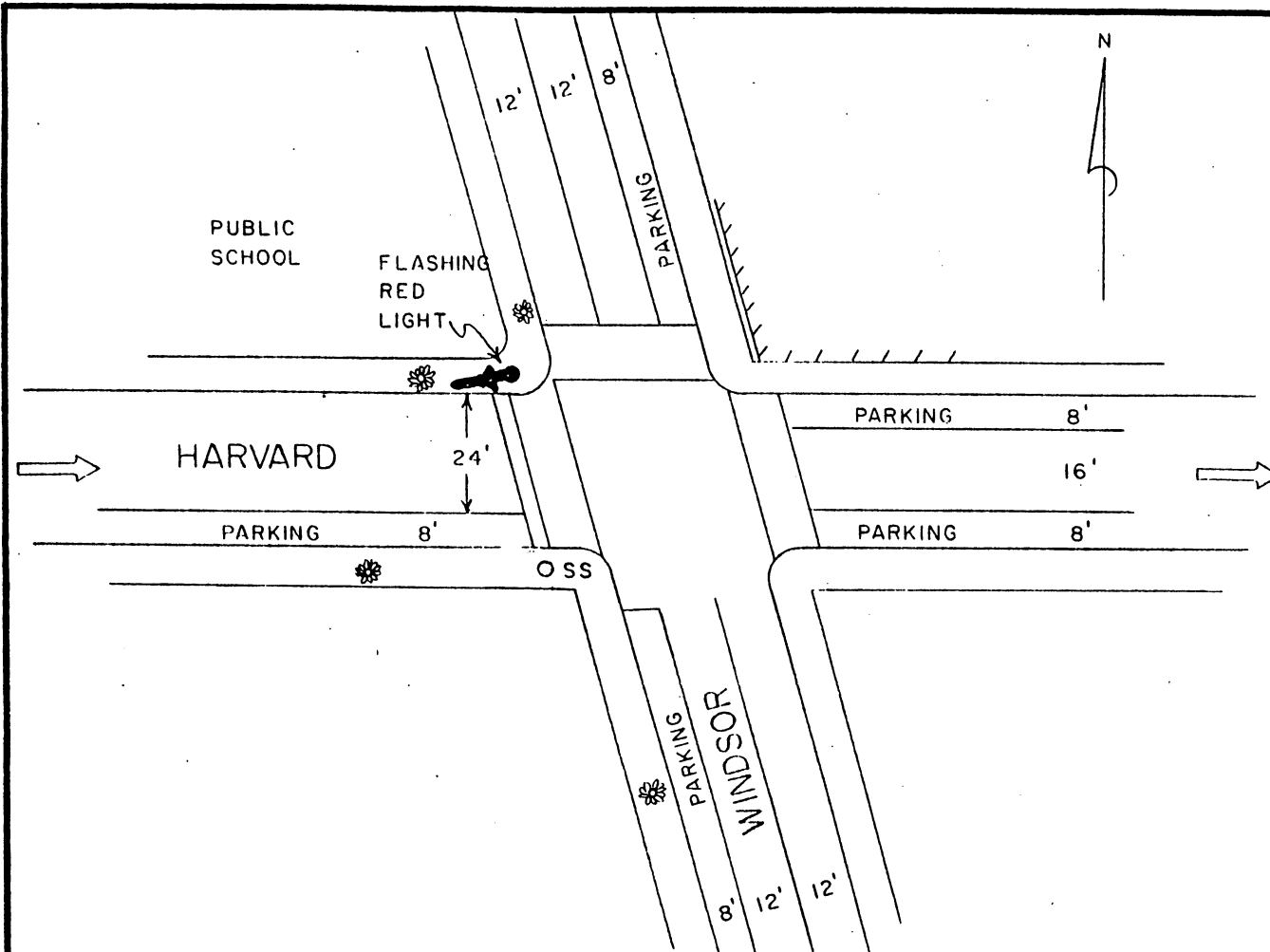
F. CONCLUSIONS AND RECOMMENDATIONS

In analyzing all the data collected it was our opinion that the intersection is operating at a level of service of "A" which is very good and that the speed is down and that pedestrians crossing do have safe gaps in traffic to cross the

street. As for the school children who cross at this intersection there is a school crossing guard assigned there to insure a safe crossing. The problem we did find was in the types of accidents that occurred at this intersection.

