Menasha

March 11, 2010

Board of Public Works
City of Menasha
Menasha, WI 54952

RE: Traffic Study Report – Broad Street from Appleton Street to De Pere Street

Members of the Board:

The Engineering Department performed a traffic study to determine the feasibility of changing the existing one-way (eastbound) traffic on Broad Street from Appleton Street to De Pere Street, to two-way traffic.

The attached accident report for the intersection of Appleton Street and Broad Street shows that the accidents do not involve limited sight distance issues at the intersection but from making a left turn movement out of the right lane crossing the left lane of the one-way street, backing into parked vehicles and a rear end accident involving slowed traffic. Even though the number and type accidents don't substantiate the need to eliminate parking; to be in compliance of minimum sight triangles (see attached) in AASHTO (American Association of State Highway and Transportation Officials) Geometric Design of Highways and Streets, you would need to remove all of the existing angle parking and possibly the first fifty feet of parallel parking allowed on the north side of the street west of the intersection. This would have a negative impact on the tavern/restaurant on the northwest corner of the intersection (546 Broad Street) as well as the auto body shop (540 Broad Street) to the west of the tavern. To eliminate the angle parking in this area, the mountable curb and gutter section would need to be removed and replaced with full head curb and gutter, as well as posting "No Parking" signs within the entire clear sight triangle area.

There was one reportable accident on the 600 block of Broad Street (see attached). One of the major concerns brought forward previously was the cars going the wrong way on the one-way street. This may occur, but the accident history only shows one rear end collision in this block. It was noted in numerous responses that the traffic going the wrong way in this area are drivers not familiar with the one-way street or the area in general. One local resident said that a number of the people driving the wrong way on this one-way street are local residents.

A number of responses from property owners and residents in the Traffic Study dated February 25, 2010 point to the inconvenience to drive east to De Pere Street and then proceed north to First Street turning left, westbound to the traffic signals. If you change the 600 block of Broad Street to two-way traffic, the residents of this block and the 600 block of Paris Street would be able to drive westbound to Appleton Street and then turn right, northbound to First Street. From there they would more than likely turn left, westbound on First Street to the traffic signals at Racine Street. This would not eliminate any traffic turns but would eliminate the one block drive to the east to De Pere Street and the need to "back track" in the 600 block of First Street.

This Department was made aware of the frustration of residents and property owners on First Street regarding the increased amount of traffic they experience because Broad Street is one-way, eastbound. This is why we included those properties in the mass mailing (approximately 260 letters total) seeking input. We did not receive a letter, phone call or email from a resident or property owner on First Street regarding this issue. I believe more drivers utilize First Street because of the convenience of the existing traffic signals at Racine Street. If the 600 block of Broad Street is changed to two-way traffic, there will be additional vehicles driving on Appleton Street, between Broad Street and First Street. A certain number of vehicles will turn left, westbound on First Street, but there will also be additional vehicles proceeding north on Appleton Street to Second Street or Third Street. These vehicles more than likely used De Pere Street in the past. Will this additional traffic on Appleton Street be frowned upon by the residents living on Appleton Street? Will those additional vehicles cause problems in the vicinity of St. Mary's Church and School?

The City received three responses from residents on the 600 block of Broad Street; those most directly affected by the proposed modification. Of those responding, two were opposed to the two-way traffic and one supported the change. These responses were to the proposed two-way traffic for the entire corridor from Racine Street to De Pere Street.

I feel to make the 600 block of Broad Street a two-way street will not be in the best interest of the City at this time. The majority of the responses for the entire corridor oppose the move. The Police Department opposes the move. Converting this one block section to two-way traffic would make it more convenient for some of the affected residents in the area, but it will also adversely affect the residents on Appleton Street with additional traffic movements. As pointed out previously, the "Human Factor" will play a big roll in the adjustment to two-way traffic. I would recommend however, that if the Council decides to leave this one-way, to make the intersection of Appleton Street and Broad Street a three way stop. This will improve the safety of the intersection without eliminating parking and still meet the recommended sight triangles (see attached) for "Intersections with All Way Stop Control". If the Council decides to make the 600 block of Broad Street two-way traffic, I would recommend to make the intersection of Appleton Street and Broad Street a four way stop with additional signage and pavement marking as shown on the attached drawing. The existing "Left Turn Only" pavement marking at De Pere Street would also need to be removed. I would recommend that the new configuration at Broad Street and De Pere Street to be controlled by stop signs on De Pere Street.

