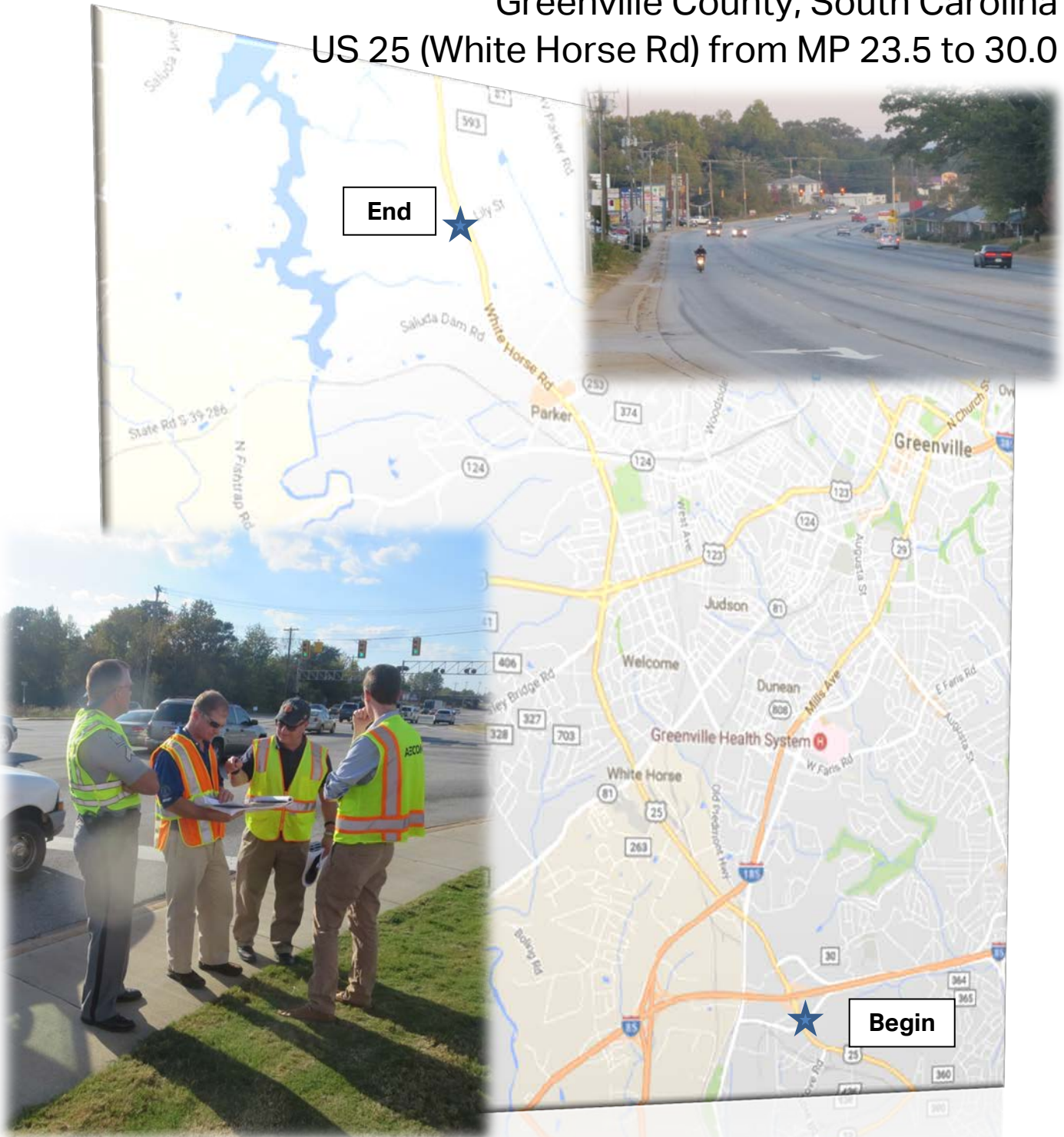


Road Safety Assessment Greenville County, South Carolina US 25 (White Horse Rd) from MP 23.5 to 30.0



May 2017

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1.0 INTRODUCTION

1.1 BACKGROUND

US 25 (White Horse Rd) is found in Greenville County, South Carolina. It is a 7-lane principal arterial that provides access to many commercial sites and residential developments. In addition, it serves as a major truck corridor that connects I-26 from the Asheville Area to I-85. Significant highway intersections along this section of US 25 are grade separated and include Interstate 85, Interstate 185, US 123 (New Easley Hwy), and SC 124 (Old Easley Hwy). The corridor also provides bus service via Greenlink Transit, Route 6, with multiple stops along the study area. The portion of US 25 that is being assessed runs from mile post (MP) 23.5 - 30.0 or just south of I-85 to S-782 (Lily St). According to data provided by SCDOT, there have been 1,971 reported crashes within this section of US 25 from January 2010 to December 2014.



Figure 1 – Typical Section of US 25 (White Horse Rd)

1.2 OBJECTIVE

The purpose of a road safety assessment is to examine the safety of a roadway by an independent, multi-disciplinary team. The team identifies areas of concern based on crash data analysis and observations in the field. After the field visit, the team categorizes potential areas of improvement along the study corridor.

1.3 ROAD SAFETY ASSESSMENT TEAM SUMMARY

The multidisciplinary team for the US 25 (White Horse Rd) Road Safety Assessment consisted of engineers from SCDOT, FHWA, and AECOM. Law enforcement representation consisted of SC Highway Patrol. The team and stakeholders met on Wednesday, October 19, 2016 and Thursday, October 20, 2016.

RSA Team

1. **Joey Riddle** – SCDOT HQ Traffic
2. **Jana Potvin** – SCDOT HQ Traffic
3. **Eric Dillon** – SCDOT District 3 Traffic
4. **Ryan Elrod** – SC Highway Patrol
5. **Dan Hinton** – FHWA - SC
6. **Ryan Eckenrode** – AECOM
7. **Emily Swearingen** – AECOM
8. **Jacob Nelson** – AECOM

The stakeholders consisted of additional representation from the Metropolitan Planning Organization (MPO), Greenville-Pickens Area Transportation Study (GPATS), the County, and SCDOT.

Stakeholders

9. **Tommy Elrod** - SCDOT
10. **Carol Jones** – SCDOT HQ Operations
11. **Emily Toler** – SCDOT HQ Traffic
12. **Brandon Wilson** – SCDOT District 3 Maintenance
13. **Kurt Walters** – Greenville County
14. **Keith Brockington** – GPATS
15. **Asangwua Ikein** – GPATS



2.0 RELEVANT DATA REVIEW

2.1 SITE CHARACTERISTICS

US 25 (White Horse Road) is a north/south principal arterial roadway that is used by different types of traffic such as commuter, commercial, residential, and school traffic. This roadway also has a significant volume of truck traffic. The roadway consists of seven (7) lanes, three (3) in each direction of travel and a center two-way left-turn lane. There are many businesses and commercial areas located on US 25 (White Horse Rd). There are 19 traffic signals located within the study area. These locations are listed below from south to north:

1. US 25 (White Horse Rd) & I-85 NB Ramps
2. US 25 (White Horse Rd) & I-85 SB Ramps
3. US 25 (White Horse Rd) & S-807 (Frontage Rd)
4. US 25 (White Horse Rd) & SC 20 (Grove Rd / Piedmont Hwy)
5. US 25 (White Horse Rd) & I-185 NB Off Ramp
6. US 25 (White Horse Rd) & S-649 (Two Notch Rd)
7. US 25 (White Horse Rd) & S-263 (Staunton Bridge Rd)
8. US 25 (White Horse Rd) & SC 81 (Anderson Rd)
9. US 25 (White Horse Rd) & S-703 (Welcome Rd)
10. US 25 (White Horse Rd) & S-85 (Old Easley Bridge Rd)
11. US 25 (White Horse Rd) & US 123 (New Easley Hwy) NB Ramps
12. US 25 (White Horse Rd) & US 123 (New Easley Hwy) SB Ramps
13. US 25 (White Horse Rd) & SC 253 (W Blue Ridge Dr)
14. US 25 (White Horse Rd) & Wal-Mart Entrance
15. US 25 (White Horse Rd) & S-474 (W Marion Rd)
16. US 25 (White Horse Rd) & S-63 (Saluda Dam Rd) / Ashe Dr
17. US 25 (White Horse Rd) & S-306 (Rangeview Cir)
18. US 25 (White Horse Rd) & S-914 (Eastbourne Rd) / Cherrylane Dr (Local)
19. US 25 (White Horse Rd) & S-782 (Lily St) / Ingles Supermarket

The US 25 study area has grade separated interchanges with I-85, I-185, US 123 (New Easley Hwy), and SC 124 (Old Easley Hwy). There are railroad crossings at multiple locations along US 25. Tracks cross US 25 just west of the intersection with Piedmont Hwy/Grove Rd. Additionally there are more tracks that cross US 25 at a skewed angle south of the intersection of US 25 and Two Notch Rd. Tracks run under US 25 at the grade separated

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interchange with SC 124 (Old Easley Hwy). There is sidewalk on both sides of US 25 throughout most of the corridor. There is no sidewalk on the northern side of US 25 near the railroad tracks crossing US 25 at Two Notch Rd. Figure 2 shows a map of the study area.

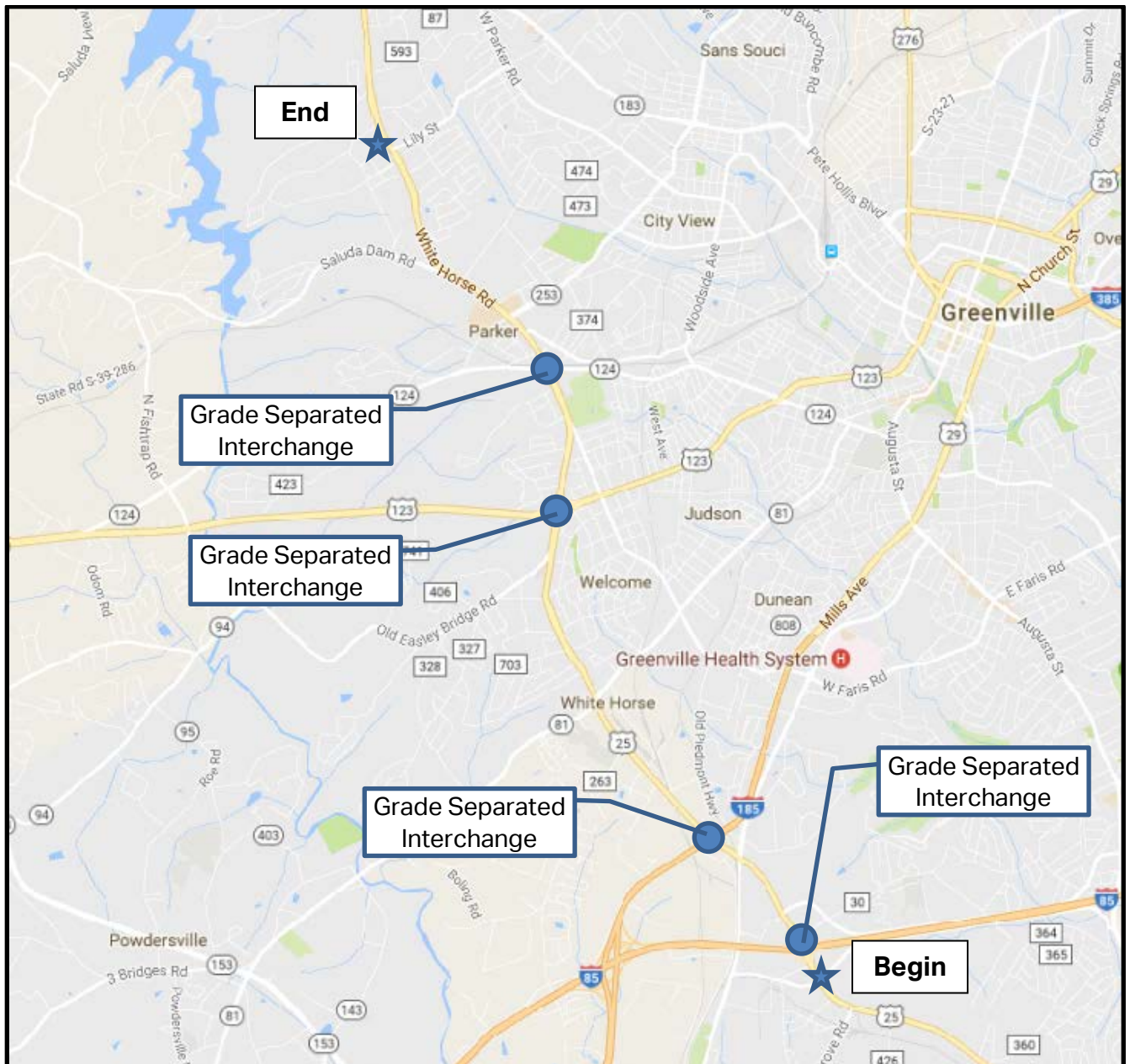


Figure 2 – Study Area – US 25 (White Horse Rd)

2.2 CRASH DATA

Crash data for this section of roadway was obtained by SCDOT over a five-year period from January 1, 2010 to December 31, 2014. There were 1,971 crashes along this corridor during this time period. Based on this data, the predominant type of crash was a rear end collision accounting for 803 crashes or 40.7% of all crashes. This was followed by angle crashes (668

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crashes, 33.9%) and sideswipe crashes (316 crashes, 16%). Of the 1,971 crashes, 25.7% of them involved some type of injury. There were thirteen (13) collisions resulting in a fatality.

Crashes during the late night and early morning hours from 12 AM to 6 AM were low, although two of the 13 fatalities were during this time. A rise in the crash number is seen from 7 AM to 9 AM likely due to increased volume on the corridor caused by school and commuter traffic. The majority of crashes occur in the afternoon with the highest number between 4 PM and 5 PM. As discussed, this is most likely due to increased volume caused by commuter traffic. The number of collisions decline throughout the evening. Data indicates 75% of the crashes happen during the daylight hours.

The most prevalent crash type is non-injury or property damage only at 74% of crashes. This is followed by a possible injury at 18% of crashes. The remaining crashes fall into the injury categories of non-incapacitating injury at 6%, incapacitating injury at 1%, and fatality at 0.1%.

The weekdays (Monday – Friday) show a higher amount of crashes than the weekend with the highest day for crashes being Friday with 364 crashes. This road safety assessment was conducted in the month of November, which is the fifth highest month in regard to total crashes. The RSA field review was conducted on Wednesday, October 19, 2016 and Thursday, October 20, 2016.

2.3 SPEED DATA

Speeding can be one of the most prevalent factors contributing to crashes. As part of this road safety assessment a speed study was conducted to evaluate average speeds compared to posted speed limits. A total of nine (9) studies were conducted and 100 samples per study were obtained. Speeds were collected using the Bushnell Speedster III radar gun. Figure 3 shows the location and direction of travel for each of the nine (9) studies, speed limit, average speed, and 85th percentile speed.

The posted speed in the study area was 40 mph starting at the I-85 NB Ramps and increased to 45 mph near the intersection of US 25 and N Washington St. The data shows that the average speed of passing vehicles met or exceeded the posted speed limit at seven (7) out of nine (9) locations. Six (6) of the nine (9) study locations had average speeds in excess of the posted speed limit. The 85th percentile speed at eight (8) of the nine (9) locations exceeded the posted speed limit by as much as 11 mph. The remaining location had an 85th percentile speed equal to the posted speed limit.

Table 1 below shows the summarized results from the speed study.

<i>Location</i>	<i>Description</i>	<i>Speed Limit (mph)</i>	<i>Average Speed (mph)</i>	<i>85th Percentile Speed (mph)</i>
1	NB – South of S-807 (Frontage Rd)	40	42	46
2	NB – South of S-782 (Lily St)	45	46	50
3	NB – Near Stanford Rd	45	41	45
4	NB – Near S-1026 (Black Hawk Rd)	40	46	51
5	SB – Near S-807 (Frontage Rd)	40	46	50
6	SB – Near S-1026 (Black Hawk Rd)	40	46	50
7	SB – Near S-703 (Welcome Rd)	40	43	47
8	SB – Near S-914 (Eastbourne Rd)	45	45	49
9	SB – Near SC 253 (W Blue Ridge Rd)	45	43	47

Table 1 – Summary of Speed Study Data on US 25 (White Horse Rd)

Data was collected on multiple dates in April and July 2016.

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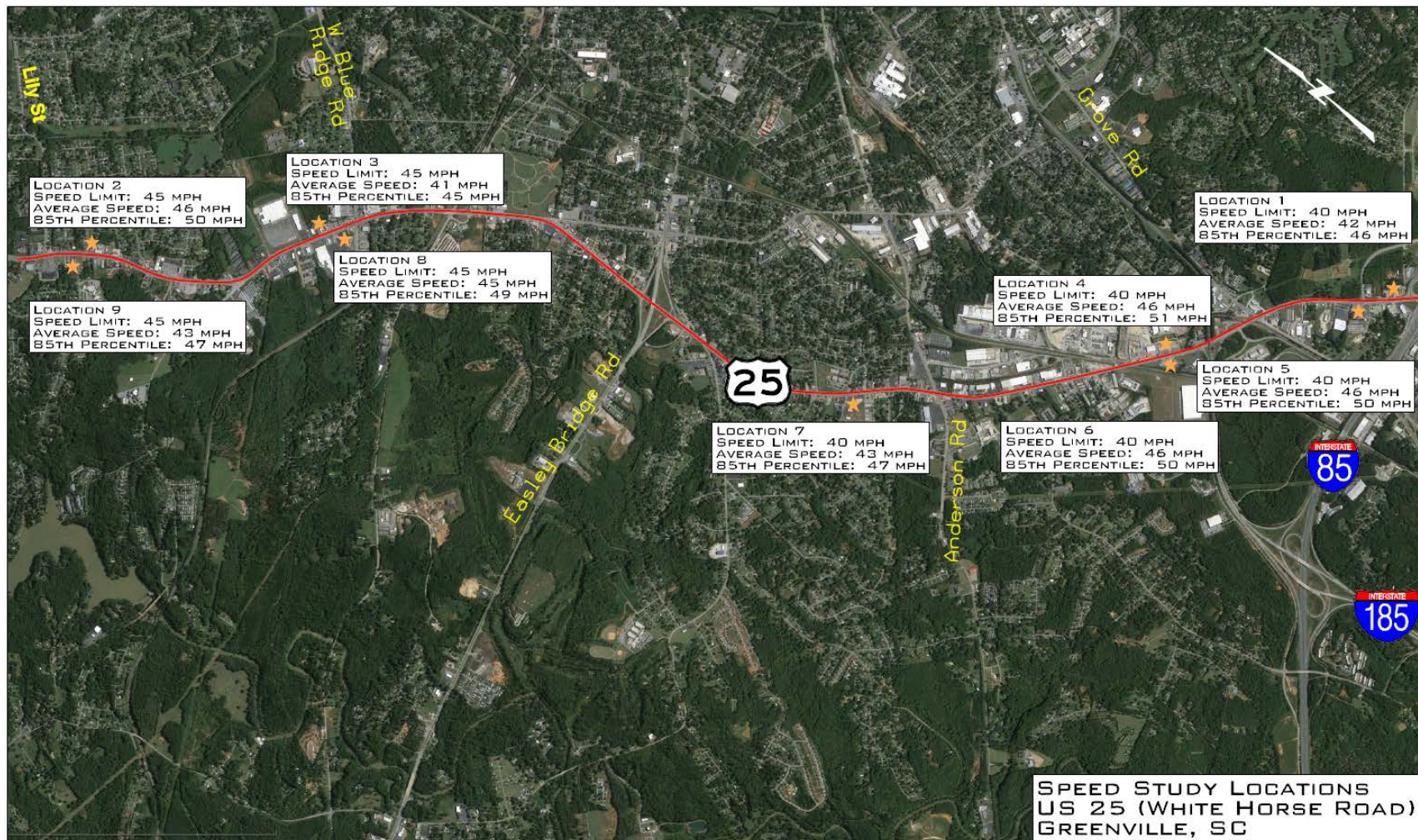


Figure 3 – Speed Study Locations and Data

2.4 VOLUME DATA

Average annual daily traffic (AADT) data was collected over ten years from 2006 to 2015 using SCDOT count stations located within the limits of the study corridor. There were three SCDOT count stations along the corridor. Station 107 is located just south of S-1026 (Black Hawk Rd). Station 109 is located approximately halfway between SC 81 (Anderson Rd) and the US 123 (Easley Bridge Rd) interchange. Station 111 is located approximately halfway between S-474 (W Marion Rd) and S-782 (Lily St). Figure 4 shows the historical AADT data based on information obtained from SCDOT.

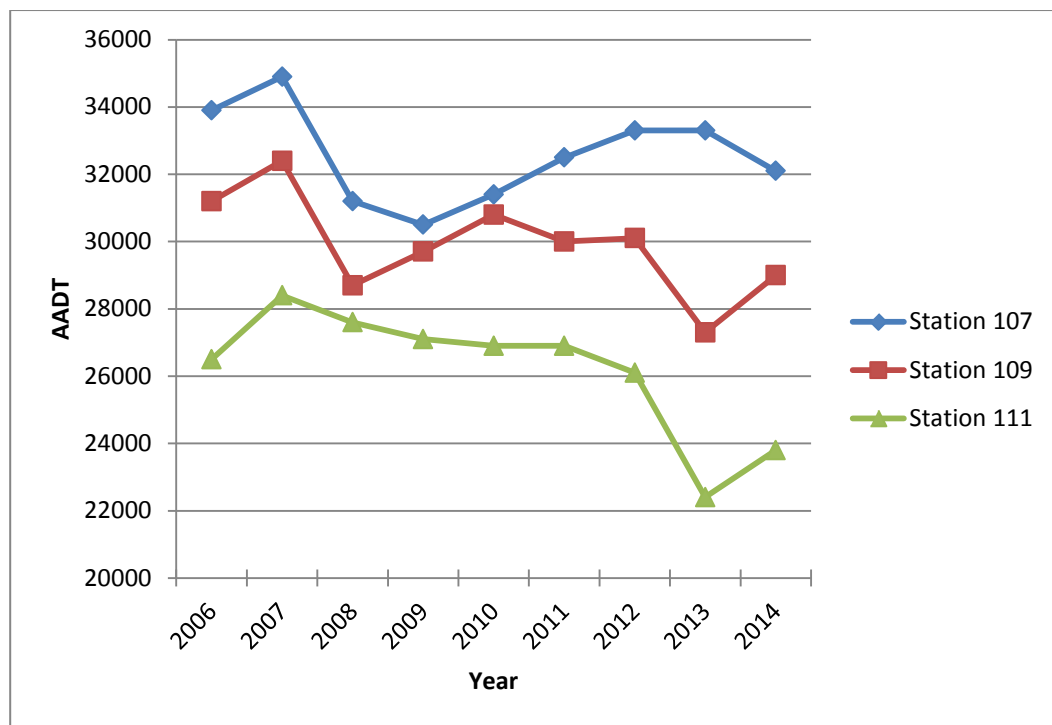


Figure 4 – US 1 (Two Notch Rd) AADT Data (Source: SCDOT)

Figure 5 shows the locations at which counts were recorded, along with average AADT and growth rate.

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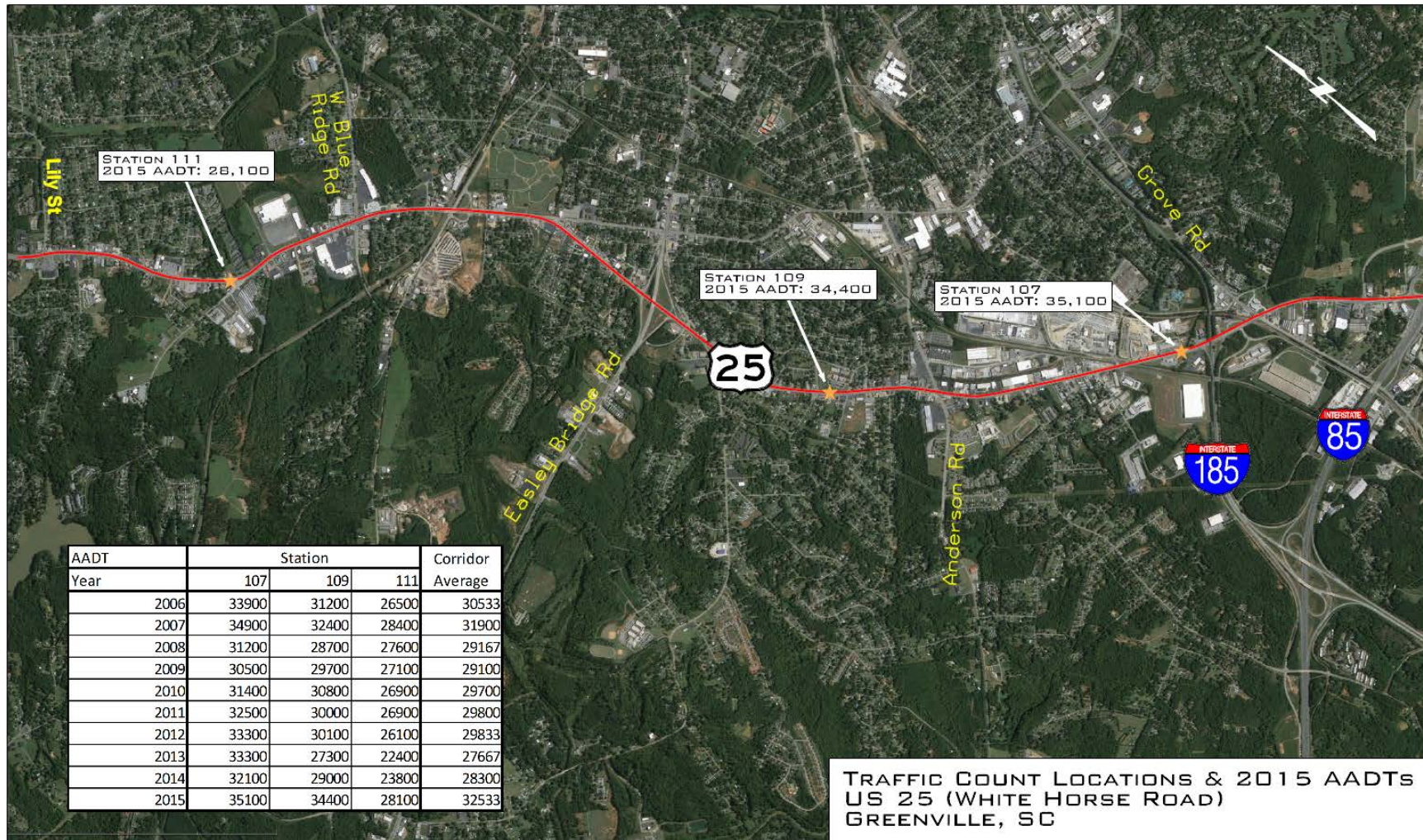


Figure 5 – SCDOT Traffic Count Locations

2.5 PLANNED IMPROVEMENTS

Additional planned projects along the US 25 corridor include the following:

- Installation of a signal at the intersection of Page Dr (Local) and US 25 (White Horse Rd) by Greenville County
- I-85 widening from White Horse Rd (Exit 44) to Woodruff Rd (Exit 50) / I-85 (US 29 to SC 129) by SCDOT

2.6 RECENT STUDIES

As part of the SCDOT High Crash Intersection Study submitted in March 2013, AECOM reviewed in detailed two of the intersections along the US 25 corridor. Each recommended consideration had a benefit / cost ratio greater than 1.0. These considerations have not officially been approved by SCDOT but were reviewed by the RSA team. This study is attached in Appendix E.

US 25 (White Horse Rd) at SC 81 (Anderson Rd)

Near term Action Items

- Increase the red clearance interval on US 25 approaches
- Install advance warning sign EB approach SC 81 "Signal Ahead"
- Increase the red clearance interval on SC 81 approaches
- Provide a protected-only SB (US 25) left-turn phase
- Install 'No left-turn' sign and right-in / right-out at northern Shopping Center Driveway (NW Corner) onto US 25
- Increase the yellow change interval on US 25 approaches
- Install Library guide sign prior to driveway on SC 81
- Install 'No left-turn' sign and right-in / right-out at southern Shopping Center Driveway (NW Corner) onto US 25
- Install 'No left-turn' sign and right-in / right-out north of Wendys Driveway onto US 25
- Increase the yellow change interval on SC 81 approaches
- Repaint EB approach on SC 81
- Repaint NB approach on US 25
- Install overhead lane designation signs on NB US 25 approach
- Install northbound nearside signal head on US 25

Long term Action Items

- Improve street lighting on all approaches
- Provide a protected only NB (US 25) left-turn phase

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- Provide a protected only WB (SC 81) left-turn phase
- Install a 100 foot NB right-turn lane in Big Lots Shopping Center
- Install a 100 foot SB right-turn lane in K&S Diner/Shopping Center
- Install a raised median on US 25 southbound approach
- Install flashing yellow arrows on each approach
- Install a raised median on SC 81 eastbound approach
- Install a raised median on SC 81 westbound approach
- Provide a protected only EB (SC 81) left-turn phase
- Offset left-turn on US 25

US 25 (White Horse Rd) at SC 253 (Blue Ridge Dr)

Near term Action Items

- Increase the yellow change interval on US 25 approaches
- Increase the red change interval on SC 253 approaches
- Increase the red change interval on US 25 approaches
- Install Stanford Rd intersection warning signs prior to road on US 25
- Install nearside signal heads on US 25 northbound
- Increase the yellow change interval on SC 253 approaches
- Install 'No left-turn' sign and right-in / right-out from White Horse Plaza onto US 25
- Install 'No left-turn' sign and right-in / right-out from KFC onto US 25
- Coordinate signal on US 25
- Install near side signal heads on WB SC 253 approach

Long term Action Items

- Improve street lighting on all approaches
- Extend raised medians on SC 253 WB approach
- Install raised median on US 25 SB approach

3.0 FINDINGS AND CONSIDERATIONS

3.1 POSITIVE MEASURES

- Most of the corridor has sidewalk present and some intersections are ADA compliant.
- Signal Ahead / Intersection Ahead signs have been installed.
- Signal spacing is good.
- Lane widths appeared to be a minimum of 12 feet wide.
- Crosswalks and pedestrian signals were present at some signalized intersections.
- Backplates were present on signals at some intersections.
- No major drainage issues on the corridor but cleaning of existing structures (sidewalks) is recommended.
- Raised pavement markings were utilized at some locations.
- Corridor does not appear to be at capacity and vehicles do not appear to experience significant delays during peak hours
- The corridor has multiple grade separated interchanges.
- Some community outreach along the corridor has been performed by Target Zero to educate drivers and pedestrians on safety precautions in recent years.

Below is a breakdown of locations, by intersection, with the potential for improvements. Improvements strategies were categorized into time frame and costs. Time frame is divided into Short-term (<1 year), Mid-term (1-3 years), and Long-term (>3 years). Costs are separated into three orders of magnitude. The cost categories include Low (maintenance staff assignments or low-cost improvements), Medium (Minor to moderate new construction), and High (significant new construction). The segments are shown on the map displayed in Figure 6.

