



**SR 48 AT HICKORY SPRING ROAD (“OLD HOBSON FARM”)
TRAFFIC SIGNAL WARRANT EVALUATION
JANUARY 30, 2019**

Senate Resolution No. 10 (SR 10), sponsored by Senators Delcollo and Lavelle, was passed by the 149th General Assembly of the Delaware State Senate. SR 10 created a Special Committee to study and make recommendations regarding truck traffic along SR 41, SR 48, and SR 7 in New Castle County. Per SR 10, the Special Committee was directed to study and make recommendations regarding how to reduce the number of trucks traveling along these roadways and improvements in engineering, infrastructure, education, and enforcement that can improve the quality of life for those who live along these roadways. In a report published January 12, 2018, The Committee made recommendations to DelDOT and the General Assembly, which included recommendation #13: Conduct signal warrant studies for the following locations:

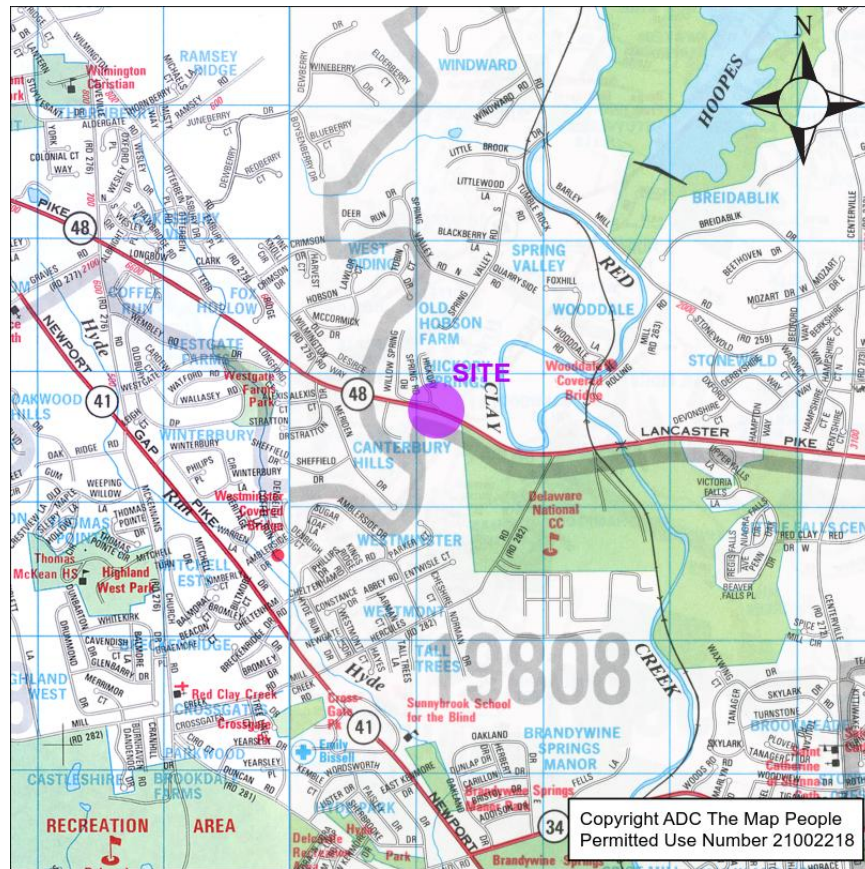
- SR 48 and Old Wilmington Road
- SR 48 and Courtney Road
- SR 48 and Hedgerow Place/Harlech Drive
- SR 48 and Old Hobson Farm

The following study presents the signal warrant analysis at SR 48 (Lancaster Pike) and Hickory Spring Road (a.k.a. “Old Hobson Farm”).

SITE DESCRIPTION

The intersection of SR 48 and Hickory Spring Road is located approximately 2 miles northwest of the City of Wilmington (see Figure 1). The intersection is located between the signalized SR 48 intersections with Loveville Road to the west and Hercules Road to the east. The eastbound approach contains a shared through/left-turn lane and bypass lane. The westbound approach contains a through lane and a shared through/right-turn lane. SR 48 is an undivided roadway. The southbound Hickory Spring Road approach contains a shared left-turn/right-turn lane. The speed limit is 50 mph on SR 48 and 25 mph on Hickory Spring Road. SR 48 is free, while southbound Hickory Spring Road is stop-controlled, but does not have a stop line or STOP sign. Hickory Spring Road branches off into Willow Spring Road, which combined provide access to 19 houses. Hickory Spring Road is 830 feet long and dead ends within the community.