The collision diagram revealed that a pattern of all right angle accidents involved vehicles traveling on Harvard Street who were continuing across Windsor Street to Harvard Street. Although there were only seven (7) accidents reported over a period of 14 months, it did suggest that there were causes for these accidents besides bad weather and drivers disobeying the stop sign. After reading the drivers' accident reports, it was determined that the drivers on Windsor Street were not aware of the Harvard Street crossing until they were close to it thereby creating a potential cross collision.

We have after analyzing the data come to the conclusion that we should install an overhead warning beacon that will alert drivers on Windsor Street to the fact that there is a cross street ahead and to use caution when approaching. This installation along with new signing should be tried and monitored for its effectiveness before any other action is taken.



NO.	DATE	DESCRIPTION	DRAWN	CHKD	REC'M	APPVD	DATE
REVISIONS ABOVE							

HARVARD ST. & WINDSOR ST.
CONDITION DIAGRAM

	INITIAL	DATE
DRAWN	W E J	3/7/90
TRACED		
CHECKED		
REC'M APP.		
APPROVED	D L B	3/9/90

DEPARTMENT OF
TRAFFIC AND PARKING
CITY OF CAMBRIDGE

DRAWING NO.
SCALE 1" = 40'

SHEET NO. 1 OF 1

CIRCULAR 212 WORKSHEET: UNSIGNALIZED - 4 APPROACHES

WINDSOR AND HARVARD ST. TRAFFIC SIGNAL STUDY 7:30 AM TO 8:30 AM

GENERAL CHARACTERISTICS

CONTROLS: STOP

PREVAILING SPEED: 30 MPH

MAIN STREET # OF LANES: 2 LANES

MINOR STREET LANES

APPROACH: C: HARVARD ST.E.B

EXCLUSIVE LEFT TURN LANES: N

EXCLUSIVE RIGHT TURN LANES: N

APPROACH: D: HARVARD ST.W.B

EXCLUSIVE LEFT TURN LANES: N

EXCLUSIVE RIGHT TURN LANES: N

APPROACH	A: WINDSOR ST.			B: WINDSOR ST.			C: HARVARD ST.		
	LT	TH	RT	LT	TH	RT	LT	TH	RT
VOLUME	0	38	9	12	97	0	28	82	39
PERCENT GRADE	0.00			0.00			0.00		
PERCENT CYCLES	0.00			0.00			0.00		
PASSENGER CARS	100.00			99.00			98.00		
PERCENT LT TRU	0.00			0.00			0.00		
PERCENT HV TRU	0.00			1.00			2.00		
PASS CAR/HR	0			12			29 84 40		

STEP 1 RIGHT TURNS FROM C: HARVARD ST.E.B

CONFLICTING FLOWS	43
CRITICAL GAPS	6.0
CAPACITY	950
DEMAND	40
CAPACITY USED	4
IMPEDANCE FACTOR	0.98
SHARED LANE	Y

STEP 2 LEFT TURNS FROM

B: WINDSOR ST.S.B

A: WINDSOR ST.N.B

CONFLICTING FLOWS	47	97
CRITICAL GAPS	5.0	5.0
CAPACITY	1145	1089
DEMAND	12	0
CAPACITY USED	1	0
IMPEDANCE FACTOR	1.00	1.00
AVAILABLE RESERVE	1133	1089
DELAY	Little or no delay	
LOS	A	

