

Spot Safety Project Evaluation

Project Log # 200712095

Spot Safety Project # 06-99-208

**Spot Safety Project Evaluation of the Installation of a Traffic Signal and
Raised Channelization at the Intersections of NC 24 (Bragg Blvd) with
Ames Street and Filter Plant Road
City of Fayetteville, Cumberland County**

Documents Prepared By:

Safety Evaluation Group
Traffic Safety Systems Management Section
Transportation Mobility and Safety Division
North Carolina Department of Transportation

Principal Investigator

Jason B. Schronce

7-30-2008
Date

Traffic Safety Project Engineer

Spot Safety Project Evaluation Documentation

Subject Location

Evaluation of Spot Safety Project Number 06-99-208 located at the Intersections of NC 24 (Bragg Blvd) at Ames Street and Filter Plant Road in Cumberland County.

Project Information and Background from the Project File Folder

The spot safety project improvement countermeasures chosen for the subject location were the installation of, at consecutive intersections, an actuated traffic signal and a raised monolithic concrete island to restrict left turns. NC 24 (Bragg Boulevard) is a major thoroughfare through the City of Fayetteville. At this location, it provides a seven lane curb and gutter section with a center turn lane and a speed limit of 35 mph. Ames Street and Filter Plant Road are both two-lane facilities at the subject location with speed limits of 35 mph. Filter Plant Road forms a three-leg intersection with NC 24 and is under stop sign control. Ames Street, also under stop sign control, intersects NC 24 at a crossroads and provides left turn lanes for both approaches.

The original statement of problem was that left turn type accidents were occurring at Filter Plant Road due to restricted sight distance caused by a crest vertical curve on NC 24. Also noted was that handicapped pedestrians cross NC 24 at Ames Street causing a severe potential for accidents. The project called for the installation of a traffic signal at Ames Street and a raised concrete median on NC 24 at Filter Plant Road to limit vehicles to right-in, right-out movements only.

The initial crash analysis was completed from March 1, 1996 to February 28, 1999 with forty (40) reported crashes, twenty-five (25) of which were deemed correctable. The final completion date for the improvements at the subject location was on November 7, 2002 with a total cost of \$50,000.00.

Naive Before and After Analysis

After reviewing the spot safety project file folder along with all the crashes at the subject location, the crash data omitted from this analysis to consider for an adequate construction period was from December 1 to February 28, 2001. The before period consisted of reported crashes from March 1, 1998 through November 30, 2001 (5 years and 9 months); and the after period consisted of reported crashes from March 1, 2002 through November 30, 2007 (5 years and 9 months). The ending date for this analysis was determined by the date of available crash data at the time of analysis.

The treatment data consisted of all crashes from 150 feet northwest of Filter Plant Road (MP 12.582) through 150 southeast of Ames Street (MP 12.918) on NC 24. The crash analysis also includes all crashes within 150 feet from NC 24 on both side streets. *Please see attached location map and photos for further details.*

The following data table depicts the Naive Before and After Analysis for the treatment location. Please note that Frontal Impact Crashes at the two intersections were the target crashes for the

applied countermeasure. However, only Left turn movements, Angle crashes, and U-turn movements (after period) were considered targets at the intersection with Filter Plant Road.

The Frontal Impact Crash types considered are as follows: Left turn, same roadway; Left turn, different roadways; Right turn, same roadway; Right turn, different roadways; Head on; and Angle.