By eliminating one block of the entire one-way corridor, the City is still not addressing the ultimate issue of "it is the only one-way street in Menasha". If it is the City's intent to eliminate the one-way street in its entirety, it should be addressed at one time and not the 600 block this year and the 500 block of Broad Street sometime in the future. As was pointed out in previous Traffic Studies, to make a safe transition to a two-way street for the entire corridor, it is recommended that a "Right Turn Only" movement be allowed from westbound Broad Street to northbound Racine Street and do not allow any straight or left turn movements from westbound Broad Street to Racine Street. With this option you would need to place a restrictive raised traffic island to force this movement. Because of a large utility pole on the northeast corner of the intersection of Racine Street and Broad Street you cannot move the curb in the turn radius north into City owned property. A WB-40 turning movement would work with a small restrictive island, but the Council needs to be aware that the WB-40 turning movement is less of a turn radius than the WB-50 which is typically used. With a larger truck, or if a smaller truck does not position itself properly, there would be tracking over the existing centerline or crowding of the sidewalk/terrace area during a turn movement. This turning movement would be hazardous to pedestrian and vehicular traffic. I would recommend that the eastbound traffic on Broad Street at Racine Street also be "Right Turn Only" with a matching restrictive island for a WB-40 turn radius. This would require any delivery trucks in the Main Street business district planning to leave to the north, to go on Milwaukee Street north to First Street or Third Street. This would increase truck traffic in a residential area on Milwaukee Street and First Street. The existing turn radii more than likely would not support large truck turning movements at the intersections, but opposing traffic would likely be less than on Racine Street.

If the Council decides to leave the existing Broad Street corridor between Racine Street and De Pere Street one-way, I would still recommend that eastbound traffic on Broad Street at Racine Street to be "Right Turn Only" with the raised traffic island accommodating a WB-40 turn radius. This movement would greatly reduce the number of accidents at Broad Street and Racine Street. The City would have to work with the downtown businesses and their respective delivery companies to provide a smooth transition.

Sincerely,

Tim J. Montour
Engineering Supervisor

Attachments
C: Street file

S:\PUBLICWORKS PUBLICWORKS\Broad Street 2010\Traffic Study(Broad_from_Appleton_to_DePere3_8_2010).doc

