

DE ROUTE 9 / 6TH STREET (N378) AT DELAWARE STREET (SIGNAL PERMIT NO. N459T)
SIGNAL REMOVAL PROCESS SUMMARY

This signal deactivation process summary has been compiled in a format that provides for an overview of the scope of work that has been or may be included for the overall signal removal process, as well as beneficial as an agenda for the meeting with the City of New Castle on April 27th, 2017.

Signal Removal Study

The signal removal study (aka traffic engineering study) was completed December 2016 to evaluate the continued need for the existing traffic control signal at the intersection of Delaware Route 9 / 6th Street (N378) and Delaware Street located in the City of New Castle, New Castle County. The results of the traffic engineering study show that the signal at the intersection of DE Route 9 / 6th Street and Delaware Street is **not warranted** under existing conditions, and that an all-way stop control (AWSC) condition will satisfy safety concerns, operational expectations, and field condition considerations. Accordingly, it has been determined that the traffic control signal may be removed and the intersection control modified to an AWSC condition with all four approaches stop-controlled.

- Signal Warrant Analysis: All nine (9) DE MUTCD signal warrants were analyzed, with five (5) signal warrants not satisfied and four (4) signal warrants were not applicable to the intersection.
- Safety consideration were also evaluated during the completion of the traffic engineering study through the review and analysis of crash history data.

Crash History Data Overview:

There was a total of 12 reported crashes within a 0.10-mile radius for approximately a three-year study period (January 2013 – September 2016), including four (4) in 2013, five (5) in 2014, two (2) in 2015, and one (1) in 2016 from the beginning of the year till September 28th, 2016. In review of the specific location for each crash, seven (7) of the 12 total crashes occurred in proximity to the intersection of DE Route 9 / 6th Street (N378) and Delaware Street, with three (3) occurring at the intersection and four (4) occurring along the approach and departure legs. Of the seven (7) crashes one (1) occurred in 2013, three (3) in 2014, two (2) in 2015, and one (1) in 2016. The three (3) crashes occurring at the intersection included two (2) sideswipe-same direction impacts, and one (1) rear-end collision. The four (4) collisions occurring on the approach and departure legs included sideswipe-same direction impact collisions with vehicles that were parked or were entering into the travel way from a parked location.

- Intersection operational analysis was also conducted as part of the traffic engineering study with Highway Capacity Software (HCS 2010) for a two-way stop control condition, an all-way stop control condition, and a signal control condition. The intersection operates with acceptable level-of-service (LOS) under all control conditions, while there was an improvement in the LOS and Delay for the all-way stop control condition over the signal control condition. The two-way stop control reflected there would be some decline in LOS and Delay.

- Field condition considerations included existing available sight distance for the proposed stop-controlled approaches. As some of the approaches do not meet the AASHTO minimum sight distance guidance the all-way stop control over the two-way stop control may be more appropriate for of control.
- The results of the Signal Removal Study were forwarded to City of New Castle on January 25th, 2017, with addition coordination efforts made in February and March. It was determined that a meeting should be held with the City Council on the Signal Removal Study and proposed Signal Deactivation Process, which is to occur on April 27th, 2017.
- With the recommendation to remove the traffic control signal from the intersection and implement an all-way stop control, the Signal Deactivation Process is being proposed for initiation.

Signal Deactivation Process

The scope of work for the Signal Deactivation Process for the intersection of Delaware Route 9 / 6th Street (N378) and Delaware Street, located within the City of New Castle, follows the DelDOT Guidelines for Signal Deactivation provided in the 2015 Traffic Design Manual Appendix K and may include additional tasks determined through coordination with DelDOT Traffic Studies Section throughout the process.