Treatment Information			
	Before	After	Percent Reduction (-) Percent Increase (+)
Total Strip Crashes	86	126	46.51 %
Total Severity Index	5.50	4.79	- 12.90 %
Target Crashes - Total	43	23	- 53.06 %
Target Crash Severity Index	7.41	5.18	- 30.09 %
Filter Plant Rd Total (150' y-line)	29	43	48.28 %
Filter Plant Rd Total Severity	5.08	5.17	1.77 %
Filter Plant Rd Targets	10	3	- 70.00 %
Filter Plant Rd Target Severity	6.92	3.47	- 49.86 %
Ames St Total (150' y-line)	39	46	17.95 %
Ames Street Total Severity	7.12	3.90	- 45.22 %
Ames Street Targets	33	20	- 39.39 %
Ames Street Target Severity	7.56	5.44	- 28.04 %
Volume	28,000	30,500	
<u>Injury Crash Summary – Total Strip</u>			
Fatal injury Crashes	0	0	N/A
Class A injury Crashes	1	2	100.00 %
Class B injury Crashes	8	7	- 12.50 %
Class C Injury Crashes	34	37	8.82 %
Total Injury Crashes	43	46	6.98 %

The naive before and after analysis at the treatment location resulted in a 46.5 percent increase in Total Crashes along the strip, a 53 percent decrease in Target Crashes combined, and a 30 percent decrease in the Total Severity Index. The before period ADT year was 1998 and the after period ADT year was 2004.

Results and Discussion

The naive before and after analysis involving the comparison of treatment actual before data versus treatment actual after data resulted in a 46.5 percent increase in Total Crashes and a 53 percent decrease in Target Crashes. The summary results above demonstrate that while Total Crashes increased in the study, the Target Crashes appear to have decreased at the two treatment locations from the before to the after period.

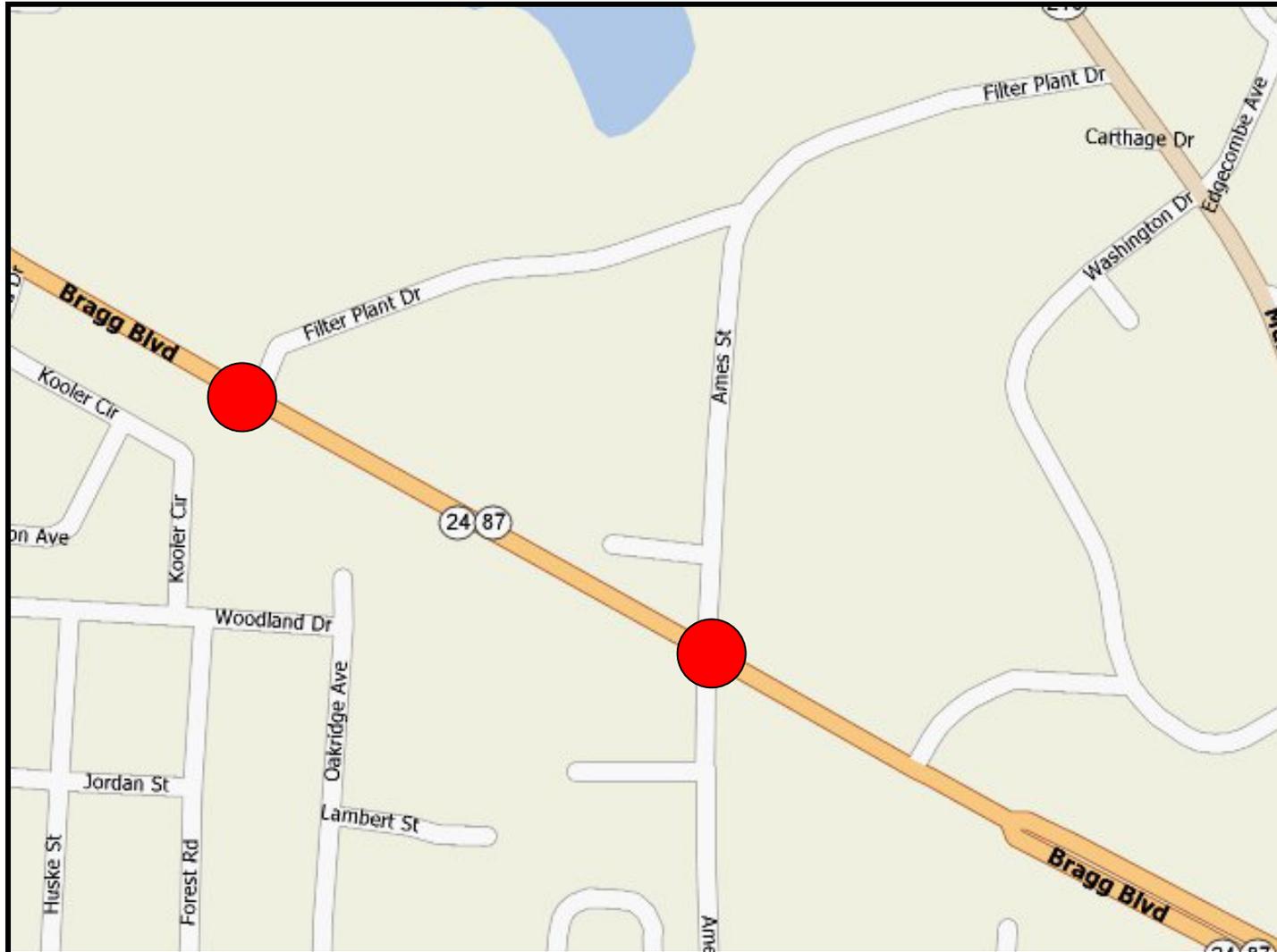
Referencing the *Collision Diagrams*, a large portion of crashes at the Ames Street intersection in the before period (33 of 39) were the result of a vehicles improperly entering a high volume roadway. After the signal installation, the frontal impact pattern was reduced to twenty (20), with the majority of those crashes resulting from red light running motorists on NC 24. The signal installation at Ames Street also produced a large increase in rear-end crashes. Eastbound NC 24 saw an increase from one (1) in the before period to ten (10) crashes in the after. Rear-end crashes account for the overall increase of after period crashes, from 39 to 46, at the Ames Street intersection.