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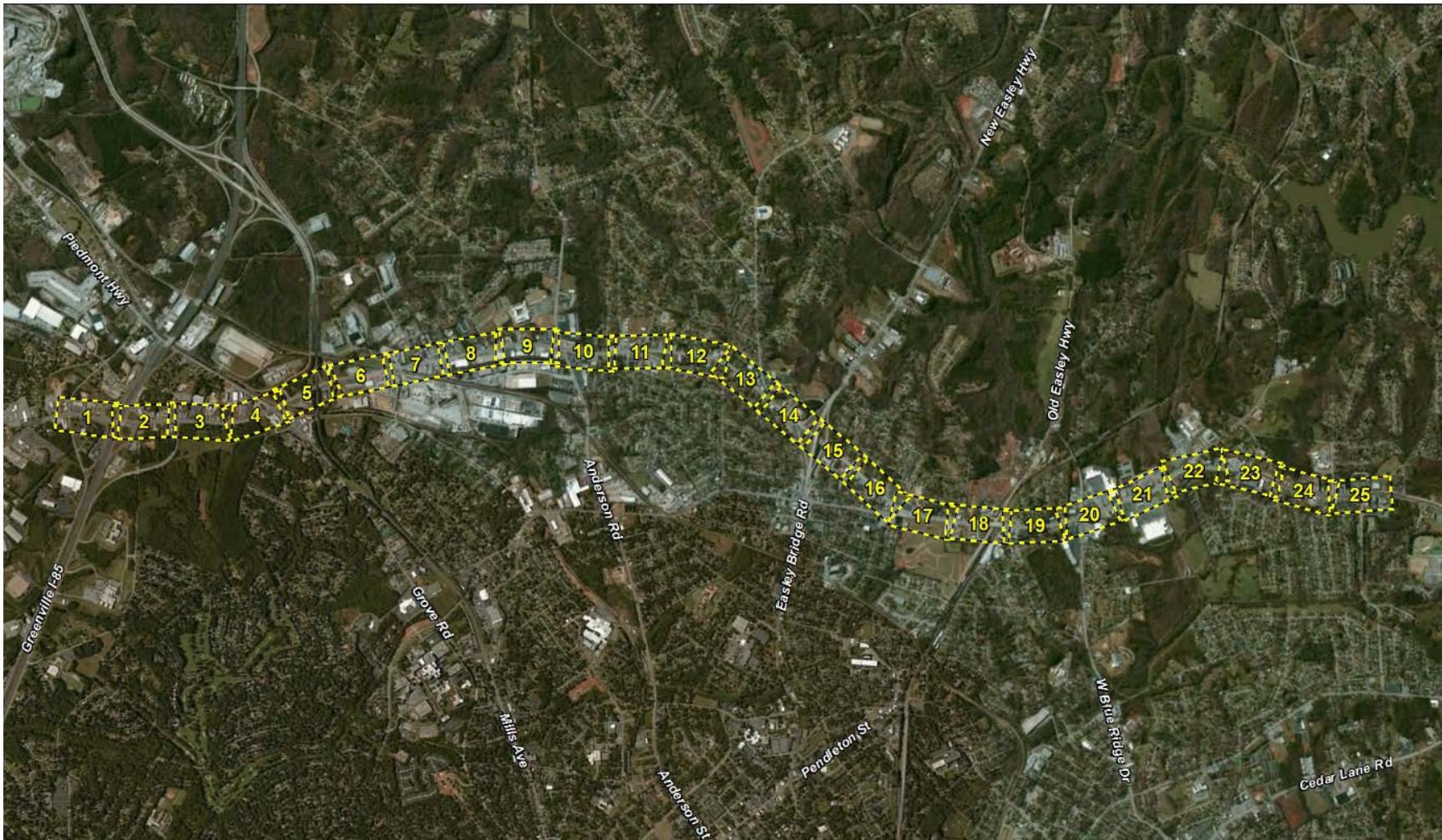


Figure 6 – Overview Map of US 25 Segments

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<i>Findings</i>	<i>Examples</i>	<i>Improvements and Considerations</i>
<p><u>Traffic Signals</u></p> <p>Not all intersections are fully equipped with backplates on each signal head. These include (# of backplates needed):</p> <ul style="list-style-type: none"> • US 25 @ I-85 SB Ramps (9) • US 25 @ Frontage Rd (11) • US 25 @ Two Notch Rd (12) • US 25 @ Old Easley Bridge Rd (12) • US 25 @ Wal-Mart Entrance (10) • US 25 @ Lily St (11) <p>Some locations would benefit from the installation of a nearside signal head that is more visible to drivers:</p> <ul style="list-style-type: none"> • US 25 @ Anderson Rd • US 25 @ Blue Ridge Dr • US 25 @ Grove Rd <p>Install flashing yellow arrow signal heads :</p> <ul style="list-style-type: none"> • US 25 @ Anderson Rd • Consider at all intersections as it has been proven to improve safety. 	 <p style="text-align: center;"><i>Some signals are not equipped with backplates.</i></p>  <p style="text-align: center;"><i>Install flashing yellow arrow signals where necessary.</i></p>	<p>Install backplates on signal heads. Anticipated cost: \$20,550</p> <p>Install nearside signal heads. Anticipated Cost: \$3,000</p> <p>Make use of flashing yellow arrow signals. Anticipated Cost: \$4,000</p> <p>Cost would be \$15,000 if FYAs implemented at all intersections along corridor.</p>

Table 2 – Traffic Signal Findings and Considerations

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Findings	Examples	Improvements and Considerations
<p><u>Access Management, Driveway Geometry, & Sight Distance</u></p> <p>Some locations have multiple full access driveways along US 25 (White Horse Rd).</p> <p>Medians would prevent left turns from some unsignalized side streets and driveways, thus minimizing conflicts and lessen the severity of crashes.</p> <p>Existing structures impede sight distance at some locations.</p>	 <p><i>Install right-in / right-out turns at driveways near some intersections along US 25 (White Horse Road)</i></p>  <p><i>The existing brick wall and fence on Staunton Bridge Rd does not allow drivers to adequately see north to make a safe right turn on red.</i></p>	<p>Construct new or extend existing concrete medians to restrict access to driveways especially near signals. (3,850 feet total) Anticipated Cost: \$225,650</p> <p>There would be approximately 50 total driveways affected by the addition of the proposed concrete medians along US 25 (White Horse Rd).</p> <p>Convert 3 driveways to right-in/right-out access only. Anticipated Cost: \$7,900</p>

Table 3 – Access Management Findings and Considerations

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Findings	Examples	Improvements and Considerations
<p><u>Signs & Pavement Markings</u></p> <p>Lanes and pavement markings are not clearly defined at all intersections. Install skip lines to guide cars making left turns at signalized intersections where necessary.</p> <p>Install overhead street name signs at all intersections.</p> <p>Ensure visibility of all signs along the corridor by clearing vegetation where necessary,</p>	 <p><i>Stop bars and lane designations are faded as shown in this image of the westbound approach at US 25 and Two Notch Rd.</i></p>	<p>Install overhead street signs at all signalized intersections along US 25 (White Horse Rd) Anticipated Cost: \$15,960*</p> <p>Restripe stop bars, skip lines, and approaches to intersections where necessary. Anticipated Cost: \$100,700*</p> <p>Restripe solid yellow lines and white dashed lines throughout corridor. Anticipated Cost: \$300,000*</p> <p>Replace all raised pavement markers along corridor. Anticipated Cost: \$50,000*</p> <p>Ensure sign visibility. Anticipated Cost: \$5,000*</p> <p>(*) – These costs were incorporated in the Long Term improvements table located on Page 60. The total is reflected in the row called "Corridor Wide Improvements."</p>

Table 4 – Signs & Pavements Markings Findings and Considerations

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Findings	Examples	Improvements and Considerations
<p><u>Pedestrian Accommodation</u></p> <p>Countdown pedestrian signals are not present at all signalized intersections with crosswalks.</p> <ul style="list-style-type: none"> • US 25 at Grove Rd • US 25 at Two Notch Rd • US 25 at Page Dr (Future Signal) • US 25 at Saluda Dam Rd <p>Crosswalks are not present in all locations where pedestrian signals are installed:</p> <ul style="list-style-type: none"> • US 25 at Rangeview Cir <p>Not ADA compliant:</p> <ul style="list-style-type: none"> • US 25 at I-85 SB Ramps • US 25 at Frontage Rd • US 25 at Grove Rd • US 25 at Two Notch Rd • US 25 at Staunton Bridge • US 25 at Anderson Rd • US 25 at Page Dr • US 25 at US 123 Ramps • US 25 at Walmart Entrance • US 25 at W Marion Rd • US 25 at Saluda Dam Rd • US 25 at Rangeview Cir <p>Lighting would be beneficial in certain locations to alleviate pedestrian related crashes. Segments that would benefit from lighting are: 6, 7, 10, 11, 12, 20, 21</p>	 <p><i>Some intersections need upgrades to ramps, crosswalks, and pedestrian signals to be ADA compliant. Shown here is a crosswalk that leads to a sidewalk with no ramp access.</i></p>  <p><i>This median has a walkway through it that would be challenging for a wheelchair to navigate.</i></p>	<p>Install / Upgrade existing pedestrian signal heads to countdown pedestrian signals at the following intersections:</p> <ul style="list-style-type: none"> • US 25 at Grove Rd (8) • US 25 at Two Notch Rd (8) • US 25 at Page Dr (8) • US 25 at Saluda Dam Rd (6) <p>Anticipated Cost: \$30,000</p> <p>Install new and restripe existing crosswalks with 12" lines.</p> <p>Upgrade all ramps and pedestrian accommodations to be ADA compliant. (71 ramps proposed in total)</p> <p>Anticipated Cost: \$219,625</p> <p>Clear sediment from gutters and remove trip hazards from the sidewalk.</p> <p>Anticipated Cost: \$5,000*</p> <p>Provide lighting in select segments on US 25.</p> <p>Anticipated Cost: \$505,000*</p> <p>(*) - See note on Page 16 under "Improvements and Considerations" for cost information.</p>

Table 5 – Pedestrian Findings and Considerations

3.2 CONSIDERATIONS

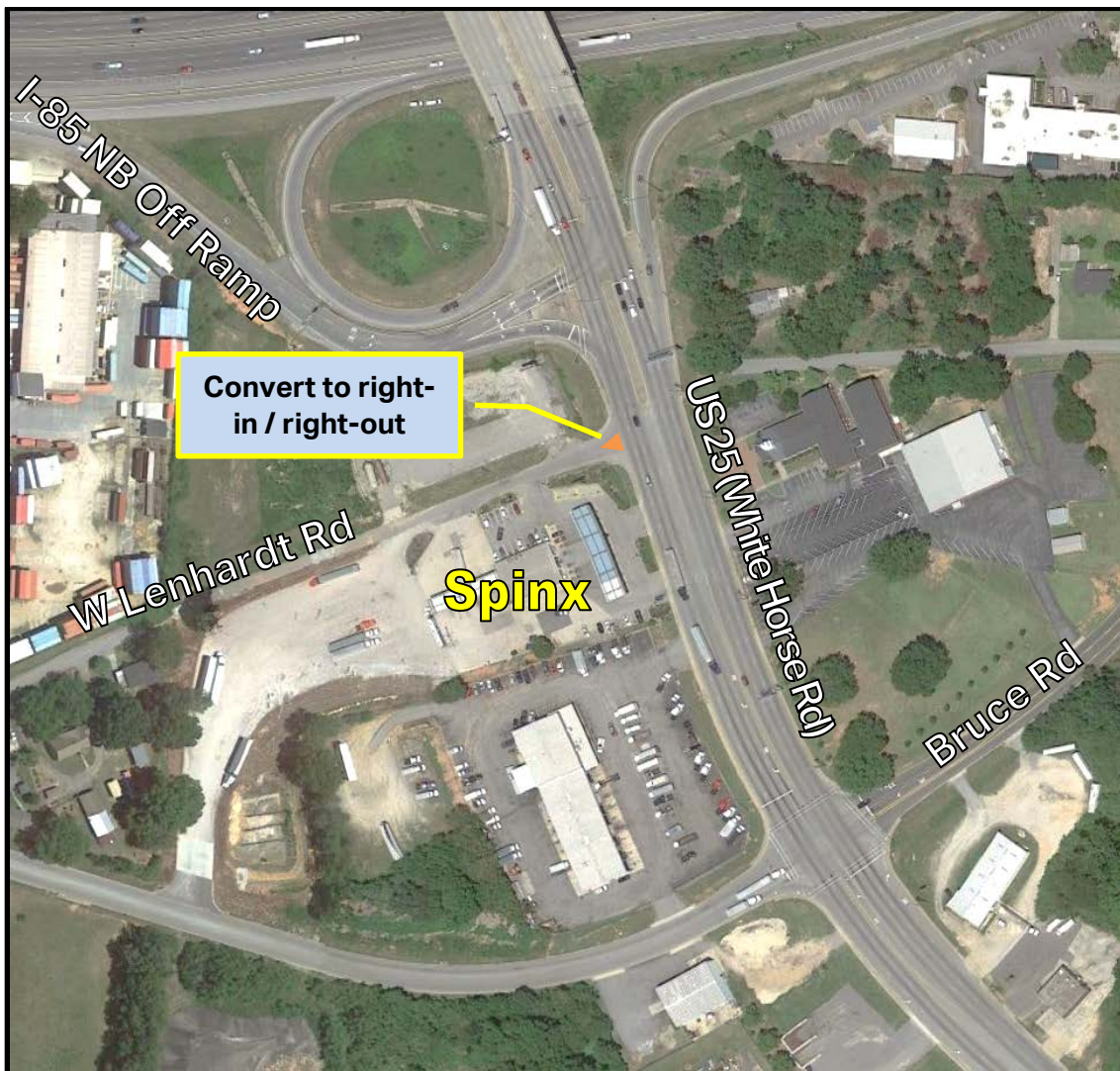
3.2.1 Segment 1 – North of Bruce Rd (S-1107) to the I-85 NB Ramps

Concerns

- Between the signalized intersections of Bruce Rd (S-1107) and I-85 NB off ramp along US 25 there are multiple full access driveways on the west side of the roadway.

Considerations

- Short Term** – Convert W Lenhardt Rd (S-1190) beside Spinx to a right- in / right-out by installing a raised concrete island at the intersection.
 - *Anticipated Cost to Implement: \$2,700*



3.2.2 Segment 2 – I-85 SB Ramps to Frontage Road (S-807)

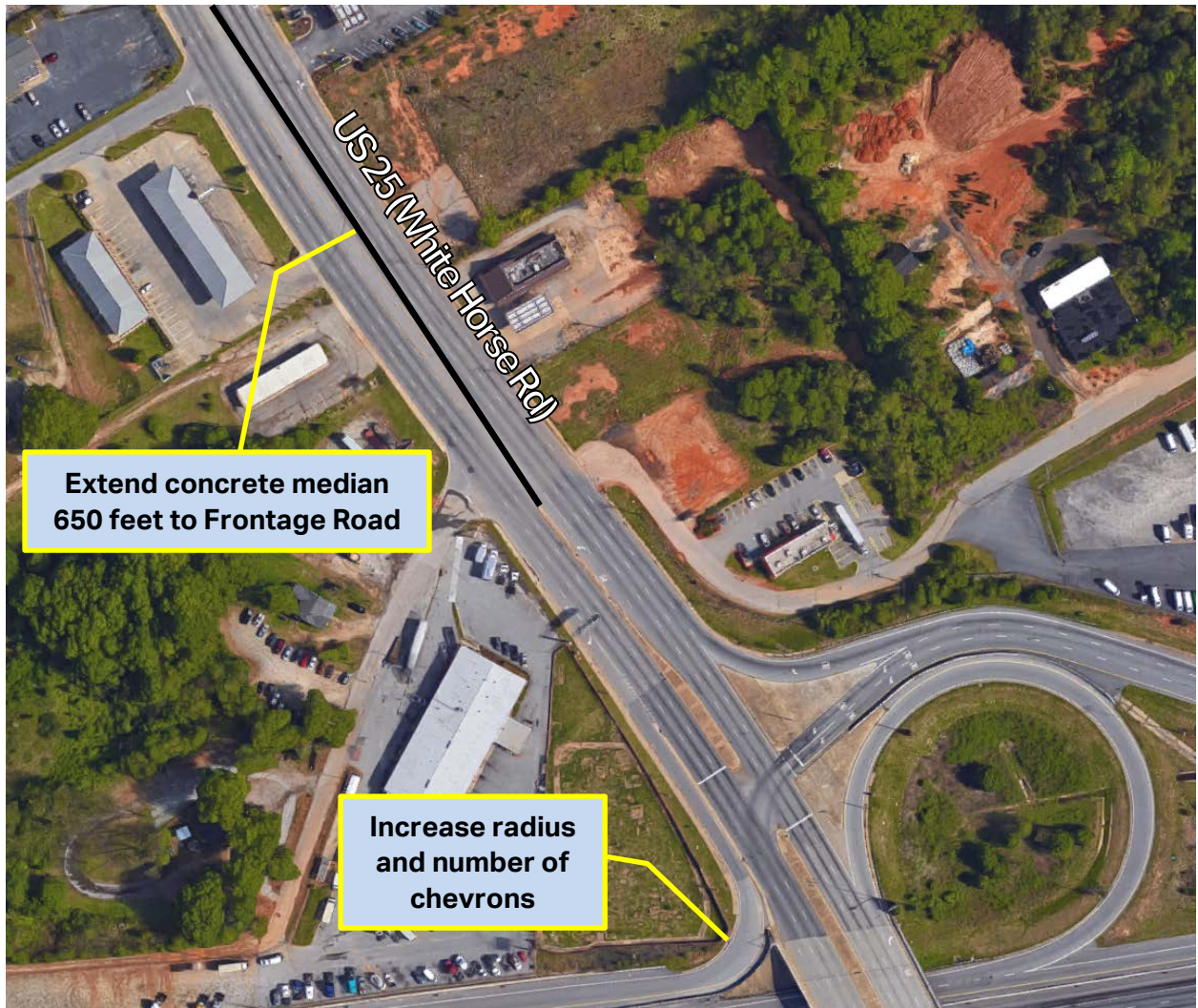
Concerns

- Signal heads at the I-85 SB Ramps do not have backplates.
- ADA accommodations are not present at ramps and crosswalks.
- Curve radius from US 25 SB onto I-85 SB on-ramp does not meet design standards.
- The I-85 SB off-ramp to US 25 NB is not free flowing and switching lanes too early.
- Access management for the left turns to / from Burty Road (S-709) and Waffle House from US 25 should be limited.

Considerations

- **Short Term** – Install backplates on signals at the intersection of I-85 SB and US 25.
 - *Anticipated Cost to Implement: \$2,800*
- **Short Term** – Install object markers on raised median from SB US 25 to I-85 SB on-ramp.
 - *Anticipated Cost to Implement: \$5,000*
- **Short Term** – Install more chevron signs on I-85 SB on-ramp.
 - *Anticipated Cost to Implement: \$1,300*
- **Short Term** – Paint base of medians.
 - *Anticipated Cost to Implement: \$1,800*
- **Mid Term** – Upgrade (6) ramps and sidewalks to be ADA compliant.
 - *Anticipated Cost to Implement: \$14,000*
- **Mid Term** – Extend concrete median 650 feet to restrict left-in and left-out access for Burty Rd (S-709) and Waffle House. Consider extending median to Cartee Ave (Local) / Frontage Rd (S-807) intersection.
 - *Anticipated Cost to Implement: \$52,650*
- **Long Term** – Increase radius of I-85 SB on-ramp from SB US 25.
 - *Anticipated Cost to Implement: \$500,000*

Greenville County Road Safety Assessment: US 25 (White Horse Rd)
From MP 23.5 to 30.0



3.2.3 Segment 3 – Near Frontage Rd (S-807) / Cartee Ave (Local)

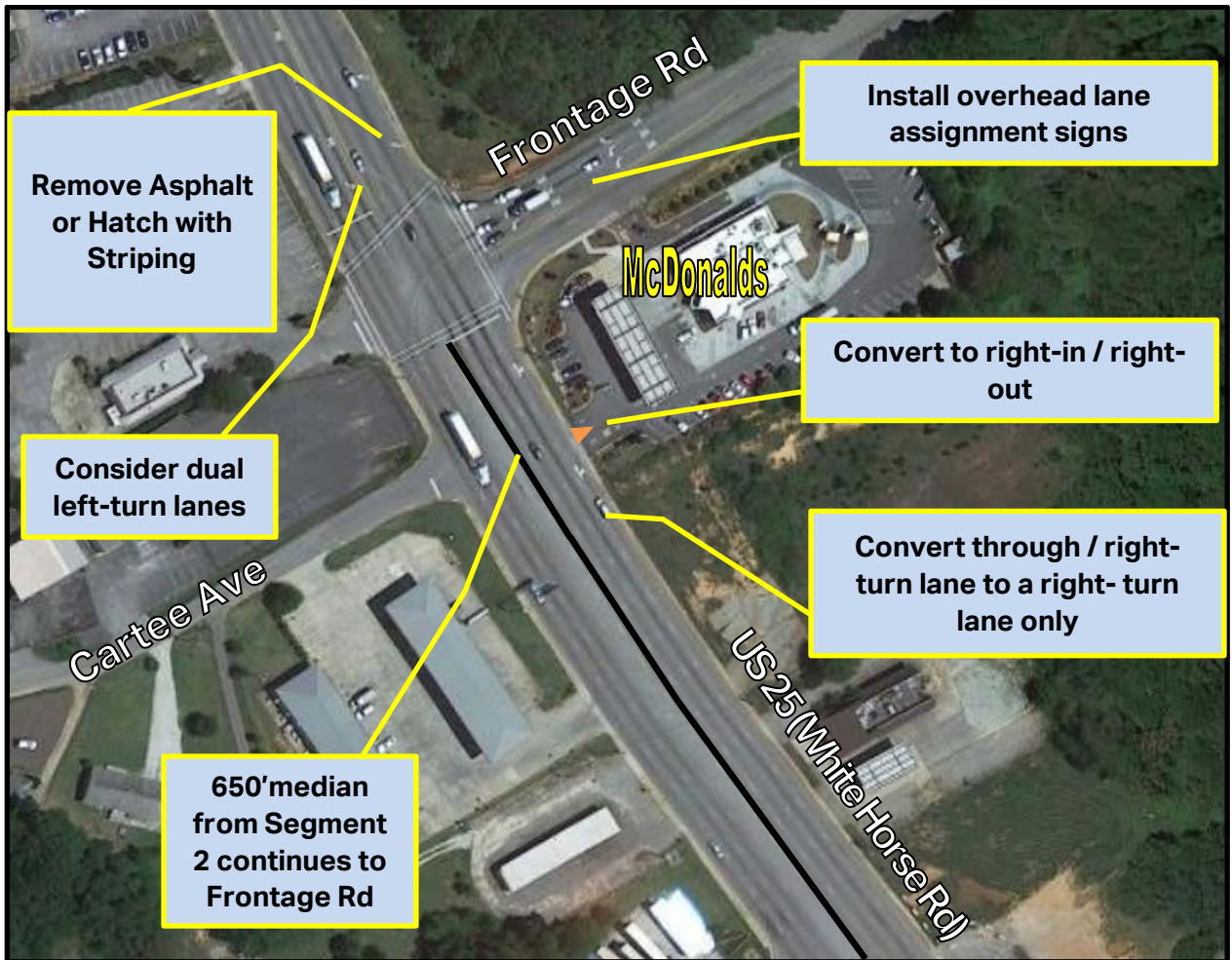
Concerns

- No backplates are present on signal heads at Frontage Rd intersection.
- Westbound Frontage Rd approach confusion over laneage.
- ADA requirements for ramps and crosswalks are not up to standards.
- SB left turns from US 25 to Frontage Road have moderate queuing.
- Vehicles in the through/right lane on the northbound US 25 approach must merge immediately after the intersection at Frontage Road.
- The driveway into the Gas Station/McDonald's is very close to the intersection and would be exiting into the right turn lane or crossing five (5) lanes to make a left turn.

Considerations

- **Short Term** – Through/Right lane northbound should be converted to a right only and the acceleration area north of the intersection removed by hatching out the area with painted striping.
 - *Anticipated Cost to Implement: \$4,000*
- **Short Term** – Consider restricting access for the Gas Station/McDonald's in southeast quadrant to a right-in right-out or extend a concrete median to prevent left turns.
 - *Anticipated Cost to Implement: \$2,700*
- **Short Term** – Install backplates on signal heads at the intersection of Frontage Rd and US 25.
 - *Anticipated Cost to Implement: \$3,500*
- **Short Term** – Install overhead lane assignment signs on Frontage Rd
 - *Anticipated Cost to Implement: \$7,500*
- **Mid Term** – Upgrade (4) ramps and sidewalks to be ADA compliant.
 - *Anticipated Cost to Implement: \$12,500*
- **Mid Term** – Consider dual left turns on SB US 25.
 - *Anticipated Cost to Implement: \$5,000*

Greenville County Road Safety Assessment: US 25 (White Horse Rd)
From MP 23.5 to 30.0



3.2.4 Segment 4 –Grove Rd (SC 20) / Piedmont Hwy (SC 20) at US 25

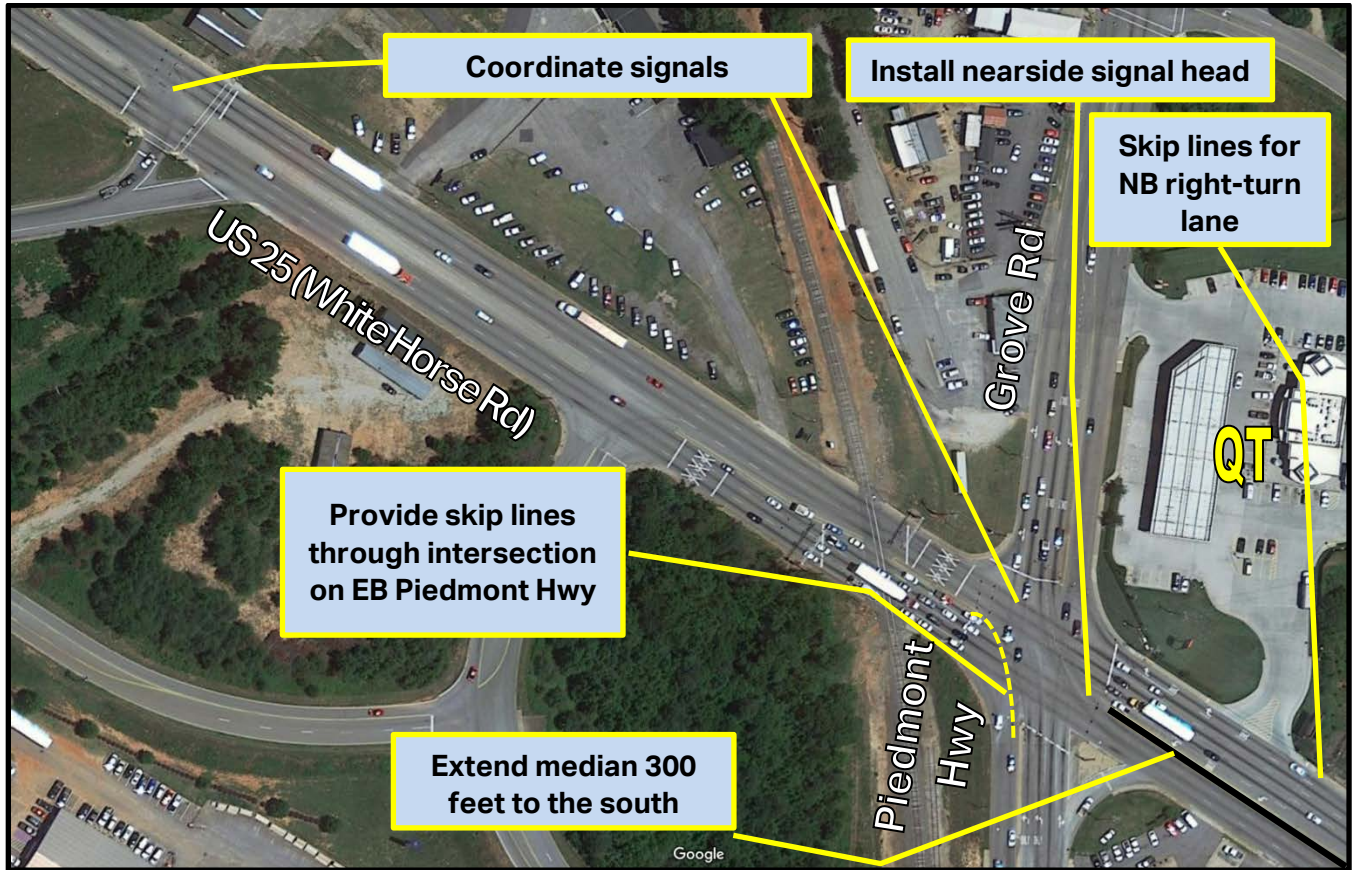
Concerns

- Crosswalks and pedestrian signal upgrades are needed.
- ADA compliant ramps are needed at intersection of US 25 at Grove Rd / Piedmont Hwy.
- Coordination with the recently installed signal at ramp on US 25
- Signal head visibility on US 25 NB could be improved.
- No separation or guidance for EB to NB dual lefts through the intersection.
- Right-turn lane on US 25 NB that begins before the QuikTrip driveway not well defined.
- Access management on US 25 NB to south of the intersection.

Considerations

- **Short Term** – Install nearside heads for NB on US 25.
 - *Anticipated Cost to Implement: \$1,000*
- **Short Term** – Implement crosswalks and pedestrian signals (8) at the intersection of US 25 and Grove Road.
 - *Anticipated Cost to Implement: \$9,000*
- **Short Term** – Provide skip lines for EB Piedmont Hwy for cars making a turn in the dual left lanes at the intersection of Grove Road and US 25.
 - *Anticipated Cost to Implement: \$500*
- **Short Term** – Provide skip lines showing the development of the right turn lane approaching the intersection of Grove Road from US 25 NB.
 - *Anticipated Cost to Implement: \$500*
- **Mid Term** – Upgrade (6) ramps and sidewalks to be ADA compliant.
 - *Anticipated Cost to Implement: \$15,625*
- **Mid Term** – Investigate potential coordination with the new signal at US 25 and the new signal for I-185 NB off ramp intersection to the north.
 - *Anticipated Cost to Implement: N/A*
- **Mid Term** – Extend the 4 foot raised median on US 25 NB approximately 300 feet to prevent left turns from the multiple driveways close to the intersection.
 - *Anticipated Cost to Implement: \$10,000*

Greenville County Road Safety Assessment: US 25 (White Horse Rd)
From MP 23.5 to 30.0



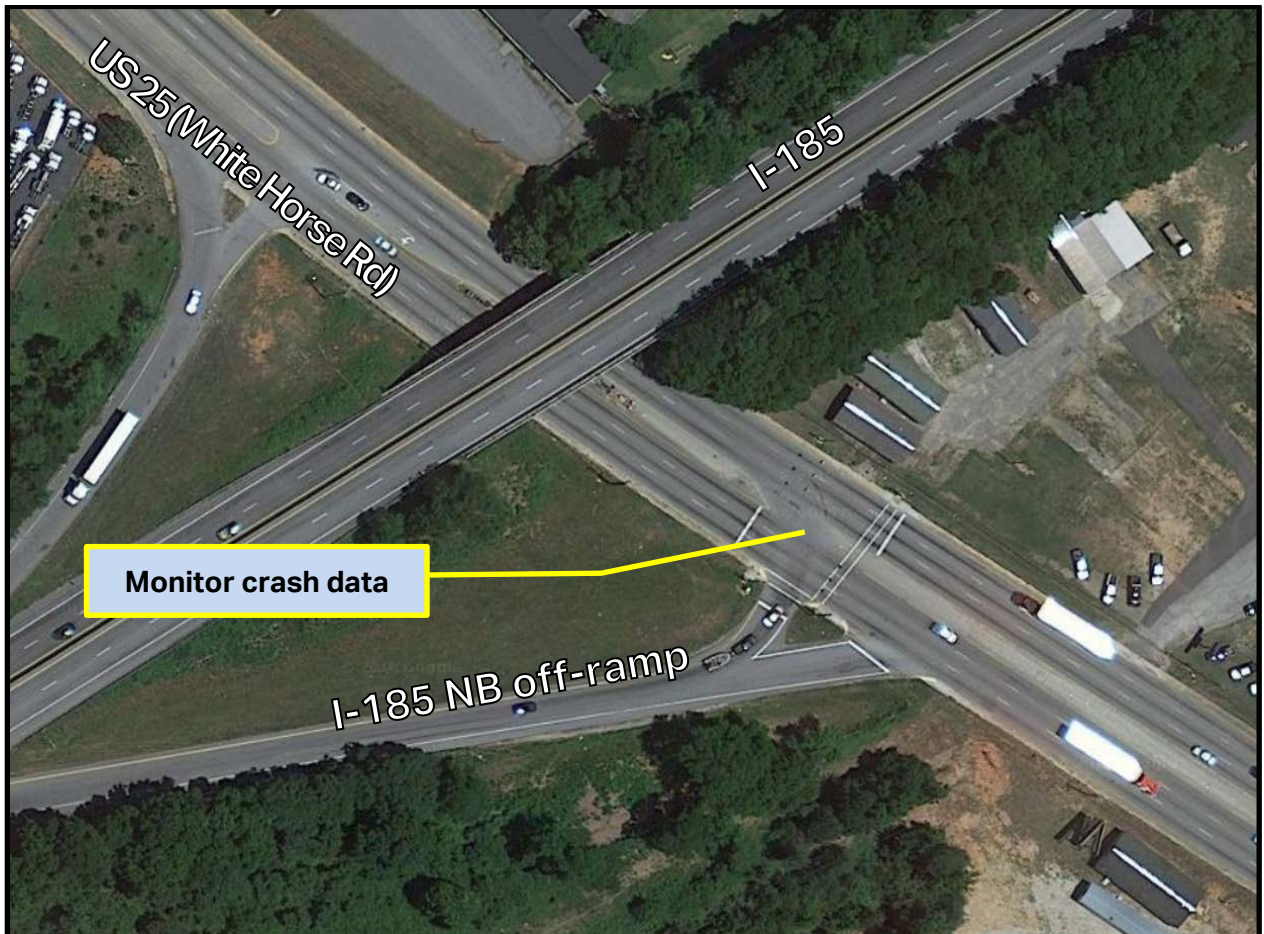
3.2.5 Segment 5 – S Old Piedmont Hwy (S-245) to North of I-185 SB On-Ramp

Concerns

- A signal was installed at the intersection of US 25 at I-185 NB off-ramp to mitigate angle crashes within the last few years.

Considerations

- **Short Term** – Monitor crash history for the new signal installation.
 - Anticipated Cost to Implement: **N/A**



3.2.6 Segment 7 – Two Notch Rd (S-649) to North of Sandra Ave (Local)

Concerns

- ADA accommodations are not present at the intersection of US 25 at Two Notch Rd. No sidewalk is present on the east side of the road across railroad, which could make pedestrians have to cross US 25. Review pedestrian routes / access.
- Backplates are not present on signal heads at intersection of US 25 at Two Notch Rd.
- Delineating lane assignments on the WB approach of Two Notch Road are faded.
- The stop bar on the WB approach of Two Notch Road is worn.
- NB vehicles on US 25 turning left into exit only driveway prior to Two Notch Rd signal



Considerations

- **Short Term** – Install backplates on signal heads at US 25 at Two Notch Road intersection.
 - *Anticipated Cost to Implement: \$3,800*
- **Short Term** – Restripe the WB approach of Two Notch Rd and indicate lane assignments with pavement markings along with a new stop bar.
 - *Anticipated Cost to Implement: \$2,560*
- **Short Term** – Install crosswalks and pedestrian signals (8) at US 25 at Two Notch Rd.
 - *Anticipated Cost to Implement: \$9,000*
- **Mid Term** – Upgrade (8) ramps and add 300 feet of sidewalks to be ADA compliant at the US 25 at Two Notch Rd intersection.
 - *Anticipated Cost to Implement: \$100,000*
- **Mid Term** – Extend the concrete median on the US 25 NB approach to Two Notch Rd intersection approximately 100 feet (4 foot wide) to the limits of the railroad right of way.
 - *Anticipated Cost to Implement: \$4,050*

Greenville County Road Safety Assessment: US 25 (White Horse Rd)
From MP 23.5 to 30.0



3.2.7 Segment 8 – Michael Dr (Local) to Staunton Bridge Rd (S-263)

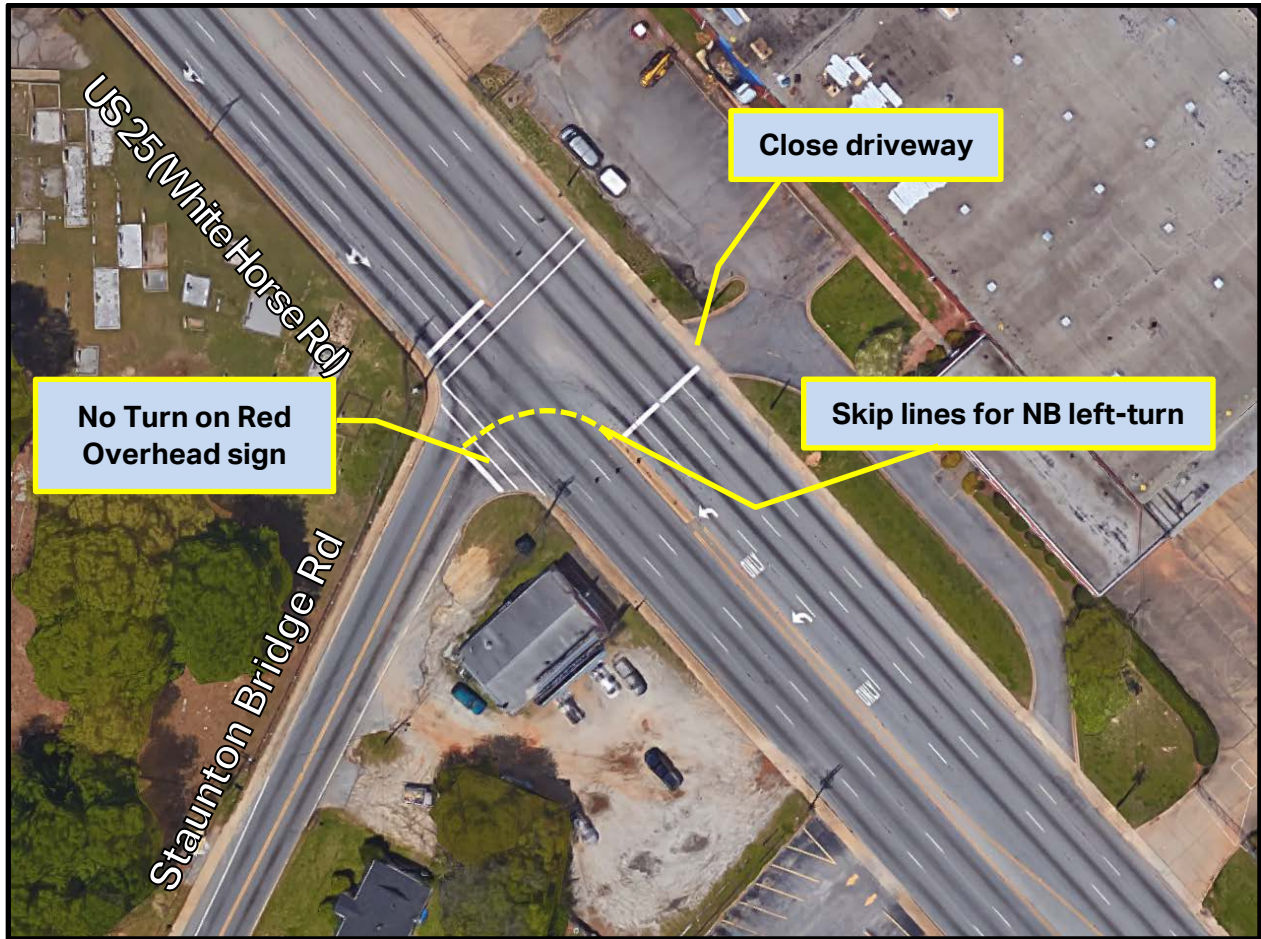
Concerns

- WB approach across from Staunton Bridge Rd has limited sight distance in both directions around the existing structures.
- Pedestrian ramps have been partially upgraded but not all are ADA compliant at the intersection of US 25 at Staunton Bridge Rd.
- It is difficult to see the receiving lane from the US 25 NB left turn lane onto Staunton Bridge Rd.
- The driveway across from Staunton Bridge Rd is included as part of the signalized intersection but does not have signal heads.