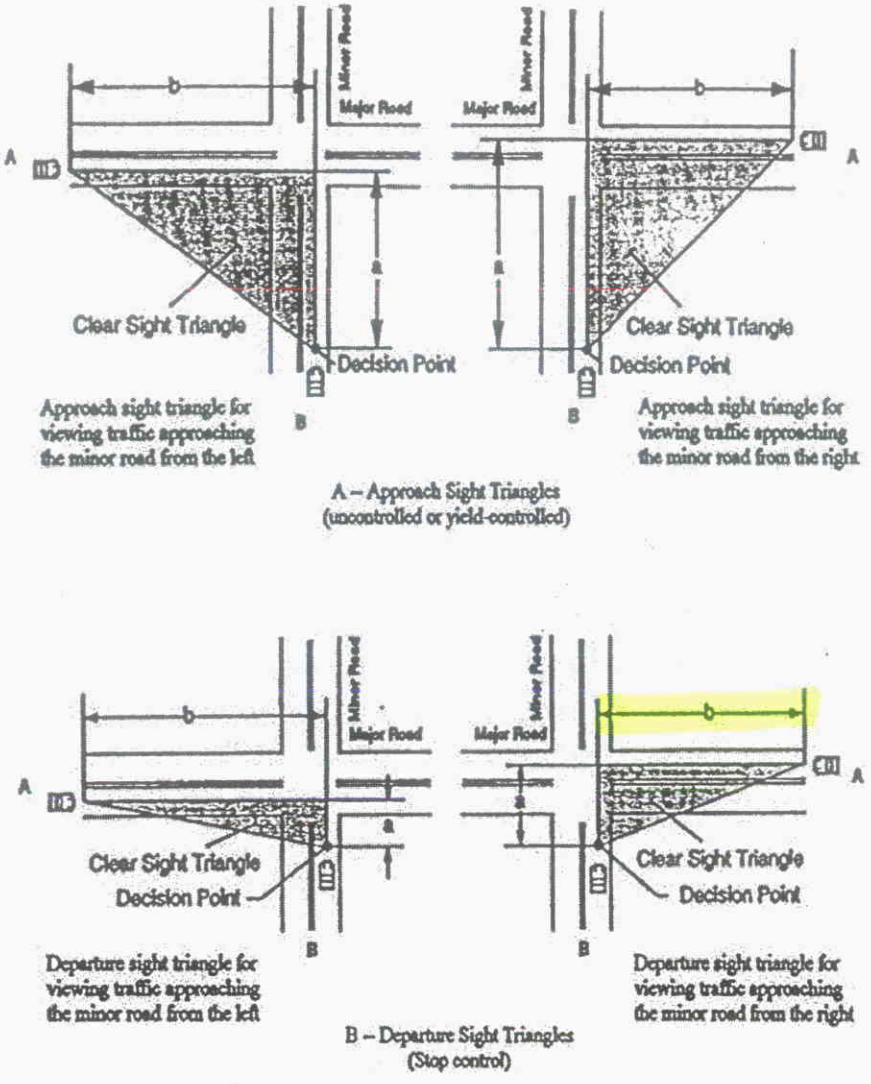


Exhibit 9-50. Intersection Sight Triangles

Metric				US Customary			
		Intersection sight distance for passenger cars				Intersection sight distance for passenger cars	
Design speed (km/h)	Stopping sight distance (m)	Calculated (m)	Design (m)	Design speed (mph)	Stopping sight distance (ft)	Calculated (ft)	Design (ft)
20	20	41.7	45	15	80	165.4	170
30	35	62.6	65	20	115	220.5	225
40	50	83.4	85	25	155	275.6	280
50	65	104.3	105	30	200	330.8	335
60	85	125.1	130	35	250	385.9	390
70	105	146.0	150	40	305	441.0	445
80	130	166.8	170	45	360	496.1	500
90	160	187.7	190	50	425	551.3	555
100	185	208.5	210	55	495	606.4	610
110	220	229.4	230	60	570	661.5	665
120	250	250.2	255	65	645	716.6	720
130	285	271.1	275	70	730	771.8	775
				75	820	826.9	830
				80	910	882.0	885

Note: Intersection sight distance shown is for a stopped passenger car to turn left onto a two-lane highway with no median and grades 3 percent or less. For other conditions, the time gap must be adjusted and required sight distance recalculated.

Exhibit 9-55. Design Intersection Sight Distance—Case B1—Left Turn from Stop

Sight distance design for left turns at divided-highway intersections should consider multiple design vehicles and median width. If the design vehicle used to determine sight distance for a divided-highway intersection is larger than a passenger car, then sight distance for left turns will need to be checked for that selected design vehicle and for smaller design vehicles as well. If the divided-highway median is wide enough to store the design vehicle with a clearance to the through lanes of approximately 1 m [3 ft] at both ends of the vehicle, no separate analysis for the departure sight triangle for left turns is needed on the minor-road approach for the near roadway to the left. In most cases, the departure sight triangle for right turns (Case B2) will provide sufficient sight distance for a passenger car to cross the near roadway to reach the median. Possible exceptions are addressed in the discussion of Case B3.

If the design vehicle can be stored in the median with adequate clearance to the through lanes, a departure sight triangle to the right for left turns should be provided for that design vehicle turning left from the median roadway. Where the median is not wide enough to store the design vehicle, a departure sight triangle should be provided for that design vehicle to turn left from the minor-road approach.

The median width should be considered in determining the number of lanes to be crossed. The median width should be converted to equivalent lanes. For example, a 7.2-m [24-ft] median should be considered as two additional lanes to be crossed in applying the multilane highway adjustment for time gaps in Exhibit 9-54. Furthermore, a departure sight triangle for left turns

However, if the traffic signal is to be placed on two-way flashing operation (i.e., flashing yellow on the major-road approaches and flashing red on the minor-road approaches) under off-peak or nighttime conditions, then the appropriate departure sight triangles for Case B, both to the left and to the right, should be provided for the minor-road approaches. In addition, if right turns on a red signal are to be permitted from any approach, then the appropriate departure sight triangle to the left for Case B2 should be provided to accommodate right turns from that approach.