The intended goal at the intersection of NC 24 and Filter Plant Road was to prohibit left turning motorists and therefore eliminate this crash pattern. From the table above, target crashes at the location were reduced by 70 percent from ten (10) to three (3). The three crashes resulted from two vehicles attempting a u-turn after turning right from Filter Plant Road and one vehicle with brake failure. However, overall crashes within 150 feet of this intersection increased by 50 percent. From the diagrams, the largest increase in crashes occurred at the PVA entrance to the BP Gas Station directly southeast of the new concrete median. This parking lot does connect directly to Filter Plant Road and it appears that drivers are potentially accessing the PVA to continue their left turn movement without hitting the concrete median.

The calculated benefit to cost ratio for this project is -11.43 considering total crashes along the strip. The benefit to cost ratio considering only target crashes from both intersections is 12.96. The benefits are calculated using the change in annual crash costs from the before to the after period. Operational and other benefits related to the project are not considered in this analysis. The costs of the project include the actual construction costs as well as the increase in annual maintenance and utility costs.

Please see the attached *Treatment Site Photos*. Photos are provided for all approaches to the treatment intersection. As the Safety Evaluation Group completes additional spot safety reviews for this type of countermeasure, we will be able to provide objective and definite information regarding actual crash reduction factors for this type of intersection.

Location Map
City of Fayetteville, Cumberland County
Evaluation of Spot Safety Project # 06-99-208