Considerations

- **Short Term** – Install No Right-turn on Red overhead sign on Staunton Bridge Rd.
 - *Anticipated Cost to Implement: \$250*
- **Short Term** – Provide skip lines for NB left turn from US 25 onto Staunton Bridge Rd due to skew of intersection.
 - *Anticipated Cost to Implement: \$500*
- **Short Term** – Close driveway across from Staunton Bridge Rd.
 - *Anticipated Cost to Implement: \$10,000*
- **Mid Term** – Upgrade (2) Ramps at the intersection of US 25 at Staunton Bridge Rd to be ADA compliant.
 - *Anticipated Cost to Implement: \$6,250*

Greenville County Road Safety Assessment: US 25 (White Horse Rd)
From MP 23.5 to 30.0



3.2.8 Segment 10 – Anderson Rd (SC 81) to North of Maxie Ave (Local)

Concerns

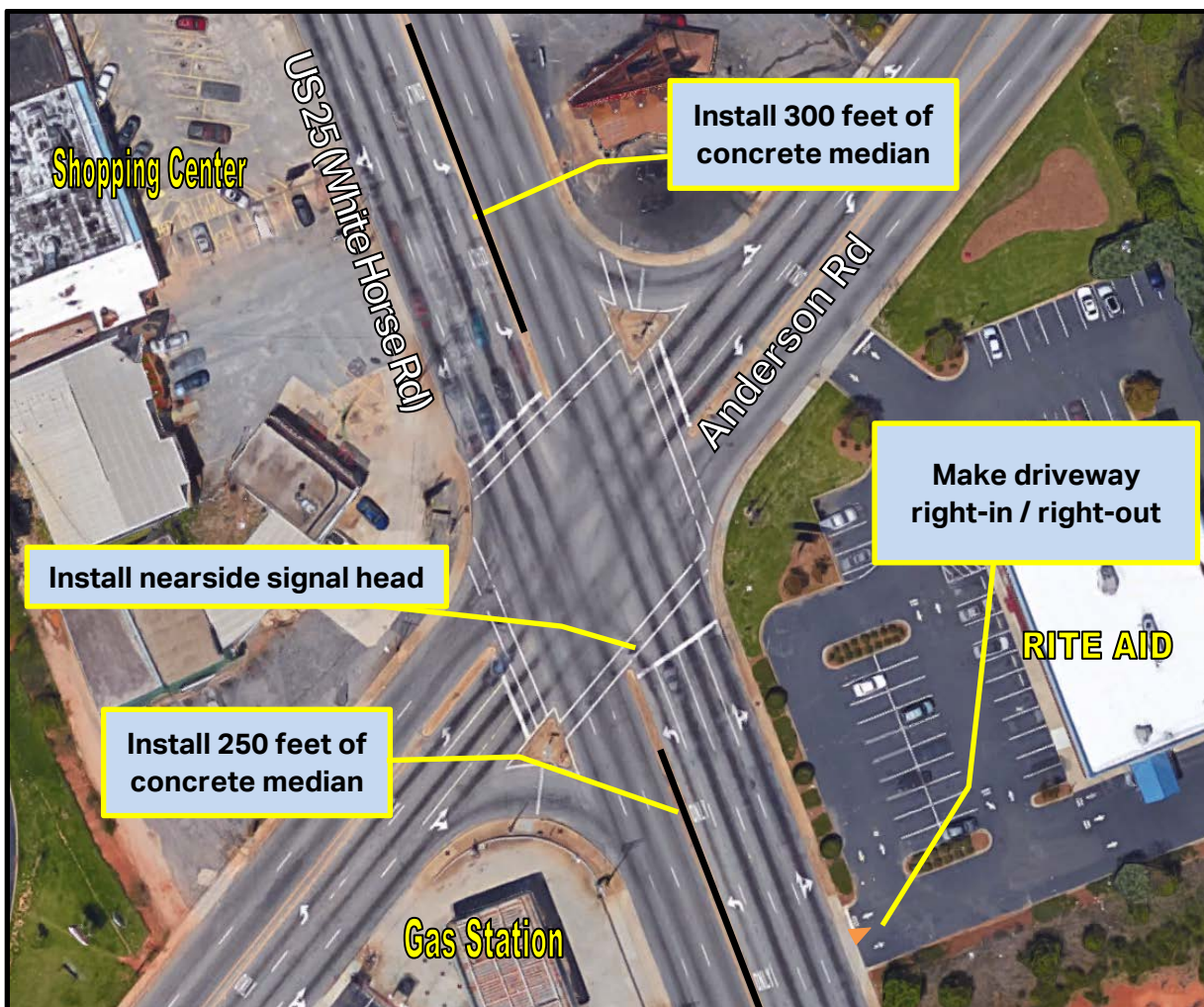
- Driver compliance for the existing 5-section protected-permissive signals heads on all four approaches of US 25 at Anderson Rd.
- No ADA accommodations at the intersection of US 25 at Anderson Rd.
- Sight distance of signal heads on the NB approach of US 25 at Anderson Rd.
- Full access driveways along US 25.

A detailed report containing many additional considerations at this intersection was performed by AECOM and submitted to SCDOT in March 2013. Recommendations from this report can be found on p. 10.

Considerations

- **Short Term** – Install Flashing Yellow Arrow signals on all 4 approaches at the intersection of US 25 at Anderson Rd.
 - *Anticipated Cost to Implement: \$4,000*
- **Short Term** – Install a nearside signal head for NB approach on US 25 at Anderson Rd.
 - *Anticipated Cost to Implement: \$1,000*
- **Short Term** – Convert existing full access on US 25 serving the Rite Aid to a right-in right-out with the installation of a concrete island
 - *Anticipated Cost to Implement: \$2,500*
- **Mid Term** – Upgrade (11) ramps and sidewalks to be ADA compliant at the intersection of US 25 at Anderson Rd.
 - *Anticipated Cost to Implement: \$25,600*
- **Mid Term** – Install concrete medians along US 25, approximately 250 feet on US 25 NB approach, approximately 300 feet on US 25 SB approach Anderson Rd.
 - *Anticipated Cost to Implement: \$20,250*

Greenville County Road Safety Assessment: US 25 (White Horse Rd)
From MP 23.5 to 30.0



3.2.9 Segment 11 – South of Cochran Dr (Local) to S Florida Ave (Local)

Concerns

- Access management between Cochran Dr to Bainbridge Dr

Considerations

- **Mid Term** – Extend concrete median 510 feet on US 25 from Welcome Rd to Cochran Dr.
 - *Anticipated Cost to Implement: \$16,200*
- **Mid Term** – Install a 375 foot concrete median on US 25 from Welcome Rd to Bainbridge Dr.
 - *Anticipated Cost to Implement: \$12,500*



3.2.10 Segment 12 – S Florida Ave (Local) to Welcome Ave Ext (Local)

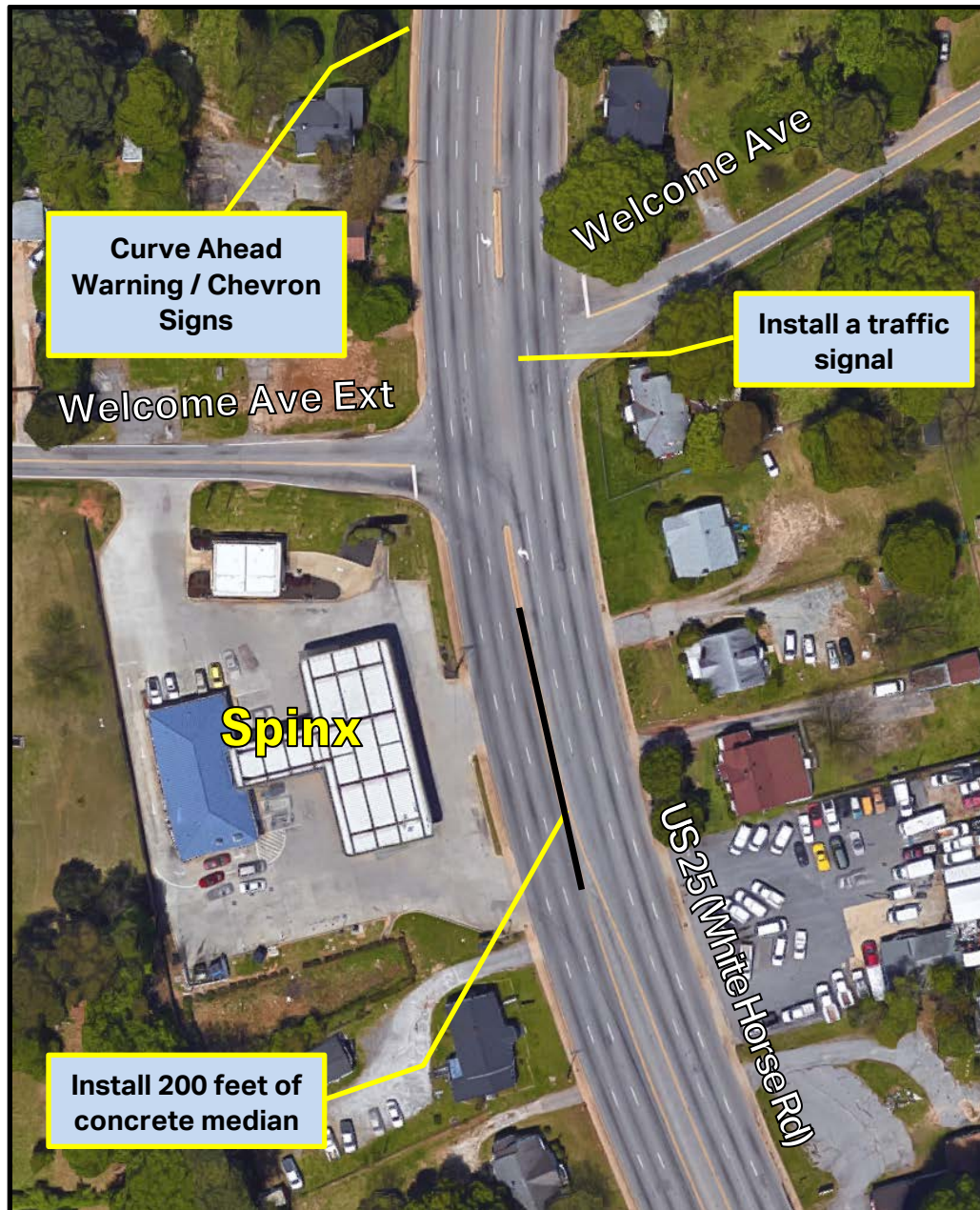
Concerns

- The crashes in this segment appear to be due to speeding.
- Access management along US 25 south of Welcome Ave Ext.
- US 25 at Welcome Ave Ext intersection is on a horizontal curve.
- There were many crashes at the intersection of US 25 at Welcome Ave Ext that involved running off the road.
- The approaches of Welcome Ave and Welcome Avenue Extension are not aligned.

Considerations

- **Short Term** – Consider additional curve ahead sign/chevrons at the intersection of US 25 at Welcome Rd.
 - *Anticipated Cost to Implement: \$1,350*
- **Short Term** – Consider a larger speed limit sign (30" x 36") to replace the existing one near the intersection of US 25 at Welcome Rd. Replace existing curve ahead sign in this segment with a larger sign (36"x36").
 - *Anticipated Cost to Implement: \$500*
- **Mid Term** – Install raised median along US 25 in front of gas station approximately 200 feet south from the intersection of Welcome Ave Ext.
 - *Anticipated Cost to Implement: \$7,250*
- **Mid Term** - Traffic study to investigate the benefits of a new signal.
 - *Anticipated Cost to Implement: \$5,000*
- **Long Term** – New signal installation.
 - *Anticipated Cost to Implement: \$160,000*

Greenville County Road Safety Assessment: US 25 (White Horse Rd)
From MP 23.5 to 30.0



3.2.11 Segment 13 – North of Welcome Ave Ext (Local) to Old Easley Bridge Rd (S-85)

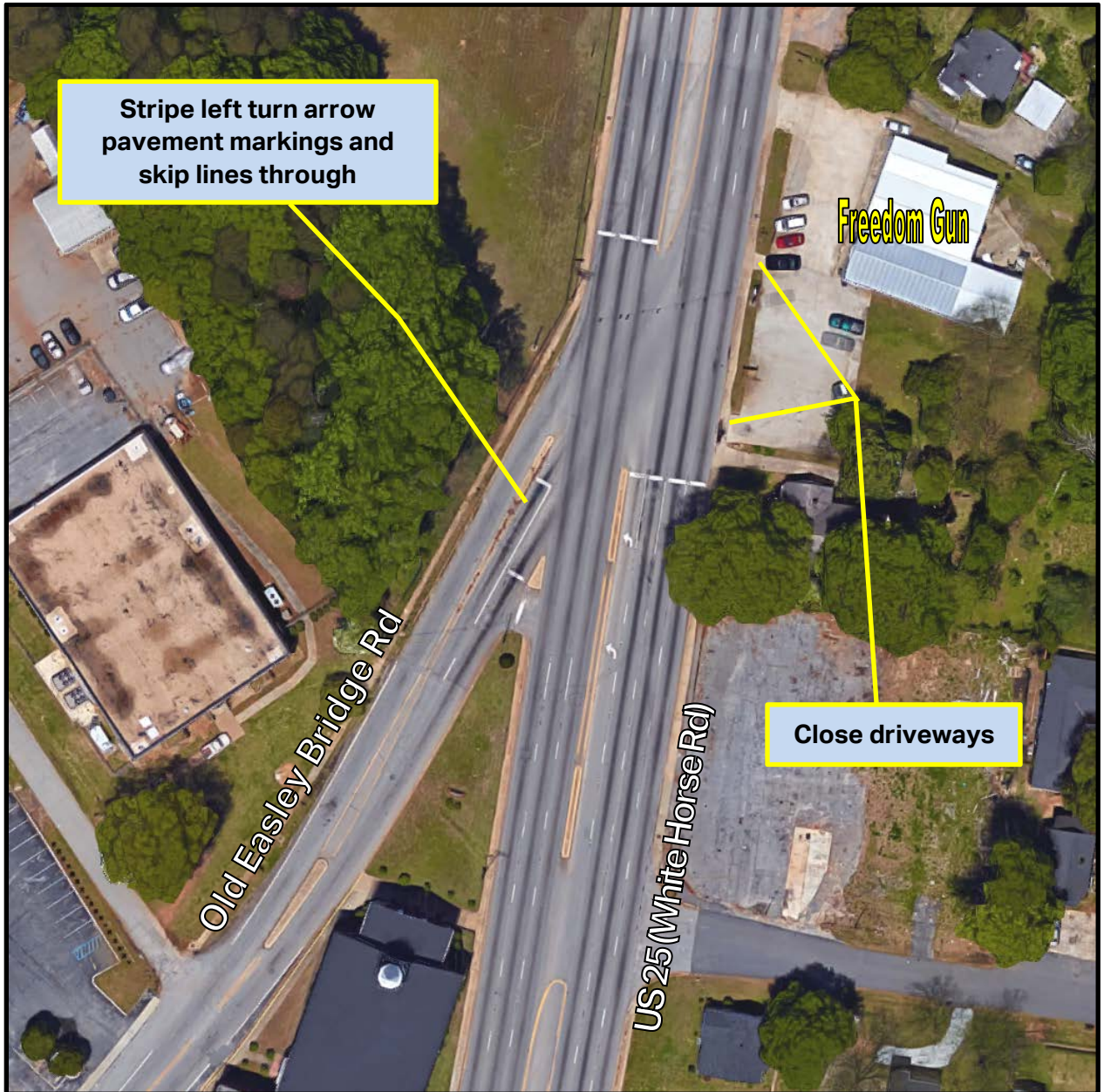
Concerns

- Pavement markings on the eastbound approach of Old Easley Bridge Rd are not present.
- Backplates are not present at US 25 and Old Easley Bridge Rd signal.
- The skewed approach of Old Easley Bridge Road.
- Pavement markings for dual left turns.

Considerations

- **Short Term** – Install pavement markings on Old Easley Bridge Rd approaching the intersection with US 25 to indicate the dual left turning movements. Consider skip lines to guide vehicles through the intersection as well.
 - *Anticipated Cost to Implement: \$300*
- **Short Term** – Install backplates on all signal heads at US 25 and Old Easley Bridge Rd.
 - *Anticipated Cost to Implement: \$3,800*
- **Short Term** – Remove unused driveway aprons in intersection (two driveways entering into Freedom Gun store).
 - *Anticipated Cost to Implement: \$1,620*
- **Short Term** – Review clearance timings to make sure there is enough time for traffic to clear the intersection due to the skew angle alignment at the signalized intersection of US 25 at Old Easley Bridge Rd.
 - *Anticipated Cost to Implement: N/A*

Greenville County Road Safety Assessment: US 25 (White Horse Rd)
From MP 23.5 to 30.0



3.2.12 Segment 14 – North of Old Easley Bridge Rd (S-85) to US 123 NB On-Ramp

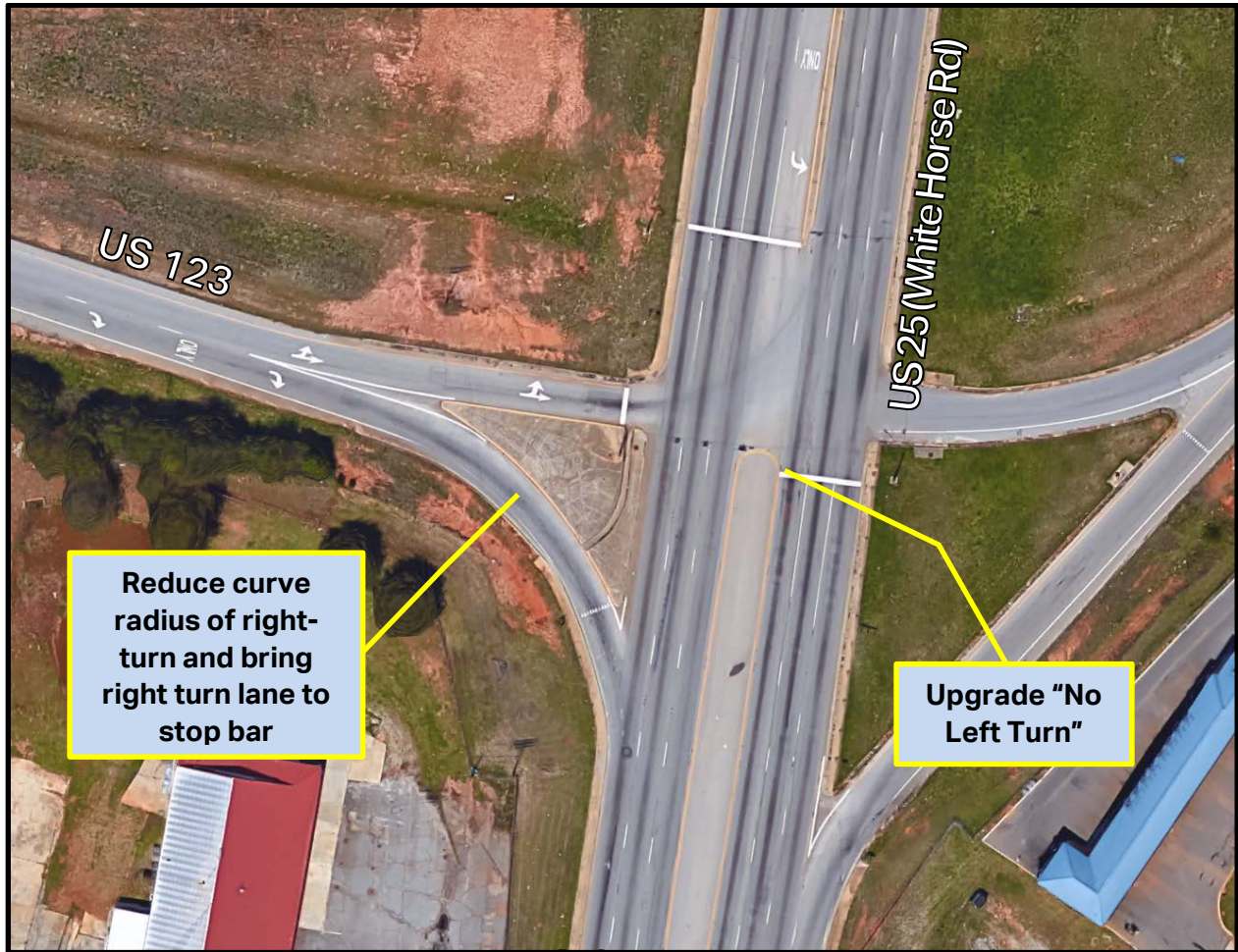
Concerns

- The right-turn lane onto US 25 from the US 123 NB off-ramp intersects at an acute angle restricting sight distance of the oncoming traffic from US 25 SB.
- The pedestrian accommodations are not ADA compliant. There is a path in the concrete median on the US 123 NB Off-Ramp that would be difficult to navigate with a wheelchair.

Considerations

- **Short Term** – Upgrade the overhead No Left Turn Sign on US 25 NB approaching the intersection with US 123 SB ramps.
 - *Anticipated Cost to Implement: \$300*
- **Mid Term** – Reduce right-turn lane curve angle from US 123 NB off-ramp by bringing the turn to the stop bar.
 - *Anticipated Cost to Implement: \$46,000*
- **Mid Term** – ADA upgrades to (8) pedestrian ramps need to be made at the intersection of US 25 and the US 123 NB ramps. Also, pour concrete to fill narrow area of median.
 - *Anticipated Cost to Implement: \$21,450*

Greenville County Road Safety Assessment: US 25 (White Horse Rd)
From MP 23.5 to 30.0



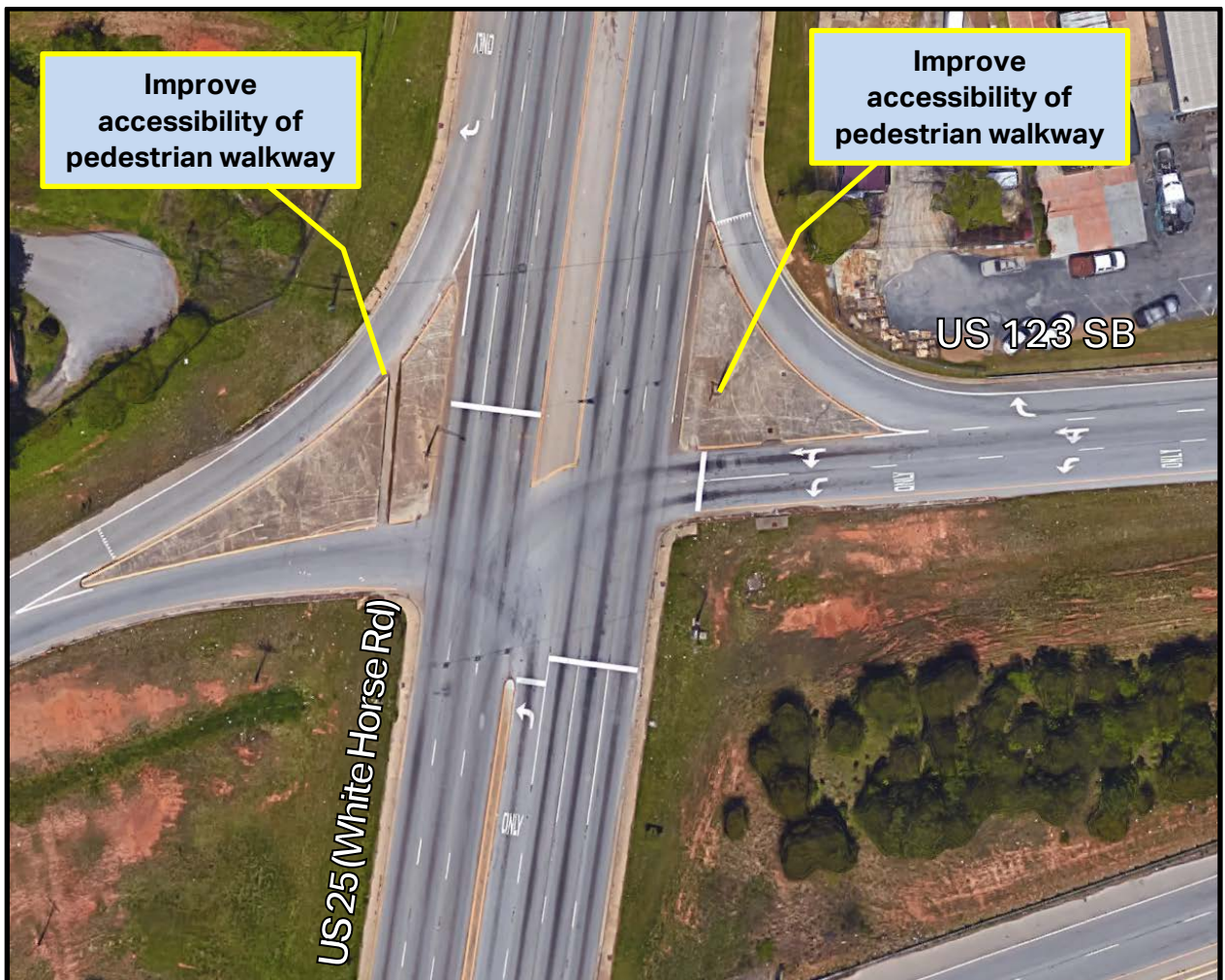
3.2.13 Segment 15 – US 123 SB Ramps to Wilbanks St (Local)

Concerns

- The pedestrian accommodations are not ADA compliant. There is a path in the concrete median on the US 123 SB Off-Ramp that would be difficult to navigate with a wheelchair.

Considerations

- **Mid Term** – ADA upgrades to (8) pedestrian ramps need to be made at the intersection of US 25 and the US 123 SB ramps. Also, pour concrete to fill narrow area of median.
 - *Anticipated Cost to Implement: \$21,450*



3.2.14 Segment 16 – Ottaray St (Local) to South of N. Washington Ave (S-149)

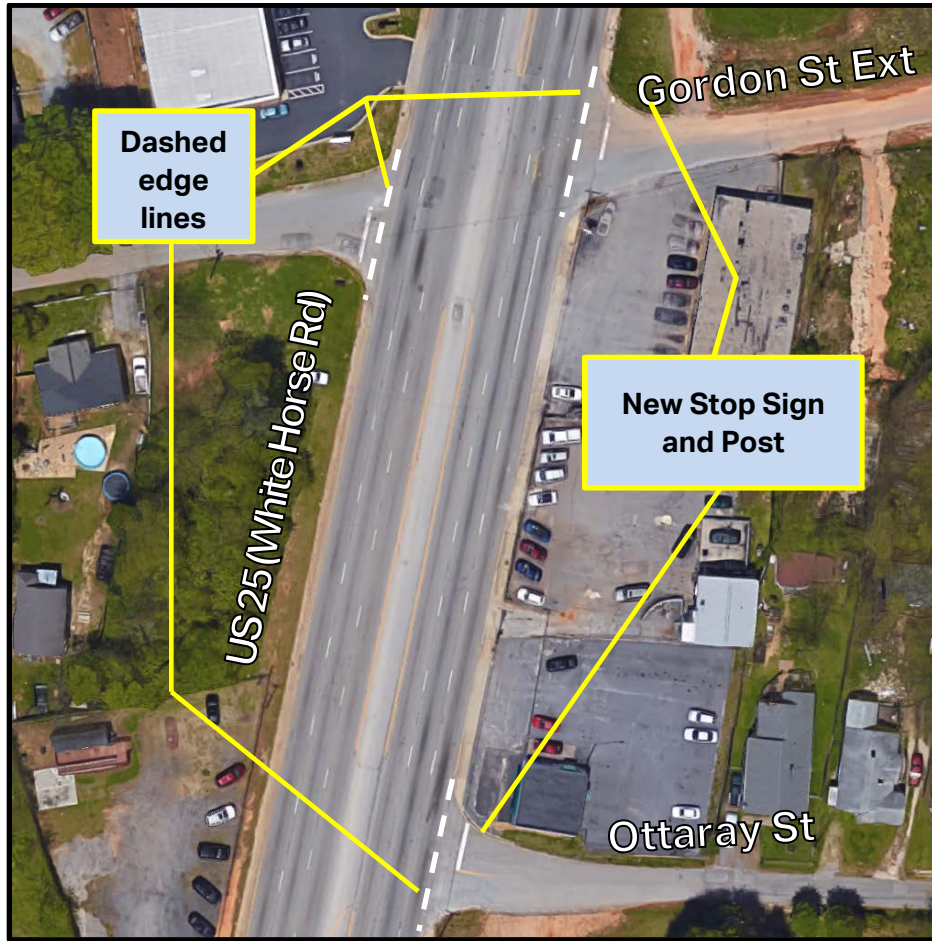
Concerns

- There is no striping to delineate lanes on side road approaches of Gordon St and Ottaray St.
- There is a sight distance issue with poles/fences/grade turning right to go Northbound from side road (Gordon Street Ext).
- Stop sign is in poor condition on WB Gordon St Ext.

Considerations

- **Short Term** – Add striping and remark stop bar markings to side road approaches toward US 25 on Ottaray St and Gordon St Ext.
 - *Anticipated Cost to Implement: \$400*
- **Short Term** – Upgrade stop signs to post mounted Fluorescent 11 signs on Ottaray St and Gordon St Ext approaches.
 - *Anticipated Cost to Implement: \$1,000*
- **Short Term** – Add a dashed edge line along US 25 at the intersections of Ottaray St and Gordon St Ext.
 - *Anticipated Cost to Implement: \$200*

Greenville County Road Safety Assessment: US 25 (White Horse Rd)
From MP 23.5 to 30.0



3.2.15 Segment 17 – N Washington Ave (S-149) to just North of Graceland Cemetery

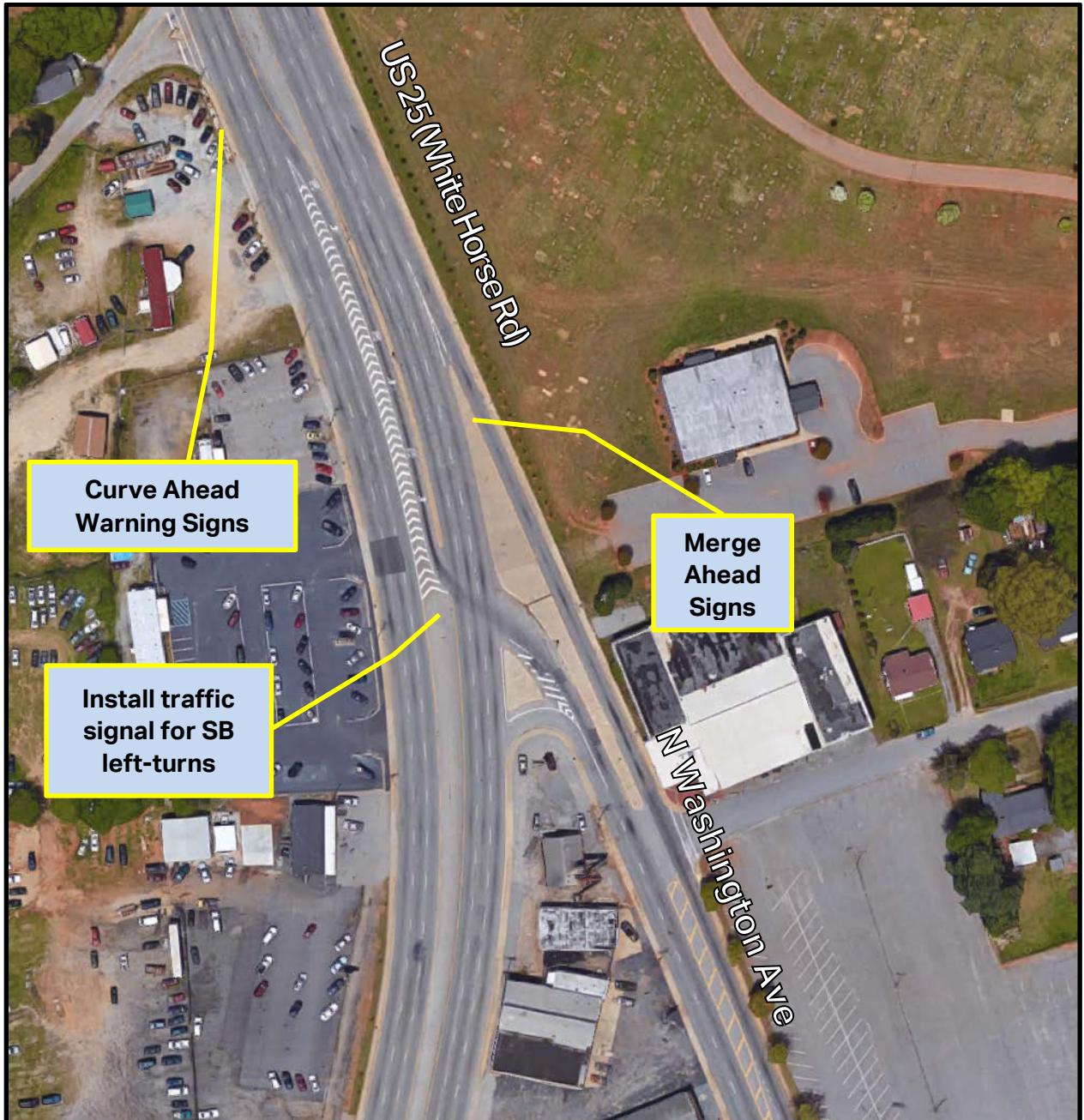
Concerns

- Superelevation issue on US 25 NB before intersection with N Washington Ave.
- There are speeding issues along this section of the corridor.
- Merge from N Washington Ave to US 25 NB

Considerations

- **Short Term** – Utilize dynamic speed detection signs to encourage drivers to decrease speed at the intersection of US 25 at N Washington Ave.
 - *Anticipated Cost to Implement: \$4,000*
- **Short Term** – Install a warning sign for curve ahead on US 25 prior to N Washington Ave intersection.
 - *Anticipated Cost to Implement: \$250*
- **Short Term** – Install Merge Ahead signs on US 25 NB to indicate the merging traffic from N Washington Ave.
 - *Anticipated Cost to Implement: \$550*
- **Long Term** – Consider maintaining a continuous flow of southbound traffic but installing a signal for southbound left turns onto N Washington Ave.
 - *Anticipated Cost to Implement: \$100,000*

Greenville County Road Safety Assessment: US 25 (White Horse Rd)
From MP 23.5 to 30.0



3.2.16 Segment 18 – Earle Dr (Local) to Old Easley Hwy (SC 124) Interchange

Concerns

- Pavement marking on bridge over Old Easley Highway needs to be more noticeable.

Considerations

- **Short Term** – Install contrast striping on bridge over Old Easley Highway.
 - Anticipated Cost to Implement: **\$5,000**



3.2.17 Segment 19 – South of Page Dr (Local) to Banner Dr (Local)

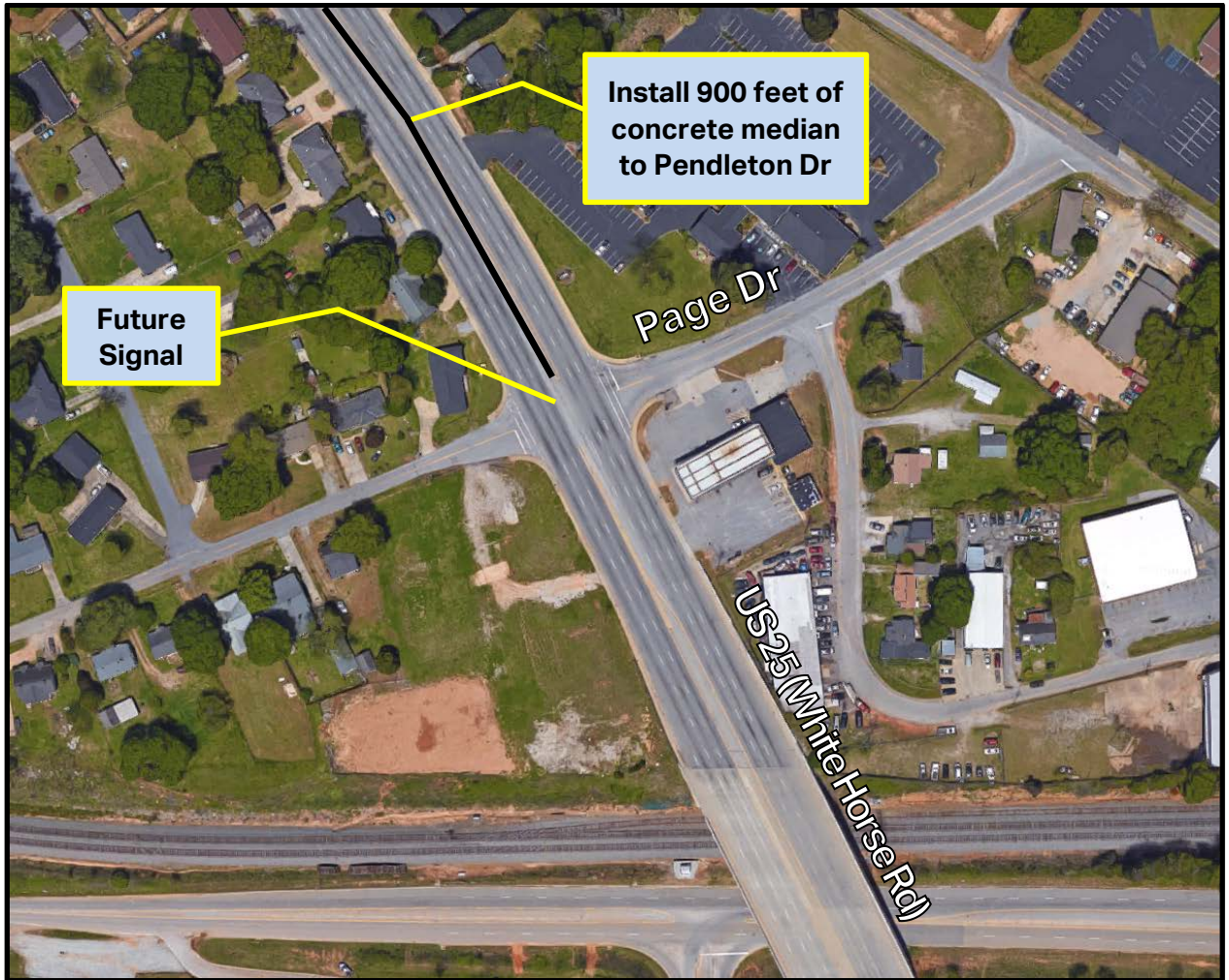
Concerns

- Full ADA pedestrian improvements needed at Page Dr at US 25.
- Left turning vehicles from Page Dr onto US 25 have a sight distance issue seeing over the bridge.
- There is no lighting along corridor from Page Dr to Blue Ridge Dr and there were four (4) fatalities on this segment, some involving pedestrians.