WINDSOR AND HARVARD ST. TRAFFIC SIGNAL STUDY 7:30 AM TO 8:30 AM

STEP 3 THRU MOVES FROM	C: HARVARD ST. E. B
CONFLICTING FLOWS	152
CRITICAL GAPS	7.0
CAPACITY	693
ADJUST FOR IMP	691
DEMAND	84
CAPACITY USED	12
IMPEDANCE FACTOR	0.92
SHARED LANE LEFT	Y
SHARED LANE RIGHT	Y

STEP 4 LEFT TURNS FROM	C: HARVARD ST. E. B
CONFLICTING FLOWS	154
CRITICAL GAPS	7.5
CAPACITY	635
ADJUST FOR IMP	632
SHARED LANE THRU	Y
SHARED LANE RIGHT	Y
SHARED LN DEMAND	152
CAPACITY OF SHARED LN	730
AVAILABLE RESERVE	578
DELAY	Little or no delay
LOS	A

CIRCULAR 212 WORKSHEET: UNSIGNALIZED - 4 APPROACHES

WINDSOR AND HARVARD ST. TRAFFIC SIGNAL STUDY 1:45 PM TO 2:45 PM

GENERAL CHARACTERISTICS

CONTROLS: STOP

PREVAILING SPEED: 30 MPH

MAIN STREET # OF LANES: 2 LANES

MINOR STREET LANES

APPROACH: C: HARVARD ST. E.B

EXCLUSIVE LEFT TURN LANES: N

EXCLUSIVE RIGHT TURN LANES: N

APPROACH: D: HARVARD ST. W.B

EXCLUSIVE LEFT TURN LANES: N

EXCLUSIVE RIGHT TURN LANES: N

APPROACH	A: WINDSOR ST.			B: WINDSOR ST.			C: HARVARD ST.		
	LT	TH	RT	LT	TH	RT	LT	TH	RT
VOLUME	0	77	14	12	129	0	38	52	45
PERCENT GRADE	0.00			0.00			0.00		
PERCENT CYCLES	0.00			0.00			0.00		
PASSENGER CARS	98.00			97.00			100.00		
PERCENT LT TRU	0.00			0.00			0.00		
PERCENT HV TRU	2.00			3.00			0.00		
PASS CAR/HR	0			12			38	52	45

STEP 1 RIGHT TURNS FROM	C: HARVARD ST. E.B
CONFLICTING FLOWS	84
CRITICAL GAPS	6.0
CAPACITY	904
DEMAND	45
CAPACITY USED	5
IMPEDANCE FACTOR	0.97
SHARED LANE	Y