Treatment Location: NC 24 (Bragg Blvd) at Ames Street & Filter Plant Road

TREATMENT SITE PHOTOS TAKEN 4/8/2008



Traveling Southeast on NC 24 (Bragg Blvd) – approaching Filter Plant Rd



Traveling Southeast on NC 24 – See Raised Median to the left



Traveling Southeast between intersections on NC 24



Traveling Southeast on NC 24 at Ames Street



Traveling Northwest on NC 24 at Ames Street



Traveling Northwest on NC 24 between intersections



Traveling Northwest on NC 24 at Filter Plant Road to the right



Traveling South on Ames Street approaching NC 24

BENEFIT-COST ANALYSIS WORKSHEET

LOCATION: NC-24 at Ames / Filter
 COUNTY: Cumberland
 FILE NO.: SS 06-99-208

BY: JBS
 DATE: 7/23/2008
 NOTES: Total Crashes - Strip

DETAILED COST: TYPE IMPROVEMENT - Signal @ Ames, Median Channelization @ Filter

ITEMS	TOTAL	SERVICE	CRF	ANNUAL COST
Construction	\$50,000	10	0.149	\$7,451
Right-of-Way	\$0	0	0.000	\$0
TOTALS	\$50,000	10	0.149	\$7,451

ESTIMATED INCREASE IN ANNUAL MAINT. COST = \$2,000
 ESTIMATED INCREASE IN ANNUAL UTILITY COST = \$900
 TOTAL ANNUAL COST= \$10,351
 TOTAL COST OF PROJECT= \$50,000

COMPREHENSIVE COST REDUCTION:

ESTIMATED NUMBER OF ANNUAL ACCIDENT DECREASES

TIME PERIOD	YEARS	K & A CRASHES	K & A CRASHES PER YR	B & C CRASHES	B & C CRASHES PER YR	PDO CRASHES	PDO CRASHES PER YR	ANNUAL COSTS
BEFORE	5.75	1	0.17	42	7.30	43	7.48	\$247,600
AFTER	5.75	2	0.35	44	7.65	80	13.91	\$365,913

Annual Benefits from Crash Cost Savings (\$118,313)

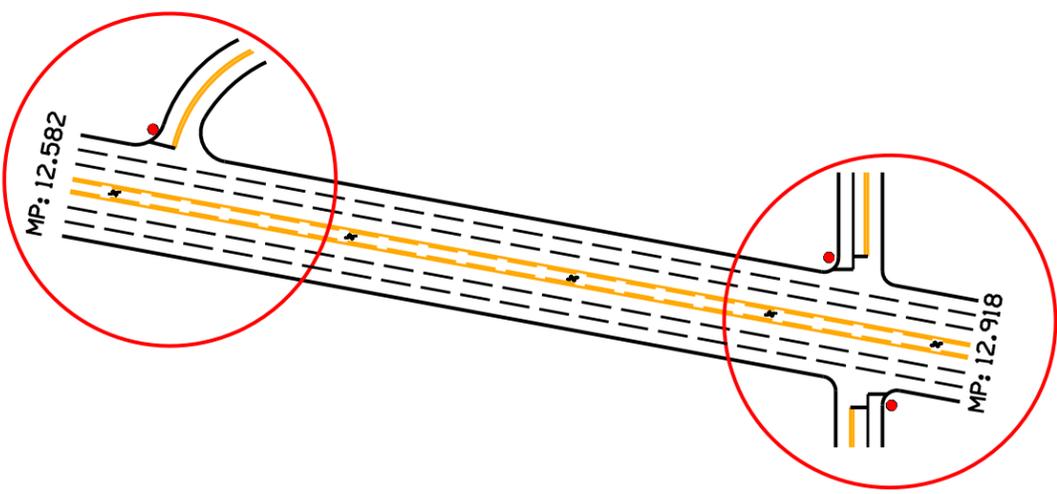
NET AVG. ANNUAL BENEFITS = AVG. ANNUAL BENEFITS - TOTAL ANNUAL COST = (\$128,665)