Considerations

- **Mid Term** – ADA compliant pedestrian accommodations are needed on this segment of roadway. Including (4) ramps, crosswalks, (4) pedestrian poles and (8) pedestrian signals.
 - *Anticipated Cost to Implement: \$21,500*
- **Mid Term** – Install a traffic signal at US 25 at Page Dr.
 - *Anticipated Cost to Implement: **To be implemented by Greenville County***
- **Mid Term** –Extend median approximately 900 feet (200 feet of 4 ft median and 700 feet of 14 ft median) from Pendleton Rd to Page Dr. Install metal fence on median.
 - *Anticipated Cost to Implement: \$125,000*
- **Mid Term** – Due to multiple pedestrian fatalities at this intersection, lighting should be considered for installation along this segment of US 25 from Page Dr to Banner Dr.
 - *Anticipated Cost to Implement: \$48,000*

Greenville County Road Safety Assessment: US 25 (White Horse Rd)
From MP 23.5 to 30.0



3.2.18 Segment 20 – W Blue Ridge Dr (SC 253) at US 25 Intersection

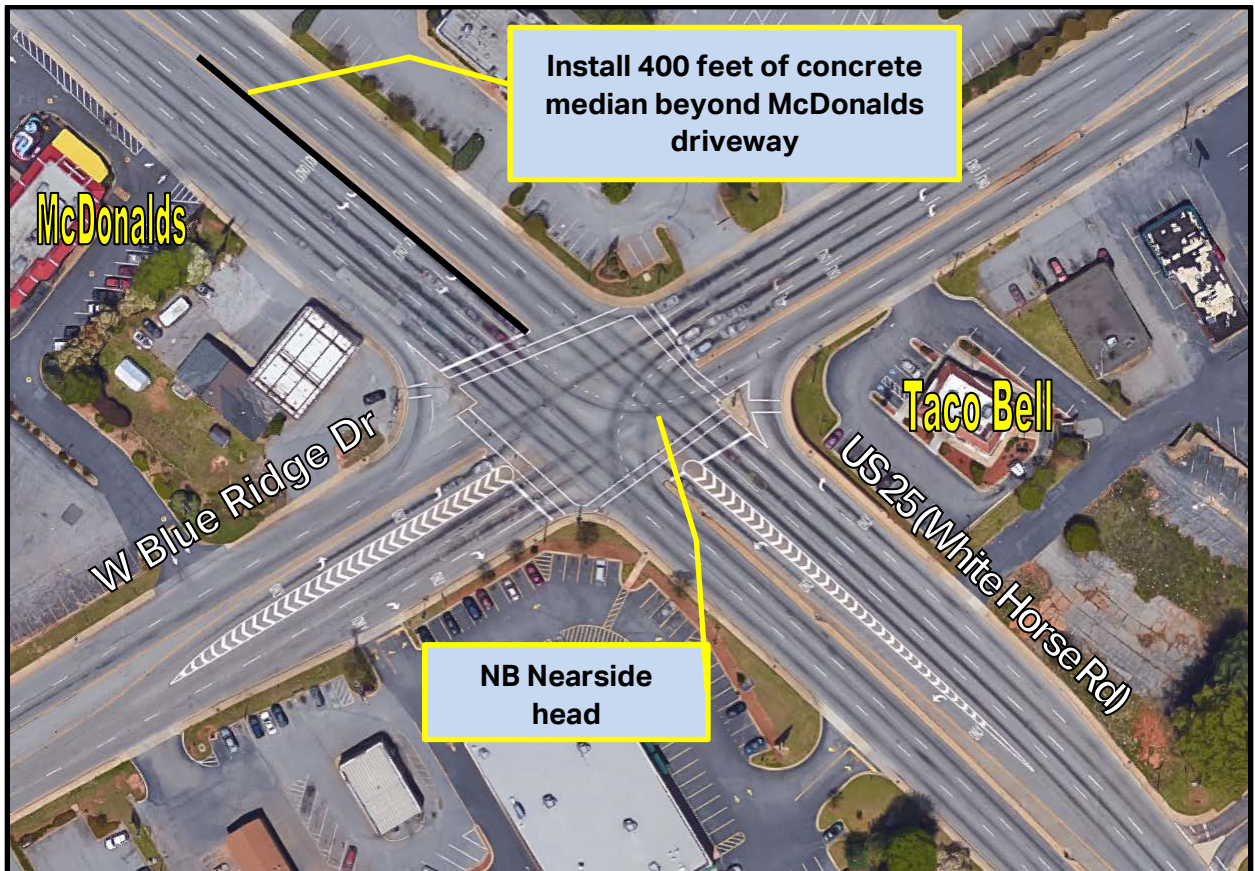
Concerns

- Northbound US 25 sight distance of signal heads.
- Access management on US 25 north of the intersection.

A detailed report containing many additional considerations at this intersection was performed by AECOM and submitted to SCDOT in March 2013. Recommendations from this report can be found on p. 11.

Considerations

- **Short Term** – Install a nearside signal head for NB approach on US 25 at Blue Ridge Dr.
 - Anticipated Cost to Implement: **\$1,000**
- **Mid Term** – Install a raised median (4' wide) along US 25 approximately 400 feet north from the intersection of Blue Ridge Dr.
 - Anticipated Cost to Implement: **\$13,500**



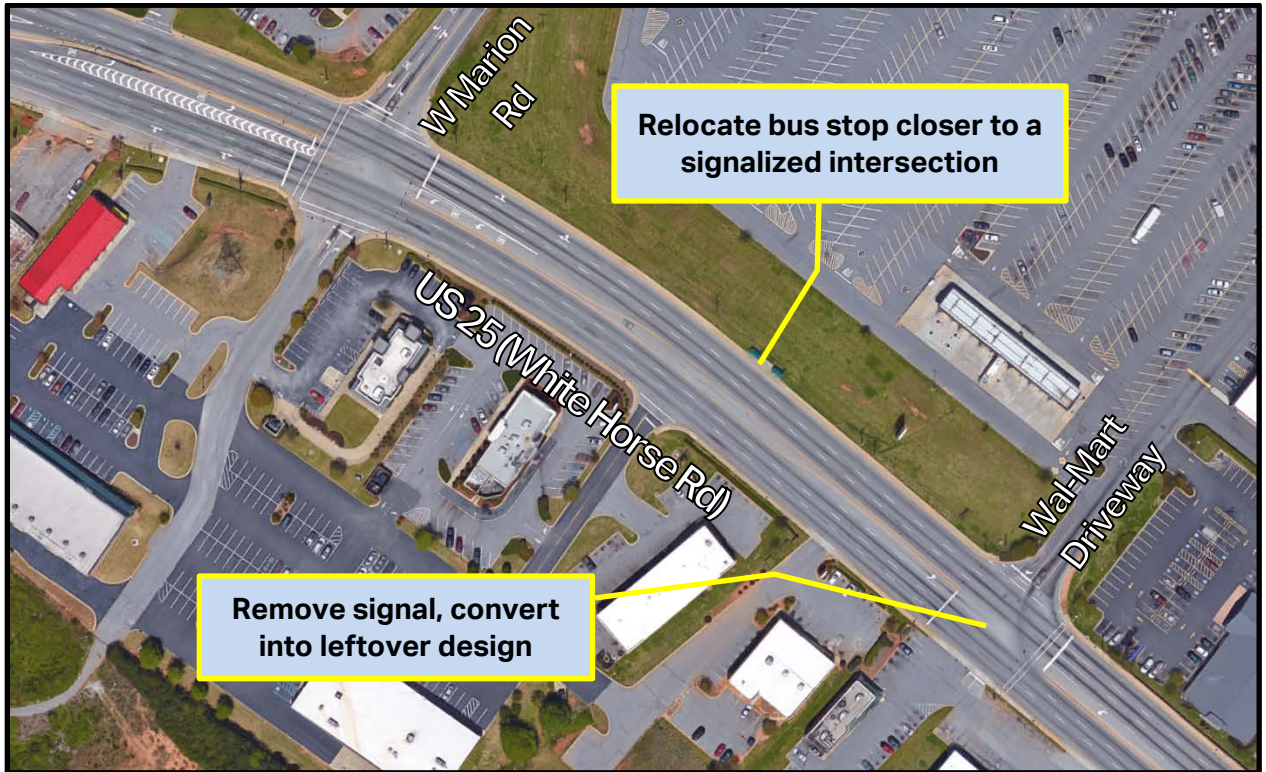
3.2.19 Segment 21 – Walmart Entrance to W. Marion Rd (S-474)

- ADA accommodations are not present at either the Wal-Mart entrance or W Marion Rd intersections.
- No backplates on traffic signals at the Wal-Mart Entrance intersection with US 25.
- Bus stop is midblock between Wal-Mart Entrance and W Marion Rd signalized intersections.
- Sun glare is an issue southbound direction along US 25 in AM peak.
- There is an unused paved area on right side of southbound approach to Marion St along US 25.
- Consider implementing protected only southbound left turn.

Considerations

- **Short Term** – Consider relocation of the bus stop closer to a signalized intersection for convenient access to pedestrian crosswalks.
 - *Anticipated Cost to Implement: \$2,500*
- **Short Term** – Install backplates on the signals at the Wal-Mart entrance signal.
 - *Anticipated Cost to Implement: \$3,150*
- **Mid Term** – Traffic study to investigate the implementation of a protected left turn signal on to W. Marion Rd from SB US 25.
 - *Anticipated Cost to Implement: \$5,000*
- **Mid Term** – Make intersections and corridor ADA compliant. Upgrade (8) pedestrian ramps to current standards.
 - *Anticipated Cost to Implement: \$25,000*
- **Long Term** – Consider removing the signalization at the entrance to the Wal-Mart and converting it to a leftover shifting left-turns exiting to W Marion Rd.
 - *Anticipated Cost to Implement: \$50,000*

Greenville County Road Safety Assessment: US 25 (White Horse Rd)
From MP 23.5 to 30.0



3.2.20 Segment 22 – North of W Marion Rd (S-474) to North of Saluda Dam Rd (S-63)

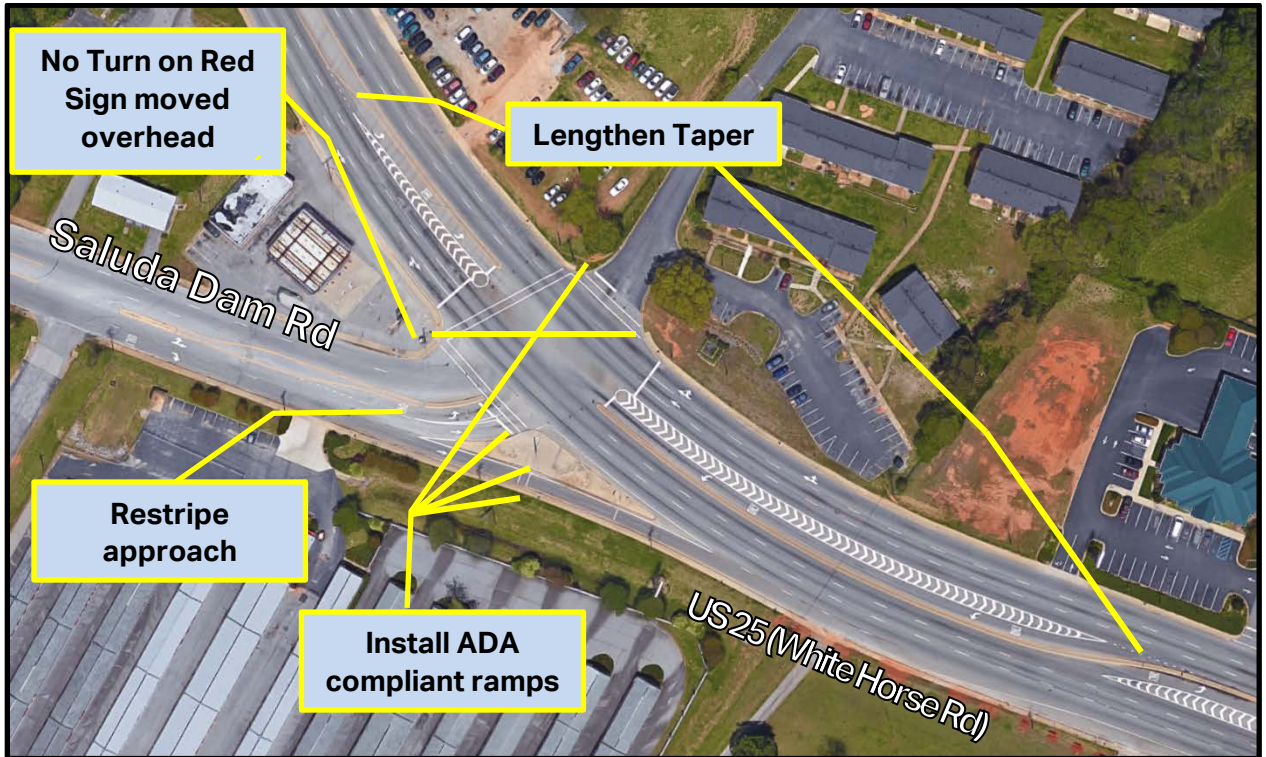
Concerns

- Tapers for the left-turn lanes at the intersection of US 25 at Saluda Dam Rd are very short with no skip lines at entry point.
- ADA ramps are not present at the intersection of US 25 and Saluda Dam Rd.
- In the right turn lane from Saluda Dam Rd to US 25 SB the signs indicate that the lane ends and to merge are not visible in the AM hours due to sun glare.
- Sign placement for right-turn from Saluda Dam Rd is an issue because signs are blocking each other.
- No Right turn on red sign for US 25 SB vehicles is posted on the traffic signal pole.
- Striping issues for turn lanes at US 25 and Saluda Dam Rd.
- Saluda Dam Rd approach striping in poor condition.

Considerations

- **Short Term** – Tapers for turn lanes along US 25 at Saluda Dam Rd should be brought to standard, skips should be added.
 - *Anticipated Cost to Implement: \$5,000*
- **Short Term** – Right-turning vehicles from Saluda Dam Road should be provided additional signage to merge.
 - *Anticipated Cost to Implement: \$550*
- **Short Term** – No Right turn on red sign for southbound right turns on US 25 needs to be moved to before the intersection or overhead.
 - *Anticipated Cost to Implement Sign: \$300*
 - *Anticipated Cost to Implement Overhead: \$7,500*
- **Short Term** – Striping on the Saluda Dam Rd approach needs to be repainted.
 - *Anticipated Cost to Implement: \$2,000*
- **Short Term** – Install countdown pedestrian signals (6) where crosswalks are present at the intersection of US 25 at Saluda Dam Rd.
 - *Anticipated Cost to Implement: \$6,000*
- **Mid Term** – Make intersection of US 25 at Saluda Dam Rd ADA compliant. Upgrade (6) pedestrian ramps to current standards.
 - *Anticipated Cost to Implement: \$18,750*

Greenville County Road Safety Assessment: US 25 (White Horse Rd)
From MP 23.5 to 30.0



3.2.21 Segment 23 – Near Rangeview Cir (S-306)

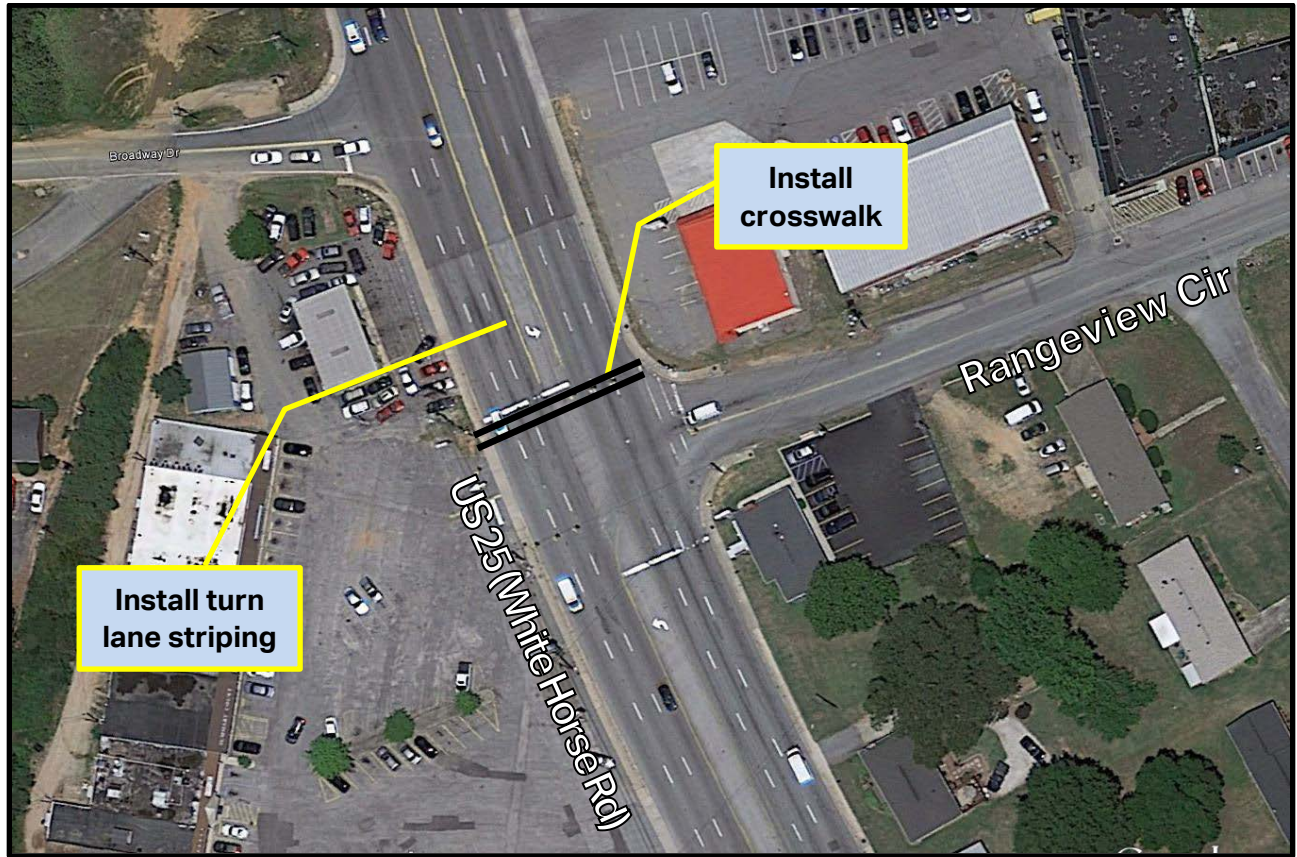
Concerns

- Striping for turn lanes are not provided at the newly signalized intersection of US 25 at Rangeview Cir.
- ADA accommodations are not present at the US 25 and Rangeview Cir intersection.
- There is no crosswalk crossing US 25 at the new Rangeview Circle signal but there are pedestrian signals present.

Considerations

- **Short Term** – Install revised striping pattern for the left turn lanes on US 25 at Rangeview Cir. Note: when the signal was installed the double yellow lanes were not removed and replaced with adequate striping for a left turn lane.
 - *Anticipated Cost to Implement: \$1,500*
- **Short Term** – Install crosswalk on the northern side of the intersection of US 25 at Rangeview Cir. There are existing pedestrian signals at this location.
 - *Anticipated Cost to Implement: \$550*
- **Mid Term** – Provide ADA compliant (4) ramps and sidewalks at the intersection of US 25 at Rangeview Cir.
 - *Anticipated Cost to Implement: \$12,500*

Greenville County Road Safety Assessment: US 25 (White Horse Rd)
From MP 23.5 to 30.0



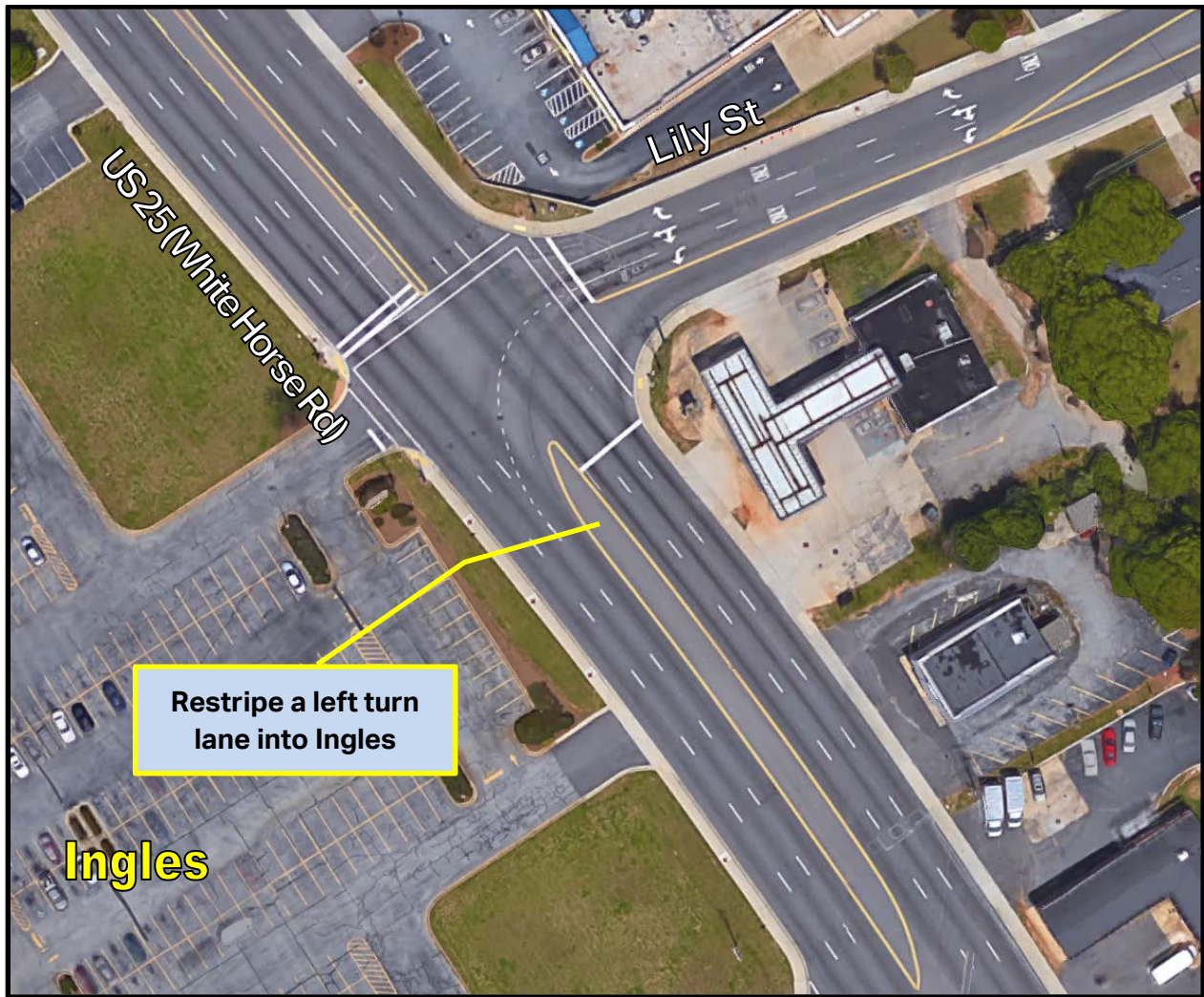
3.2.22 Segment 25 – Eastbourne Rd (S-914) to Lily St (S-782)

Concerns

- There is no left turn lane on the US 25 NB approach to the intersection with Lily St so vehicles sit in the median to make a left-turn.
- No backplates are present on signal heads.

Considerations

- **Short Term** – Restripe to provide a left-turn lane into Ingles from US 25 NB.
 - *Anticipated Cost to Implement: \$1,500*
- **Short Term** – Install backplates on all signal heads.
 - *Anticipated Cost to Implement: \$3,500*



4.0 SUMMARY OF COSTS

To help prioritize the improvements, cost summaries are provided at each intersection categorized into low, medium, and high. Low magnitude improvements are expected to be performed by maintenance staff or be of low cost. Medium improvements may include minor to moderate new construction and High improvements are those that would require significant new construction.

Segment 1 - US 25 (White Horse Rd) & Spinx Driveway near W Lenhardt Rd

- **Low – \$2,700**

Total: \$2,700

Segment 2 - US 25 (White Horse Rd) & I-85 SB Ramps

- **Low – \$10,900**
- **Medium – \$66,650**
- **High – \$500,000**

Total: \$577,550

Segment 3 - US 25 (White Horse Rd) & Frontage Rd

- **Low – \$17,700**
- **Medium – \$17,500**

Total: \$35,200

Segment 4 - US 25 (White Horse Rd) & Grove Rd / Piedmont Hwy

- **Low – \$11,000**
- **Medium – \$25,625**

Total: \$36,625

Segment 5 - US 25 (White Horse Rd) & I-185 SB Off-Ramp

Total: \$0

Segment 6 - US 25 (White Horse Rd) & White Horse Flea Market Area

Total: \$0

Segment 7 - US 25 (White Horse Rd) & Two Notch Rd

- **Low – \$15,360**
- **Medium – \$104,050**

Total: \$119,410

Segment 8 - US 25 (White Horse Rd) & Staunton Bridge Rd

- **Low – \$10,750**
- **Medium – \$6,250**

Total: \$17,000

Segment 9 - \$0

**Greenville County Road Safety Assessment: US 25 (White Horse Rd)
From MP 23.5 to 30.0**

Segment 10 - US 25 (White Horse Rd) & Anderson Rd

- **Low – \$7,500**
- **Medium – \$45,850**
- Total: \$53,350**

Segment 11 - US 25 (White Horse Rd) & Welcome Rd

- **Medium – \$28,700**
- Total: \$28,700**

Segment 12 - US 25 (White Horse Rd) & Welcome Avenue Ext

- **Low – \$1,850**
- **Medium - \$12,250**
- **High - \$160,000**
- Total: \$174,100**

Segment 13 - US 25 (White Horse Rd) & Old Easley Bridge Rd

- **Low – \$5,720**
- Total: \$5,720**

Segment 14 - US 25 (White Horse Rd) & US 123 NB Ramps

- **Low - \$300**
- **Medium – \$67,450**
- Total: \$67,750**

Segment 15 - US 25 (White Horse Rd) & US 123 SB Ramps

- **Medium – \$21,450**
- Total: \$21,450**

Segment 16 - US 25 (White Horse Rd) near Ottaray St

- **Low – \$1,600**
- Total: \$1,600**

Segment 17 - US 25 (White Horse Rd) & N Washington St

- **Low – \$4,800**
- **High– \$100,000**
- Total: \$104,800**

Segment 18 - US 25 (White Horse Rd) & Old Easley Highway Interchange

- **Low – \$5,000**
- Total: \$5,000**

Segment 19 - US 25 (White Horse Rd) & Page Drive

- **Medium – \$184,500**
- Total: \$184,500**

**Greenville County Road Safety Assessment: US 25 (White Horse Rd)
From MP 23.5 to 30.0**

Segment 20 - US 25 (White Horse Rd) & W Blue Ridge Road

- **Low – \$1,000**
- **Medium – \$13,500**
- Total: \$14,500**

Segment 21 - US 25 (White Horse Rd) & Wal-Mart Driveway & W Marion Rd

- **Low – \$5,650**
- **Medium – \$30,000**
- **High – \$50,000**
- Total: \$85,650**

Segment 22 - US 25 (White Horse Rd) & Saluda Dam Rd

- **Low – \$21,050**
- **Medium – \$18,750**
- Total: \$39,800**

Segment 23 - US 25 (White Horse Rd) & Rangeview Cir

- **Low – \$2,050**
- **Medium – \$12,500**
- Total: \$14,550**

Segment 24 - \$0

Segment 25 - US 25 (White Horse Rd) & Lily St

- **Low – \$5,000**
- Total: \$5,000**

Corridor Wide Improvements

Total: \$966,660

**Greenville County Road Safety Assessment: US 25 (White Horse Rd)
From MP 23.5 to 30.0**

Segment#: Primary Intersection	Costs
Segment 1: US 25 (White Horse Rd) & Spinx Driveway near W Lenhardt Rd	\$2,700
Segment 2: US 25 (White Horse Rd) & I-85 SB Ramps	\$10,900
Segment 3: US 25 (White Horse Rd) & Frontage Rd	\$17,700
Segment 4: US 25 (White Horse Rd) & Grove Rd / Piedmont Hwy	\$11,000
Segment 5: US 25 (White Horse Rd) & I-185 SB Off-Ramp	\$0
Segment 6: US 25 (White Horse Rd) & White Horse Flea Market Area	\$0
Segment 7: US 25 (White Horse Rd) & Two Notch Rd	\$15,360
Segment 8: US 25 (White Horse Rd) & Staunton Bridge Rd	\$10,750
Segment 9: No Improvement Recommended	\$0
Segment 10: US 25 (White Horse Rd) & Anderson Rd	\$7,500
Segment 11: US 25 (White Horse Rd) & Welcome Rd	\$0
Segment 12: US 25 (White Horse Rd) & Welcome Avenue Ext	\$1,850
Segment 13: US 25 (White Horse Rd) & Old Easley Bridge Rd	\$5,720
Segment 14: US 25 (White Horse Rd) & US 123 NB Ramps	\$300
Segment 15: US 25 (White Horse Rd) & US 123 SB Ramps	\$0
Segment 16: US 25 (White Horse Rd) near Ottaray St	\$1,600
Segment 17: US 25 (White Horse Rd) & N Washington St	\$4,800
Segment 18: US 25 (White Horse Rd) & Old Easley Highway Interchange	\$5,000
Segment 19: US 25 (White Horse Rd) & Page Dr	\$0
Segment 20: US 25 (White Horse Rd) & W Blue Ridge Rd	\$1,000
Segment 21: US 25 (White Horse Rd) & Wal-Mart Driveway & W Marion Rd	\$5,650
Segment 22: US 25 (White Horse Rd) & Saluda Dam Rd	\$21,050
Segment 23: US 25 (White Horse Rd) & Rangeview Cir	\$2,050
Segment 24: No Improvement Recommended	\$0
Segment 25: US 25 (White Horse Rd) & Lily St	\$5,000
Subtotal	\$129,930
Mobilization, Bonds, Insurance, Traffic Control , etc. at 30%	\$38,979
Subtotal	\$168,909
Contingencies at 20%	\$33,782
Total	\$202,691

Table 6 – Short Term Improvement Costs

**Greenville County Road Safety Assessment: US 25 (White Horse Rd)
From MP 23.5 to 30.0**

Segment#: Primary Intersection	Costs
Segment 1: US 25 (White Horse Rd) & Spinx Driveway near W Lenhardt Rd	\$0
Segment 2: US 25 (White Horse Rd) & I-85 SB Ramps	\$66,650
Segment 3: US 25 (White Horse Rd) & Frontage Rd	\$17,500
Segment 4: US 25 (White Horse Rd) & Grove Rd / Piedmont Hwy	\$25,625
Segment 5: US 25 (White Horse Rd) & I-185 SB Off-Ramp	\$0
Segment 6: US 25 (White Horse Rd) & White Horse Flea Market Area	\$0
Segment 7: US 25 (White Horse Rd) & Two Notch Rd	\$104,050
Segment 8: US 25 (White Horse Rd) & Staunton Bridge Rd	\$6,250
Segment 9: No Improvement Recommended	\$0
Segment 10: US 25 (White Horse Rd) & Anderson Rd	\$45,850
Segment 11: US 25 (White Horse Rd) & Welcome Rd	\$28,700
Segment 12: US 25 (White Horse Rd) & Welcome Avenue Ext	\$12,250
Segment 13: US 25 (White Horse Rd) & Old Easley Bridge Rd	\$0
Segment 14: US 25 (White Horse Rd) & US 123 NB Ramps	\$67,450
Segment 15: US 25 (White Horse Rd) & US 123 SB Ramps	\$21,450
Segment 16: US 25 (White Horse Rd) near Ottaray St	\$0
Segment 17: US 25 (White Horse Rd) & N Washington St	\$0
Segment 18: US 25 (White Horse Rd) & Old Easley Highway Interchange	\$0
Segment 19: US 25 (White Horse Rd) & Page Dr	\$184,500
Segment 20: US 25 (White Horse Rd) & W Blue Ridge Rd	\$13,500
Segment 21: US 25 (White Horse Rd) & Wal-Mart Driveway & W Marion Rd	\$30,000
Segment 22: US 25 (White Horse Rd) & Saluda Dam Rd	\$18,750
Segment 23: US 25 (White Horse Rd) & Rangeview Cir	\$12,500
Segment 24: No Improvement Recommended	\$0
Segment 25: US 25 (White Horse Rd) & Lily St	\$0
Subtotal	\$655,025
Mobilization, Bonds, Insurance, Traffic Control , etc. at 30%	\$196,508
Subtotal	\$851,533
Contingencies at 20%	\$170,307
Total	\$1,021,839

Table 7 – Mid Term Improvement Costs

**Greenville County Road Safety Assessment: US 25 (White Horse Rd)
From MP 23.5 to 30.0**

Segment#: Primary Intersection	Costs
Segment 1: US 25 (White Horse Rd) & Spinx Driveway near W Lenhardt Rd	\$0
Segment 2: US 25 (White Horse Rd) & I-85 SB Ramps	\$500,000
Segment 3: US 25 (White Horse Rd) & Frontage Rd	\$0
Segment 4: US 25 (White Horse Rd) & Grove Rd / Piedmont Hwy	\$0
Segment 5: US 25 (White Horse Rd) & I-185 SB Off-Ramp	\$0
Segment 6: US 25 (White Horse Rd) & White Horse Flea Market Area	\$0
Segment 7: US 25 (White Horse Rd) & Two Notch Rd	\$0
Segment 8: US 25 (White Horse Rd) & Staunton Bridge Rd	\$0
Segment 9: No Improvement Recommended	\$0
Segment 10: US 25 (White Horse Rd) & Anderson Rd	\$0
Segment 11: US 25 (White Horse Rd) & Welcome Rd	\$0
Segment 12: US 25 (White Horse Rd) & Welcome Avenue Ext	\$160,000
Segment 13: US 25 (White Horse Rd) & Old Easley Bridge Rd	\$0
Segment 14: US 25 (White Horse Rd) & US 123 NB Ramps	\$0
Segment 15: US 25 (White Horse Rd) & US 123 SB Ramps	\$0
Segment 16: US 25 (White Horse Rd) near Otteray St	\$0
Segment 17: US 25 (White Horse Rd) & N Washington St	\$100,000
Segment 18: US 25 (White Horse Rd) & Old Easley Highway Interchange	\$0
Segment 19: US 25 (White Horse Rd) & Page Dr	\$0
Segment 20: US 25 (White Horse Rd) & W Blue Ridge Rd	\$0
Segment 21: US 25 (White Horse Rd) & Wal-Mart Driveway & W Marion Rd	\$50,000
Segment 22: US 25 (White Horse Rd) & Saluda Dam Rd	\$0
Segment 23: US 25 (White Horse Rd) & Rangeview Cir	\$0
Segment 24: No Improvement Recommended	\$0
Segment 25: US 25 (White Horse Rd) & Lily St	\$0
Corridor Wide Improvements	\$966,660
Subtotal	\$1,776,660
Mobilization, Bonds, Insurance, Traffic Control , etc. at 30%	\$532,998
Subtotal	\$2,309,658
Contingencies at 20%	\$461,932
Total	\$2,771,590

