

Several potential design configurations were discussed as a part of the RSA workshop specific to the eastern portion of the study corridor, including a road diet in combination with bicycle lanes, the implementation of a raised median, and other innovative highway designs to improve safety. Ultimately, given the existing traffic volumes, right-of-way limitations, and other site characteristics, it was determined that either the implementation of bicycle lanes or implementation of a raised median may be an appropriate alternative with additional operational analyses.

Implementing bicycle lanes would include the reduction of existing through and center left-turn lane widths to accommodate a bicycle lane of adequate width along SR 196. This also would likely involve reducing the posted speed limit to 35 MPH in this portion of SR 196 to better fit within the context of the modified highway, reducing the risk of crashes between vehicles and non-motorized road users. This alternative would specifically address several safety issues identified in **Table 11**. Additionally, potential changes to the exclusive right-turn lane, as identified in safety issue #8, could be implemented in conjunction with bicycle lanes. While this alternative would directly help to address bicycle-related safety concerns along the corridor, right-of-way limitations and operational impacts may result in this alternative not being feasible at this location. Despite these concerns, the implementation of bicycle lanes merits further study.

The potential raised median would be implemented in conjunction with converting the minor approach stop-controlled intersections along SR 196 to either a RCUT or MUT design, providing a median opening, or otherwise consolidating access to SR 196. While several potential intersection configurations at each location along the corridor may be appropriate based upon further study, RCUT conversions will be assumed for the purposes of performing alternatives analysis. The implementation of a raised median would also provide notable safety benefits to pedestrians along the corridor, providing refuge to allow a two-stage crossing of the five-lane arterial. Raised medians also provide several additional benefits according to the FHWA, including potentially decreasing vehicular delay, increasing capacity, and reducing vehicular speeds.

Installing lighting along this section of the corridor would provide notable safety benefits, addressing all potential crash types occurring at night. This treatment is particularly important in improving the roadway environment for pedestrians and bicyclists, and would complement all the recommendations provided in **Table 12**. Repairing the damaged sidewalks along the corridor and ensuring adequate width would support non-motorized road users, representing low-cost, short-term improvements that can provide moderate safety benefits.

4.3. Intersection with Veterans Parkway

The signalized intersection with Veterans Parkway at the eastern end of the corridor represents the connection of two urban minor arterials, serving almost 34,000 total vehicles per day. SR 196 maintains its five-lane configuration on either side of Veterans Parkway; however, exclusive right-turn lanes are provided at the intersection. Veterans Parkway is a four-lane, divided highway on either side of SR 129; however, dual exclusive left-turn lanes and exclusive right-turn lanes are provided at the intersection. The 187 total crashes that occurred during the five-year study period represents nearly 36 percent of all crashes along the study corridor, demonstrating that enhancements to this urban signalized intersection provide a substantial opportunity to improve safety performance. In fact, the 28.8 annual excess crashes estimated by the EB-method analysis represents more than 65 percent of all excess crashes along the corridor. **Table 13** summarizes the safety issues specific to the intersection of SR 196 and Veterans Parkway identified as a part of this evaluation.

Table 13. Safety Findings for Elma G. Miles and Veterans Parkway Intersection

#	Location	Safety Findings/Comments
18	Veterans Parkway Intersection	Relatively high approach speeds at intersection and complex visual environment for drivers
19	Veterans Parkway Intersection	Signal heads lack retroreflective backplates; supplementary signal heads are not present

#	Location	Safety Findings/Comments
20	Veterans Parkway Intersection	Eastbound and Westbound signal heads do not have flashing yellow arrows
21	Veterans Parkway Intersection	Significant queues were observed along several approaches
22	Veterans Parkway Intersection	Channelizing islands require drivers to look over their shoulder to view cross traffic
23	Veterans Parkway Intersection	Pedestrian signals missing count down signal heads
24	Veterans Parkway Intersection	Driveways within functional area of intersection
25	Veterans Parkway Intersection	W3-3 Signal Ahead warning signs are placed too far upstream and have lost retro reflectivity

Approach speeds to the intersection were noted to be relatively high during the RSA process, a concern that is evidenced by the fact that 140 of the 187 crashes that occurred at this location were rear end in nature. The combination of the relatively high approach speeds with the queues that form during the peak hours at this location (shown in **Figure 27**) compound this concern, leading the noted pattern of rear end crashes.