Case E—Intersections with All-Way Stop Control

At intersections with all-way stop control, the first stopped vehicle on one approach should be visible to the drivers of the first stopped vehicles on each of the other approaches. There are no other sight distance criteria applicable to intersections with all-way stop control and, indeed, all-way stop control may be the best option at a limited number of intersections where sight distance for other control types cannot be attained.

Case F—Left Turns from the Major Road

All locations along a major highway from which vehicles are permitted to turn left across opposing traffic, including intersections and driveways, should have sufficient sight distance to accommodate the left-turn maneuver. Left-turning drivers need sufficient sight distance to decide when it is safe to turn left across the lane(s) used by opposing traffic. Sight distance design should be based on a left turn by a stopped vehicle, since a vehicle that turns left without stopping would need less sight distance. The sight distance along the major road to accommodate left turns is the distance traversed at the design speed of the major-road in the travel time for the design vehicle given in Exhibit 9-66.

Design vehicle	Time gap (t_g) (seconds) at design speed of major road
Passenger car	5.5
Single-unit truck	6.5
Combination truck	7.5

Adjustment for multilane highways:

For left-turning vehicles that cross more than one opposing lane, add 0.5 seconds for passenger cars and 0.7 seconds for trucks for each additional lane to be crossed.

Exhibit 9-66. Time Gap for Case F—Left Turns from the Major Road

The table also contains appropriate adjustment factors for the number of major-road lanes to be crossed by the turning vehicle. The unadjusted time gap in Exhibit 9-66 for passenger cars was used to develop the sight distances in Exhibit 9-67 and illustrated in Exhibit 9-68.

COLLISION DIAGRAM

Key Number =

MUNICIPALITY: Menasha COUNTY: Winnebago

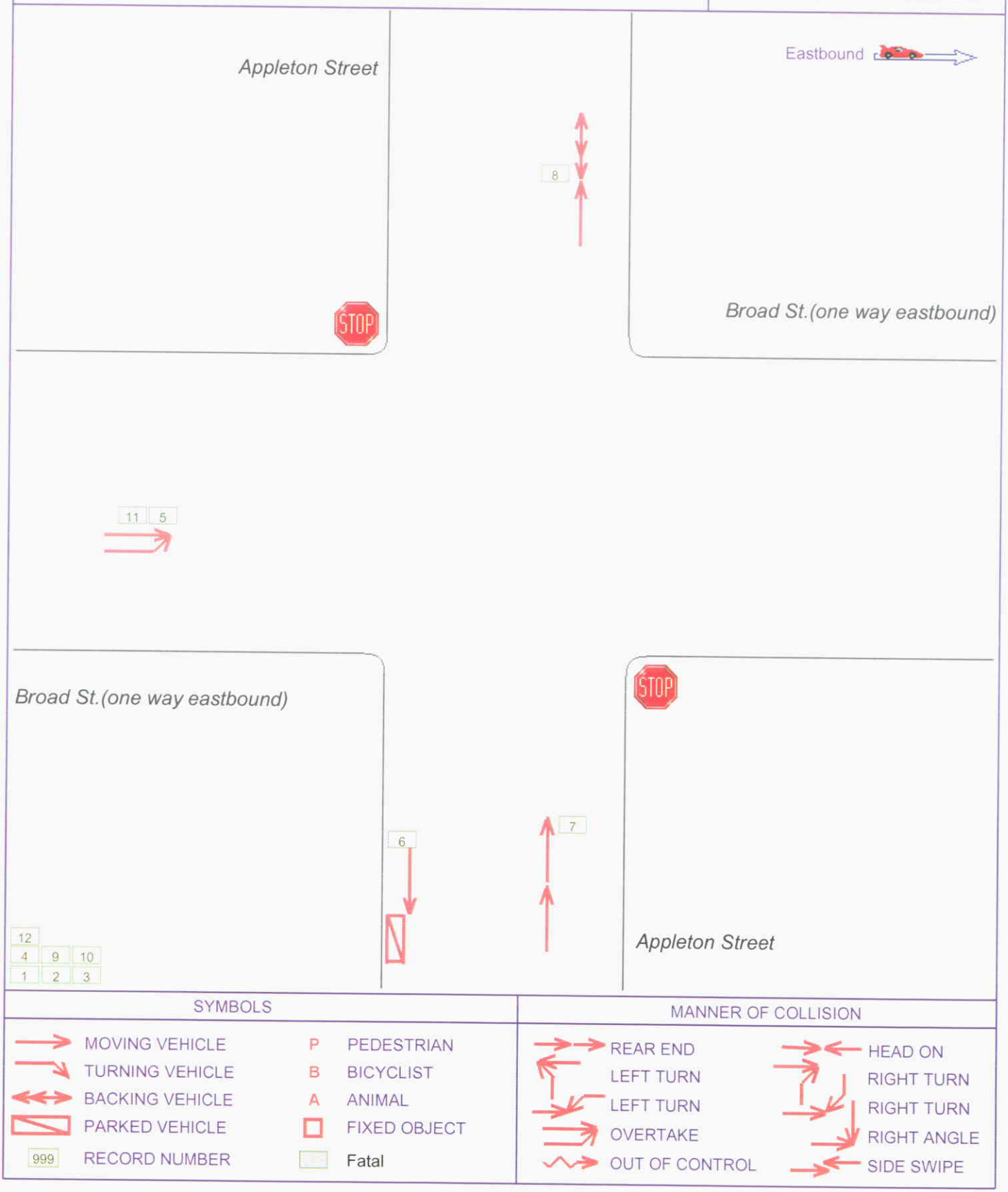
INTERSECTION: Broad St.