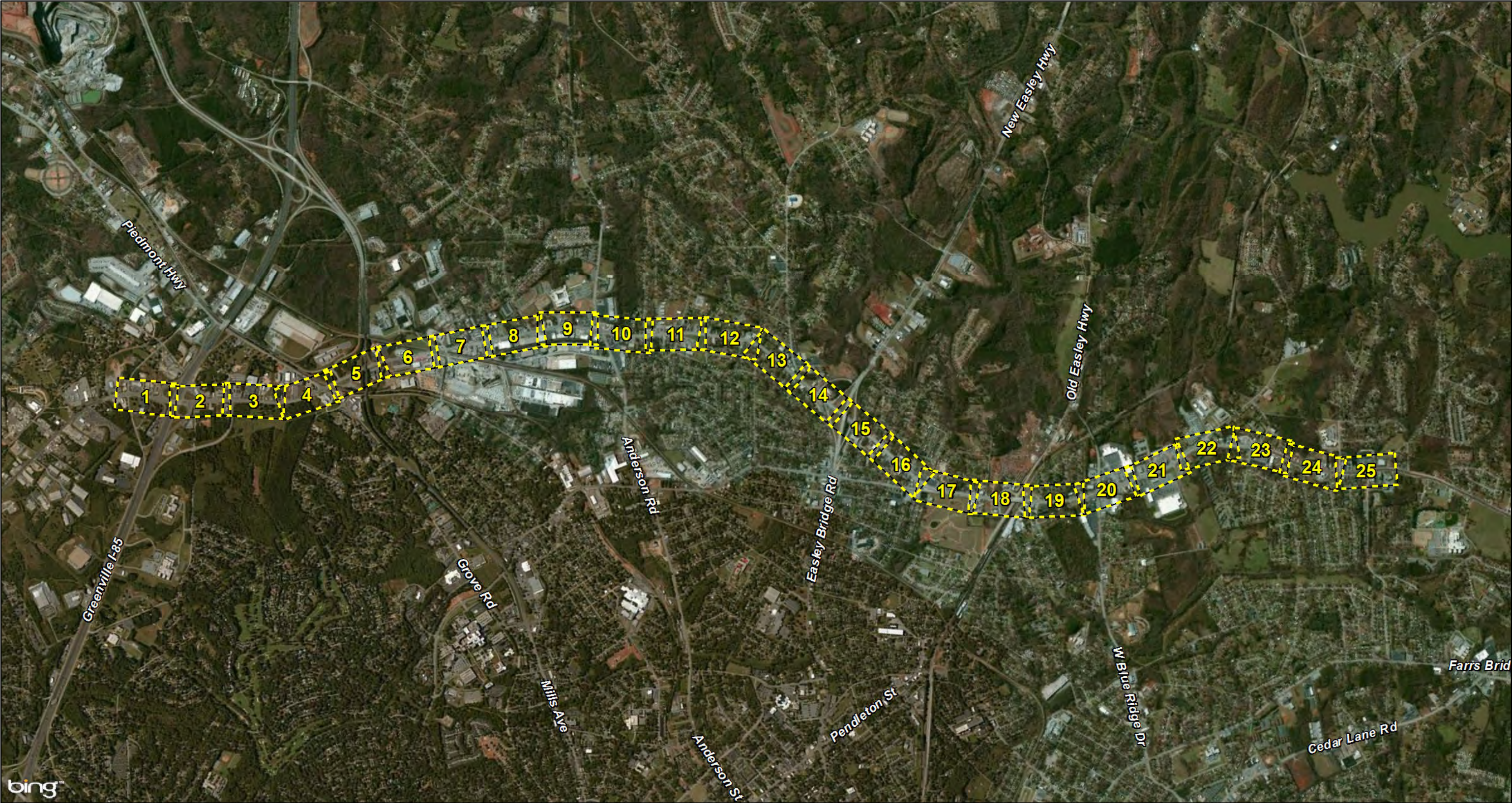
Table 8 – Long Term Improvement Costs

Greenville County Road Safety Assessment: US 25 (White Horse Rd)
From MP 23.5 to 30.0


Category	Cost
Short Term	\$202,691
Mid Term	\$1,021,839
Long Term	\$2,771,590
Total	\$3,996,120

Table 9 – Improvement Costs Summary Table

APPENDIX A – RSA SUMMARY PACKETS



Legend

 Map Sheet Pages



Sources:
Aerial: Bing Maps through ESRI
Map Projection: SC State Plane

US 25 (White Horse Road)
Road Safety Audit from MP 23.5 - 30.0

0 1,250 2,500 5,000 Feet

1 inch = 2,500 feet

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October 2016

Figure 1

Crash Types, Conditions, and Year
US 25 (White Horse Road)
Greenville, SC

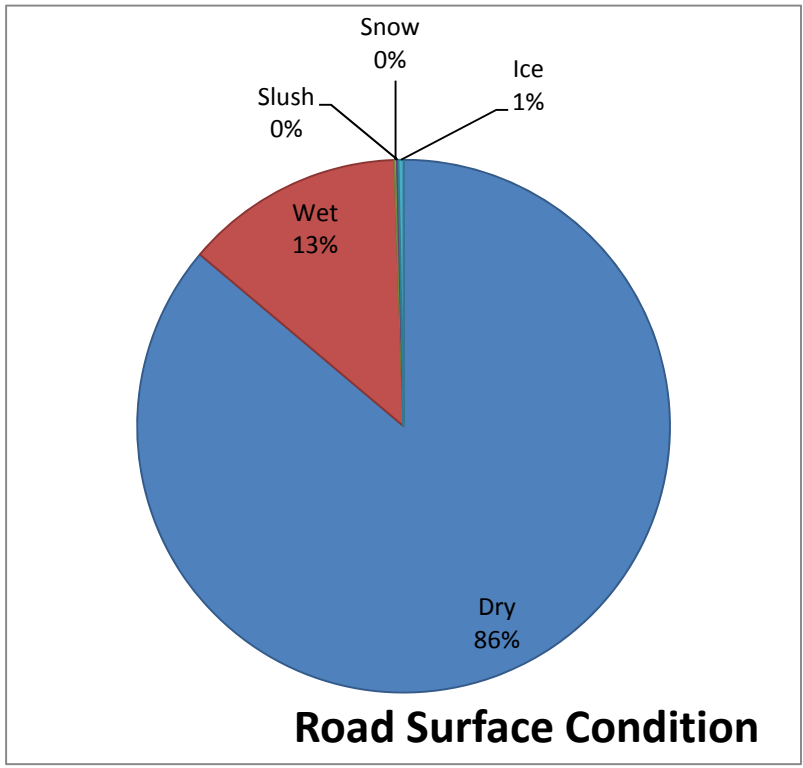
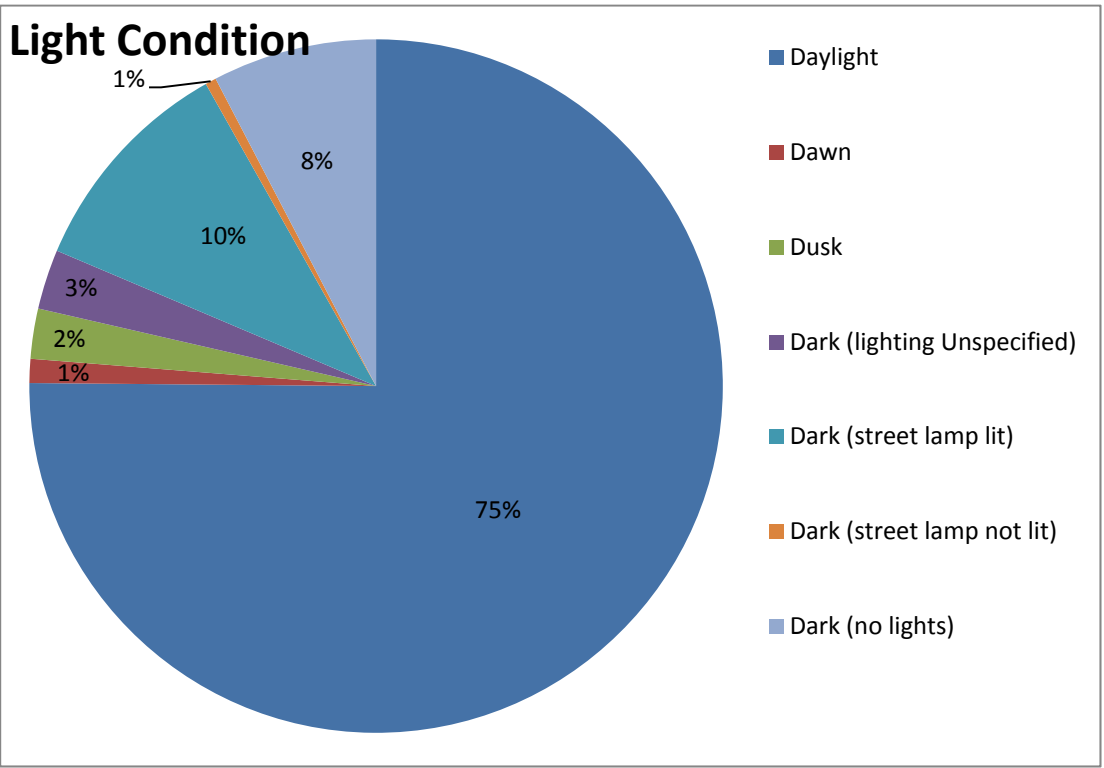
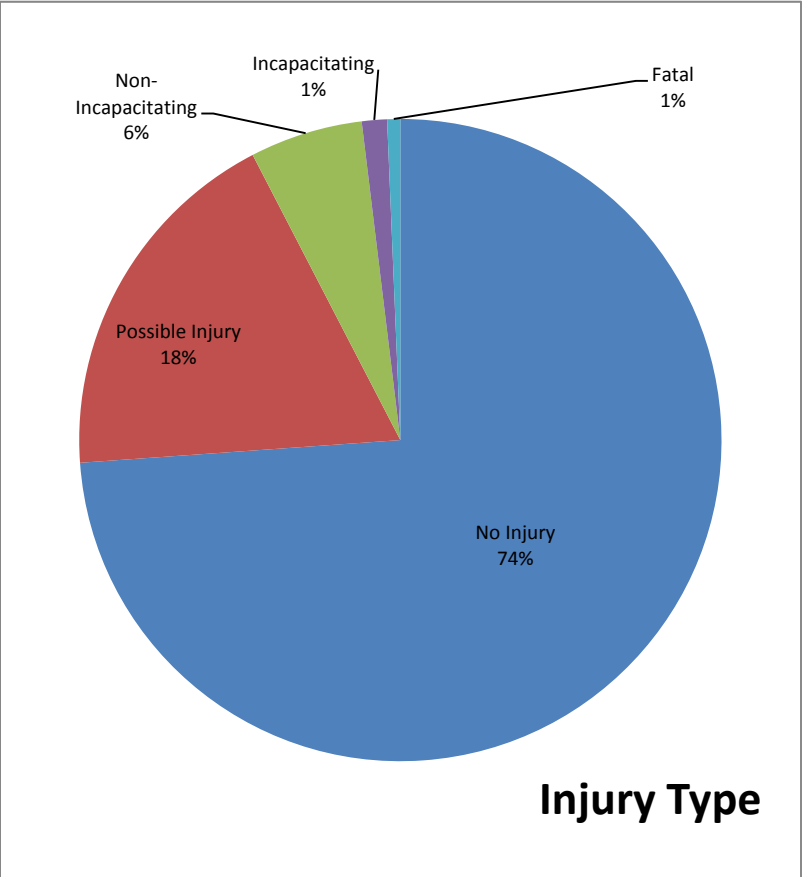
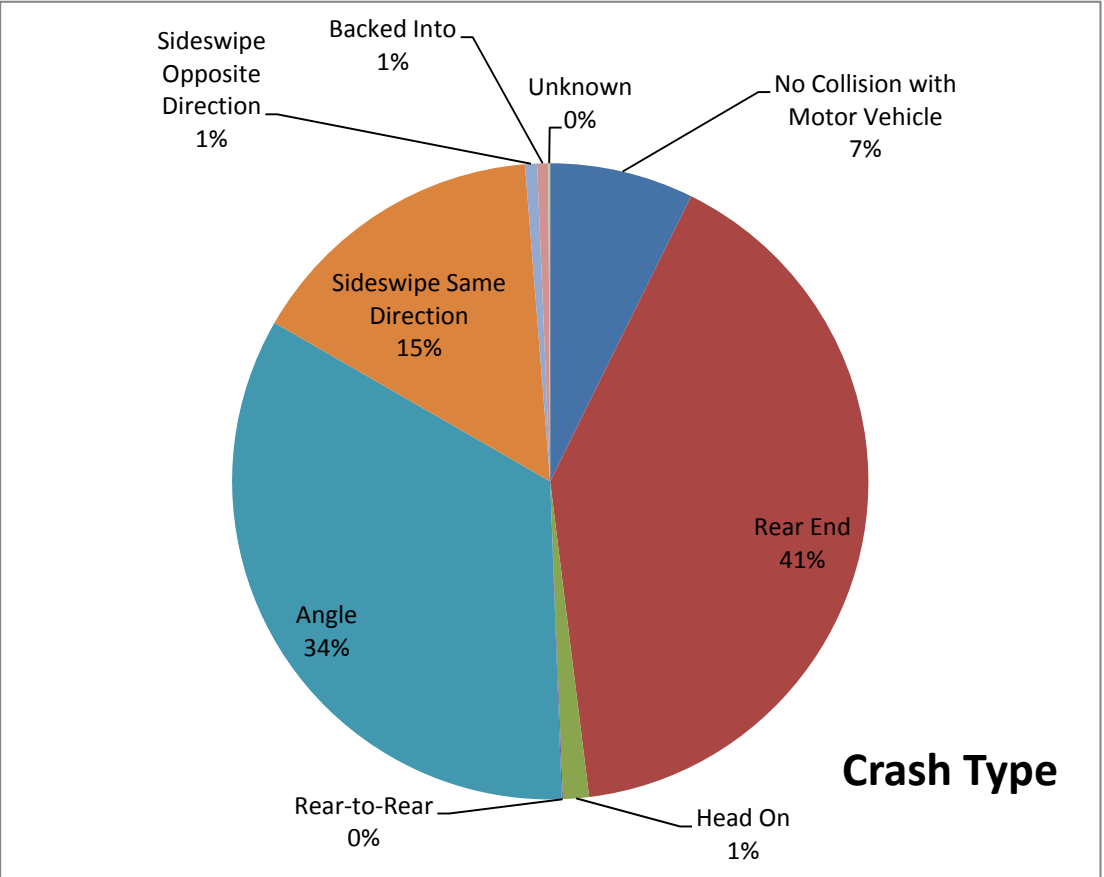
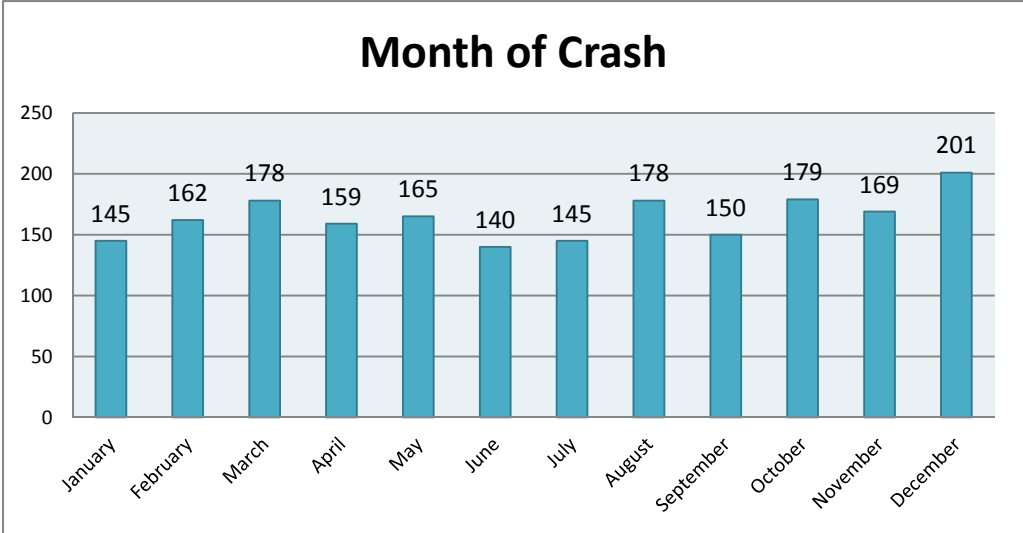
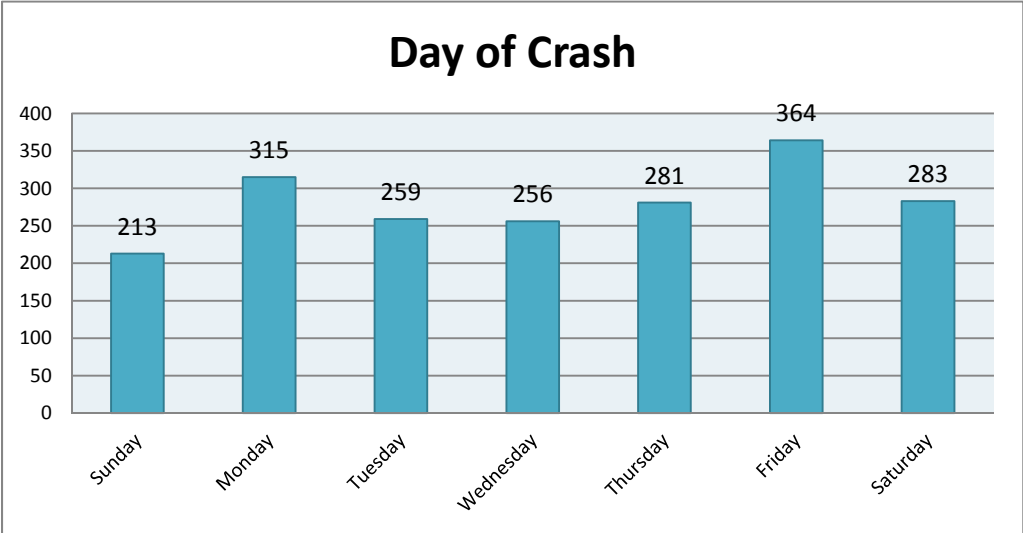
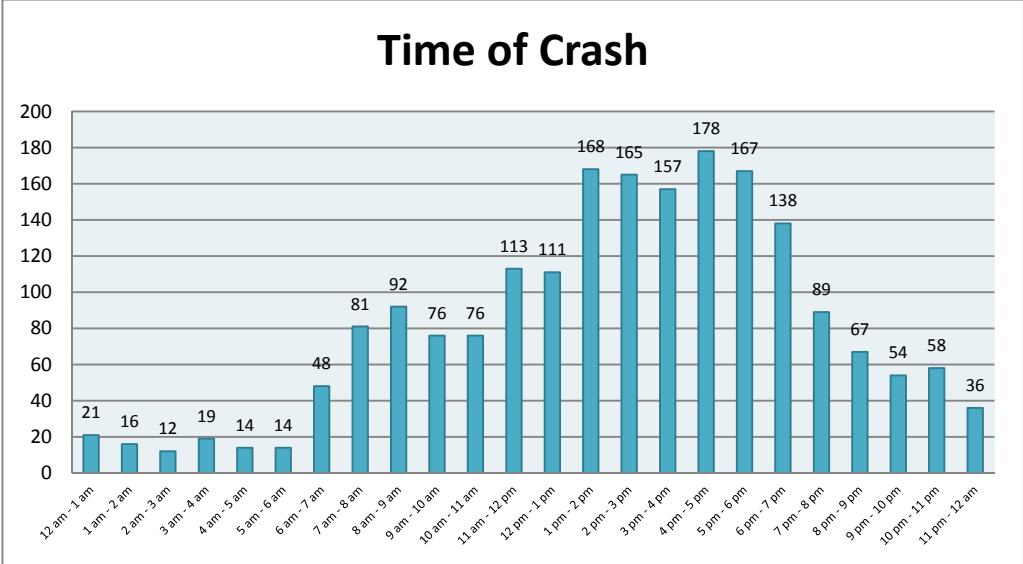
				Crash Type								Light Condition		Road Surface Condition		Year				
Segment	# Crashes	# Injury Crashes	# Fatal	# DUI	# Pedestrian Crashes	# Angle	# Rear End	# Sideswipe	# Head On	# Non Motor Vehicle Crashes	# Other Crash Types	# Daytime	# Night	# Wet Conditions	# Dry Conditions	# 2010	# 2011	# 2012	# 2013	# 2014
1	21	4	0	1	0	6	10	3	0	2	0	14	7	5	16	1	5	5	5	5
2	94	18	0	5	0	28	38	19	0	9	0	69	25	14	80	14	27	18	20	15
3	96	34	0	5	0	46	31	10	1	7	1	70	26	12	84	12	22	10	30	22
4	157	38	1	5	0	30	92	23	1	9	2	122	35	29	128	21	28	34	38	36
5	88	27	0	6	0	37	23	18	1	9	0	67	21	8	80	16	13	19	17	23
6	65	14	1	0	1	18	28	14	0	4	1	54	11	9	56	10	8	13	19	15
7	61	16	1	3	2	13	30	9	2	6	1	46	15	7	54	5	15	18	10	13
8	83	25	0	4	0	28	34	11	1	6	3	68	15	9	74	11	12	18	17	25
9	34	7	0	2	0	8	14	9	1	2	0	26	8	6	28	8	6	5	4	11
10	202	56	1	7	4	95	68	30	4	5	0	152	50	24	178	36	34	50	42	40
11	70	19	0	2	2	23	32	11	1	3	0	58	12	8	62	9	12	17	16	16
12	113	40	2	7	3	52	21	18	4	18	0	77	36	13	100	22	19	22	30	20
13	17	3	0	0	0	1	8	3	0	5	0	13	4	0	17	8	4	1	3	1
14	90	15	0	5	0	26	46	16	0	2	0	70	20	14	76	14	11	24	19	22
15	53	19	0	6	1	9	30	9	0	5	0	46	7	11	42	14	6	10	9	14
16	40	10	1	2	2	17	11	8	1	3	0	26	14	2	38	8	2	8	14	8
17	46	17	0	0	0	14	14	11	2	4	1	37	9	7	39	4	13	10	11	8
18	38	6	1	2	0	6	20	7	1	4	0	31	7	6	32	10	4	1	11	12
19	71	22	4	4	3	35	15	14	0	7	0	47	24	14	57	12	16	9	17	17
20	206	50	0	9	3	49	108	34	0	12	3	146	60	27	179	28	49	38	39	52
21	156	38	0	4	2	62	68	15	2	7	2	122	34	26	130	25	38	25	35	33
22	88	17	0	4	0	26	36	12	3	11	0	65	23	12	76	12	21	21	14	20
23	51	12	1	2	0	27	10	11	1	2	0	38	13	4	47	15	5	16	9	6
24	11	4	0	1	0	5	5	0	0	1	0	4	7	1	10	11	0	0	0	0
25	20	4	0	1	0	7	11	1	0	1	0	13	7	5	15	20	0	0	0	0
Total	1971	515	13	87	23	668	803	316	26	144	14	1481	490	273	1698	346	370	392	429	434

Crashes by Month and Day of Week
US 25 (White Horse Road)
Greenville, SC

	Month												Day of Week							
Segment	# January	# February	# March	# April	# May	# June	# July	# August	# September	# October	# November	# December	# Sunday	# Monday	# Tuesday	# Wednesday	# Thursday	# Friday	# Saturday	
1	2	2	2	1	2	1	3	1	2	2	1	2	0	4	4	2	4	5	2	
2	5	7	13	3	10	11	6	4	9	7	8	11	12	18	7	12	13	20	12	
3	10	14	5	4	9	2	6	8	12	7	12	7	12	13	14	15	19	14	9	
4	14	5	16	14	6	9	15	16	15	19	13	15	14	33	16	18	18	32	26	
5	6	6	5	7	7	6	8	10	5	13	8	7	7	12	11	15	21	13	9	
6	6	7	7	8	0	0	6	7	4	3	7	10	10	7	5	11	8	10	14	
7	3	9	5	3	2	3	9	7	6	3	4	7	5	6	8	12	9	4	17	
8	4	6	6	8	3	6	7	6	9	9	7	12	7	13	17	10	10	17	9	
9	1	6	5	2	3	0	3	2	4	3	0	5	2	7	6	4	3	10	2	
10	15	17	27	20	14	19	14	15	16	12	16	17	20	36	24	32	21	42	27	
11	8	4	7	12	2	4	4	4	5	14	3	3	8	10	8	8	10	15	11	
12	6	9	7	8	10	9	6	9	11	13	13	12	11	15	18	9	15	29	16	
13	1	4	3	0	2	2	0	0	3	1	1	0	5	2	3	3	1	1	2	
14	4	3	5	9	11	11	9	9	6	6	4	13	13	16	12	12	11	14	12	
15	4	5	6	1	8	4	6	5	1	1	10	2	5	15	8	6	5	10	4	
16	4	7	4	4	4	2	2	2	2	2	2	5	2	8	5	6	7	3	9	
17	5	1	5	6	3	2	2	5	5	4	4	4	4	10	8	5	6	7	6	
18	3	4	3	2	6	6	2	1	1	1	4	5	2	10	4	4	8	7	3	
19	6	7	5	7	4	6	5	10	3	8	5	5	6	8	16	11	8	12	10	
20	17	21	11	19	27	14	14	22	9	12	19	21	27	24	25	25	40	36	29	
21	7	12	16	11	16	9	10	18	9	18	13	17	17	27	21	16	20	30	25	
22	5	2	8	5	7	7	2	12	8	12	6	14	8	14	10	12	13	16	15	
23	5	2	7	4	7	3	5	2	2	4	5	5	12	5	7	4	6	9	8	
24	2	0	0	0	1	0	0	1	1	2	2	2	1	1	2	1	2	2	2	
25	2	2	0	1	1	4	1	2	2	3	2	0	3	1	0	3	3	6	4	
Total	145	162	178	159	165	140	145	178	150	179	169	201	213	315	259	256	281	364	283	

Crash Statistics for US 25 (White Horse Road)

From MP 23.5 to MP 30.0





LOCATION 2
SPEED LIMIT: 45 MPH
AVERAGE SPEED: 46 MPH
85TH PERCENTILE: 50 MPH

LOCATION 3
SPEED LIMIT: 45 MPH
AVERAGE SPEED: 41 MPH
85TH PERCENTILE: 45 MPH

LOCATION 1
SPEED LIMIT: 45 MPH
AVERAGE SPEED: 42 MPH
85TH PERCENTILE: 46 MPH

LOCATION 9
SPEED LIMIT: 45 MPH
AVERAGE SPEED: 43 MPH
85TH PERCENTILE: 47 MPH

LOCATION 8
SPEED LIMIT: 45 MPH
AVERAGE SPEED: 45 MPH
85TH PERCENTILE: 49 MPH

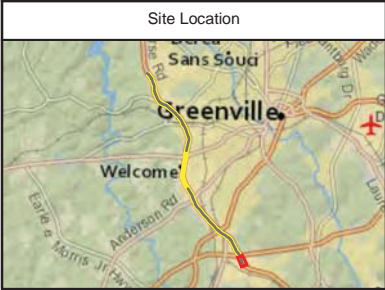
LOCATION 4
SPEED LIMIT: 45 MPH
AVERAGE SPEED: 46 MPH
85TH PERCENTILE: 51 MPH

LOCATION 5
SPEED LIMIT: 45 MPH
AVERAGE SPEED: 46 MPH
85TH PERCENTILE: 50 MPH

LOCATION 7
SPEED LIMIT: 45 MPH
AVERAGE SPEED: 43 MPH
85TH PERCENTILE: 47 MPH

LOCATION 6
SPEED LIMIT: 45 MPH
AVERAGE SPEED: 46 MPH
85TH PERCENTILE: 50 MPH

SPEED STUDY LOCATIONS
US 25 (WHITE HORSE ROAD)
GREENVILLE, SC



Crash Type	Total
● Angle	6
● Rear End	10
● Sideswipe	3
● Other	2
Total	21

Night and Day
Night = 7
Day = 14
Road Conditions
Wet = 5
Dry = 16

Severity Type	Total
Not Injured	17
Possibly Injured	3
Non-Incapacitating	1
Incapacitating	0
★ Fatal	0

**Total Crashes
Segment #1
21**

Sources:
Roads and Accident Data: SCDOT
Aerial: Bing Maps through ESRI
Map Projection: SC State Plane



US 25 (White Horse Road)

Road Safety Audit from MP 23.5 - 30.0

050100200

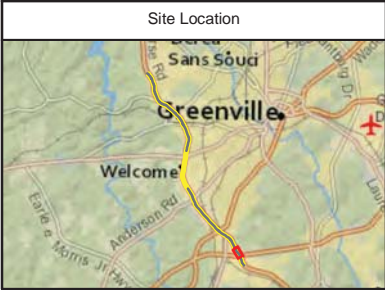
Feet

1 inch = 100 feet

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October 2016

Segment 1 of 25



Crash Type	Total
● Angle	28
● Rear End	38
● Sideswipe	19
● Other	9
Total	94

Night and Day
Night = 25
Day = 69
Road Conditions
Wet = 14
Dry = 80

Severity Type	Total
Not Injured	76
Possibly Injured	13
Non-Incapacitating	4
Incapacitating	1
★ Fatal	0

**Total Crashes
Segment #2
94**

Sources:
Roads and Accident Data: SCDOT
Aerial: Bing Maps through ESRI
Map Projection: SC State Plane



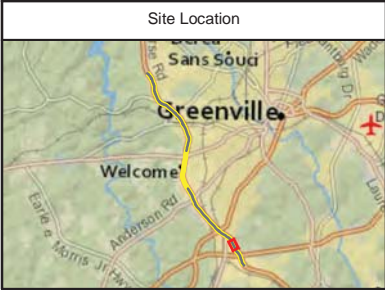
US 25 (White Horse Road)
Road Safety Audit from MP 23.5 - 30.0



1 inch = 100 feet

October 2016

Segment 2 of 25



Crash Type	Total
● Angle	46
● Rear End	31
● Sideswipe	10
● Other	9
Total	96

Night and Day
Night = 26
Day = 70
Road Conditions
Wet = 12
Dry = 84

Severity Type	Total
Not Injured	62
Possibly Injured	26
Non-Incapacitating	6
Incapacitating	2
★ Fatal	0

**Total Crashes
Segment #3
96**

Sources:
Roads and Accident Data: SCDOT
Aerial: Bing Maps through ESRI
Map Projection: SC State Plane



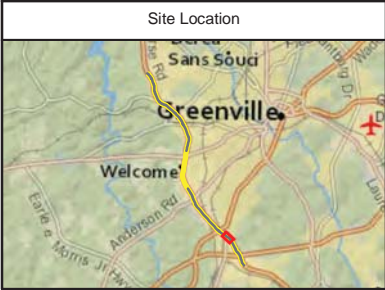
US 25 (White Horse Road)
Road Safety Audit from MP 23.5 - 30.0



1 inch = 100 feet

October 2016

Segment 3 of 25



Crash Type	Total
● Angle	30
● Rear End	92
● Sideswipe	23
● Other	12
Total	157

Night and Day
Night = 35
Day = 122
Road Conditions
Wet = 29
Dry = 128

Severity Type	Total
Not Injured	119
Possibly Injured	29
Non-Incapacitating	8
Incapacitating	0
★ Fatal	1

**Total Crashes
Segment #4
157**

Sources:
Roads and Accident Data: SCDOT
Aerial: Bing Maps through ESRI
Map Projection: SC State Plane



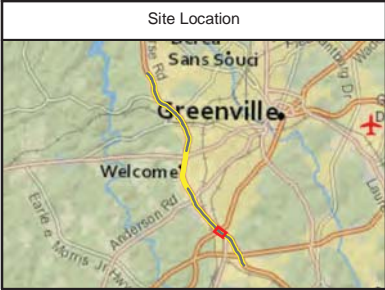
US 25 (White Horse Road)
Road Safety Audit from MP 23.5 - 30.0



1 inch = 100 feet

October 2016

Segment 4 of 25



Crash Type	Total
● Angle	37
● Rear End	23
● Sideswipe	18
● Other	10
Total	88

Night and Day
Night = 21
Day = 67
Road Conditions
Wet = 8
Dry = 80

Severity Type	Total
Not Injured	61
Possibly Injured	18
Non-Incapacitating	8
Incapacitating	1
★ Fatal	0

**Total Crashes
Segment #5
88**

Sources:
Roads and Accident Data: SCDOT
Aerial: Bing Maps through ESRI
Map Projection: SC State Plane



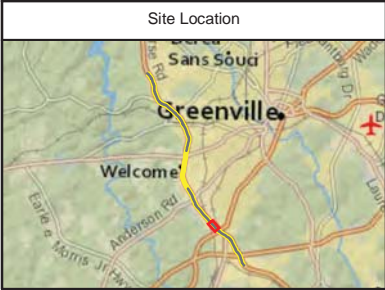
US 25 (White Horse Road)
Road Safety Audit from MP 23.5 - 30.0



1 inch = 100 feet

October 2016

Segment 5 of 25



Crash Type	Total
● Angle	18
● Rear End	28
● Sideswipe	14
● Other	5
Total	65

Night and Day
Night = 11
Day = 54
Road Conditions
Wet = 9
Dry = 56

Severity Type	Total
Not Injured	51
Possibly Injured	10
Non-Incapacitating	2
Incapacitating	1
★ Fatal	1

**Total Crashes
Segment #6
65**

Sources:
Roads and Accident Data: SCDOT
Aerial: Bing Maps through ESRI
Map Projection: SC State Plane



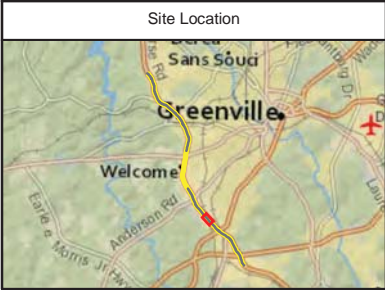
US 25 (White Horse Road)
Road Safety Audit from MP 23.5 - 30.0



1 inch = 100 feet

October 2016

Segment 6 of 25



Crash Type	Total
● Angle	13
● Rear End	30
● Sideswipe	9
● Other	9
Total	61

Night and Day
Night = 15
Day = 46
Road Conditions
Wet = 7
Dry = 54

Severity Type	Total
Not Injured	45
Possibly Injured	7
Non-Incapacitating	6
Incapacitating	2
★ Fatal	1

**Total Crashes
Segment #7
61**

Sources:
Roads and Accident Data: SCDOT
Aerial: Bing Maps through ESRI
Map Projection: SC State Plane



US 25 (White Horse Road)
Road Safety Audit from MP 23.5 - 30.0

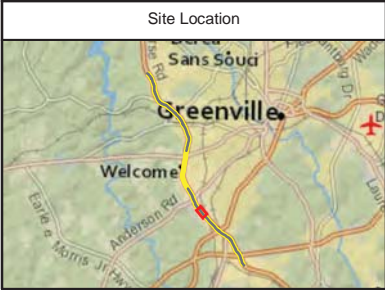


1 inch = 100 feet

AECOM

October 2016

Segment 7 of 25



Crash Type	Total
● Angle	28
● Rear End	34
● Sideswipe	11
● Other	10
Total	83

Night and Day
Night = 15
Day = 68
Road Conditions
Wet = 9
Dry = 74

Severity Type	Total
Not Injured	58
Possibly Injured	20
Non-Incapacitating	4
Incapacitating	1
★ Fatal	0