BENEFIT-COST RATIO = AVG ANNUAL BENEFITS/TOTAL ANNUAL COST = -11.43

TOTAL COST OF PROJECT - \$50,000 COMPREHENSIVE B/C RATIO - -11.43



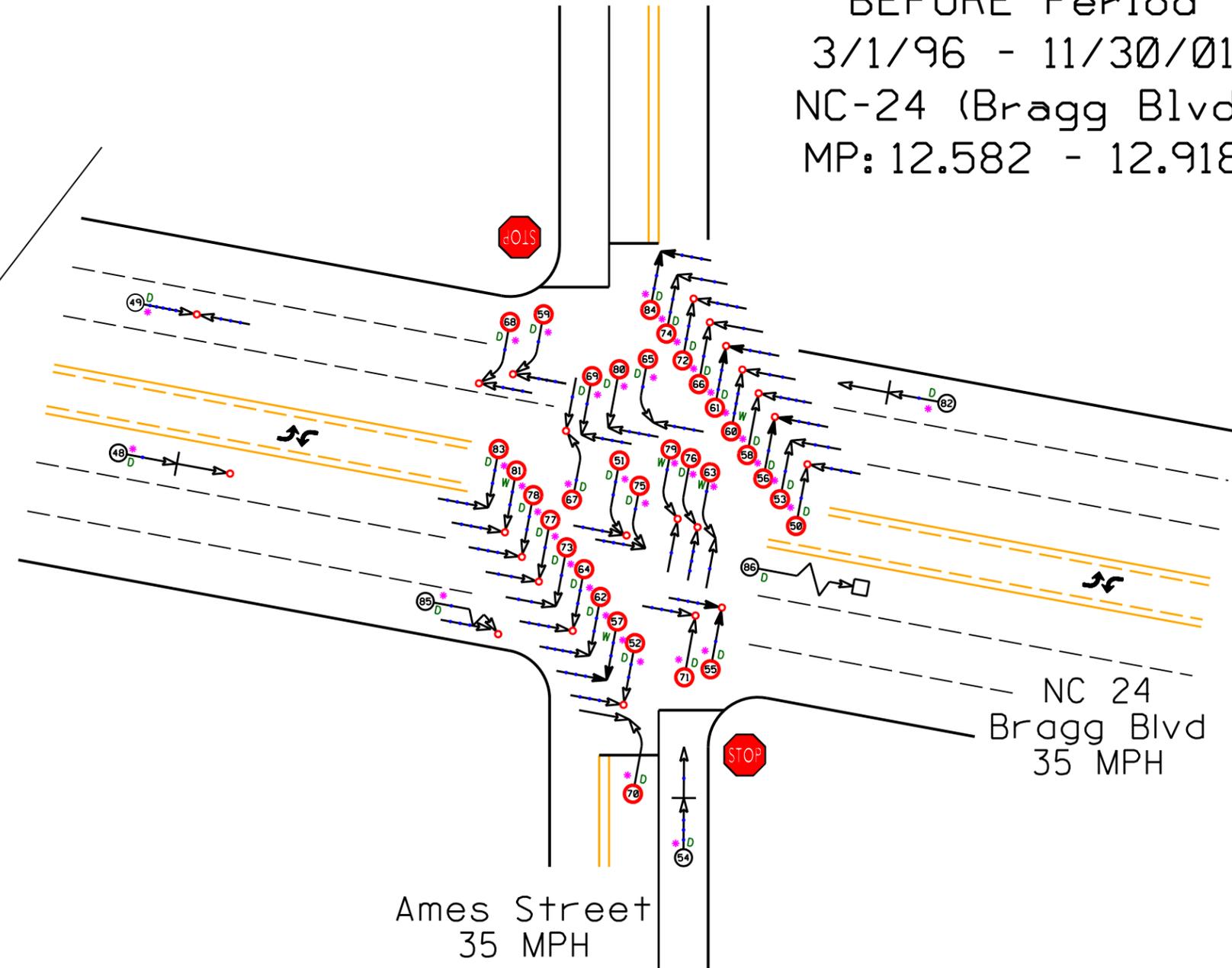
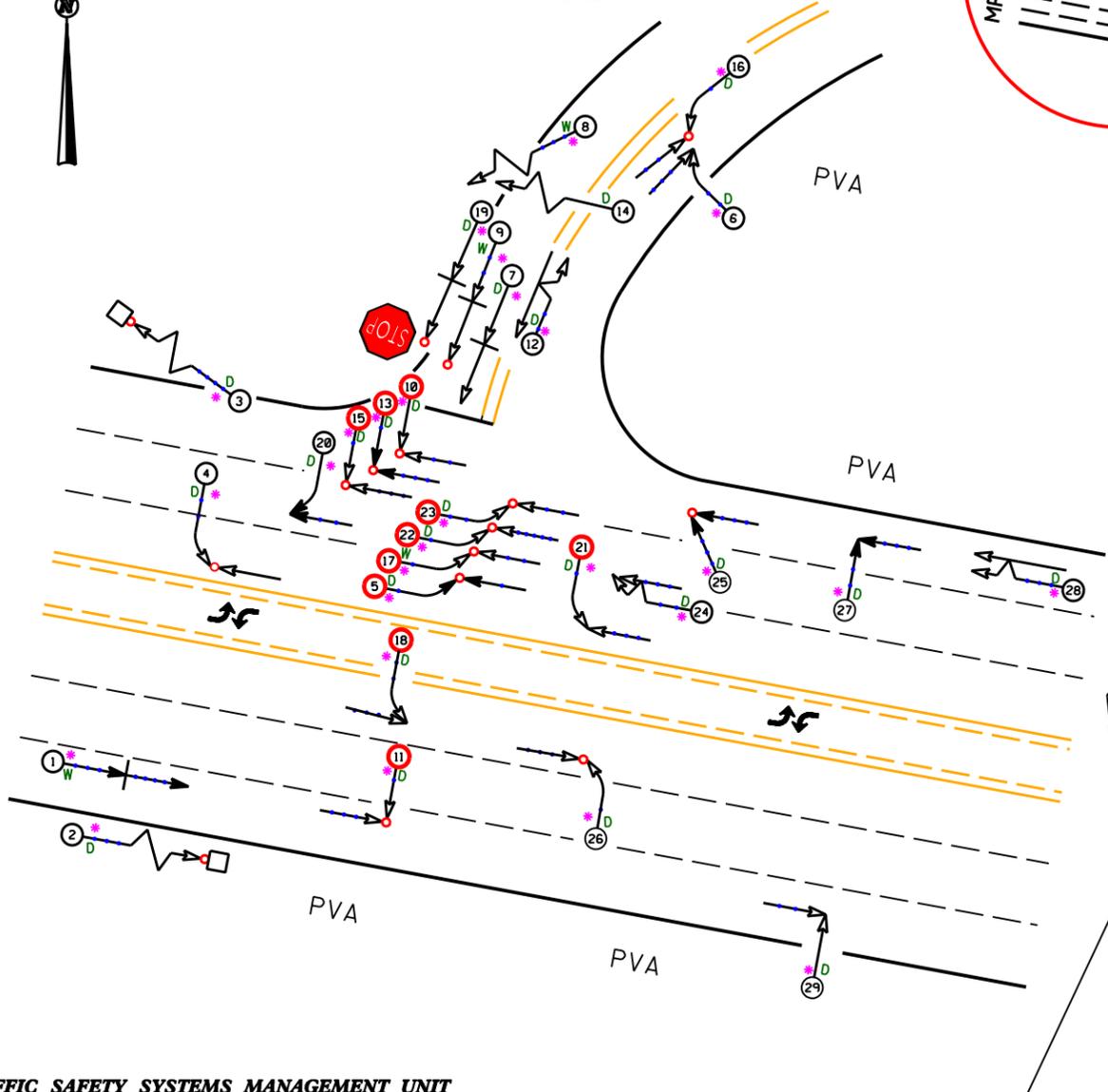
Filter Plant Rd
35 MPH