PERIOD: 0 YEARS 0 MONTHS FROM TO

FILE: broad_appleton

CASE # :

BY: cr DATE: 3/8/2010



SYMBOLS

- MOVING VEHICLE
- TURNING VEHICLE
- BACKING VEHICLE
- PARKED VEHICLE
- 999 RECORD NUMBER
- P PEDESTRIAN
- B BICYCLIST
- A ANIMAL
- FIXED OBJECT
- Fatal

MANNER OF COLLISION

- REAR END
- LEFT TURN
- LEFT TURN
- OVERTAKE
- OUT OF CONTROL
- HEAD ON
- RIGHT TURN
- RIGHT TURN
- RIGHT ANGLE
- SIDE SWIPE

ACCIDENT SUMMARY SHEET

ROUTE: *Broad St.* **LOCATION:** *at Appleton St.*

MUNICIPALITY: *Menasha* **COUNTY:** *Winnebago*

TIME PERIOD COVERED: - **REFERENCE MARKERS / NODES:** -

REMARKS: *All Accidents* **DATE:** *3/8/2010*

TIME OF DAY	# ACC	%
6 AM - 10 AM	1	8.3%
10 AM - 4 PM	7	58.3%
4 PM - 7 PM	1	8.3%
7 PM - 12 AM	2	16.7%
12 AM - 6 AM	0	0.0%
Unspecified	1	8.3%
Total	**12**	

DIRECTION	# ACC	%
North	4	18.2%
South	2	9.1%
East	12	54.5%
West	1	4.5%
Total	**22**	

DIRECTION	# ACC	
Northeast	2	9.1%
Northwest	1	4.5%
Southeast	0	0.0%
Southwest	0	0.0%
Unspecified	0	0.0%

WEATHER	# ACC	%
Clear	3	25.0%
Cloudy	5	41.7%
Rain	1	8.3%
Snow	0	0.0%
Sleet/Hail/Freezing Rain	0	0.0%
Fog/Smog/Smoke	0	0.0%
Unspecified	3	25.0%
Total	**12**	

ACCIDENT TYPE	# ACC	%
Rear End	1	8.3%
Overtake	2	16.7%
Right Angle	0	0.0%
Left Turn	4	33.3%
Right Turn	0	0.0%
Fixed Object	0	0.0%
Head On	0	0.0%
Sideswipe	0	0.0%
Total	**12**	

ACCIDENT TYPE	# ACC	
Pedestrian	0	0.0%
Bicycle	0	0.0%
Parked Vehicle	1	8.3%
Backing	1	8.3%
Run Off The Road	0	0.0%
Animal	0	0.0%
Other	2	16.7%
Unspecified	1	8.3%

SURFACE	# ACC	%
Dry	7	58.3%
Wet	1	8.3%
Mud/Slush	1	8.3%
Snow/Ice	0	0.0%
Unspecified	3	25.0%
Total	**12**	