**Total Crashes
Segment #8
83**

Sources:
Roads and Accident Data: SCDOT
Aerial: Bing Maps through ESRI
Map Projection: SC State Plane



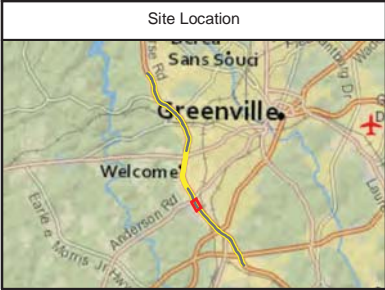
US 25 (White Horse Road)
Road Safety Audit from MP 23.5 - 30.0



1 inch = 100 feet

October 2016

Segment 8 of 25



Crash Type	Total
● Angle	8
● Rear End	14
● Sideswipe	9
● Other	3
Total	34

Night and Day
Night = 8
Day = 26
Road Conditions
Wet = 6
Dry = 28

Severity Type	Total
Not Injured	27
Possibly Injured	6
Non-Incapacitating	0
Incapacitating	1
★ Fatal	0

**Total Crashes
Segment #9
34**

Sources:
Roads and Accident Data: SCDOT
Aerial: Bing Maps through ESRI
Map Projection: SC State Plane



US 25 (White Horse Road)

Road Safety Audit from MP 23.5 - 30.0

050100200

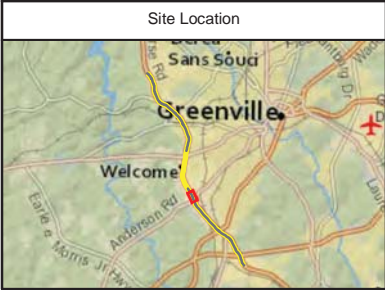
Feet

1 inch = 100 feet

AECOM

October 2016

Segment 9 of 25



Crash Type	Total
● Angle	95
● Rear End	68
● Sideswipe	30
● Other	9
Total	202

Night and Day
Night = 50
Day = 152
Road Conditions
Wet = 24
Dry = 178

Severity Type	Total
Not Injured	146
Possibly Injured	39
Non-Incapacitating	13
Incapacitating	3
★ Fatal	1

**Total Crashes
Segment #10
202**

Sources:
Roads and Accident Data: SCDOT
Aerial: Bing Maps through ESRI
Map Projection: SC State Plane



US 25 (White Horse Road)

Road Safety Audit from MP 23.5 - 30.0

050100200

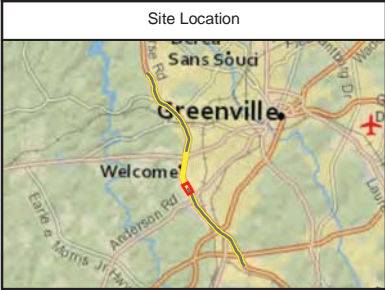
Feet

1 inch = 100 feet

AECOM

October 2016

Segment 10 of 25



Crash Type	Total
● Angle	23
● Rear End	32
● Sideswipe	11
● Other	4
Total	70

Night and Day
Night = 12
Day = 58
Road Conditions
Wet = 8
Dry = 62

Severity Type	Total
Not Injured	51
Possibly Injured	15
Non-Incapacitating	2
Incapacitating	2
★ Fatal	0

**Total Crashes
Segment #11
70**

Sources:
Roads and Accident Data: SCDOT
Aerial: Bing Maps through ESRI
Map Projection: SC State Plane



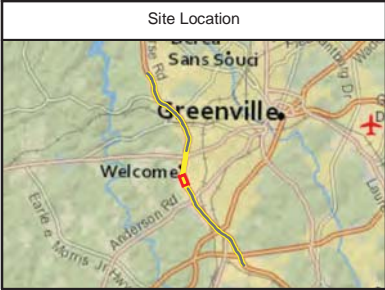
US 25 (White Horse Road)
Road Safety Audit from MP 23.5 - 30.0



1 inch = 100 feet

October 2016

Segment 11 of 25



Crash Type	Total
● Angle	52
● Rear End	21
● Sideswipe	18
● Other	22
Total	113

Night and Day
Night = 36
Day = 77
Road Conditions
Wet = 13
Dry = 100

Severity Type	Total
Not Injured	73
Possibly Injured	32
Non-Incapacitating	5
Incapacitating	1
★ Fatal	2

**Total Crashes
Segment #12
113**

Sources:
Roads and Accident Data: SCDOT
Aerial: Bing Maps through ESRI
Map Projection: SC State Plane



US 25 (White Horse Road)
Road Safety Audit from MP 23.5 - 30.0

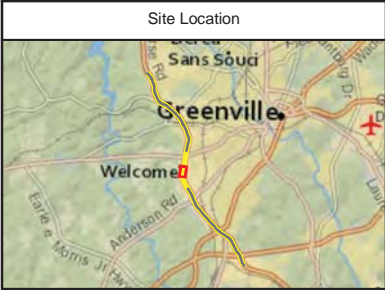
050100200
Feet

1 inch = 100 feet

AECOM

October 2016

Segment 12 of 25



Crash Type	Total
● Angle	1
● Rear End	8
● Sideswipe	3
● Other	5
Total	17

Night and Day
Night = 4
Day = 13
Road Conditions
Wet = 0
Dry = 17

Severity Type	Total
Not Injured	14
Possibly Injured	2
Non-Incapacitating	0
Incapacitating	1
★ Fatal	0

Total Crashes
Segment #13
17

Sources:
Roads and Accident Data: SCDOT
Aerial: Bing Maps through ESRI
Map Projection: SC State Plane

US 25 (White Horse Road)
Road Safety Audit from MP 23.5 - 30.0

050100200
Feet

1 inch = 100 feet

October 2016

Segment 13 of 25



Crash Type	Total
● Angle	26
● Rear End	46
● Sideswipe	16
● Other	2
Total	90

Night and Day
Night = 20
Day = 70
Road Conditions
Wet = 14
Dry = 76

Severity Type	Total
Not Injured	75
Possibly Injured	12
Non-Incapacitating	3
Incapacitating	0
★ Fatal	0

**Total Crashes
Segment #14
90**

Sources:
Roads and Accident Data: SCDOT
Aerial: Bing Maps through ESRI
Map Projection: SC State Plane



US 25 (White Horse Road)

Road Safety Audit from MP 23.5 - 30.0

050100200

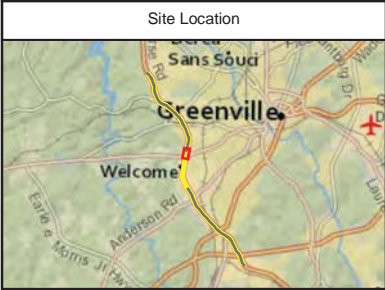
Feet

1 inch = 100 feet

AECOM

October 2016

Segment 14 of 25



Crash Type	Total
● Angle	9
● Rear End	30
● Sideswipe	9
● Other	5
Total	53

Night and Day
Night = 7
Day = 46
Road Conditions
Wet = 11
Dry = 42

Severity Type	Total
Not Injured	34
Possibly Injured	13
Non-Incapacitating	6
Incapacitating	0
★ Fatal	0

**Total Crashes
Segment #15
53**

Sources:
Roads and Accident Data: SCDOT
Aerial: Bing Maps through ESRI
Map Projection: SC State Plane



US 25 (White Horse Road)

Road Safety Audit from MP 23.5 - 30.0

050100200

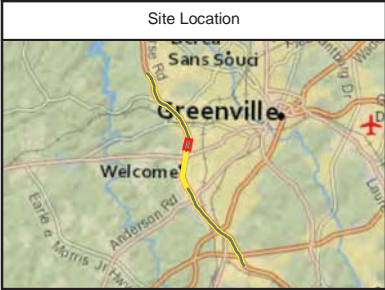
Feet

1 inch = 100 feet

AECOM

October 2016

Segment 15 of 25



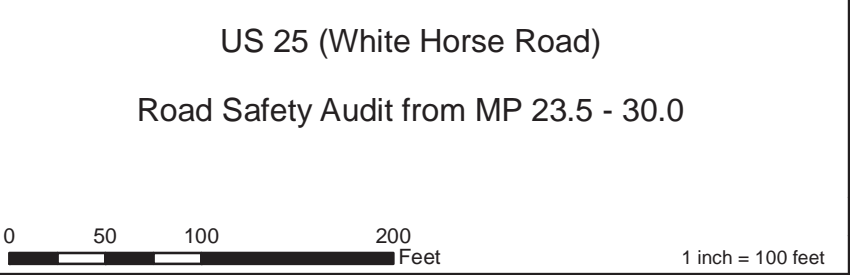
Crash Type	Total
● Angle	17
● Rear End	11
● Sideswipe	8
● Other	4
Total	40

Night and Day
Night = 14
Day = 26
Road Conditions
Wet = 2
Dry = 38

Severity Type	Total
Not Injured	30
Possibly Injured	5
Non-Incapacitating	2
Incapacitating	2
★ Fatal	1

**Total Crashes
Segment #16
40**

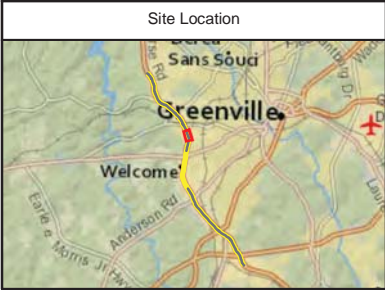
Sources:
Roads and Accident Data: SCDOT
Aerial: Bing Maps through ESRI
Map Projection: SC State Plane



AECOM

October 2016

Segment 16 of 25



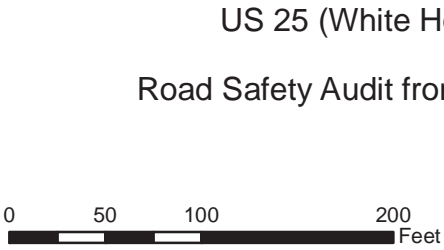
Crash Type	Total
● Angle	14
● Rear End	14
● Sideswipe	11
● Other	7
Total	46

Night and Day
Night = 9
Day = 37
Road Conditions
Wet = 7
Dry = 39

Severity Type	Total
Not Injured	29
Possibly Injured	13
Non-Incapacitating	3
Incapacitating	1
★ Fatal	0

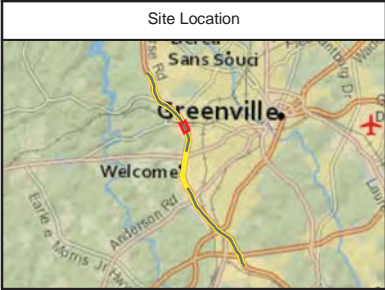
**Total Crashes
Segment #17
46**

Sources:
Roads and Accident Data: SCDOT
Aerial: Bing Maps through ESRI
Map Projection: SC State Plane



October 2016

Segment 17 of 25



Crash Type	Total
● Angle	6
● Rear End	20
● Sideswipe	7
● Other	5
Total	38

Night and Day
Night = 7
Day = 31
Road Conditions
Wet = 6
Dry = 32

Severity Type	Total
Not Injured	32
Possibly Injured	3
Non-Incapacitating	2
Incapacitating	0
★ Fatal	1

**Total Crashes
Segment #18
38**

Sources:
Roads and Accident Data: SCDOT
Aerial: Bing Maps through ESRI
Map Projection: SC State Plane



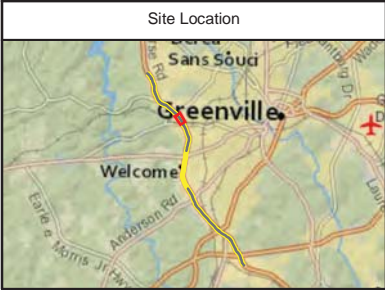
US 25 (White Horse Road)
Road Safety Audit from MP 23.5 - 30.0



1 inch = 100 feet

October 2016

Segment 18 of 25



Crash Type	Total
● Angle	35
● Rear End	15
● Sideswipe	14
● Other	7
Total	71

Night and Day
Night = 24
Day = 47
Road Conditions
Wet = 14
Dry = 57

Severity Type	Total
Not Injured	49
Possibly Injured	10
Non-Incapacitating	7
Incapacitating	1
★ Fatal	4

**Total Crashes
Segment #19
71**

Sources:
Roads and Accident Data: SCDOT
Aerial: Bing Maps through ESRI
Map Projection: SC State Plane



US 25 (White Horse Road)
Road Safety Audit from MP 23.5 - 30.0



1 inch = 100 feet

October 2016

Segment 19 of 25



Crash Type	Total
● Angle	49
● Rear End	108
● Sideswipe	34
● Other	15
Total	206

Night and Day
Night = 60
Day = 146
Road Conditions
Wet = 27
Dry = 179

Severity Type	Total
Not Injured	156
Possibly Injured	32
Non-Incapacitating	13
Incapacitating	5
★ Fatal	0

**Total Crashes
Segment #20
206**

Sources:
Roads and Accident Data: SCDOT
Aerial: Bing Maps through ESRI
Map Projection: SC State Plane



US 25 (White Horse Road)

Road Safety Audit from MP 23.5 - 30.0

050100200

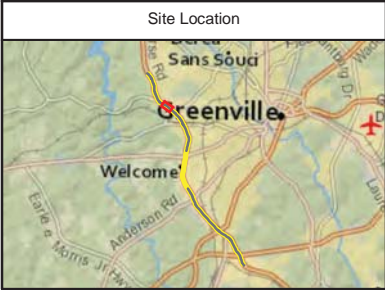
Feet

1 inch = 100 feet

AECOM

October 2016

Segment 20 of 25



Crash Type	Total
● Angle	62
● Rear End	68
● Sideswipe	15
● Other	11
Total	156

Night and Day
Night = 34
Day = 122
Road Conditions
Wet = 26
Dry = 130

Severity Type	Total
Not Injured	118
Possibly Injured	28
Non-Incapacitating	10
Incapacitating	0
★ Fatal	0

**Total Crashes
Segment #21
156**

Sources:
Roads and Accident Data: SCDOT
Aerial: Bing Maps through ESRI
Map Projection: SC State Plane



US 25 (White Horse Road)

Road Safety Audit from MP 23.5 - 30.0

050100200

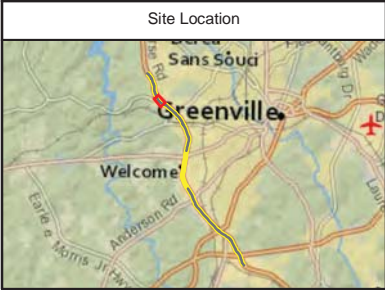
Feet

1 inch = 100 feet

AECOM

October 2016

Segment 21 of 25



Crash Type	Total
● Angle	26
● Rear End	36
● Sideswipe	12
● Other	14
Total	88

Night and Day
Night = 23
Day = 65
Road Conditions
Wet = 12
Dry = 76

Severity Type	Total
Not Injured	71
Possibly Injured	13
Non-Incapacitating	4
Incapacitating	0
★ Fatal	0

**Total Crashes
Segment #22
88**

Sources:
Roads and Accident Data: SCDOT
Aerial: Bing Maps through ESRI
Map Projection: SC State Plane



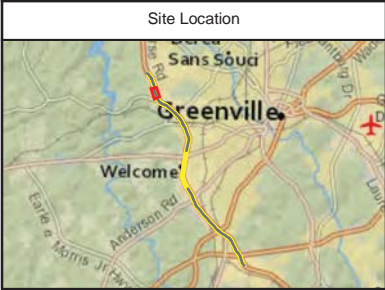
US 25 (White Horse Road)
Road Safety Audit from MP 23.5 - 30.0



1 inch = 100 feet

October 2016

Segment 22 of 25



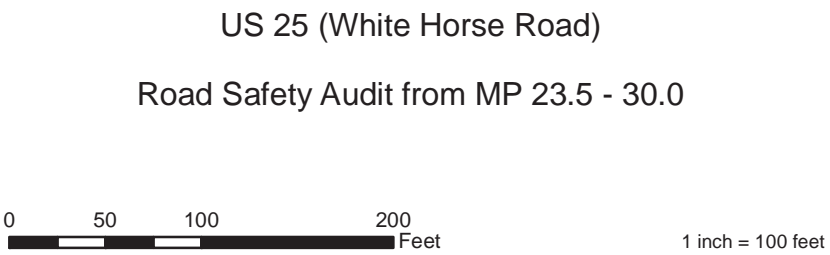
Crash Type	Total
● Angle	27
● Rear End	10
● Sideswipe	11
● Other	3
Total	51

Night and Day
Night = 13
Day = 38
Road Conditions
Wet = 4
Dry = 47

Severity Type	Total
Not Injured	39
Possibly Injured	9
Non-Incapacitating	2
Incapacitating	0
★ Fatal	1

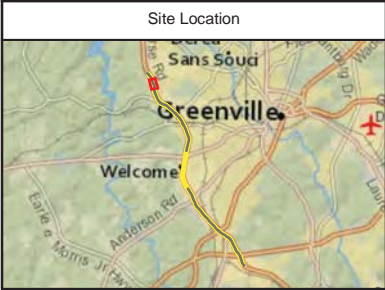
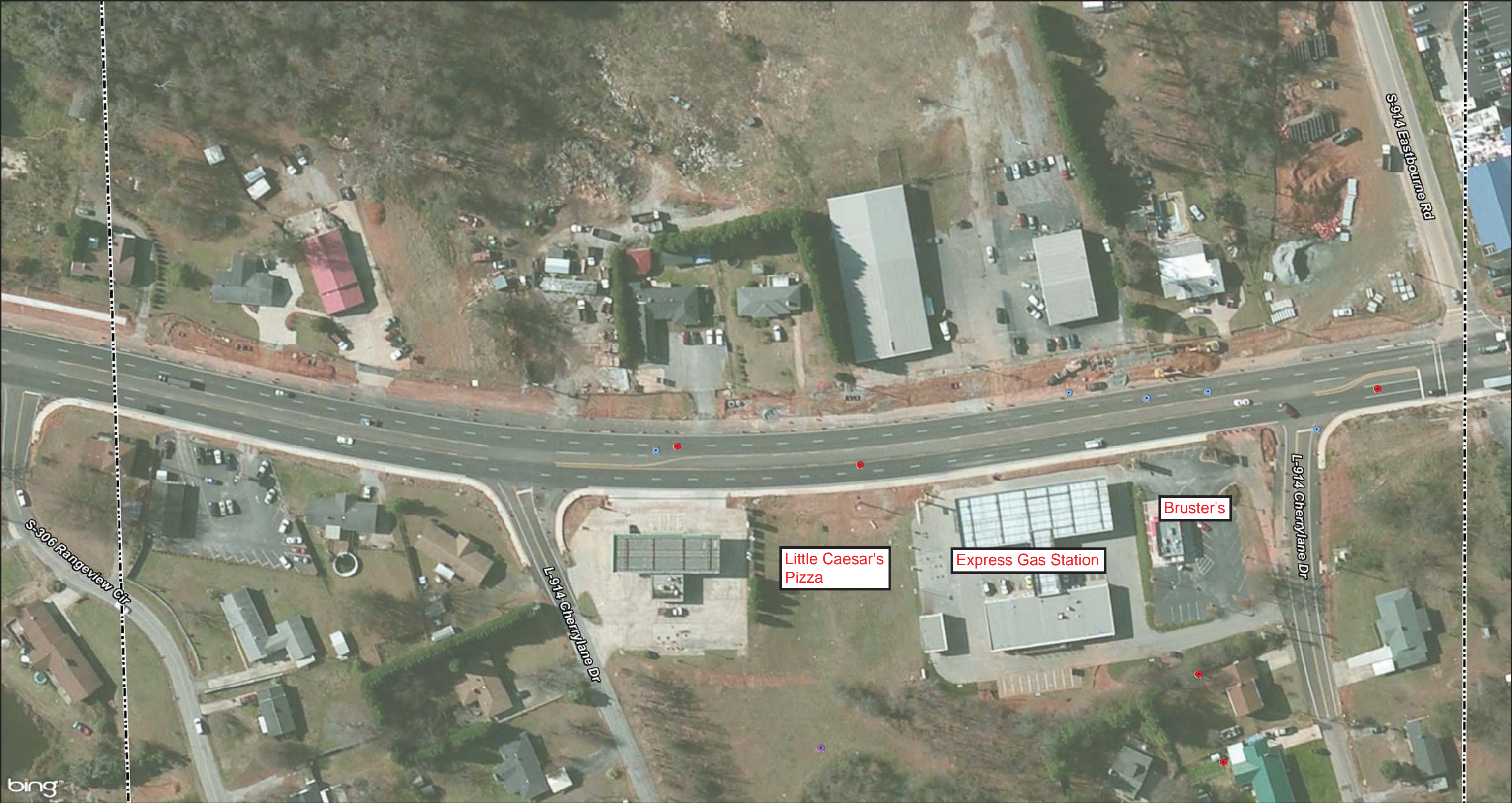
**Total Crashes
Segment #23
51**

Sources:
Roads and Accident Data: SCDOT
Aerial: Bing Maps through ESRI
Map Projection: SC State Plane



October 2016

Segment 23 of 25



Crash Type	Total
● Angle	5
● Rear End	5
● Sideswipe	0
● Other	1
Total	11

Night and Day
Night = 7
Day = 4
Road Conditions
Wet = 1
Dry = 10

Severity Type	Total
Not Injured	7
Possibly Injured	4
Non-Incapacitating	0
Incapacitating	0
★ Fatal	0

**Total Crashes
Segment #24
11**

Sources:
Roads and Accident Data: SCDOT
Aerial: Bing Maps through ESRI
Map Projection: SC State Plane



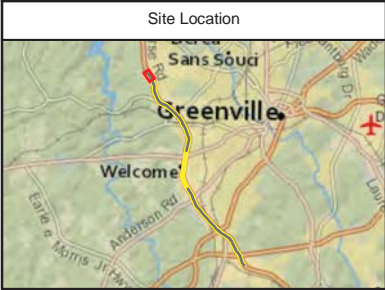
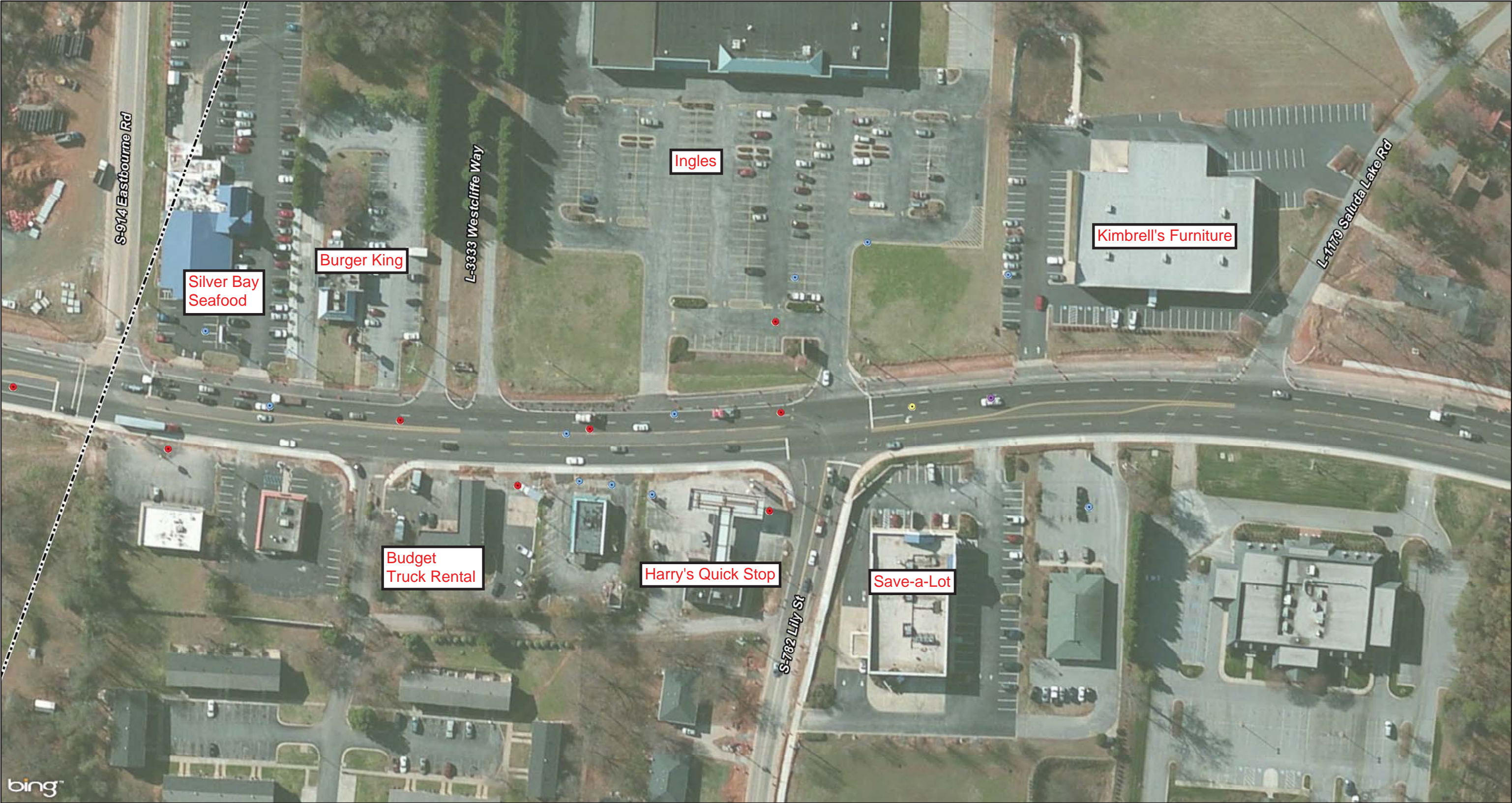
US 25 (White Horse Road)
Road Safety Audit from MP 23.5 - 30.0



1 inch = 100 feet

October 2016

Segment 24 of 25



Crash Type	Total
● Angle	7
● Rear End	11
● Sideswipe	1
● Other	1
Total	20

Night and Day
Night = 7
Day = 13
Road Conditions
Wet = 5
Dry = 15

Severity Type	Total
Not Injured	16
Possibly Injured	3
Non-Incapacitating	1
Incapacitating	0
★ Fatal	0

**Total Crashes
Segment #25
20**

Sources:
Roads and Accident Data: SCDOT
Aerial: Bing Maps through ESRI
Map Projection: SC State Plane



US 25 (White Horse Road)

Road Safety Audit from MP 23.5 - 30.0

050100200

Feet

1 inch = 100 feet

AECOM

October 2016

Segment 25 of 25

PROMPT LIST 6 (1 OF 2)

Existing Road Audit									
Road Function, Classification, Environment	Road Alignment and Cross Section	Auxiliary Lanes	Intersections	Interchanges	Signs and Lighting	Marking and Delineation	Barriers and Clear Zones	Traffic Signals	Pedestrians and Bicyclists
	1 Visibility, sight distance	1 Tapers	1 Location	1 Visibility, sight distance	1 Lighting	1 General issues	1 Clear zones	1 Operations	1 General issues
	2 Design speed	2 Shoulders	2 Visibility, sight distance	2 Lanes, shoulders	2 General signs issues	2 Centerlines, edge-lines, lane lines	2 Barriers	2 Visibility	2 Pedestrians
	3 Speed limit/speed zoning	3 Signs and markings	3 Signing and marking	3 Signing, marking, delineation	3 Sign legibility	3 Guideposts and reflectors	3 End treatments /Crash cushions	3 Placement of signal heads	3 Bicyclists
	4 Passing	4 Turning traffic	4 Layout and 'readability' (perception) by drivers	4 Pedestrians, bicyclists	4 Sign supports	4 Curve warning and delineation	4 Pedestrian railing		4 Public transport
	5 'Readability' (perception) of the alignment by drivers		5 Pedestrians, bicyclists	5 Lighting			5 Visibility of barriers and fences		
	6 Human factors		6 Lighting						
	7 Widths								
	8 Shoulders								
	9 Cross slopes								
	10 Side slopes								
	11 Drains								
	12 Combinations of features								

PROMPT LIST 6 (2 OF 2)

Existing Road Audit						
Older Drivers	Bridges and Culverts	Pavement	Parking	Provision For Heavy Vehicles	Floodways and Causeways	Other Safety Issues
1 Turning operations (receiving lane widths, radii)	1 Design features	1 Pavement defects		1 Design issues	1 Ponding and flooding	1 Landscaping
	2 Barriers	2 Skid resistance		2 Pavement/shoulder quality	2 Safety of devices	2 Temporary works
2 Channelization, opposing left turn lanes	3 Pedestrian and recreational facilities, delineation	3 Ponding/icing/snow accumulation				3 Headlight glare
3 Sight triangles		4 Loose stones/material				4 Roadside activities
4 Signing, marking and delineation		5 Manholes				5 Signs of possible problems (pavement, roadside)
5 Traffic signals						6 Rest areas
						7 Environment
						8 Median curbing

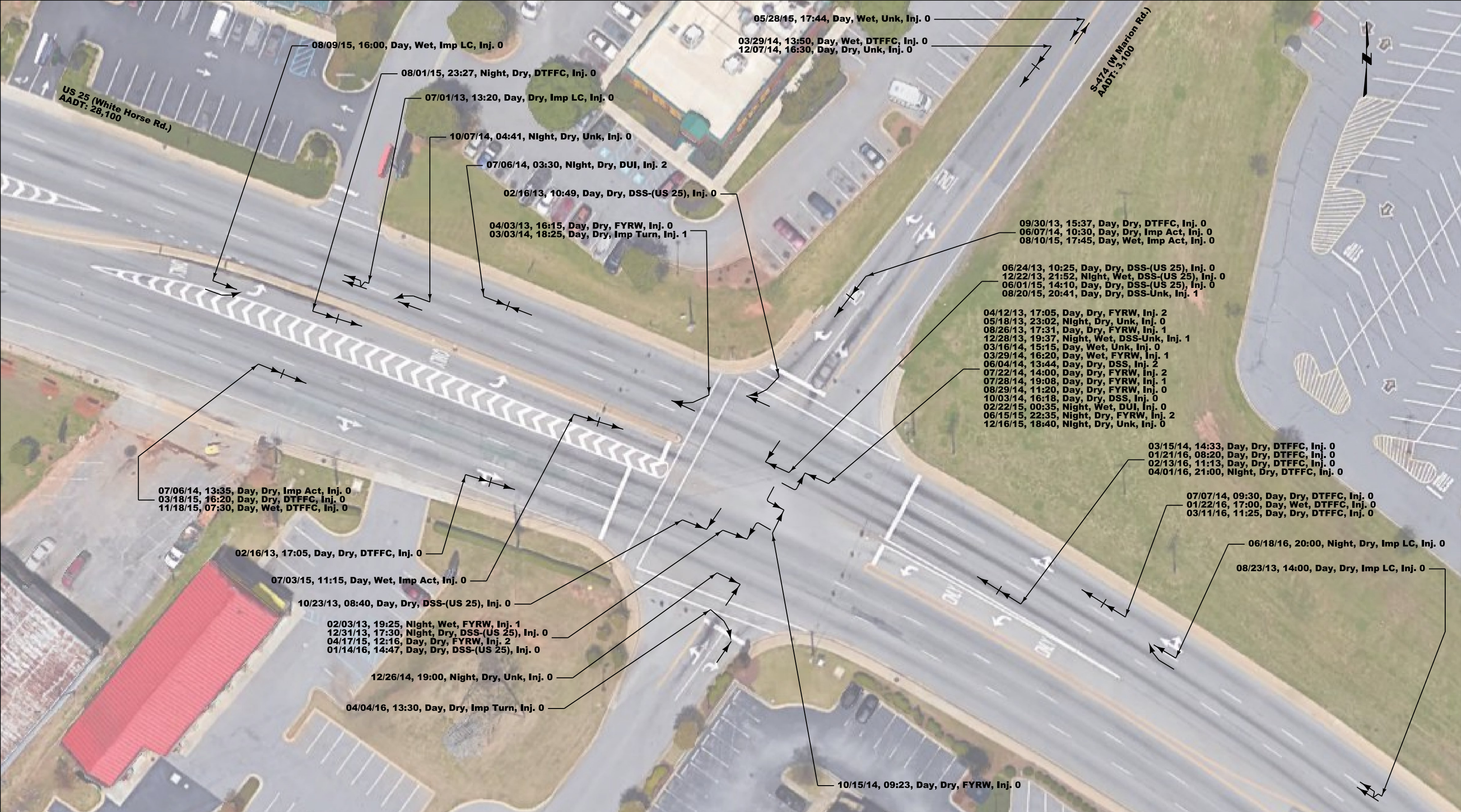
APPENDIX B – TEAM MEETING SIGN IN SHEET

Sign In Sheet

US 25 Road Safety Pre-Audit Meeting - AECOM (10 Patewood Dr, Greenville, SC) - October 19, 2016

#	Name	Email	Phone #	Agency
1	Emily Swannigan	emily.swannigan@aecom.com	864-234-2111	AECOM
2	ASANGWU KEEW	ALKEW@GREENVILLECOUNTY.ORG	864-467-7287	G.P.A.T.S
3	Joey Riddle	riddlej@scdot.org	803-737-3582	SCDOT
4	Jana Potvin	potvinjb@scdot.org	803-737-0532	SCDOT
5	V. Carol Jones	jonesvc@scdot.org	803-737-1050	SCDOT
6	Emily Toler	toler ef@scdot.org	803-737-0529	SCDOT
7	Alex Elrod	jrelrod@scdps.gov	(864) 978-3442	SCDP/SCDPS
8	Brandon Wilson	wilsonbe@scdot.org	864-444-5032	SCDOT
9	KURT WALTERS	KWALTERS@GREENVILLECOUNTY.ORG	467-7013	Greenville Co
10	North Brockington	Nbrockington@greenvillecounty.org	467-7143	" " GPATS
11	Jacob Nelson	jacob.nelson@aecom.com	864 234 3053	AECOM
12	Eric Duff	dillon ec@scdot.org	864 304-7411	SCDOT
13	Ryan Eckenrode	ryan.eckenrode@aecom.com	864 234-8731	AECOM
14				
15				
16				
17				
18				
19				
20				

APPENDIX C – COLLISION DIAGRAMS



LEGEND

DSS - Disregarded Sign or Signal
Inatt - Inattention
DTFFC - Driving Too Fast for Conditions
FYRW - Failure to Yield Right of Way
ROR - Ran off Road
FTC - Followed Too Closely
AOV - Aggressive Operation of Vehicle
SAO - Swerving to Avoid Object
DUI - Under the Influence
Imp LC - Improper Lane Change

RA = Right Angle
RE = Rear End
SS = Side Swipe
HO = Head On
OC = Out of Control
HA = Hit Animal
OTH = Other

YR	2013	2014	2015	2016	Total
RA	11	10	6	2	29
RE	2	6	5	5	18
SS	2	1	2	1	6
HO	0	1	0	0	1
OC	0	0	0	0	0
HA	0	0	0	0	0
OTH	0	0	0	0	0
Total	15	18	13	8	54

Total = 54
AADT = 29,650
Years = 3.5
01/01/13 - 06/30/16
CR = 1.426
SI = 2.112

Night - 14
Day - 40
Wet - 13
Dry - 41

PDO - 41
Inj. 1 - 7
Inj. 2 - 6
Inj. 3 - 0
Fatal - 0

SCDOT
South Carolina Department of Transportation

TRAFFIC ENGINEERING
DIVISION
COLUMBIA, S.C.
TRAFFIC SAFETY PROGRAM

SUBJECT TITLE
Collision Diagram

SPECIFIC LOCATION
US 25 & S-474

CITY	Greenville	COUNTY	Greenville
DRAWN BY	DATE	SCALE	PAGE
JCB	10/27/16	None	1 of 1

LEGEND

DSS - Disregarded Sign or Signal
Inatt - Inattention
DTFFC - Driving Too Fast for Conditions
FYRW - Failure to Yield Right of Way
ROR - Ran off Road
FTC - Followed Too Closely
AOV - Aggressive Operation of Vehicle
SAO - Swerving to Avoid Object
DUI - Under the Influence
Imp LC - Improper Lane Change

RA = Right Angle
RE = Rear End
SS = Side Swipe
HO = Head On
OC = Out of Control
HA = Hit Animal
OTH = Other