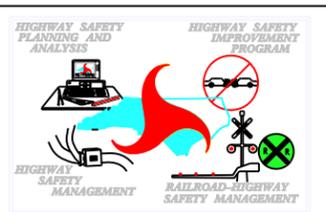
LEGEND

	MOVING VEHICLE		ANGLE		9 MPH OR LESS		PEDESTRIAN
	PEDESTRIAN		TURNING		10 MPH TO 19		TRAIN
	PAKED VEHICLE		BACKING		20 MPH TO 29		DRIVER AT FAULT
	PARKING VEHICLE		SIDESWIPE		30 MPH TO 39		DRY
	FIXED OBJECT		OUT OF CONTROL		40 MPH TO 49		WET
	HEAD ON		INJURY		50 MPH TO 59		ICY OR SNOWY
	REAR END		FATALITY		60 MPH TO 69		70 AND UP
	RAN OFF ROAD		SPEED UNKNOWN		9 MPH OR LESS		ONLY

SS# 06-99-208
Cumberland County
City of Fayetteville
BEFORE Period
3/1/96 - 11/30/01
NC-24 (Bragg Blvd)
MP: 12.582 - 12.918



TRAFFIC SAFETY SYSTEMS MANAGEMENT UNIT

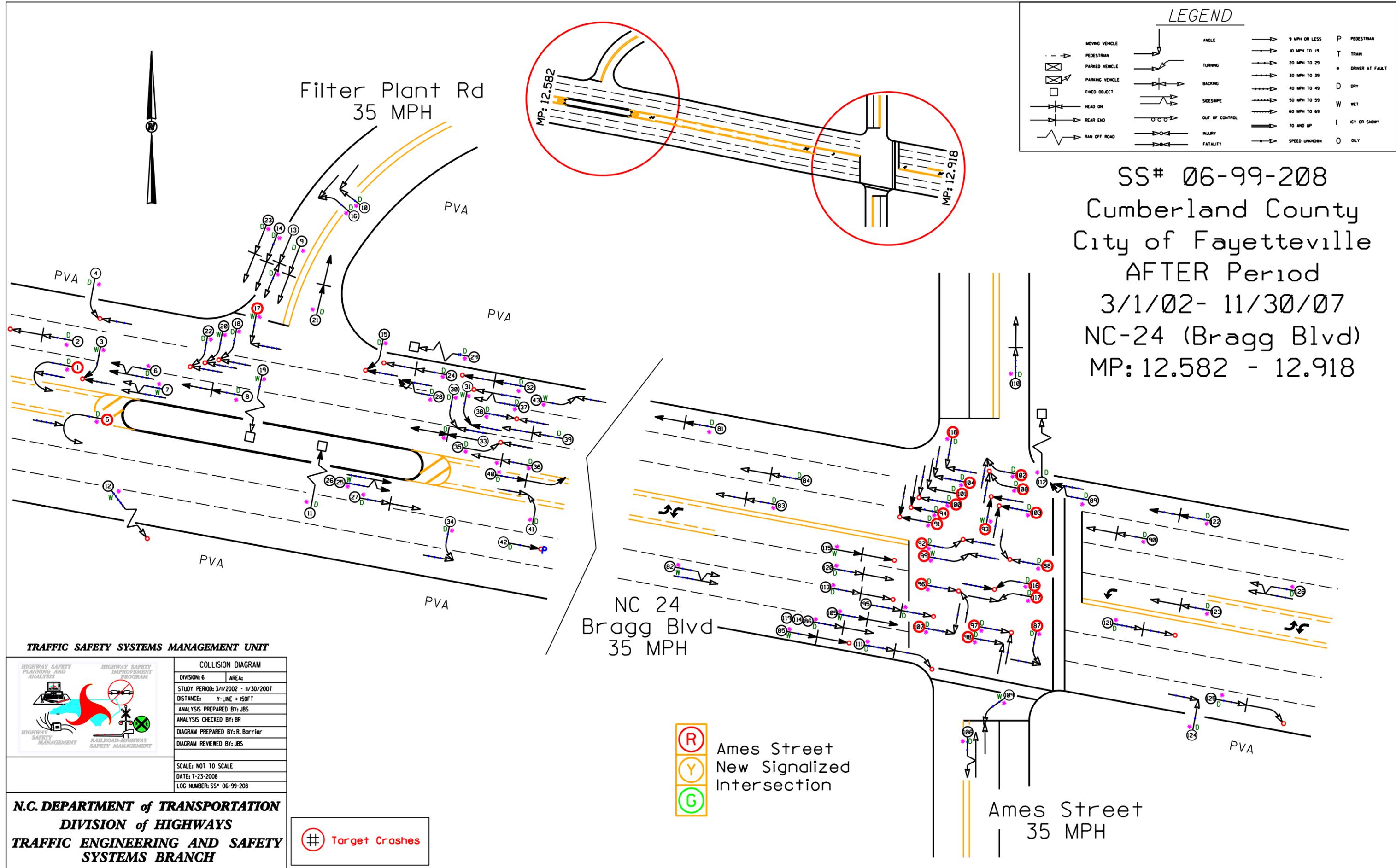


COLLISION DIAGRAM

DIVISION: 6	AREA:
STUDY PERIOD: 3/1/1996 - 11/30/2001	
DISTANCE: Y-LINE = 150 FT	
ANALYSIS PREPARED BY: JBS	
ANALYSIS CHECKED BY: BR	
DIAGRAM PREPARED BY: R. Barrier	
DIAGRAM REVIEWED BY: JBS	
SCALE: NOT TO SCALE	
DATE: 7-21-2008	
LOG NUMBER: SS* 06-99-208	

N.C. DEPARTMENT of TRANSPORTATION
DIVISION of HIGHWAYS
TRAFFIC ENGINEERING AND SAFETY
SYSTEMS BRANCH