Figure 27: View of Westbound SR 196 at Veterans Parkway Intersection

The existing traffic signal heads at the intersection do not include retroreflective backplates (shown in **Figure 28**). Additionally, four-level flashing yellow arrow signal heads are not included for the eastbound and westbound left-turn movements, as the existing signal heads employ the dog-house design. Supplementary signal heads are also not present, which may help to provide additional guidance to drivers attempting to complete left-turn movements.



Figure 28: View of Eastbound Signal Heads at Veterans Parkway Intersection

The existing raised concrete channelizing islands were implemented with a higher deflection angle that can result in drivers having to look over their shoulder to observe conflicting traffic. As a result, a pattern of rear end crashes within the channelized right-turn lanes was observed during the five-year study period (Figure 29).

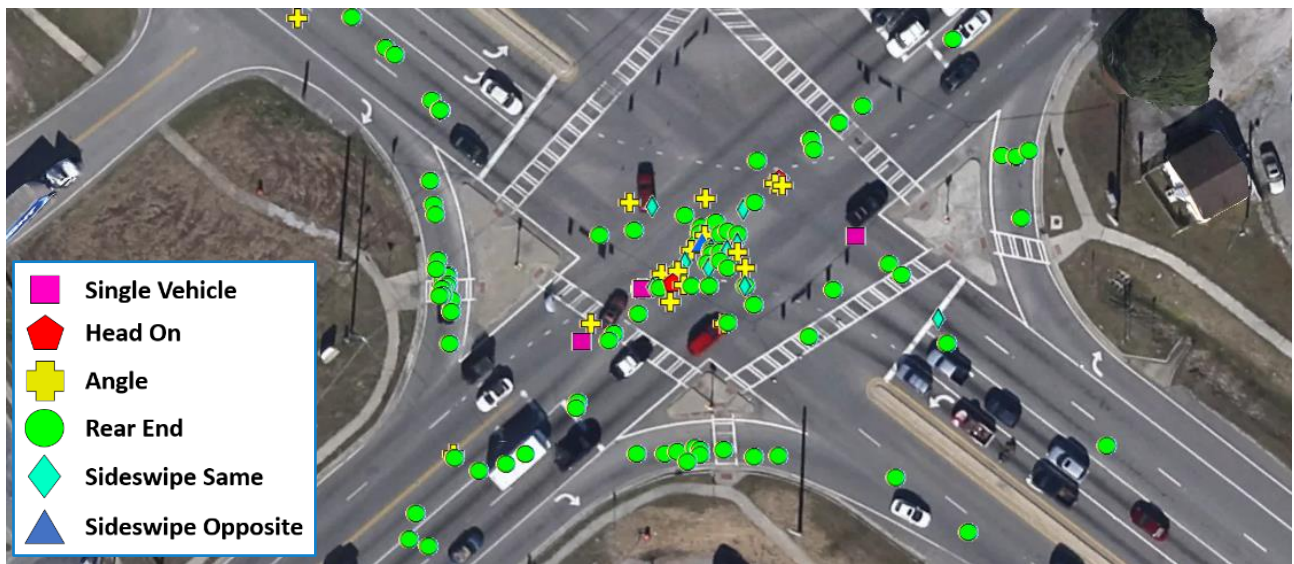


Figure 29: Pattern of Rear End Crashes in Channelized Right-Turn Lanes (2012-2016)

While pedestrian signal heads and push button actuation are present at this location, pedestrian count down signal heads have not been included (Figure 30). The RSA team determined the crosswalks and ADA-complaint ramps present at this location are in good condition.



Figure 30: View of Pedestrian Signal Head and Push Button Actuation

Due to the relatively high access point density present along this portion of SR 196, there are driveways located within the functional area of the signalized intersection. In particular, the gas station driveways located on the north leg of the intersection represent a potential safety concern. This is evidenced by the fact that four angle-type crashes occurred during the five-year study period involving vehicles entering or exiting these driveways (shown in **Figure 31**).