YR	2013	2014	2015	2016	Total
RA	4	6	9	6	25
RE	8	16	7	8	39
SS	2	2	3	1	8
HO	0	0	0	0	0
OC	1	1	1	1	4
HA	0	0	0	0	0
OTH	0	0	0	0	0
Total	15	25	20	16	76

Total = 76
AADT = 37100
Years = 3.5
01/01/13 - 06/30/16
CR = 1.604
SI = 2.237

Night - 11
Day - 65
Wet - 11
Dry - 65

PDO - 61
Inj. 1 - 12
Inj. 2 - 2
Inj. 3 - 1
Fatal - 0

SCDOT

South Carolina Department of Transportation

TRAFFIC ENGINEERING
DIVISION
COLUMBIA, S.C.
TRAFFIC SAFETY PROGRAM

SUBJECT TITLE
Collision Diagram

SPECIFIC LOCATION
US 25 & S-263

CITY	Greenville	COUNTY	Greenville
DRAWN BY	DATE	SCALE	PAGE
REW	10/25/16	None	1 of 1

US 25 & S-149

US 25
ADT 28,100

10/01/15, 17:00, DAY, DRY, DTFFC, INJ 0

11/19/14, 16:00, DAY, DRY, FTYRW, INJ 0

12/18/15, 08:20, DAY, DRY, ILC, INJ 0

05/05/14, 14:59, DAY, DRY, ILC, INJ 1

02/11/15, 14:15, DAY, DRY, UNK, INJ 0

01/14/13, 14:25, DAY, WET, UNK, INJ 0
01/16/13, 17:00, DAY, WET, UNK, INJ 0
08/20/13, 10:00, DAY, DRY, DTFFC, INJ 1
11/06/15, 17:01, DAY, DRY, IMPR ACT, INJ 0

02/13/16, 11:40, DAY, DRY, DTFFC, INJ 0

02/25/13, 16:02, DAY, DRY, DTFFC, INJ 0
04/26/13, 17:14, DAY, DRY, DTFFC, INJ 2
10/29/14, 15:50, DAY, DRY, DTFFC, INJ 1

03/18/16, 12:35, DAY, DRY, IMPR ACT, INJ 0

08/06/14, 16:45, DAY, DRY, DTFFC, INJ 0

09/11/13, 12:25, DAY, DRY, ILC, INJ 0

06/18/15, 17:50, DAY, WET, DTFFC, INJ 1

09/04/13, 16:20, DAY, DRY, IMPR TRN, INJ 0

06/09/15, 09:30, DAY, DRY, ILC, INJ 0

12/06/13, 07:05, DAY, DRY, IMPR ACT, INJ 0
11/04/13, 16:50, DAY, DRY, FTYRW, INJ 0
04/05/16, 18:35, DAY, DRY, FTYRW, INJ 4 (MOTORCYCLE)
06/24/16, 01:10, DAY, DRY, FTYRW, INJ 0

YR	2013	2014	2015	2016	Total
RA	2	0	1	2	5
RE	6	2	2	2	12
SS	2	3	3	0	8
HO	0	0	0	0	0
OC	0	0	0	0	0
HA	0	0	0	0	0
OTH	0	0	0	0	0
Total	10	5	6	4	25

Night - 0
Day - 25
Wet - 3
Dry - 22

Total = 25
AADT = 39,050
Years = 3.5
01/01/13 - 06/30/16
CR = 0.501
SI = 0.962

PDO - 18
Inj. 1 - 5
Inj. 2 - 1
Inj. 3 - 0
Fatal - 1

LEGEND

DSS - Disregarded Sign or Signal
Inatt - Inattention
DTFFC - Driving Too Fast for Conditions
FTYRW - Failure to Yield Right of Way
ROR - Ran off Road
FTC - Followed Too Closely
ADV - Aggressive Operation of Vehicle
SAO - Swerving to Avoid Object
DUI - Under the Influence
Imp LC - Improper Lane Change

RA = Right Angle
RE = Rear End
SS = Side Swipe
HO = Head On
OC = Out of Control
HA = Hit Animal
OTH = Other

04/17/14, 18:48, DAY, DRY, UNK, INJ 1
11/16/13, 14:30, DAY, DRY, DTFFC, INJ 0

US 25
ADT 34,400

S-149
ADT 15,600

SCDOT TRAFFIC ENGINEERING
South Carolina Department of Transportation
DIVISION
COLUMBIA, S.C.
TRAFFIC SAFETY PROGRAM

SUBJECT TITLE **Collision Diagram**

SPECIFIC LOCATION
US 25 & S-149

CITY	Greenville	COUNTY	Greenville
DRAWN BY	WWB	DATE	10/25/16
SCALE	None	PAGE	1 of 1

US 25 & S-477

01/17/15, 11:55, DAY, DRY, ILC, INJ 0

05/21/15, 14:30, DAY, DRY, ILC, INJ 0

09/18/13, 18:24, DAY, DRY, UNK, INJ 3 (MOPED)

05/26/13, 14:50, DAY, DRY, DTFFC, INJ 0

08/16/14, 00:06, NIGHT, DRY, FTYRW, INJ 1

06/07/13, 15:38, DAY, DRY, FTYRW, INJ 0

02/10/14, 17:45, NIGHT, DRY, FTYRW, INJ 1
05/07/16, 12:04, DAY, DRY, FTYRW, INJ 0

WELCOME AVENUE EXT
ADT 500

01/11/13, 14:55, DAY, DRY, FTYRW, INJ 0
03/13/13, 20:35, NIGHT, DRY, FTYRW, INJ 1

10/21/14, 20:23, NIGHT, DRY, DUI, INJ 4
03/18/16, 08:37, DAY, DRY, MEDICAL, INJ 1

02/01/14, 15:44, DAY, DRY, DUI, INJ 0
12/05/14, 18:30, NIGHT, DRY, DTFFC, INJ 0
03/12/13, 16:30, DAY, DRY, MEDICAL, INJ 1

05/11/13, 13:08, DAY, DRY, FTYRW, INJ 0
06/01/13, 18:45, DAY, DRY, FTYRW, INJ 0
04/16/16, 20:00, NIGHT, DRY, FTYRW, INJ 0
05/23/15, 17:15, DAY, DRY, FTYRW, INJ 0

08/09/13, 16:10, DAY, WET, FTYRW, INJ 1

06/19/13, 11:00, DAY, DRY, DTFFC, INJ 0
06/08/15, 07:10, DAY, DRY, DTFFC, INJ 0

01/04/16, 13:55, DAY, DRY, UNK, INJ 0

US 25
ADT 34,400

10/19/13, 12:30, DAY, DRY, ILC, INJ 0
12/29/15, 07:15, DAY, DRY, UNK, INJ 0

03/08/13, 11:25, DAY, DRY, DEBRIS, INJ 0

12/07/13, 09:10, DAY, DRY, DUI, INJ 0

01/06/16, 19:25, NIGHT, DRY, DSS (NB US 25), INJ 1
04/07/16, 10:30, DAY, DRY, FTYRW, INJ 0

10/29/13, 06:10, NIGHT, DRY, UNK, INJ 0
04/04/14, 22:00, NIGHT, DRY, FTYRW, INJ 0
10/04/14, 21:38, NIGHT, DRY, FTYRW, INJ 0
12/25/14, 18:31, NIGHT, DRY, FTYRW, INJ 1
01/01/16, 06:09, NIGHT, DRY, FTYRW, INJ 0

04/23/15, 15:14, DAY, DRY, DTFFC, INJ 0

03/07/14, 19:30, NIGHT, DRY, FTYRW, INJ 0
12/07/14, 11:27, DAY, DRY, FTYRW, INJ 0

01/02/15, 12:45, DAY, WET, UNK, INJ 0

10/22/14, 16:30, DAY, DRY, DTFFC, INJ 0

07/16/13, 17:41, DAY, DRY, FTYRW, INJ 2
08/13/13, 23:20, NIGHT, DRY, FTYRW, INJ 0
11/14/14, 22:46, NIGHT, DRY, FTYRW, INJ 1

12/13/14, 12:10, DAY, DRY, DUI, INJ 0

03/03/14, 17:05, DAY, DRY, FTYRW, INJ 0

06/21/16, 14:50, DAY, DRY, FTC, INJ 0

05/15/16, 20:15, NIGHT, DRY, UNK, INJ 0

US 25
ADT 34,400

WELCOME AVENUE
ADT 1375

LEGEND

DSS - Disregarded Sign or Signal
Inatt - Inattention
DTFFC - Driving Too Fast for Conditions
FTYRW - Failure to Yield Right of Way
ROR - Ran off Road
FTC - Followed Too Closely
ADV - Aggressive Operation of Vehicle
SAO - Swerving to Avoid Object
DUI - Under the Influence
Imp LC - Improper Lane Change

RA = Right Angle
RE = Rear End
SS = Side Swipe
HO = Head On
OC = Out of Control
HA = Hit Animal
OTH = Other

YR	2013	2014	2015	2016	Total
RA	6	3	0	4	13
RE	3	2	3	1	9
SS	5	8	4	3	20
HO	0	0	0	0	0
OC	0	0	0	0	0
HA	0	0	0	0	0
OTH	2	1	0	1	4
Total	16	14	7	9	46

Night - 16
Day - 30
Wet - 2
Dry - 44

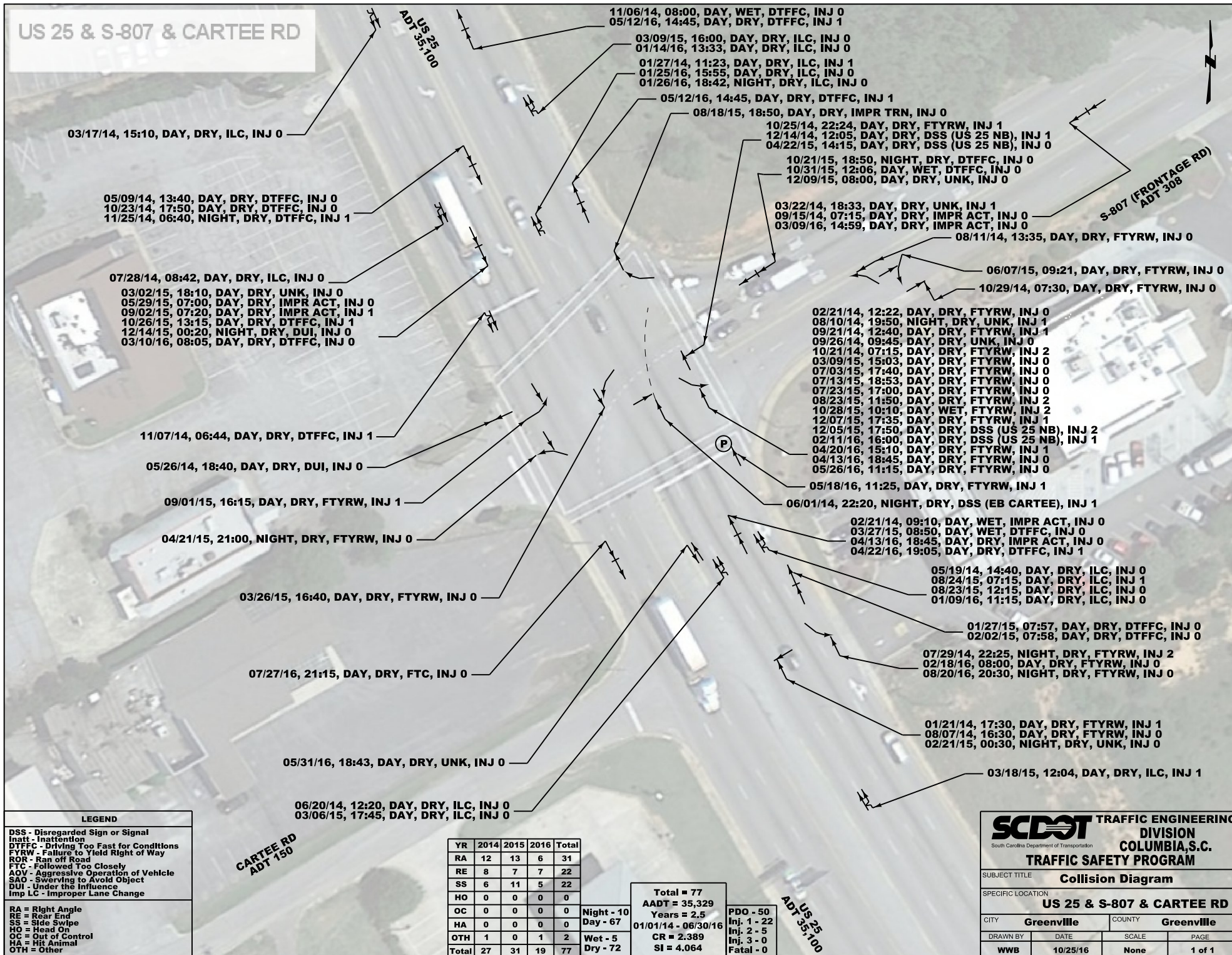
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Years = 3.5
01/01/13 - 06/30/16
CR = 1.019
SI = 1.750

PDO - 34
Inj. 1 - 9
Inj. 2 - 1
Inj. 3 - 1
Fatal - 1

SCDOT TRAFFIC ENGINEERING
DIVISION
COLUMBIA, S.C.
TRAFFIC SAFETY PROGRAM

SUBJECT TITLE Collision Diagram			
SPECIFIC LOCATION US 25 & S-477			
CITY Greenville	COUNTY Greenville		
DRAWN BY WWB	DATE 10/27/16	SCALE None	PAGE 1 of 1

US 25 & S-807 & CARTEE RD



APPENDIX D – SPEED STUDY DATA SHEETS

Speed Study Data Form

Date: 4/26/2016
Name: Jacob Nelson
City: Greenville
Intersection: South of Frontage Rd
Approach: Northbound

Speed Limit: 45
Start Time: 1:35 PM
End Time: 3:15 PM
Down Time: -
Weather: Clear, Sunny

Speeds:
 (mph)

40	37	40	39	45	42	43	41	43	42
51	48	42	43	45	43	40	46	40	39
42	44	37	48	47	40	40	47	46	41
42	48	46	50	46	45	41	45	46	41
47	40	42	41	43	38	43	49	49	38
41	44	40	52	45	40	35	38	38	43
39	38	42	40	40	45	35	38	37	42
38	36	42	46	41	36	44	43	37	37
44	42	41	42	38	39	37	42	39	38
42	40	40	37	40	35	51	35	42	46

Key:



Trucks



Buses

15%tile= 38

Mean= 42

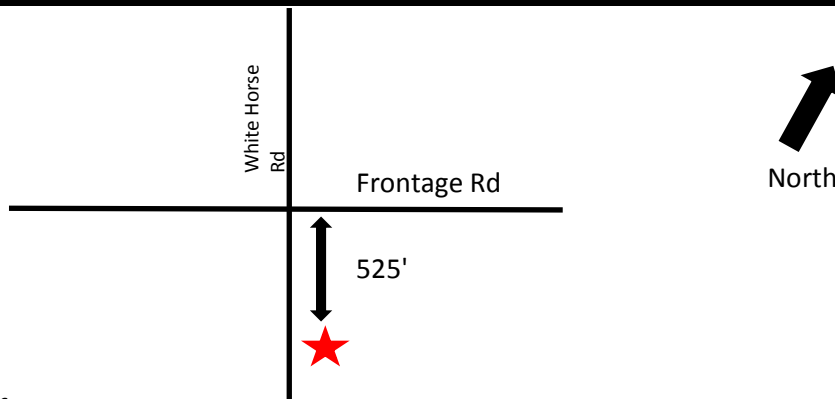
50%tile= 42

Std. Dev= 4

85%tile= 46

Mode= 40

Sketch of Location:



Comments:



Distance from intersection

Speed Study Data Form

Date: 4/27/2016
Name: Jacob Nelson
City: Greenville
Intersection: South of Lily St
Approach: Northbound

Speed Limit: 45
Start Time: 9:15 AM
End Time: 10:05 AM
Down Time: -
Weather: Clear, Sunny

Speeds:
 (mph)

43	46	41	43	45	46	52	42	53	45
42	45	44	53	50	41	42	45	45	47
43	39	39	46	44	43	45	42	48	51
45	46	42	44	42	48	53	52	53	44
45	43	45	40	49	46	48	47	46	43
51	45	43	47	44	43	40	58	50	50
47	49	55	49	42	45	43	46	50	42
47	48	47	49	44	46	46	48	39	45
45	53	53	50	47	49	46	51	43	37
47	52	45	48	46	46	45	43	44	47

Key:



Trucks



Buses

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Mean= 46

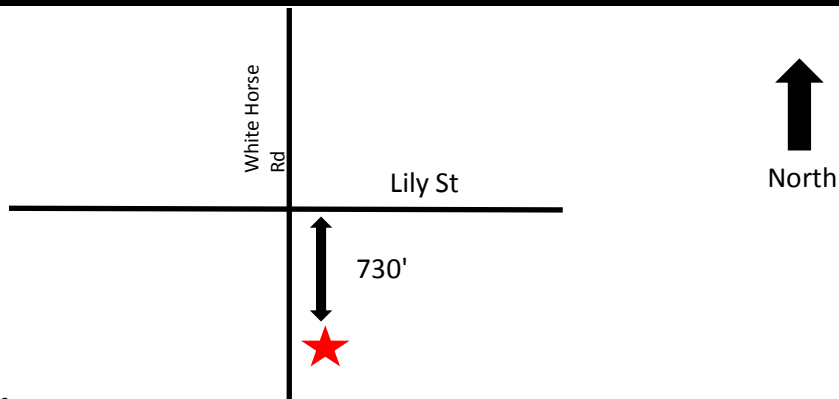
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Std. Dev= 4

85%tile= 50

Mode= 45

Sketch of Location:



Comments:



Distance from intersection

Speed Study Data Form

Date: 4/27/2016
Name: Jacob Nelson
City: Greenville
Intersection: Stanford Rd
Approach: Northbound

Speed Limit: 45
Start Time: 10:30 AM
End Time: 11:30 AM
Down Time: -
Weather: Clear, Sunny

Speeds:
 (mph)

42	39	40	42	40	43	39	38	39	47
40	44	38	42	43	33	42	38	41	39
45	48	37	38	40	39	50	38	40	41
39	40	46	39	44	37	42	37	42	39
41	41	44	38	45	35	46	41	41	39
41	39	35	40	41	49	48	35	37	43
40	48	39	45	43	36	44	37	39	40
43	39	45	38	39	40	38	34	38	45
36	48	42	38	38	37	35	39	38	35
46	41	41	42	41	38	33	46	44	37

Key:



Trucks



Buses

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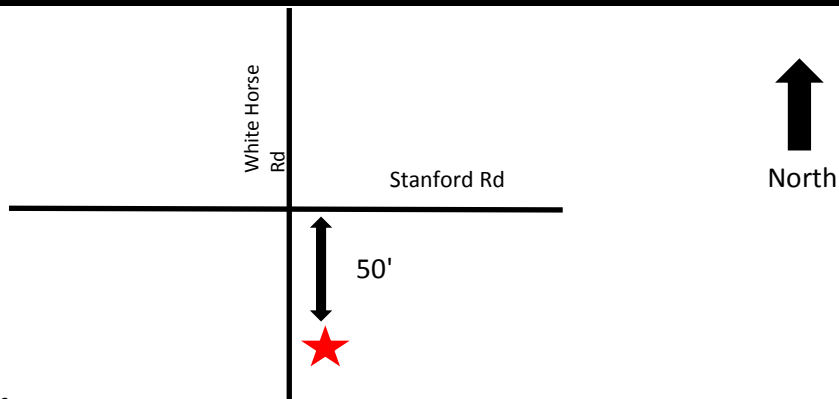
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Mean= 41

Std. Dev= 4

Mode= 39

Sketch of Location:



Comments:



Distance from intersection

Speed Study Data Form

Date: 7/22/2016
Name: Jacob Nelson
City: Greenville
Intersection: Near Black Hawk Road
Approach: Northbound

Speed Limit: 45
Start Time: 10:00 AM
End Time: 11:15 AM
Down Time: -
Weather: Clear, Sunny

Speeds:
 (mph)

49	53	45	45	50	40	48	46	48	54
55	40	46	42	39	44	45	50	45	49
35	51	48	42	37	52	43	46	49	43
45	49	49	42	49	49	50	53	43	47
44	52	45	44	47	53	46	48	39	45
52	46	48	49	46	42	46	41	51	45
47	49	51	47	41	42	45	49	46	48
47	51	53	44	46	47	49	38	43	50
45	47	37	48	49	42	42	41	51	53
47	53	48	45	45	46	47	49	49	41

Key:



Trucks



Buses

15%tile= 42

Mean= 46

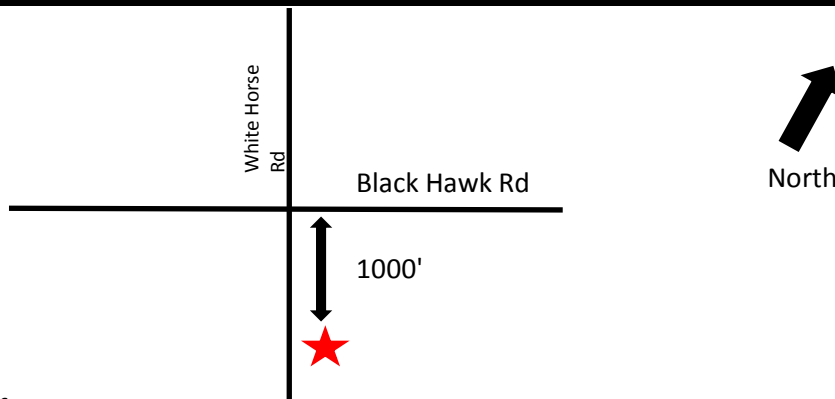
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Std. Dev= 4

85%tile= 51

Mode= 49

Sketch of Location:



Comments:

White Horse Flea Market



Distance from intersection

Speed Study Data Form

Date: 7/25/2016
Name: Jacob Nelson
City: Greenville
Intersection: Near Frontage Rd
Approach: Southbound

Speed Limit: 45
Start Time: 9:15 AM
End Time: 10:30 AM
Down Time: -
Weather: Clear, Sunny

Speeds:
 (mph)

46	46	45	51	48	40	48	46	42	53
44	49	42	48	49	42	45	41	62	54
41	43	50	44	40	49	48	46	44	48
36	45	48	47	41	44	42	43	51	47
43	41	49	44	47	46	45	50	52	40
50	43	53	46	40	44	43	40	46	43
47	37	54	49	49	41	47	46	47	46
46	52	41	48	48	51	49	45	41	53
42	45	44	43	49	41	43	49	44	54
47	43	37	46	47	44	43	46	57	52

Key:



Trucks



Buses

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Mean= 46

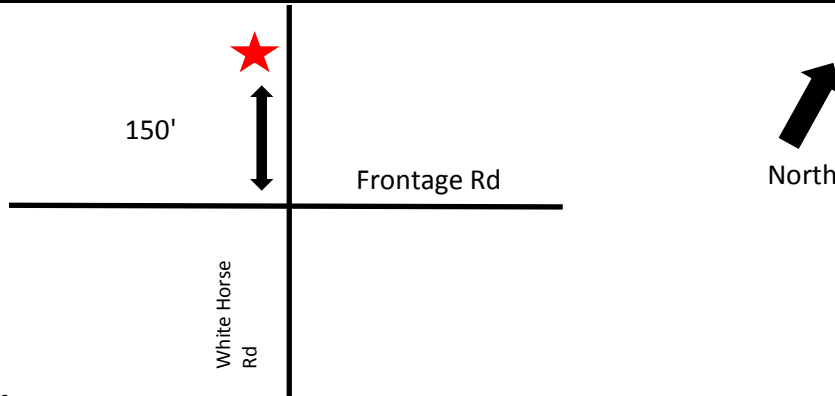
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Std. Dev= 4

85%tile= 50

Mode= 46

Sketch of Location:



Comments:

1705 White Horse Rd



Distance from intersection

Speed Study Data Form

Date: 7/25/2016
Name: Jacob Nelson
City: Greenville
Intersection: Near Black Hawk Road
Approach: Southbound

Speed Limit: 45
Start Time: 10:40 AM
End Time: 11:25 AM
Down Time: -
Weather: Clear, Sunny

Speeds:
 (mph)

43	49	49	56	51	47	47	45	41	48
38	45	54	52	42	49	42	48	42	41
43	41	43	47	46	45	47	54	49	45
50	46	47	50	42	49	48	48	43	51
44	42	38	45	46	48	41	46	42	45
46	48	42	50	47	35	44	48	47	42
42	51	44	46	46	41	40	47	49	43
45	44	40	44	43	52	51	44	50	49
42	41	44	49	44	44	48	49	47	49
46	42	50	52	48	50	45	49	40	42

Key:



Trucks



Buses

15%tile= 42

Mean= 46

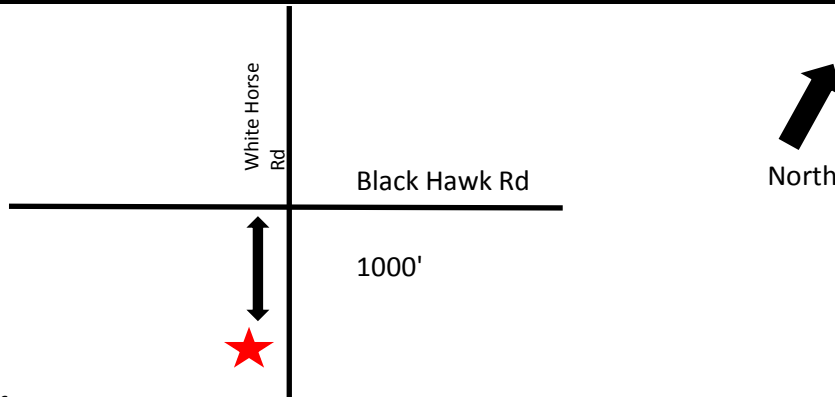
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Std. Dev= 4

85%tile= 50

Mode= 42

Sketch of Location:



Comments:

Citgo across from
 White Horse Flea Market



Distance from intersection

Speed Study Data Form

Date: 7/25/2016
Name: Jacob Nelson
City: Greenville
Intersection: Near E Welcome Rd
Approach: Southbound

Speed Limit: 45
Start Time: 1:25 PM
End Time: 2:15 PM
Down Time: -
Weather: Clear, Sunny

Speeds:
 (mph)

45	39	46	38	46	46	43	37	40	49
41	49	36	37	39	39	50	49	49	41
40	46	45	37	50	42	41	39	47	45
44	51	46	42	47	46	38	43	42	38
36	49	39	42	38	45	43	45	41	47
47	38	44	44	42	42	39	43	43	42
39	45	47	46	46	37	42	41	41	43
45	41	47	50	41	39	44	40	38	44
41	35	42	41	42	42	37	44	49	40
36	48	50	42	40	47	43	42	35	41

Key:



Trucks



Buses

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Mean= 43

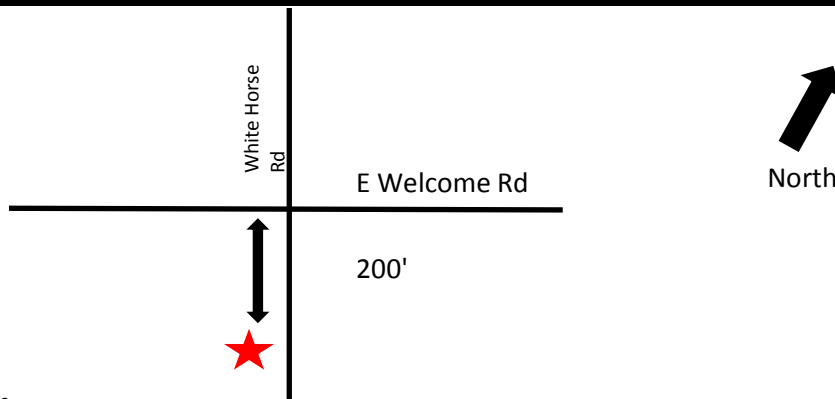
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Std. Dev= 4

85%tile= 47

Mode= 42

Sketch of Location:



Comments:

Papa John's Parking Lot



Distance from intersection

Speed Study Data Form

Date: 7/25/2016
Name: Jacob Nelson
City: Greenville
Intersection: Near Eastbourne Rd
Approach: Southbound

Speed Limit: 45
Start Time: 3:40 PM
End Time: 4:20 PM
Down Time: -
Weather: Clear, Sunny

Speeds:
 (mph)

44	46	43	51	39	48	45	41	48	45
45	51	41	49	38	45	42	47	42	49
43	53	45	51	46	47	44	42	39	43
39	50	47	46	48	41	40	46	44	42
48	52	40	51	49	45	47	49	40	42
47	51	39	48	47	48	44	41	46	43
40	49	48	55	48	46	42	52	45	38
41	50	42	50	46	41	51	47	46	44
53	44	44	43	41	44	41	41	45	45
49	45	46	45	46	47	46	47	49	47

Key:



Trucks



Buses

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Mean= 45

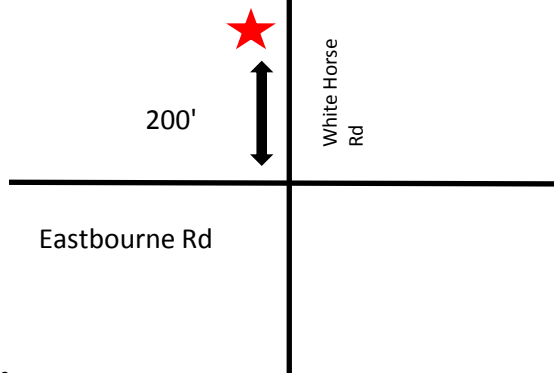
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Std. Dev= 4

85%tile= 49

Mode= 46

Sketch of Location:



Distance from intersection

Comments:

Silver Bay Seafood

Speed Study Data Form

Date: 7/25/2016
Name: Jacob Nelson
City: Greenville
Intersection: Near W Blue Ridge Rd
Approach: Southbound

Speed Limit: 45
Start Time: 2:40 PM
End Time: 3:30 PM
Down Time: -
Weather: Clear, Sunny

Speeds:
 (mph)

40	45	38	42	43	50	42	46	45	47
42	43	45	39	49	45	44	47	46	39
41	44	37	44	46	48	39	41	49	27
43	43	45	45	44	44	41	40	42	41
36	51	38	44	39	40	38	42	42	39
41	42	44	42	45	43	42	47	40	49
51	47	42	37	47	39	44	45	45	45
46	41	43	50	43	42	47	41	40	47
38	44	40	46	41	35	47	39	43	43
51	43	39	44	49	50	44	41	46	41

Key:



Trucks



Buses

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Mean= 43

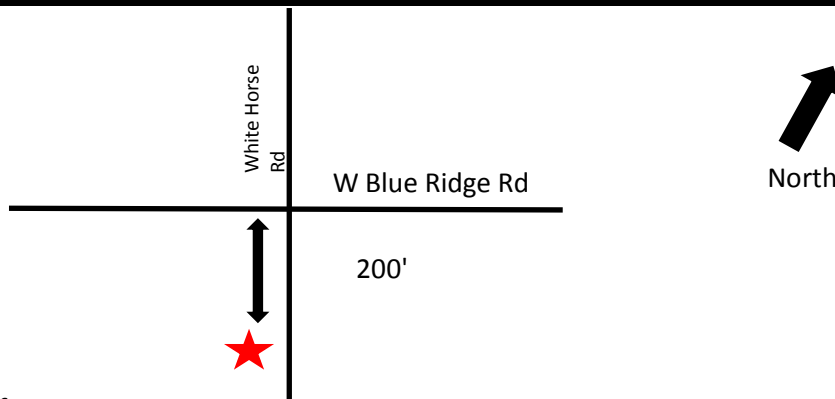
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Std. Dev= 4

85%tile= 47

Mode= 42

Sketch of Location:



Comments:

Fox's Pizza



Distance from intersection

APPENDIX -- k-#-Vuiouy) @o



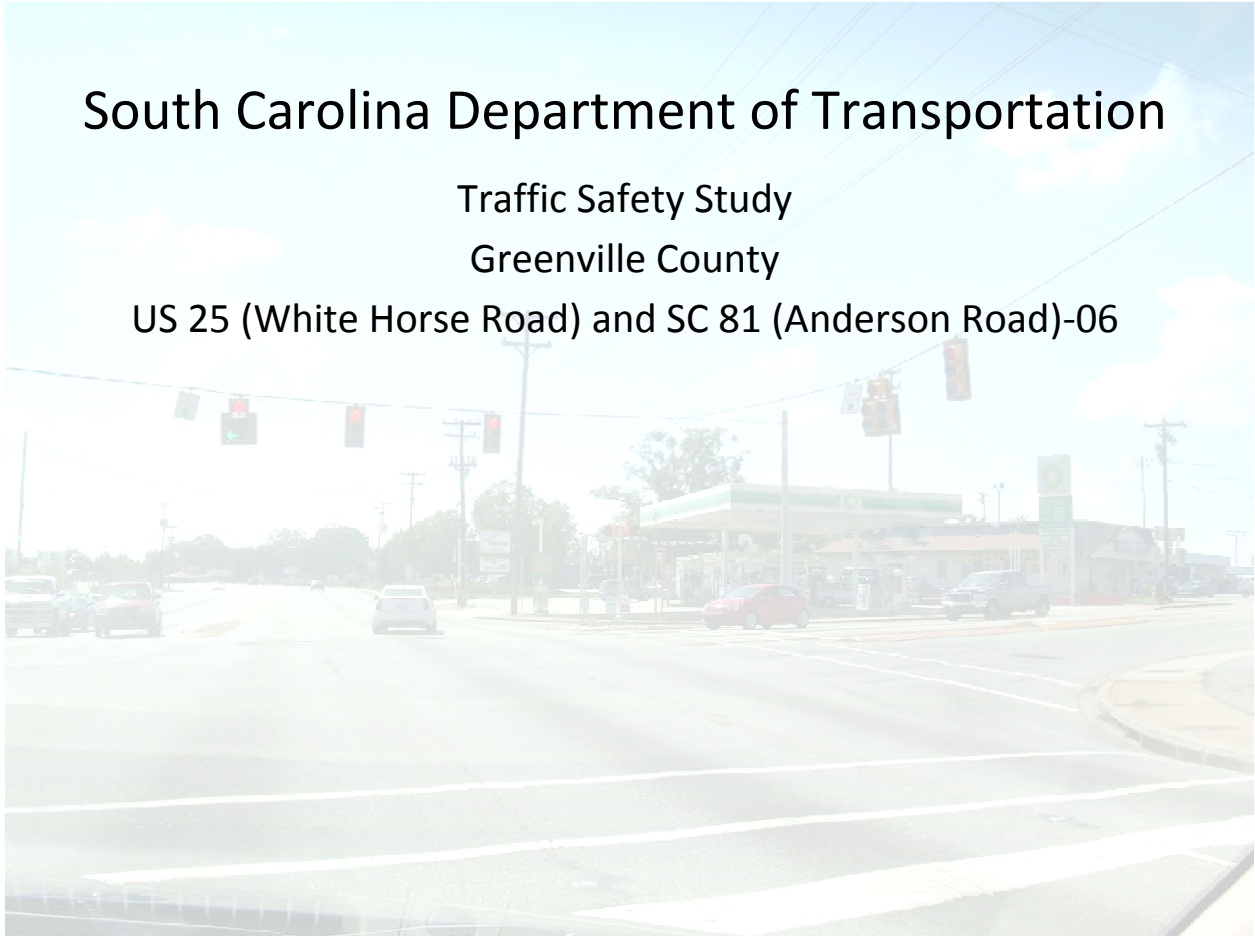
March 2013

South Carolina Department of Transportation

Traffic Safety Study

Greenville County

US 25 (White Horse Road) and SC 81 (Anderson Road)-06



Prepared for:

South Carolina Department of Transportation



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INTRODUCTION

Project Background

The South Carolina Department of Transportation (SCDOT) has requested a comprehensive traffic safety study at 15 signalized intersections in South Carolina. The goal is to identify near-term and long-term considerations based on crash data information and observations in the field. Cost benefits differentiating from the near-term and long-term considerations will be provided to assist the SCDOT in future project planning. This report focuses on the signalized intersection at US 25 (White Horse Road) and SC 81 (Anderson Road) located in Greenville, South Carolina. The intersection is in Greenville County and in the SCDOT's District 3.