**FIGURE 1
Site Location Map**



CRASH SUMMARY

A total of seven crashes were reported during the 5.3-year period between January 2013 and April 2018 at the intersection of SR 48 and Hickory Spring Road, including two (29 percent) crashes resulting in personal injury. The following is a summary of the crashes by type:

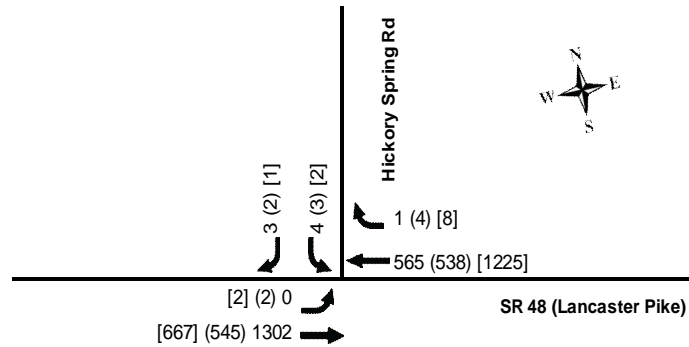
- 2 westbound crashes with guardrail (both drivers were cited with DUIs)
- 2 westbound/eastbound head-on crashes (one due to westbound vehicle failing to stay in lane, and the other due to the eastbound vehicle failing to stay in lane while under the influence)
- 1 westbound crash due to tree branch falling
- 1 westbound crash with a utility pole
- 1 eastbound rear end crash due to slowing for traffic ahead



TRAFFIC VOLUMES

Turning movement counts were conducted on Tuesday, May 8, 2018 from 6 AM to 7 PM and are depicted in Figure 2.

**FIGURE 2
Peak Hour Volumes**



May 8, 2018 Traffic Volumes
 00: AM Peak Hour (7:15 - 8:15 AM)
 (00): Midday Peak Hour (1:00 - 2:00 PM)
 [00]: PM Peak Hour (4:30 - 5:30 PM)

SIGHT DISTANCES

SR 48 has a 50-mph speed limit. The slope of eastbound SR 48 approaching the intersection of Hickory Spring Road is -3.6 percent, and the slope approaching Hickory Spring Road on westbound SR 48 is +2.9 percent. This data was used to determine the stopping and intersection sight distances from equations in the *AASHTO Policy on Geometric Design of Highways and Streets*.

As shown in Table 1, the southbound Hickory Spring Road corner sight distances looking left and right at SR 48 do not meet AASHTO criteria when vehicles are positioned 10 feet from the edge of the roadway (see Photos 1-2). Southbound Hickory Spring Road corner sight distances looking left meet AASHTO criteria when vehicles move forward to about 5 feet from the edge of roadway, but the corner sight distance is still not met looking right (see Photos 3-4). The stopping sight distances for eastbound and westbound SR 48 exceed AASHTO criteria.





Photo 1: Southbound Hickory Spring Rd corner sight distance looking left onto SR 48 (from "stop line")



Photo 2: Southbound Hickory Spring Rd corner sight distance looking right onto SR 48 (from "stop line")



Photo 3: Southbound Hickory Spring Rd corner sight distance looking left onto SR 48 (beyond "stop line")



Photo 4: Southbound Hickory Spring Rd corner sight distance looking right onto SR 48 (beyond "stop line")

TABLE 1
Sight Distance Measurements

Corner Sight Distance								
Approach	Looking Left (625 ft required)				Looking Right (768 ft required)			
	From "stop line"	Criteria Met?	Beyond "stop line"	Criteria Met?	From "stop line"	Criteria Met?	Beyond "stop line"	Criteria Met?
Southbound Hickory Spring Rd	550 ft	No	640 ft	Yes	500 ft	No	550 ft	No
Stopping Sight Distances								
Approach		Measured		Criteria		Criteria Met?		
Eastbound SR 48		620 ft		451 ft		Yes		
Westbound SR 48		670 ft		405 ft		Yes		



SPEED STUDY

Free-flow vehicle speeds were measured along SR 48 between 9:40 AM and 11:15 AM on Thursday, January 11, 2018. The results are summarized in Table 2. As shown, the 85th-percentile speeds along SR 48 are 9 and 6 miles per hour above the 50-mph speed limit on eastbound and westbound SR 48, respectively.