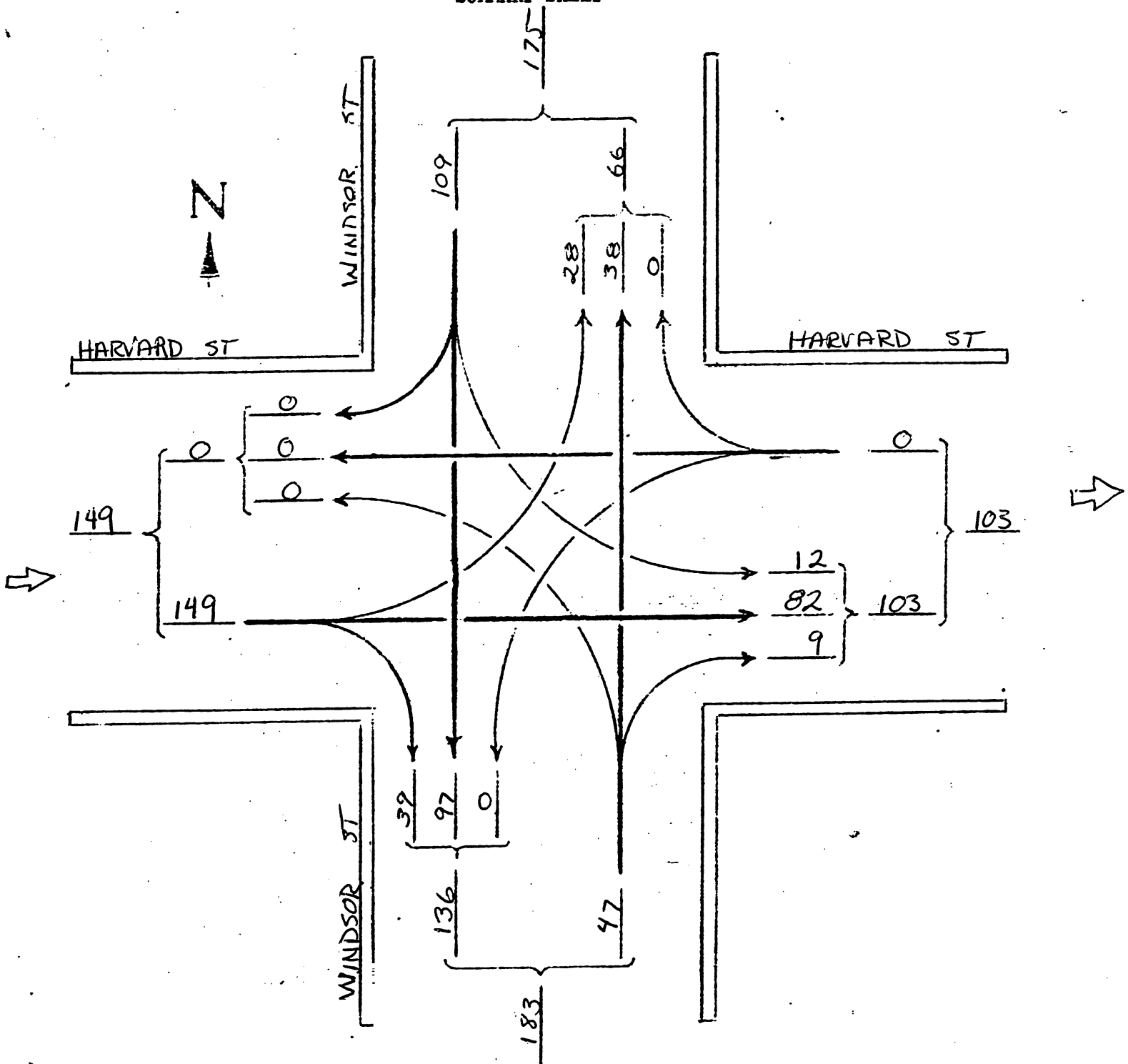
STEP 2 LEFT TURNS FROM	B: WINDSOR ST. S.B
CONFLICTING FLOWS	91
CRITICAL GAPS	5.0
CAPACITY	1096
DEMAND	12
CAPACITY USED	1
IMPEDANCE FACTOR	1.00
AVAILABLE RESERVE	1083
DELAY	Little or no delay
LOS	A

WINDSOR AND HARVARD ST. TRAFFIC SIGNAL STUDY 1:45 PM TO 2:45 PM

STEP 3 THRU MOVES FROM	C: HARVARD ST. E. B
CONFLICTING FLOWS	225
CRITICAL GAPS	7.0
CAPACITY	626
ADJUST FOR IMP	623
DEMAND	52
CAPACITY USED	8
IMPEDANCE FACTOR	0.95
SHARED LANE LEFT	Y
SHARED LANE RIGHT	Y

STEP 4 LEFT TURNS FROM	C: HARVARD ST. E. B
CONFLICTING FLOWS	227
CRITICAL GAPS	7.5
CAPACITY	569
ADJUST FOR IMP	566
SHARED LANE THRU	Y
SHARED LANE RIGHT	Y
SHARED LN DEMAND	135
CAPACITY OF SHARED LN	674
AVAILABLE RESERVE	539
DELAY	Little or no delay
LOS	A