1. **30 days prior** to converting existing signal to flash mode:
 - Install SIGNAL UNDER STUDY FOR REMOVAL signs on each approach.
 - Inform affected agencies as determined necessary (i.e. TMC, DelDOT public relations department, local municipalities, police, emergency service providers, local businesses, etc) about the planned signal deactivation. Inform the City of New Castle.
2. **One week prior** to converting existing signal to flash mode:
 - Install NEW TRAFFIC PATTERN STARTING XX/XX/XXXX message boards on each intersection approach.
 - Stop and Stop Ahead signs installed and bagged on all future stop controlled approaches.
 - Inform local municipalities (City of New Castle) about the proposed date of the conversion, and suggest they have uniformed law enforcement officers available (City of New Castle Police Department), if necessary.
3. **Day of** converting existing signal to flash mode:
 - Place the signal on flash, mirroring future all-way stop control. Provide flashing red on all approaches.
 - Uncover Stop and Stop Ahead signs on the all approaches immediately after transition to flash mode.
 - Change the legend on the message boards to NEW TRAFFIC PATTERN AHEAD.
 - Observe the operation at the intersection at the time when signal is placed on flash mode (time of conversion) to make sure it operates as planned. Observe for a minimum of 1-hour at time of conversion.

- Observe the operation at the intersection for a minimum of 1-hour during the higher volume peak hour, completing a stopped time delay study on the approach reflected as having the highest approach delay.
- Observe for a minimum of 1-hour during the same higher volume peak hour, as noted above, the longest queue lengths along the approach with the highest reflected approach delay, documenting the max queue length. Observations should also include queues lengths for all other approaches, and any conflicts in traffic operations occurring at the intersection.

4. **One week after** the transition to flash mode:

- Remove the message boards.
- Review traffic operations at the intersection.
- Observe the operation at the intersection for a minimum of 1-hour during the higher volume peak hour, completing a stopped time delay study.
- Observe for a minimum of 1-hour during the same higher volume peak hour, documenting the max queue length. Observations should also include queues lengths for all other approaches, and any conflicts in operation occurring at the intersection.

5. **Two months after** the transition to flash mode:

- Review traffic operations at the intersection. Complete observations at intersection, including a field visit to verify flash operation working as planned. Additional review items and observation timeframes may be determined based on “day of” and “one week after” observations and findings.
- Conduct a crash data analysis based on 2-months of crash data after the transition to flash mode.

6. **Six months after** the transition to flash mode:

- Conduct a crash data analysis based on 6-months of crash data after the transition to flash mode.
- If the crash analysis indicates that STOP-control is an adequate form of traffic control at the intersection, remove all traffic signal equipment and abandon conduits; and remove SIGNAL UNDER STUDY FOR REMOVAL signs.
- Remove other conflicting signing and pavement markings.

7. **One year after** the transition to flash mode:

- Complete another crash data analysis based on 12-months of crash data after the transition to flash mode.
- Confirm all permanent signing and striping recommended for installation or removal has been completed correctly, and that any final requests or recommendations for signing and striping modification are addressed.

Delay Studies

During the Signal Deactivation Process, Stopped-Time Delay studies will be conducted to evaluate delay and queuing at the intersection when operating as an all-way stop control condition, along with comparing real time data to what was reflected in the Signal Removal Study.

Public Comment

During the Signal Deactivation Process, public comments may be forwarded to and received by DeIDOT for tracking. The public comments received are documented and taken into consideration as part of the signal deactivation process.

Crash Reports

Crash data will be collected and reviewed periodically during the Signal Deactivation Process.

Signal Deactivation Process Recommendations / Next Steps

- During the “Six months After” conversion to flash mode evaluation period, this is typically when the traffic signal control equipment is to be removed, with consideration of the evaluations included in the Signal Deactivation Process up to that point.
- With the permanent stop control condition implemented, crash data will be reviewed once again for at the “One Year After” conversion to flash mode evaluation period. In addition to the review of 12 months of crash data, it will also be confirmed that all permanent signing and striping recommendations have been completed correctly, and that any final requests or recommendations for signing and striping modification are addressed. This will be when the Signal Deactivation Process is officially completed.