ACCIDENT SEVERITY	# ACC	%
Fatal	0	0.0%
Injury	0	0.0%
Property Damage	9	75.0%
Non-Reportable	2	16.7%
Total	**12**	

TIME OF YEAR	# ACC	%
Winter (Dec-Feb)	2	18.2%
Spring (Mar-May)	3	27.3%
Summer (Jun-Aug)	3	27.3%
Fall (Sep-Nov)	3	27.3%
Total	**11**	

TYPE OF VEHICLE	# ACC	%
Passenger Cars	11	100.0%
Commercial Vehicles	0	0.0%
Total	**11**	

DAY OF WEEK	# ACC	%
Sunday	2	16.7%
Monday	1	8.3%
Tuesday	1	8.3%
Wednesday	0	0.0%
Thursday	2	16.7%
Friday	5	41.7%
Saturday	1	8.3%
Total	**12**	

LIGHT CONDITION	# ACC	%
Daylight	5	41.7%
Dawn/Dusk	0	0.0%
Night	1	8.3%
Unspecified	6	50.0%
Total	**12**	

SUMMARY OF ACCIDENT SEVERITY BY YEAR:

	0
Fatal Accidents	0
Injury Accidents	0
Property Damage Accidents	0
Non-Reportable Accidents	0
Total Accidents	**0**

DETAILS OF ACCIDENT HISTORY

PERIOD STUDIED:
FROM:
TO:
0 MONTHS

ROUTE NUMBER/STREET NAME: *Broad St.*
LOCATION *at Appleton St.*
MUNICIPALITY: *Menasha* COUNTY: *Winnebago*
REFERENCE MARKERS / NODES: -

CASE No.
FILE: *broad_appleton*
BY: *cr*
DATE: *3/8/2010*

No.	DATE	TIME	# VEHICLES	SEVERITY	LIGHT COND	ROAD CHAR	SURFACE	WEATHER	CONTRIB. FACTORS	ACC. TYPE	ACCIDENT DESCRIPTION	KEY #
9												
1	6/24/1994	14:00		PDO			1	2		LTRN		
2	8/4/1996	22:25		PDO			1	1		OTH		
3	12/12/1996	11:46		PDO			5	2		OTH		
4	1/30/1998	17:02		PDO			1	2		LTRN		
5	5/16/1999	15:13		PDO			1	2		OVTK		
6	10/18/2002	12:10	2	N/R	1	1			3	Park	unit 2 was angle parked, unit 1 backed into left side of unit 2	
7	7/15/2003	15:31	1	N/R	1	1			4	Rend	unit 2 slowed rapidly for traffic, unit 1 rear ended unit 2	
8	4/25/2005	21:10	2	PDO	4	1	2	3	3	Back	unit 1 backing out of driveway, struck legally parked unit 2	
10	5/14/2009	7:20	2	PDO	1	1	1	2	18	Ltrn	veh 1 turned left from right lane in front of veh 2	
12	9/11/2009	14:42	2	PDO	1	1	1	1	18	Ltrn	veh 1 made left turn from right lane, struck veh 2 in left lane	
11	9/11/2009	14:42	2	PDO	1	1	1	1	18	Ovtk	unit 1 turn left nb from right lane into unit 2 eb-one way st	

COLLISION DIAGRAM

Key Number =

MUNICIPALITY: *Menasha* COUNTY: *Winnebago*

INTERSECTION: *Broad St.*

PERIOD: *0* YEARS *0* MONTHS FROM TO

FILE: *broad_600blockB*

CASE # :

BY: *cr* DATE: *3/9/2010*

SYMBOLS				MANNER OF COLLISION	
MOVING VEHICLE	P	PEDESTRIAN		REAR END	HEAD ON
TURNING VEHICLE	B	BICYCLIST		LEFT TURN	RIGHT TURN
BACKING VEHICLE	A	ANIMAL		LEFT TURN	RIGHT TURN
PARKED VEHICLE		FIXED OBJECT		OVERTAKE	RIGHT ANGLE
999 RECORD NUMBER		Fatal		OUT OF CONTROL	SIDE SWIPE