TABLE 2
Speed Data Summary

Criteria	SR 48	
	Eastbound	Westbound
Posted Speed Limit	50 mph	50 mph
85 th -Percentile Speed	59 mph	56 mph
% More Than 5 mph Over Speed Limit	28%	15%
Mean Speed	54 mph	53 mph
High/Low Speed	64/45 mph	64/39 mph
USLIMITS2 Recommendation	55 mph	55 mph

BYPASS GEOMETRICS

Bypass lane taper and storage lengths were calculated from the equations found in the *De/IDOT Development Coordination Manual*. The current bypass lane meets the required lengths for the storage length and departure taper length; however, the required approach taper length is not satisfied. Based on the *De/IDOT Development Coordination Manual*, bypass lanes are not permitted on roads with an ADT greater than 8,000 vehicles per day. SR 48 has an AADT of 32,512; therefore, a bypass lane is not warranted.

TABLE 3
Bypass Lane Geometrics

Criteria	Required	Measured
Approach Taper Length	215 ft	160 ft
Storage Length*	75 ft	109 ft
Departure Taper Length	110 ft	216 ft

* Based on the eastbound left-turning volumes per hour, a bypass lane is not warranted. Storage length is based on 10-14 left-turning vehicles per hour.

TRAFFIC SIGNAL WARRANT ANALYSIS

A signal warrant analysis was conducted in accordance with the *2011 Delaware Manual on Uniform Traffic Control Devices (DE MUTCD)* for the SR 48 at Hickory Spring Road intersection. A summary of the warrant analysis is presented in Table 4. The 85th-percentile speeds on SR 48 exceed 40 miles per hour; therefore, the *2011 DE MUTCD*'s reduced volume criteria were applied. Two lanes are provided for the major road (SR 48) approach, and one lane is provided on the minor approach. Right turns from Hickory Spring Road typically would not be included because they experience minimal delay; however, they were included in this signal warrant analysis to represent the "worst-case" scenario. As shown in Table 4, none of the signal warrants are met.



TABLE 4
Traffic Signal Warrant Analysis Summary

<i>DE MUTCD Warrant</i>	Criteria			No. of Hours Meets Criteria (Warrants 1, 2, 4) Actual Conditions (Warrant 3)		Warrant Criteria Met?
	Major Street Volume (VPH)	Minor Street Volume (VPH)	No. of Hours Required			
1 – Eight-Hour Vehicular Volume	<i>(Any of the three conditions must be met)</i>					
Cond. A – Min. Vehicular Volume	420	105	8	0	No	No
Cond. B – Interruption of Cont. Traffic	630	53	8	0	No	
Cond. C – Combination of Conditions • 80% of Condition A • 80% of Condition B	336 504	84 42	8 8	0 0	No	
2 – Four-Hour Vehicular Volume	(See Figure 4C-1 or 4C-2)		4	0		No
3 – Peak Hour	<i>(Either of the two conditions must be met)</i>					
Condition A	Delay \geq 4 Veh.-Hrs. Approach Volume \geq 100 vph Entering Volume \geq 800 vph		1	0	No	No
Condition B	(See Figure 4C-3 or 4C-4)		1	0	No	
4 – Pedestrian Volume	<i>(Both of the two conditions must be met)</i>					
Condition A	(See Figure 4C-5 or 4C-6)		4	0	No	No
Condition B	(See Figure 4C-7 or 4C-8)		1	0	No	
5 – School Crossing	(Refer to <i>DE MUTCD</i> Section 4C.06 for Criteria)			-		N/A
6 – Coordinated Signal System	(Refer to <i>DE MUTCD</i> Section 4C.07 for Criteria)			-		N/A
7 – Crash Experience	(Refer to <i>DE MUTCD</i> Section 4C.08 for Criteria)			-		No
8 – Roadway Network	(Refer to <i>DE MUTCD</i> Section 4C.09 for Criteria)			-		N/A
9 - Intersection Near a Grade Crossing	(Refer to <i>DE MUTCD</i> Section 4C.10 for Criteria)			-		N/A



RECOMMENDATIONS

At this time, no changes to the intersection operations or geometrics at SR 48 at Hickory Spring Road are recommended. With seven reported crashes in the more than five-year study period at the two intersections, none of which would have been correctable by signalization, there are no significant safety concerns at this location. Additionally, no signal warrants are met; therefore, no signalization is recommended at this time. It is recommended at this time that a STOP sign (R1-1) and stop line be installed on southbound Hickory Spring Road in accordance with the *2011 Delaware Manual on Uniform Traffic Control Devices (DE MUTCD)*; however, this work will need to be facilitated with the homeowners via the Special Committee because Hickory Spring Road is not state-maintained. It is further recommended to replace WATCH FOR TURNING TRAFFIC (W21-9-DE) on eastbound and westbound SR 48 with Side Road warning signs (W2-2) and WATCH FOR TURNING TRAFFIC (W21-9P-DE) plaques or Advance Street Name (W16-8P) plaques.

