



DEPARTMENT OF PUBLIC WORKS

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TECHNICAL MEMORANDUM

DATE: April 21, 2023

RE: Main Street at White Rock Avenue/Pleasant Street Traffic Study

Alderson Rodriguez made a referral to Building & Grounds to review the intersection of Main Street at White Rock Avenue. This was an item introduced to the Building & Grounds Committee (Item ID#23-5490). *“To discuss and act on adding additional signage and/or flashing lights at the intersection of Main Street, Pleasant Street, and White Rock Avenue, to be placed on Main Street.”*

The following technical memorandum investigates the necessity of performing a more comprehensive traffic study after pulling crash reports of the intersection. See study location in [Exhibit 1](#).

Current Intersection Layout

The intersection of Main Street at White Rock Avenue/Pleasant Street is a 3-way stop controlled intersection with eastbound Main Street being uncontrolled. The intersection was reconstructed in 2018 to re-align White Rock Avenue to be at a 90° angle with Main Street which is a common practice to increase safety at an intersection.

The intersection is approximately 325' east of the signalized traffic signal at Main Street at East Avenue/Buckley Street and approximately 865' west of the all-way stop controlled intersection at Main Street at Hartwell Avenue.

Previous Review/Study

A previous study was performed for the intersection of Main Street at White Rock Avenue/Pleasant Street in June 2018 before it was reconstructed to see if warrants were met for an all-way stop control or a traffic signal. At the time, the all-way stop control warrants and the traffic signal warrants were not met, so it was deemed to keep the control of the intersection as is and simply update signing with the project.

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Crash Statistics

The crash data for the analysis of the intersection of Main Street at White Rock Avenue/Pleasant Street was for a 5+ year period from 1/1/2018 to 3/1/2023. In this timeframe, there were a total of 21 reported crashes with 7 crashes in each of the years of 2021 and 2022. 10 of the 14 crashes from 2021 and 2022 were right-angle crashes involving an eastbound thru vehicle with a southbound thru/left turning vehicle, one of the crashes was a right-angle crash involving an eastbound thru vehicle with a northbound thru vehicle, and one of the crashes involved an eastbound left turning vehicle with a pedestrian crossing on the north side of the intersection. A summary and breakdown of the crashes at the intersection is in [Exhibit 2](#).

Of the 11 right angle crashes in 2021 and 2022 involving an eastbound thru vehicle, a common theme within the crash reports said the driver of the side street vehicle thought the eastbound vehicle was going to stop.

The statewide average crash rate (circa 2015), provided by the Wisconsin Department of Transportation, is 1.0 crashes / MEV (million entering vehicles). The crash rate calculated for the intersection is 0.83 which is below the statewide average.

Traffic Volume Information

In March 2023, vehicular counts were obtained to understand the flow and dynamic of the intersection. A breakdown of the Average Daily Traffic (ADT) is outlined below:

- Eastbound Main Street: 5,533 veh/day
- Westbound Main Street: 3,159 veh/day
- Southbound White Rock Avenue: 4,019 veh/day
- Northbound Pleasant Street: 564 veh/day

Volume data was collected over a couple of days to ensure consistency and no abnormalities in traffic flow with no abnormalities existing.

For Eastbound Main Street, 39% of the traffic makes a left turn to proceed north on White Rock Avenue, 58% of the traffic proceeds thru to continue eastbound on Main Street, and 3% make a right turn to proceed south on Pleasant Street.

For Westbound Main Street, 3% of the traffic makes a right turn to proceed north on White Rock Avenue, 92% of the traffic proceeds thru to continue westbound on Main Street, and 5% make a left turn to proceed south on Pleasant Street.

For Southbound Main Street, 86% of the traffic makes a right turn to proceed west on Main Street, 11% of the traffic proceeds thru to go south on Pleasant Street, and 3% make a left turn to proceed east on Main Street.

For Northbound Pleasant Street, 38% of the traffic makes a left turn to proceed west on Main Street, 52% of the traffic proceeds thru to go north on White Rock Avenue, and 10% make a right turn to proceed east on Main Street.

See [Exhibit 3](#) for the traffic distribution percentages.

All-Way Stop Warrant Analysis

Seeing the higher number of crashes at the intersection recently along with the higher number of vehicles traveling through the intersection, an all-way stop warrant analysis was conducted.

The warrant associated with the number of crashes within a 12-month period that can be corrected by multi-way stop control was met along with the minimum volume threshold warrant was met. See [Exhibit 4](#) for the all-way stop warrant analysis report.

Traffic Signal Warrant Analysis

Knowing the all-way stop warrant was met, traffic signal warrants were also evaluated. None of the traffic signal warrants were met. See [Exhibit 5](#) for the traffic signal warrant analysis.

Queueing Analysis

Knowing an all-way stop control is warranted, a queue analysis was performed to determine if eastbound Main Street would queue into the signalized intersection of Main Street at East Avenue. The distance from the edge of the east approach crosswalk for the traffic signal at Main Street at East Avenue to the proposed eastbound stop bar at Main Street at White Rock Avenue/Pleasant Street is approximately 200 feet. 200 feet can comfortably handle a queue of 7 to 8 passenger vehicles.

The following analyses were only performed during the PM Peak (3:45pm – 4:45pm), as that time period saw the most volume for all approaches.

A queue analysis was performed using the Highway Capacity Software (HCS). Inputting the appropriate geometrics, parameters, and volumes, it was determined that the 95% Queue Length (in vehicles) for the eastbound left turn lane would be 2.0 vehicles (45' to 50') and the eastbound shared thru/right lane would be 4.8 vehicles (120' to 140'). See [Exhibit 6](#) for the HCS All-Way Stop Control Report.

Additionally, a similar queue analysis was performed using Synchro/SimTraffic 11 – Signal Timing and Analysis Software. Inputting the appropriate geometrics, parameters, and volumes, it was determined that the 95th Queue Length (in feet) for the eastbound left turn lane would be 77' and the eastbound shared thru/right lane would be 88'. See [Exhibit 7](#) for the SimTraffic Report.

Both analyses indicate there to be sufficient storage for the eastbound movements between the traffic signal at Main Street at East Avenue and Main Street at White Rock Avenue/Pleasant Street.

Conclusions and Recommendations

With the intersection of E. Main Street at White Rock Avenue/Pleasant Street, it is recommended to update the intersection control to an all-way stop. It is recommended that all the following should be implemented at the time when the intersection becomes an all-way stop:

- Install a “Stop” sign and an “All-Way” plaque underneath on the light pole for eastbound Main Street,
- Paint an eastbound E. Main Street stop bar,
- Install overhead stop signs off of existing light poles for eastbound and westbound Main Street,
- Install red circular flashing indications with vertical louvers above the light pole mounted stop signs for eastbound and westbound Main Street which will receive power from the intersection lighting cabinet,
- Remove the “Traffic from right does not stop,” “Oncoming traffic does not stop,” and “Traffic from left does not stop” signs and replace them with “All-Way” plaques, and
- Install warning flags for all directions above the near-right stop signs.

If an all-way stop control is not desired, the following should be done:

- Install an overhead stop sign off of existing light pole for westbound Main Street and
- Install a red circular flashing indication with vertical louvers above the light pole mounted stop sign for westbound Main Street which will receive power from the intersection lighting cabinet.