ACCIDENT SUMMARY SHEET

ROUTE: *Broad St.* **LOCATION:** *600 block B*

MUNICIPALITY: *Menasha* **COUNTY:** *Winnebago*

TIME PERIOD COVERED: - **REFERENCE MARKERS / NODES:** -

REMARKS: *All Accidents* **DATE:** *3/9/2010*

TIME OF DAY	# ACC	%
6 AM - 10 AM	0	0.0%
10 AM - 4 PM	0	0.0%
4 PM - 7 PM	0	0.0%
7 PM - 12 AM	1	100.0%
12 AM - 6 AM	0	0.0%
Unspecified	0	0.0%
Total	**1**	

DIRECTION	# ACC	%
North	0	0.0%
South	0	0.0%
East	1	100.0%
West	0	0.0%
Total	**1**	

DIRECTION	# ACC	
Northeast	0	0.0%
Northwest	0	0.0%
Southeast	0	0.0%
Southwest	0	0.0%
Unspecified	0	0.0%

WEATHER	# ACC	%
Clear	0	0.0%
Cloudy	1	100.0%
Rain	0	0.0%
Snow	0	0.0%
Sleet/Hail/Freezing Rain	0	0.0%
Fog/Smog/Smoke	0	0.0%
Unspecified	0	0.0%
Total	**1**	

ACCIDENT TYPE	# ACC	%
Rear End	0	0.0%
Overtake	0	0.0%
Right Angle	0	0.0%
Left Turn	0	0.0%
Right Turn	0	0.0%
Fixed Object	0	0.0%
Head On	0	0.0%
Sideswipe	0	0.0%
Total	**1**	

ACCIDENT TYPE	# ACC	
Pedestrian	0	0.0%
Bicycle	0	0.0%
Parked Vehicle	1	100.0%
Backing	0	0.0%
Run Off The Road	0	0.0%
Animal	0	0.0%
Other	0	0.0%
Unspecified	0	0.0%

SURFACE	# ACC	%
Dry	1	100.0%
Wet	0	0.0%
Mud/Slush	0	0.0%
Snow/Ice	0	0.0%
Unspecified	0	0.0%
Total	**1**	

ACCIDENT SEVERITY	# ACC	%
Fatal	0	0.0%
Injury	0	0.0%
Property Damage	1	100.0%
Non-Reportable	0	0.0%
Total	**1**	

TIME OF YEAR	# ACC	%
Winter (Dec-Feb)	1	100.0%
Spring (Mar-May)	0	0.0%
Summer (Jun-Aug)	0	0.0%
Fall (Sep-Nov)	0	0.0%
Total	**1**	

TYPE OF VEHICLE	# ACC	%
Passenger Cars	2	100.0%
Commercial Vehicles	0	0.0%
Total	**2**	

DAY OF WEEK	# ACC	%
Sunday	1	100.0%
Monday	0	0.0%
Tuesday	0	0.0%
Wednesday	0	0.0%
Thursday	0	0.0%
Friday	0	0.0%
Saturday	0	0.0%
Total	**1**	

LIGHT CONDITION	# ACC	%
Daylight	0	0.0%
Dawn/Dusk	0	0.0%
Night	1	100.0%
Unspecified	0	0.0%
Total	**1**	

SUMMARY OF ACCIDENT SEVERITY BY YEAR: **0**

Fatal Accidents	0
Injury Accidents	0
Property Damage Accidents	0
Non-Reportable Accidents	0
Total Accidents	**0**