INTERSECTION COUNT OF VEHICULAR TRAFFIC
SUMMARY SHEET



WEATHER ICY RAIN SHEET 1 OF 1 SHEETS

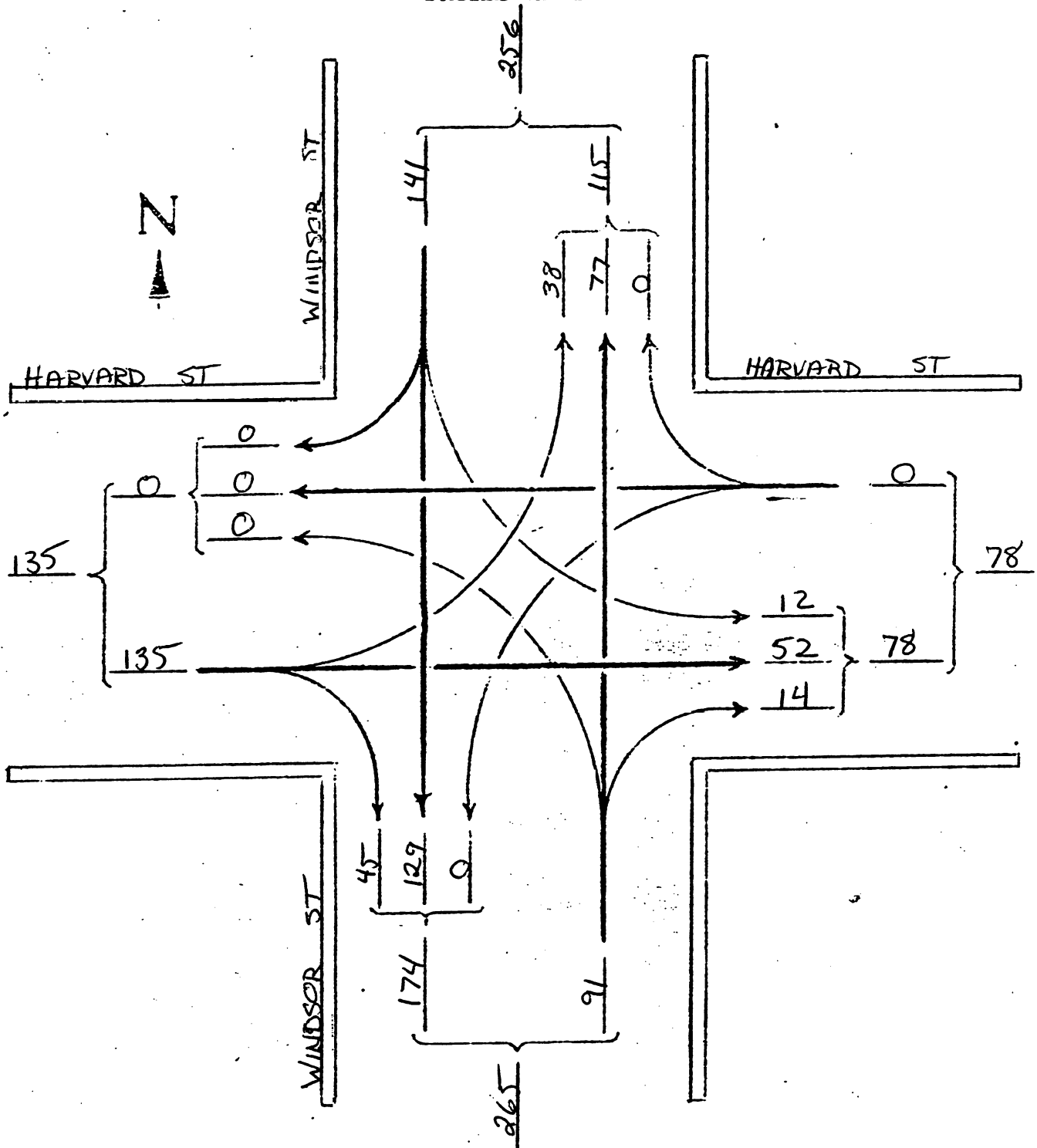
COMPILED BY DLB

CITY OF CAMBRIDGE
DEPT. OF TRAFFIC AND PARKING

LOCATION HARVARD & WINDSOR

DATE 2-15-90 DAY THUR 1:45 to 2:45 P.M.

