

# Memo

Date: 9/7/2022

To: Mr. Bradley Kosco, P.E., P.S.  
City of Hudson

From: Michael W. Schweickart, P.E., PTOE  
TMS Engineers, Inc.

Subject: Stow Road & Ravenna Street  
Safety Improvements

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This report provides an evaluation to improve the traffic safety at the intersection of Ravenna Street and Stow Road due to the recent crash at this intersection as discussed in a recent Traffic Safety Committee meeting. The City is interested in short term solutions to bring awareness to the intersection and long term solutions to reduce motor vehicle crashes at this location.

A crash report was provided for review. The crash occurred on Saturday, August 20, 2022 at 9:59 AM. The report indicated that there was one vehicle traveling northbound on Stow Road and one vehicle traveling eastbound on Ravenna Street. The northbound motorist was reported to run the red light and struck the eastbound motorist. The northbound motorist was reported to have been cited for a red light violation. The driver of the northbound vehicle stated that sun obstructed his view and contributed to the inability to see the red signal.

Altitude and heading records for the sun in the City of Hudson were researched for the day and time of the motor vehicle crash. The records state that at 9:59 AM, the sun's altitude was at 36° and its heading was 107° ESE. The sun was not directly behind the traffic signals for the northbound approach, however there could have been some impact with sun glare at that location on that date and time.

It is recommended by the OMUTCD in section 4D-11 that back-plates should be installed on all signal faces to improve visibility of the traffic signal by making the signal head stand out from its surroundings and by helping to prevent confusion due to distracting features in the background. The use of back-plates also enhances the contrast between traffic signal and their surroundings for both day and night conditions, which is helpful to elderly drivers.

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ODOT is currently in the process of changing the signals within their jurisdiction to ones with back-plates. Furthermore, the back-plates are being fitted with retro-reflective sheeting. Since signal back-plates are located overhead, they are disadvantaged with respect to vehicle headlights, aimed to illuminate the roadway directly in front of the driver and not overhead signs. Therefore, high intensity sheeting material is recommended for use as a border material on the back-plates. It is recommended that the City consider this location and all of its signalized intersections to be retro-fitted with back-plates. However, it is our opinion that back-plates at this location would not have prevented the motor vehicle crash that was reviewed.

A field review was performed at this location to determine the need for additional or new signage, pavement marking or other signal improvements. The vehicular traffic signals are being supported by "span-wire" connected diagonally by two wood poles. The review found that minimum sight distance requirements are met for signal visibility as shown in Table 4D-2 in the Ohio Manual of Uniform Traffic Control Devices. The controller and signal equipment were operating properly. Pavement markings and signage were in compliance with the OMUTCD and were in good operating condition. No additional signage, pavement marking or signal improvements are recommended. However, in the long term, it should be considered that the traffic signal be fully upgraded with mast arm supports and connected to the future adaptive signal system for monitoring purposes.

Additional research was performed by reviewing motor vehicle crash reports for 2019, 2020 and 2021. These were obtained through ODOT's GCAT crash analysis tool. There were a total of three (3) crashes in 2019, three (3) crashes in 2020 and two (2) crashes in 2021 for a three year total of eight (8) crashes. Of the eight crashes, four (4) crashes were rear end type, two (2) crashes were angle, red light violations and two (2) crashes were run-off-the-road type. Crash maps for 2022, provide by Beau Chumley show there have been four (4) crashes so far. It is requested that the motor vehicle crash reports be provided for these collisions so that they can be evaluated.

The red light angle crashes and the rear end crashes found in the 2019, 2020 and 2021 crash evaluation indicates the possibility of the need for re-timing of the intersection. In particular, the yellow and all-red clearances should be evaluated to determine if they meet current design standards for this location. The approach grade should be included in the evaluation.

The traffic signal at this location currently operates "semi-actuated", whereas detectors are placed on the left turn phases and on the side street phases. There are no detection devices on the Stow Road through movement.

Past research shows that approximately 45% of all crashes in the United States occur at intersections. A major proportion of these crashes occur because of red-light runners, who either misjudge the required time to clear the intersection or do not pay attention to the signal display. These vehicle crashes may be attributable to problems in "dilemma zones". Dilemma zones are areas where at the onset of yellow, drivers may decide to proceed and some may decide to stop. This disagreement among drivers can lead to rear-end crashes

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and/or right-angle crashes. It is our opinion that the intersection of Stow Road and Ravenna Street exhibits the results of the dilemma zone problem based upon our review of the 2019, 2020 and 2021 crash records.

Engineering studies indicate that modifying the traffic signal to utilize radar-based protection systems placed on the main street through movement are superior to green hold/termination systems and multi-loop systems. This is attributed to the capability of the radar-based system to monitor vehicle speeds continuously and act accordingly, whereas the green hold/termination system assumes constant vehicle speeds. The results also indicate that the prevailing multi-detector loop setups perform differently depending on traffic volume.

Studies performed using a before-and-after comparison of the frequency of red-light running indicated a significant reduction in red-light running (up to 80% reduction) when the radar-based dilemma zone protection system was activated. These systems also improve safety by reducing rear-end crashes. It is recommended that a radar-based dilemma zone protection system be installed on the Stow Road through approach.

The following improvements are recommended for this location:

Short term:

- Review and evaluate 2022 motor vehicle crash reports for this location.
- Install back-plates on all vehicle signals that are in compliance with ODOT Standard Construction Drawing TC-85.22
- Perform a current turning movement count at the location and prepare new signal timing evaluation. Insure grade is considered in the calculation of yellow and all red clearance timing. Implement new signal timing.

Medium term:

- Prepare traffic signal modification plans to construct a radar-based dilemma zone protection system for Stow Road through approach. Bid and construct the new system. Evaluate the new system.

Long term:

- Upgrade the traffic signal to replace the span wire support system to mast arms. Connect the traffic signal to the City's upcoming adaptive signal system for monitoring purposes.

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