Figure 31: View of Northern Leg of Elma G. Miles and Veterans Parkway Intersection

While the W3-3 Signal Ahead warning signs are placed along each approach to the intersection, these devices are past their useful service life and are not providing appropriate retro-reflectivity (**Figure 32**). Additionally, these devices are located too far downstream to provide the necessary warning to drivers of the upcoming intersection, especially considering the queues often observed during the peak hour (an example of vehicles queued beyond the W3-3 sign is shown in **Figure 27**).



Figure 32: View of Westbound SR 196 at Veterans Parkway Intersection

Recommendations to address these safety issues are presented in **Table 14**, including the specific safety issue addressed by each countermeasure or treatment.

Table 14. Recommendations for Elma G. Miles and Veterans Parkway Intersection

#	Recommendation	Safety Benefit	Time Frame	Cost/Effort	Safety Issues Addressed
14	Replace existing channelizing islands with updated 30-60-90 degree raised concrete channelizing islands.	High	Intermediate	Moderate	22
15	Eliminate direct left-turn movements from Veterans Parkway using MUT design.	High	Long	High	18
16	Replace and relocate W3-3 Signal Ahead warning signs farther upstream.	Moderate	Short	Low	18,21,25
17	Perform signal timing study to potentially reduce queueing.	Moderate	Short	Low	21
18	Install pedestrian count down signal heads.	Moderate	Intermediate	Moderate	23
19	Install flashing yellow arrows for left-turn signal heads on eastbound and westbound approaches.	Moderate	Intermediate	Low	18,20
20	Install retroreflective backplates.	Moderate	Intermediate	Low	18,19
21	Install supplementary signal heads.	Moderate	Intermediate	Low	18,19
22	Consider implementation of dual left-turn lanes for SR 196 approaches.	Low	Intermediate	High	21
23	Consolidate driveways in functional area of intersection.	Low	Intermediate	Low	24

Given the presence of significant non-motorized traffic at this location, treatments to improve pedestrian and bicycle safety performance are a critical element of this RSA. Pedestrian count down signal heads have been shown to improve non-motorized safety performance, and replacing the existing pedestrian signal heads with

count down heads would provide additional guidance to pedestrians attempting to cross this complex urban intersection.

The existing W3-3 Signal Ahead warning signs are beyond their useful service life; replacing these signs would greatly improve their conspicuity, especially under dark conditions. Further, relocating these devices farther upstream would provide additional guidance to drivers of the upcoming signalized intersection. This would directly help to address safety issues #18, #21 and #25. It should be noted that the bicycle lane alternative identified for the eastern portion of the SR 196 corridor would also help to address safety issue #18 related to high approach speeds on the western leg.

The installation of retroreflective backplates, supplementary signal heads, and flashing yellow arrows for the eastbound and westbound left-turn signal heads would also help to improve traffic signal conspicuity, providing additional guidance to drivers in this complex visual environment. It should be noted that the recommended signal treatments may not be appropriate in combination with recommendations #21 and #23. A review of the existing signal timing may also identify opportunities to reduce queuing to address safety issue #21.

The implementation of 30-60-90 degree raised concrete channelizing islands would represent a significant improvement over the existing condition, helping to address the pattern of rear end-type crashes shown in **Figure 29**. Consolidating driveways within the functional area of the intersection, specifically the gas station driveways located on the northern leg, would directly help to address the crash pattern shown in **Figure 31**.

Altering the SR 196 approaches to include dual left-turn lanes may help to address queueing observed during the peak hour. This is particularly relevant given the presence of Fort Stewart north of the intersection, as army post traffic frequently uses SR 196 to access Fort Stewart from Veterans Parkway. An additional alternative would be to eliminate direct left-turn movements from Veterans Parkway, and implement a MUT design, which would require left-turn movements to use a cross-over downstream along Veterans Parkway before making a right-turn movement at the signalized intersection to complete the left-turn. While these alternatives would require additional study to determine feasibility, geometric improvements to this signalized intersection represent a significant opportunity to improve safety performance.