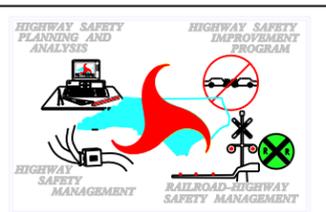


LEGEND

	MOVING VEHICLE		ANGLE		9 MPH OR LESS		PEDESTRIAN
	PEDESTRIAN		TURNING		10 MPH TO 19		TRAIN
	PARKED VEHICLE		BACKING		20 MPH TO 29		DRIVER AT FAULT
	PARKING VEHICLE		SIDESWIPE		30 MPH TO 39		DRY
	FIXED OBJECT		OUT OF CONTROL		40 MPH TO 49		WET
	HEAD ON		INJURY		50 MPH TO 59		ICY OR SNOWY
	REAR END		FATALITY		60 MPH TO 69		7 TO AND UP
	RAN OFF ROAD		SPEED UNKNOWN		9 MPH OR LESS		ONLY

SS# 06-99-208
 Cumberland County
 City of Fayetteville
 AFTER Period
 3/1/02- 11/30/07
 NC-24 (Bragg Blvd)
 MP: 12.582 - 12.918

TRAFFIC SAFETY SYSTEMS MANAGEMENT UNIT



COLLISION DIAGRAM	
DIVISION: 6	AREA:
STUDY PERIOD: 3/1/2002 - 11/30/2007	
DISTANCE: Y-LINE = 150FT	
ANALYSIS PREPARED BY: JBS	
ANALYSIS CHECKED BY: BR	
DIAGRAM PREPARED BY: R. Barrier	
DIAGRAM REVIEWED BY: JBS	
SCALE: NOT TO SCALE	
DATE: 7-23-2008	
LOG NUMBER: SS* 06-99-208	

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Target Crashes

Ames Street
New Signalized
Intersection

Ames Street
35 MPH