INTERSECTION COUNT OF VEHICULAR TRAFFIC
SUMMARY SHEET



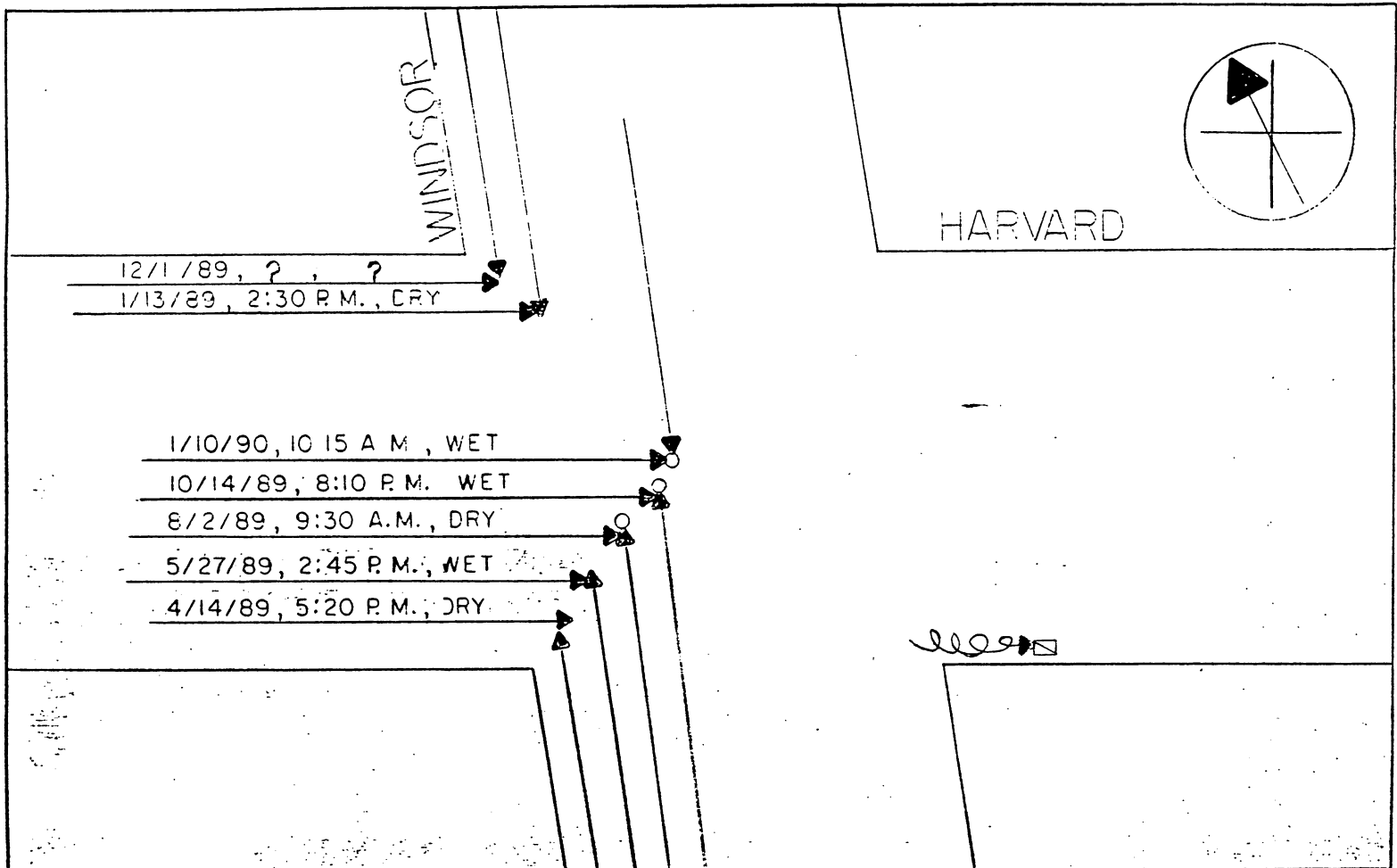
WEATHER Clear Cold SHEET 1 OF 1 SHEETS

COMPILED BY DLB

CITY OF CAMBRIDGE

COLLISION DIAGRAM

Location HARVARD & WINDSOR Number of Accidents 7
 From 1/1/89 To 12/31/89 Date 2/22/90
 Data Obtained From CAMBRIDGE POLICE DEPT. By E. J.



Legend	Accident Summary									
	By Types					By Years				
← Moving Motor Vehicle ← Pedestrian ◻ Parked Vehicle ◻ Fixed Object → Fatal Accident → Personal Injury → Property Damage ← Trolley → Out of Control ← Rear End → Right Angle	Type	Fatal	Inj.	Prop. Damage	Total	Year	M.V. M.V.	M.V. Ped.	Other	Total
	Head On					89	6			6
	Side Swipe					90	1			1
	M.V. Ped.									
	Fixed Object									
	Right Angle		3	4	7					
	Others									
	Total		3	4	7		7			7

Date 2/22/90 Compiled By E. J.

LOCATION: Windsor AT Harvard

AT

Harvard

TIME: 3-4

WEATHER:

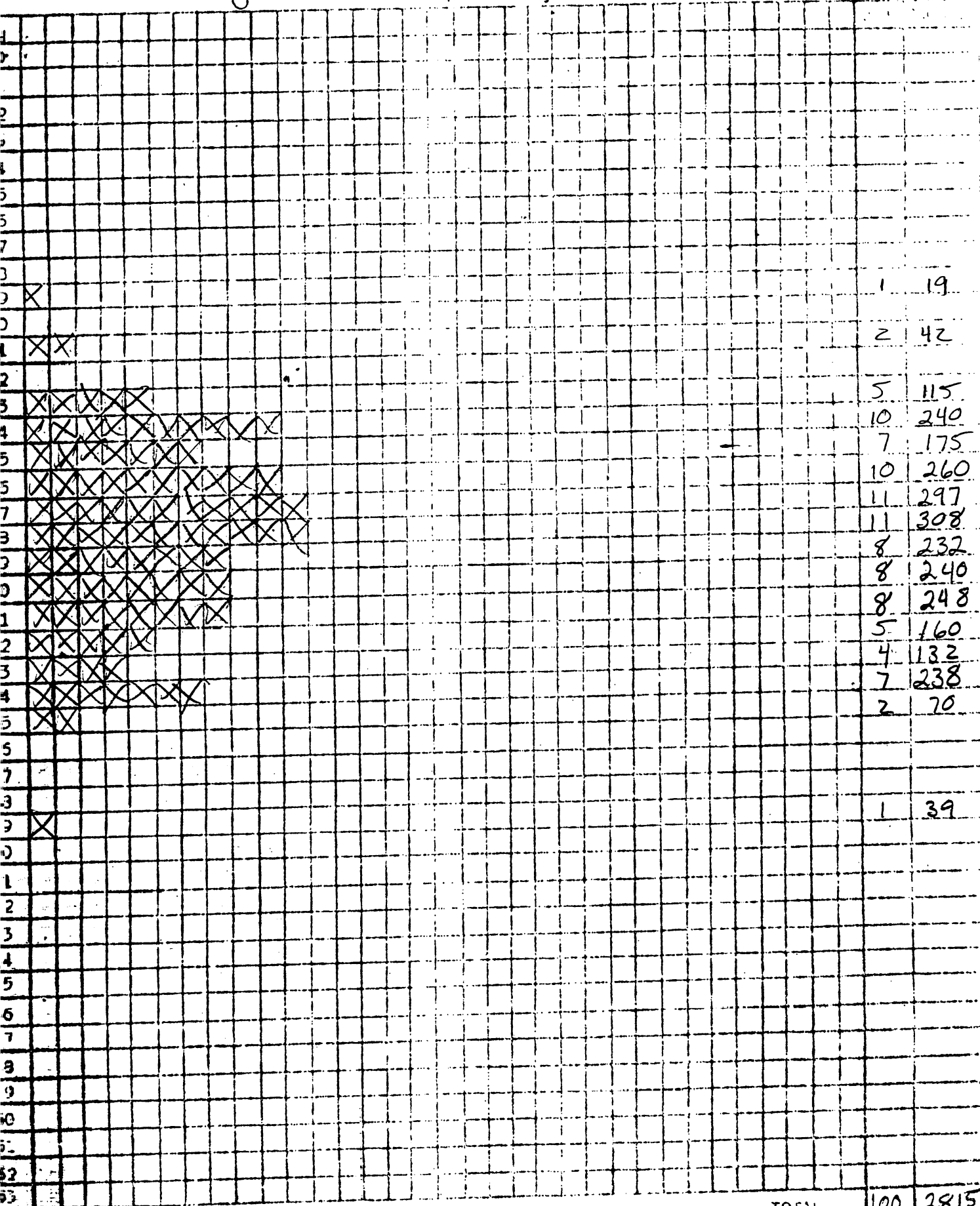
Sunny cool

CONDITION OF ROAD:

good

↑ SB(WB)

RECOMMEND:

$$n\sqrt{k}$$


TOTAL

100	28	5
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AVERAGE

28

RADAR SPEED CHECK

LOCATION: Harvard St

TIME: 8⁴⁰ - 9³⁰

Good

EB

Windsor (approaching stop) (FR)

overcast

MLK

MPH	QUAN	PRODUCT
10		
11		
12		
13		
14	3	42
15	6	90
16	7	112
17	8	136
18	8	144
19	8	152
20	10	200
21	6	126
22	10	220
23	12	276
24	5	120
25	9	225
26	3	78
27	5	135
28		
29		
30		
31		
32		
33		
34		
35		
36		
37		
38		
39		
40		
41		
42		
43		
44		
45		
46		
47		
48		
49		
50		
51		
52		
53		
TOTAL	100	2246

25 MPH

100

2046

20



CITY OF CAMBRIDGE

CAMBRIDGE, MASSACHUSETTS 02139

TEL. 498-9011

EXECUTIVE DEPARTMENT

ROBERT W. HEALY

City Manager

RICHARD C. ROSSI

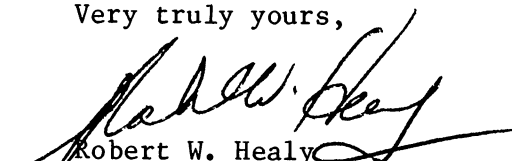
Deputy City Manager

March 12, 1990

To The Honorable, The City Council:

In response to Awaiting Report Item No. 25, dated 2/12/90, relative to traffic signal study update for Windsor Street and Harvard Street, attached please find a report from George Teso, Director of Traffic & Parking, concerning this matter.

Very truly yours,


Robert W. Healy
City Manager

RWH/mev
enclosure



CITY OF CAMBRIDGE
INTEROFFICE CORRESPONDENCE

To Robert Healy, City Manager

Date March 9, 1990

From  George Teso, Traffic Director

Reference

Subject Traffic Signal Study Update for Windsor St. and Harvard Street

The Traffic Department has completed a Traffic Signal Feasibility Study for the intersection of Windsor Street and Harvard Street. I have enclosed twelve (12) copies for your distribution. It is our opinion that we should follow through on the recommendations of the report and if you approve of our decision, I will start the procedures for the installation of an overhead warning beacon. In any event, I will install new warning signs in the area.

Enc. GT:rd

Agenda # 18

S-243

Awaiting Report Item Number 25 regarding
traffic signal study update for Windsor
Street and Harvard Street.

In City Council,

March 12, 1990

Placed on file