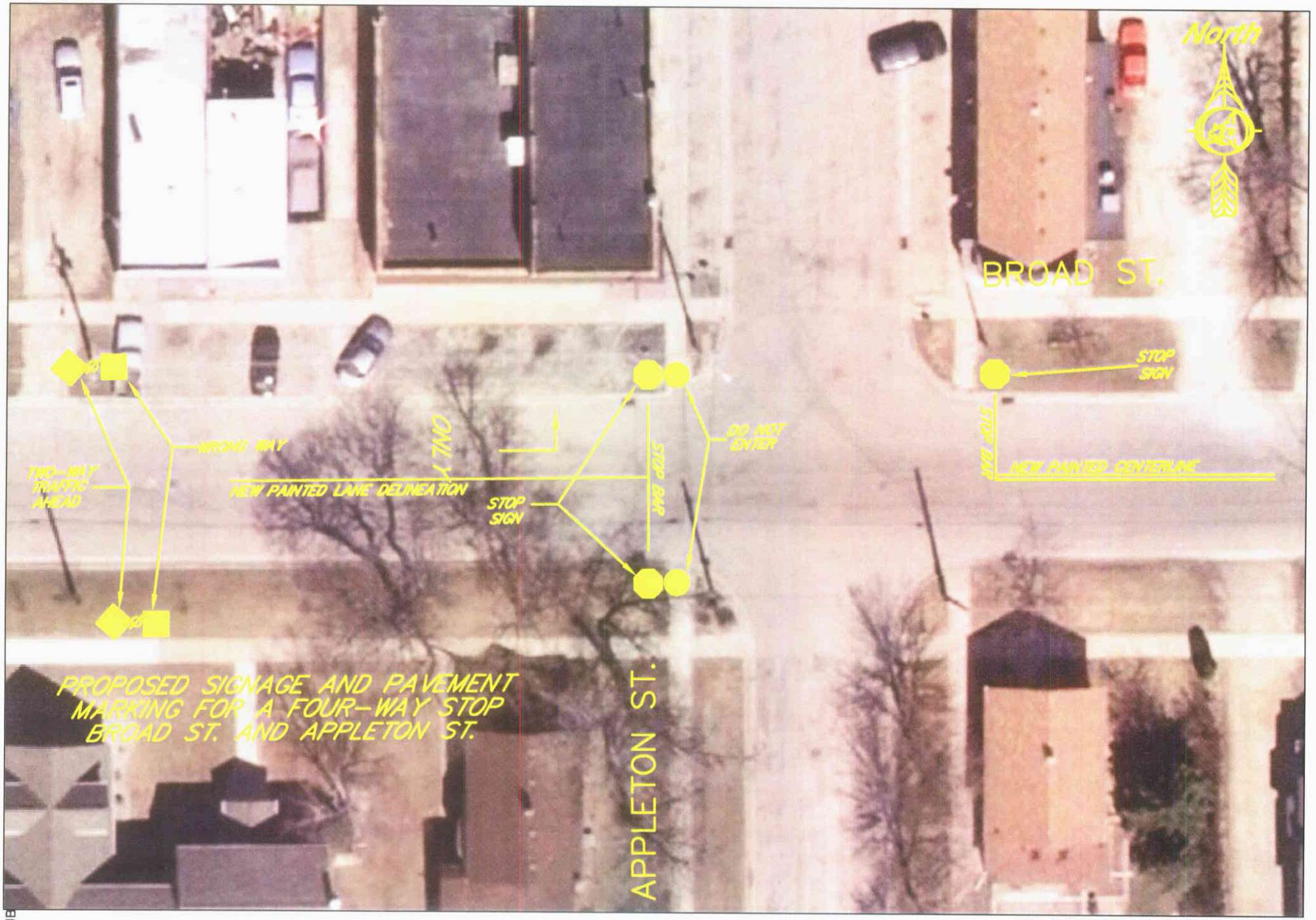
DETAILS OF ACCIDENT HISTORY

PERIOD STUDIED:
FROM:
TO:
0 MONTHS

ROUTE NUMBER/STREET NAME: *Broad St.*
LOCATION *600 block B*
MUNICIPALITY: *Menasha* COUNTY: *Winnebago*
REFERENCE MARKERS / NODES: -

CASE No.
FILE: *broad_600blockB*
BY: *cr*
DATE: *3/9/2010*

No.	DATE	TIME	# VEHICLES	SEVERITY	LIGHT COND	ROAD CHAR	SURFACE	WEATHER	CONTRIB. FACTORS	ACC. TYPE	ACCIDENT DESCRIPTION	KEY #
1	12/16/2007	19:05	2	PDO	4	1	1	2	2	Park	veh 1 rear ended parked veh 2, DUI	


North
BROAD ST.
STOP SIGN
STOP BAR
NEW PAINTED CENTERLINE
ONE WAY
WRONG WAY
TWO-WAY TRAFFIC AHEAD
NEW PAINTED LANE DELINEATION
STOP SIGN
STOP BAR
DO NOT ENTER
APPLETON ST.
PROPOSED SIGNAGE AND PAVEMENT MARKING FOR A FOUR-WAY STOP BROAD ST. AND APPLETON ST.

P:\PUB