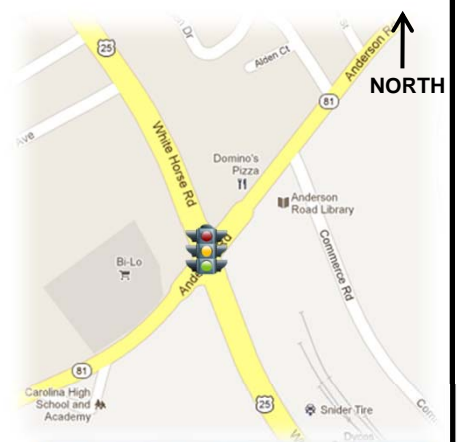
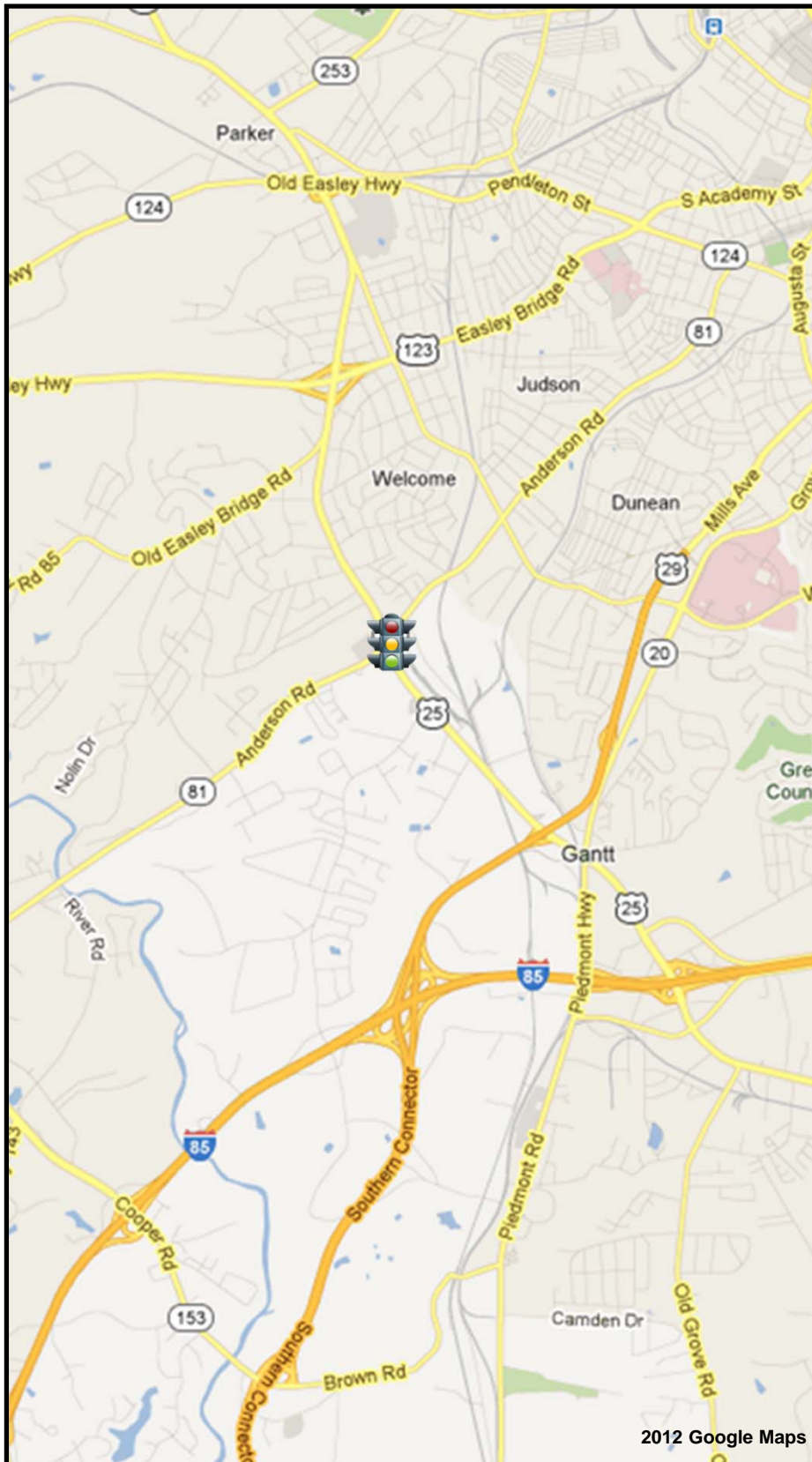
Existing Roadway Characteristics

The signalized intersection is maintained by the SCDOT and controlled by a 170 controller. The signal is running uncoordinated (free or isolated condition). Multiple business driveways are close to the intersection. The two major roadways, White Horse Road and Anderson Road are described below.

US 25 (White Horse Road) is a north-south six-lane roadway divided with a two-way left-turn lane with multiple signals and driveways. The southbound approach carries an AADT of 30,800. The northbound approach carries 31,400 AADT. The truck percentage is 3.6 for the southbound approach and 5.1 for the northbound approach during the AM peak period. During the PM peak period the truck percentage averages are 2.8 for the southbound approach and 2.2 for the northbound approach. The buses on White Horse Road range from 1 to 2 percent of the total volume for both directions during the peak hours. The posted speed limit is 40 mph.

SC 81 (Anderson Road) is a four-lane east-west roadway at the intersection with White Horse Road. The eastbound approach has an AADT of 9500. The roadway geometry of the eastbound approach consists of four lanes with a two-way left-turn lane. The truck and bus percent ranges from 1 to 2 percent for the AM and PM peak periods. The westbound approach has an AADT of 14,300. The roadway geometry of the westbound approach consists of four lanes with a two-way left-turn lane. The posted speed limit is 40 mph.

Figure 1 depicts the location map and study area and **Figure 2** depicts the existing geometry, existing signal phasing, signs, traffic control, layout and configuration of the intersection.



Northbound



Southbound



Eastbound



Westbound

1 mi
1 Km



AECOM

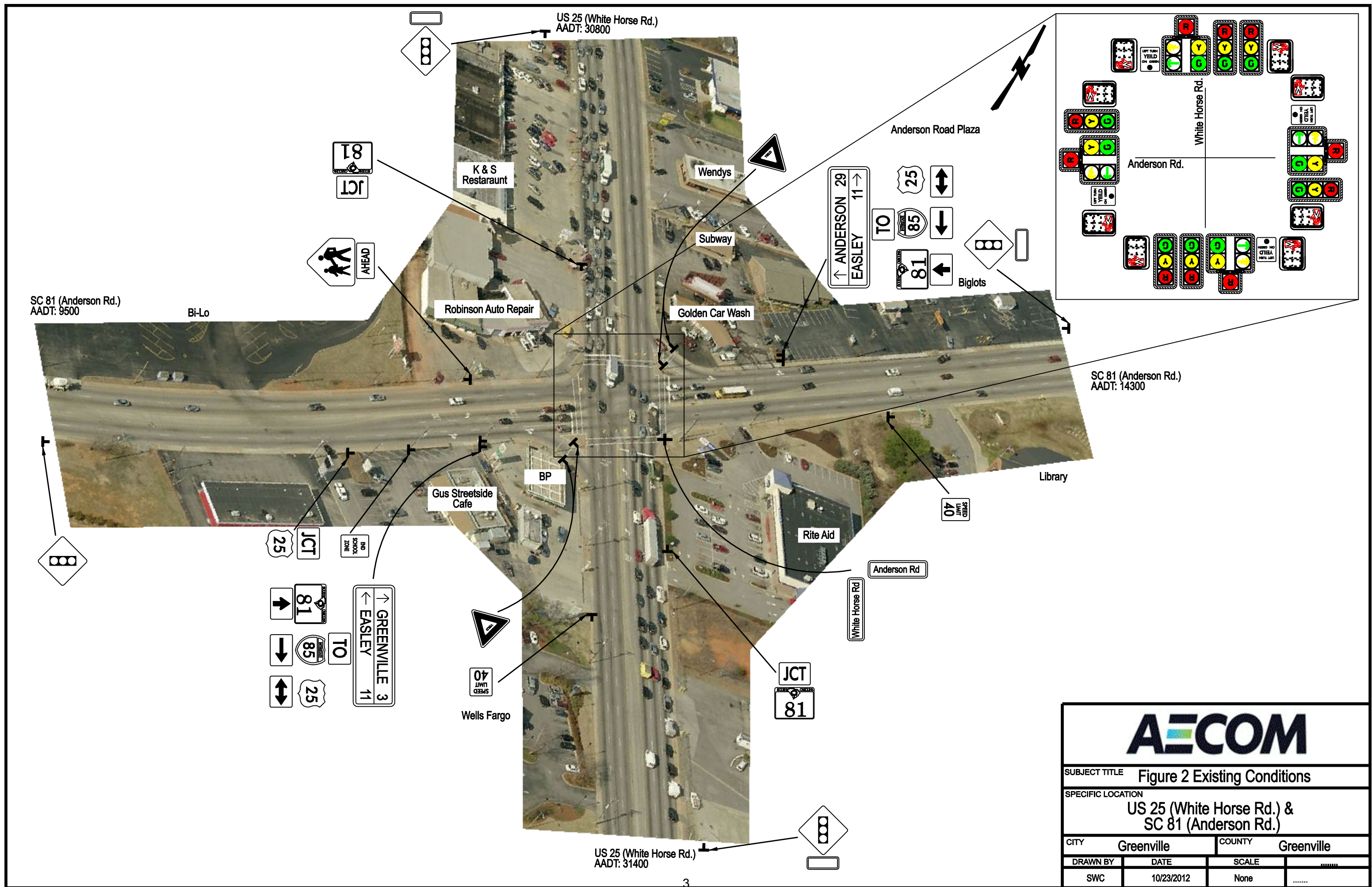
Location Map
SCDOT- US 25 (White Horse Rd) &
SC 81 (Anderson Rd)
Greenville, South Carolina

Project No. 60268052

Date: 9-21-12

Figure

1



AECOM			
SUBJECT TITLE Figure 2 Existing Conditions			
SPECIFIC LOCATION US 25 (White Horse Rd.) & SC 81 (Anderson Rd.)			
CITY	Greenville	COUNTY	Greenville
DRAWN BY	DATE	SCALE	
SWC	10/23/2012	None	

TRAFFIC DATA SUMMARY

Count Data

The intersection turning movement count traffic data at the study intersection was conducted by AECOM. The traffic counts were performed during the 7:00 AM to 9:00 AM and 4:00 PM to 6:00 PM weekday peak periods on September 13, 2012. The traffic counts at the intersection were summarized in 15 minute intervals. The existing traffic count data is shown in **Figure 3**.

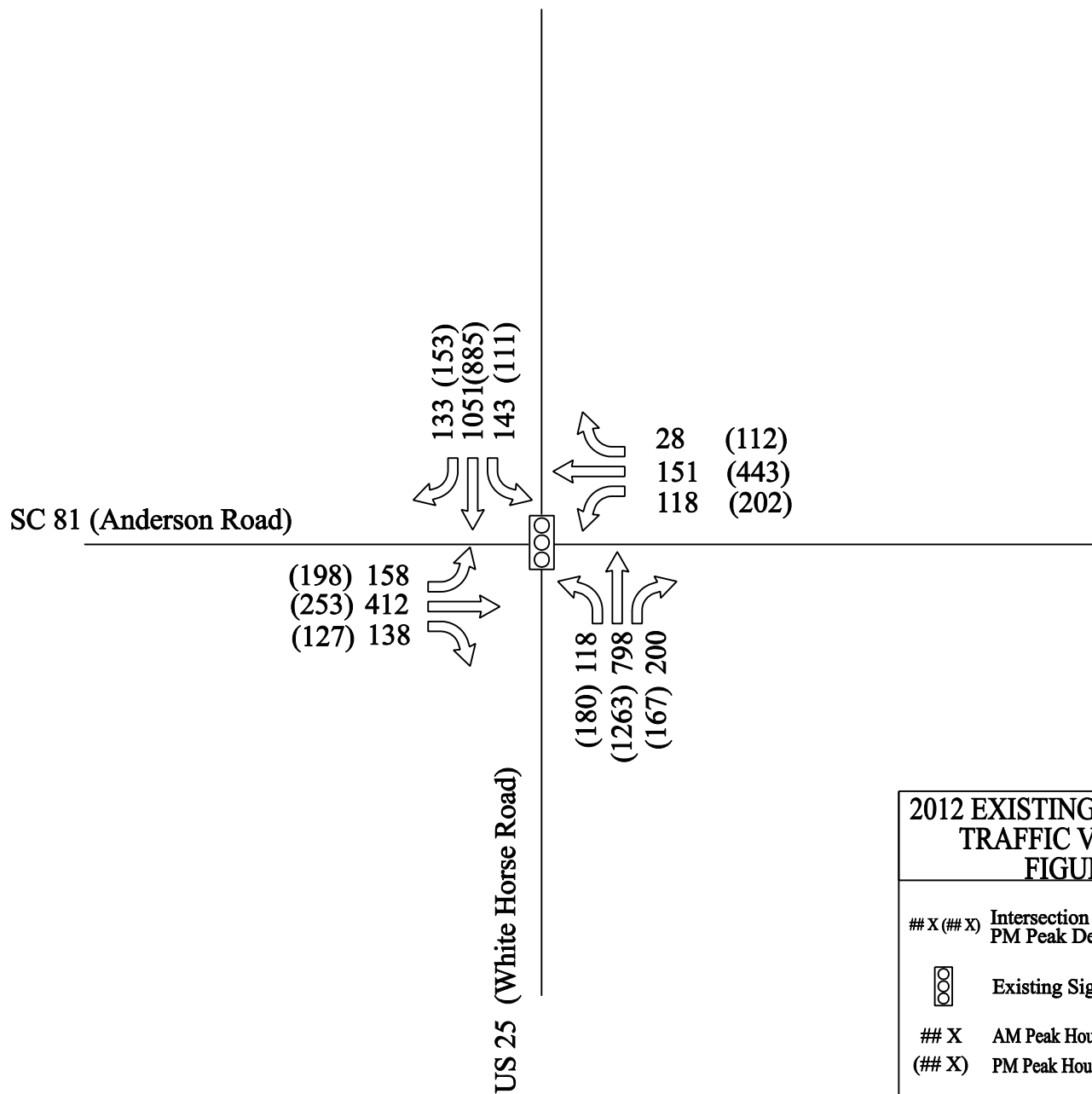
The 15 minute counts were converted into hourly volumes. A right-turn on red count was conducted manually during the traffic count to incorporate a percentage of right-turn on reds for the analysis. The count data along with the right-turn on red count is shown in **Appendix A**.

Weekday Morning Peak (AM): Two hours (7:00 to 9:00 AM) of weekday morning peak hours were analyzed as AM peak hours. The weekday traffic volumes between 7:30 to 8:30 AM were selected as the highest AM peak hour.

Weekday Afternoon Peak (PM): Two hours (4:00 to 6:00 PM) of weekday afternoon peak hours were analyzed. The weekday traffic volumes between 5:00 to 6:00 PM were selected as the highest PM peak hour.

Speed Study

The intersection speed study was conducted by AECOM on September 13, 2012. There were 100 speeds collected at each leg of the intersection using a speed radar gun. A (15th, 50th, and 85th) percentile speeds, mean, standard deviation and mode were determined for each leg. The average speed westbound and eastbound (Anderson Road) was 40 mph with an 85th percentile speed of 43 mph westbound and 44 mph eastbound. The northbound and southbound (White Horse Road) 85th percentile speed was 47 mph with the average speed southbound 44 mph and northbound 43 mph. The 85th percentile speeds for the all directions during the speed study were above the 40 mph posted speed limit. The Speed Study Data Form for each leg of the intersection is shown in **Appendix B**.



EXISTING DELAY AND LOS
20.8 C (25.6 C)

2012 EXISTING PEAK HOUR TRAFFIC VOLUMES FIGURE 3

X (## X) Intersection AM and PM Peak Delay and LOS



Existing Signal

X AM Peak Hour Traffic Volume

(## X) PM Peak Hour Traffic Volume

All Distances in Feet

Drawing Not to Scale

NAME OF INTERSECTION

US 25 (WHITE HORSE ROAD) &
SC 81 (ANDERSON ROAD)

AECOM



OPERATIONAL AND CAPACITY ANALYSIS

An operational and capacity analysis of US 25 (White Horse Road) and SC 81 (Anderson Road) was performed to optimize the existing traffic conditions during the two peak periods of the day. Several cycle lengths were considered ranging from 50 seconds to 150 seconds. Existing traffic volumes (**Figure 3**) were used for weekday traffic.

Analysis Methodology

A series of operational analyses were performed on the study intersection using the existing peak hour traffic data, existing roadway and intersection geometrics, and traffic controls. The operational analysis was performed using Synchro/SimTraffic 7.0 software.

The Synchro software program uses the methodologies presented in the Highway Capacity Manual 2000. The Highway Capacity Manual 2000 (HCM) was developed by the Transportation Research Board (TRB). It contains concepts, guidelines, and procedures for computing the capacity and quality of service of various highway facilities, including freeways, signalized and unsignalized intersections, and rural highways. The HCM is a nationally recognized reference manual, and its use is widely accepted in the design and evaluation of roadway facilities.

SimTraffic was used to create simulations of the study operation, which allows for the examination of the effects arising from a unique combination of traffic conditions, traffic control, and roadway/intersection geometrics throughout a roadway network. SimTraffic calculates a range of performance measures of effectiveness, such as delay per vehicle, directly from the simulations. SimTraffic was primarily used to determine the maximum queue lengths.

At a signalized intersection, the total delay is dependent upon a number of factors, including when a driver approaches the intersection, the driver's position in the queue, and the traffic signal cycle length and green times. The control delay for a signalized intersection is determined for each lane group (e.g. left-turn lane group, through lane group, and right-turn lane group) and aggregated for each approach and for the intersection as a whole.

The HCM defines traffic operations in terms of six levels of service (LOS). Each LOS represents a range of driver delay. **Table 1** presents the LOS criteria for signalized intersections.

Table 1: Level of Service Definitions for Signalized Intersections

LOS	Signalized Intersection	Definition
A	≤10 sec	EXCELLENT. Favorable progression. Many vehicles do not stop at all.
B	10-20 sec	VERY GOOD. Good progression. More vehicles stop than LOS A.
C	20-35 sec	GOOD. Fair progression. Some drivers may wait through more than one red light.
D	35-55 sec	FAIR. Unfavorable progression. Congestion becomes more noticeable.
E	55-80 sec	POOR. Poor progression. Drivers wait through several red lights/cycles. Excessive queue lengths/back-up of vehicles.
F	≥80 sec	FAILURE. Intersection does not have the capacity to handle the number of vehicles arriving at the intersection. Unacceptable delays with continuously increasing queue lengths.

EXISTING OPERATIONAL ANALYSIS**Existing Intersection Timing/Phasing Combination**

SCDOT provided signal timing plans for the study intersection as shown in **Appendix C**. *US 25 (White Horse Road) and SC 81 (Anderson Road)* signal is currently running “free” or in “isolated condition with no set cycle length or splits. The yellow and red times, pedestrian timings are set; green times are chosen by the controller based on the minimum green times, and the gap times for each signal phase. There are protected-permissive left-turns on all approaches.

Intersection Operating Condition with Existing Signal Phasing/Timing

The existing hourly flow and Level of Service (LOS) for the study intersection was calculated based on the average control delay from the four approaches. The Synchro software program was used to summarize the results shown in **Table 2**. The Synchro output files are provided in **Appendix D**.

Table 2: Summary of Delay and LOS for Intersection (Existing)

APPROACH	MOVEMENT	AM Peak		PM Peak	
		Delay (sec)	LOS	Delay (sec)	LOS
Eastbound (SC 81)	Left	25.4	C	67.8	E
	Through	26.4	C	24.8	C
	Right	9.7	A	5.9	A
	Overall	22.9	C	35.7	D
Westbound (SC 81)	Left	28.4	C	32.9	C
	Through	23.9	C	28.6	C
	Right	9.1	A	10.7	B
	Overall	24.3	C	27.1	C
Northbound (US 25)	Left	28.8	C	43.3	D
	Through/Right	18.0	B	22.6	C
	Overall	19.2	B	25.0	C
Southbound (US 25)	Left	24.5	C	30.9	C
	Through/Right	19.7	B	19.5	B
	Overall	20.2	C	20.6	C
INTERSECTION		20.8	C	25.6	C

Deficiencies/Problems of the Existing Timing Plan

The AM and PM peak hours are operating at LOS C. Significant queues were not observed at the intersection.

Existing Crash Data Analysis

A safety and economic loss analysis was conducted at the intersection utilizing the historic crash data. Historic crash data including the Collision Diagram for the most recent three year period (2008-2010) was provided by SCDOT as shown in **Figure 4**. The crash data was examined to determine the frequency and type of crashes that had occurred at the intersections during the three year analysis period.

A summary of the crash diagram analysis is shown in **Table 3**. The potential causal factors were determined from the *National Cooperative Highway Research Program (NCHRP), A Guide for Reducing Collisions at Signalized Intersections* and used to recommend near-term and long-term considerations supported by the crash data. The location numbers that correspond with the crash type are described in the crash diagram analysis shown in **Figure 4**. The majority of the crashes at this intersection are right angle in the intersection including a fatality (involving a bicyclist) at the driveway on the southbound approach (White Horse Road). Rear-end crashes also occurred on the southbound approach (White Horse Road) for vehicles traveling northbound.

In the crash diagram analysis, a thorough look at each type and location of crash was analyzed. The analysis describes in detail by the location of crash, number and type of crash, and potential casual factors and considerations. The considerations are categorized into near-term and long-term recommendations and are shown in more detail in **Figures 5 and 6**.

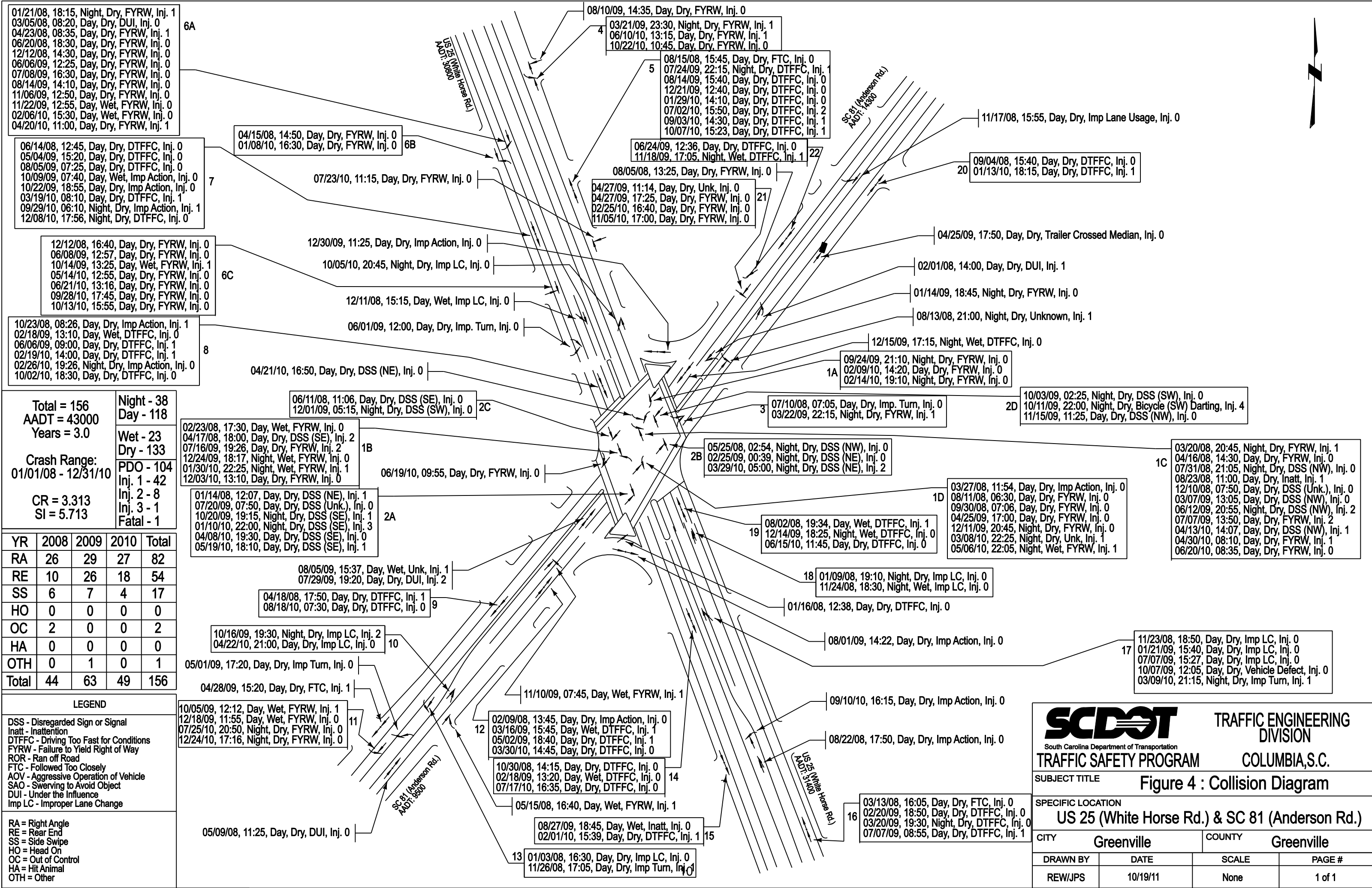


Table 3: Crash Diagram Analysis for US 25 (White Horse Road) at SC 81 (Anderson Road)					
Location of crash	Location # (See Figure 4)	Type of Crash	Potential Causal Factor	Considerations	
				Near-Term	Long- Term
In the Intersection	1A	(3) EB left-turns opposing WB through traffic (FTRW)	Vehicles making left-turn on red, sight distance, no lighting	Adjust yellow, red clearance interval, or Flashing Yellow Arrow (FYA),	Add protected left-turns, install street light
	1B	(6) NB left-turns opposing SB through traffic (FTRW,DSS)	Vehicles making left-turn on red, sight distance	Adjust yellow, red clearance interval, or Flashing Yellow Arrow (FYA)	Widen intersection for better left-turn offset, Add protected left-turns, lighting
	1C	(11) SB left-turns opposing NB through traffic (FTRW,DSS, Inatt)	Vehicles making left-turn on red, sight distance	Adjust yellow, red clearance interval, or Flashing Yellow Arrow (FYA), add protected only left turn, add nearside head NB through	Widen intersection for better left-turn offset, install street light
	1D	(7) WB left-turns opposing EB through traffic (FTRW, Imp Action, Unk)	Vehicles making left-turn on red, sight distance, no lighting	Adjust yellow, red clearance interval, or Flashing Yellow Arrow (FYA)	Add protected left-turns, install street light
	2A	(6) Right Angle EB and SB throughs (DSS)	too many distractions, intersection not coordinated	Adjust red clearance	Install street light
	2B	(3) Right Angle EB and NB throughs (DSS)	too many distractions, intersection not coordinated	Adjust red clearance	Install street light
	2C	(2) Right Angle SB and WB throughs (DSS)	too many distractions, speed	Adjust red clearance	Install street light
	2D	(3) Right Angle NB and WB throughs (DSS)	too many distractions, speed, no lighting	Adjust red clearance	Install street light
	3	(2) Side swipe SB left-turn and NB right-turn (Imp Turn, FYRW)	Vehicles making left-turn on red, sight distance	Adjust yellow, red clearance interval, or Flashing Yellow Arrow (FYA)	
Southbound (White Horse Rd)	4	(4)Right Angle into/out of shopping center (FYRW)	speed, fail to yield right of way	Install right-in/right-out only at Plaza shopping center driveway	Install median on North leg of intersection from signal to just past shopping center driveway
	5	(8) Rear End NB (FTC, DTFFC)	speed	Install sign for Big Lots Shopping Center just before intersection to have motorists turn right at intersection and left into shopping center driveway	Install right turn storage bay for Big Lots shopping center
	6A	(12) Right Angle out of K & S Shopping Center Entrance 2(FYRW, DUI)	speed, sight distance curve	Install right-in/right-out only at shopping center driveway	Install median on North leg of intersection from signal to just past shopping center driveway
	6B	(2) Right Angle into K & S Shopping Center Entrance 2 (FYRW)	speed, crossing too many lanes	Install right-in/right-out only at shopping center driveway	Install left-over for left-turns into the shopping center driveway
	6C	(7) Right Angle out of K & S Shopping Center Entrance 1 (FYRW)	speed, crossing too many lanes	Install right-in/right-out only at shopping center driveway	Install median on North leg of intersection from signal to just past K & S shopping center driveway
	7	(8) Rear End SB (DTFFC, Imp Action)	speed, too many distractions, Intersection not coordinated	Adjust red clearnace	Install right turn storage bay for K & S shopping center
	8	(6) Rear End SB (DTFFC, Imp Action)	speed, sight distance curve	"Signal Ahead" warning sign recently installed	
Eastbound(Anderson Rd)	9	(2) Rear End WB (DTFFC)	speed	Install larger "Signal Ahead" warning sign and add name plate	
	10	(2) Side Swipe (Imp LC)	too many distractions, worn pavement markings	Re-paint lane lines to make them more visible	
	11	(4) Right Angle out of Bi-Lo shopping center	speed, sight distance curve	Install right-in/right-out only at shopping center driveway	Install median on West leg of intersection from signal to just past shopping center driveway
	12	(4) Rear End EB (DTFFC, Imp Action)	speed, signal not coordinated	Adjust red clearnace, add name plate to exisitng "Signal Ahead" warning sign	
	13	(2) Right Angle in TWLTL (Imp Turn, Imp LC)	too many distraction, inattention, worn pavement markings	Re-paint lane lines to make them more visible	Install median on West leg of intersection from signal to just past shopping center driveway
Northbound (White Horse Rd)	14	(3) Rear End SB (DTFFC)	speed, too many distractions		
	15	(2) Rear End SB (DTFFC, Inatt)	speed, too many distractions		
	16	(4) Rear End NB (FTC, DTFFC)	speed, too many distractions	Install nearside signal head	
	17	(5) Side Swipe (Imp LC, Imp Turn)	worn pavement lane markings	Re-paint lane lines to make them more visible	Overhead lane marking signs
	18	(2) Side Swipe (Imp LC)	worn pavement lane markings	Re-paint lane lines to make them more visible	Overhead lane marking signs
	19	(3) Rear End NB (DTFFC)	speed, signal not coordinated	Adjust red clearnace	
Westbound (Anderson Rd)	20	(2) Rear End NB at Library Entrance (DTFFC)	speed, driveway	Install Advance Library Sign	
	21	(4) Right Angle out of Subway shopping center (FYRW, Unk)	driveway very close to intersection	Install right-in/right-out only at Subway driveway	Install median on the East leg of intersection from signal to end of left-turn taper
	22	(2) Rear End WB at Subway Entrance (DTFFC)			

CAPACITY ANALYSIS PROPOSED IMPROVEMENTS SUMMARY

The signal timing/phasing combination at all the study intersections were modified and/or revised to address the operational and safety deficiencies. The timing has been revised from optimized existing operation to an optimized proposed operation.

The AM and PM Improvements include:

1. Increasing yellow times and red times
2. Adding protected only left turns for the Southbound left-turns

The operational condition results (intersection delay and LOS) at the study intersection during peak times of day are summarized in **Table 4**. The Synchro output files are provided in **Appendix F**.

Table 4: Summary of Delay and LOS for Intersection (Proposed)

APPROACH	MOVEMENT	AM Peak		PM Peak	
		Delay (sec)	LOS	Delay (sec)	LOS
Eastbound (SC 81)	Left	26.0	C	46.6	D
	Through	39.9	D	38.2	D
	Right	20.2	C	9.8	A
	Overall	32.9	C	34.7	C
Westbound (SC 81)	Left	26.4	C	33.3	C
	Through	36.1	D	44.6	D
	Right	12.6	B	22.6	C
	Overall	30.1	C	38.3	D
Northbound (US 25)	Left	28.8	C	29.7	C
	Through/Right	30.2	C	36.3	D
	Overall	30.0	C	35.6	D
Southbound (US 25)	Left	70.1	E	72.5	E
	Through/Right	30.4	C	31.5	C
	Overall	34.7	C	35.5	D
INTERSECTION		32.4	C	36.0	D

The results show the intersection is expected to operate at LOS C for the AM peak and LOS D for the PM peak with more overall delay.

The signal timing/phasing combination at all the study intersections were modified and/or revised to address the safety deficiencies.

Table 5 shows the effects of the safety improvements in overall delay comparing the existing delay and LOS to the proposed improvements.

Table 5: Comparison of Existing and Proposed Improvements Delay and LOS

APPROACH	AM Peak		PM Peak	
	Existing Delay (LOS)	Proposed Delay (LOS)	Existing Delay (LOS)	Proposed Delay (LOS)
Eastbound (SC 81)	22.9 C	32.9 C	35.7 D	34.7 C
Westbound (SC 81)	24.3 C	30.1 C	27.1 C	38.3 D
Northbound (US 25)	19.2 B	30.0 C	25.0 C	35.6 C
Southbound (US 25)	20.2 C	34.7 C	20.6 C	35.5 C
INTERSECTION	20.8 C	32.4 C	25.6 C	36.0 D

Overall, the results do not show improvements in delay when compared with existing conditions, mostly due to the addition of protected left turns for the SB left turn traffic; however, the intersection is expected to operate at the same LOS with added safety benefits. The safety analysis of this intersection recommended changing the permissive left-turns into protected only left-turns for the southbound approach of the intersection. The red and yellow clearance times for all directions were increased to coincide with the SCDOT's Signal Design Guidelines. The bold recommended yellow and red times are expected to provide sufficient time separating the phases. **Table 6** shows the recommended clearance timings.

Table 6: Red and Yellow Clearance Times

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Existing Yellow	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.5	4.0	4.5
Recommended Yellow	4.9	4.9	4.9	4.1	4.1	4.1	4.4	4.4	4.2	4.2
Existing Red	1.0	2.0	2.0	1.0	2.0	2.0	1.0	1.5	1.0	1.5
Recommended Red	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2

Table 7 shows the Synchro/Sim Traffic recommended storage versus existing storage for the left-turn lanes on all approaches using the existing data (**Appendix D**).

Table 7: Storage Lengths for Left-turn Lanes

Storage (ft)	Eastbound Left (SC 81)		Westbound Left (SC 81)		Northbound Left (US 25)		Southbound Left (US 25)	
	AM	PM	AM	PM	AM	PM	AM	PM
Existing	200		200		250		250	
Existing 95 th Queue	151	235	162	203	106	141	109	82
Proposed 95 th Queue	144	224	126	177	95	172	178	135

- Left-turn queuing is projected to exceed the provided storage for the eastbound approach. This long-term improvement includes:

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1. A long-term improvement to restripe the eastbound left-turn storage on White Horse Road from 200 feet to 225 feet to accommodate the PM peak 224 foot 95th queue. The left-turn storage can be extended into the existing two-way left-turn lane.

Proposed Cycle Lengths

For the proposed cycle lengths, the recommended optimized cycle length is 120 seconds for the AM and PM peak periods.

NEAR-TERM AND LONG-TERM CONSIDERATIONS

Recommended considerations were determined by studying the crash data including the number of crashes, location of crash, type of crash, and potential causal factor and using the NCHRP as a resource. After this data was analyzed, near-term and long-term recommended considerations were determined. The following considerations were determined using **Figure 4** and summarized in **Table 3**. The considerations are shown in **Figures 5** and **6**.

Near-Term Considerations (refer to Figures 4 and 5 for the numbering scheme below and the corresponding considerations)

In the Intersection

- **1A, 1B, 1C, 1D, 3** – Flashing Yellow Arrows (FYA): There were a total of 27 crashes involving left-turning traffic colliding with the opposing straight through traffic in the intersection. FYAs are recommended in all directions of this intersection. Flashing yellow arrows are proven safer and more effective installations for protected-permissive left-turns according to a National Study (*NCHRP Report 493*).
- **1A, 1B, 1C, 1D, 3** - Adjust red and yellow clearance intervals. The red and yellow times are currently set with insufficient clearance times according to the SCDOT's most recent Signal Design Guidelines suggest. **Table 4** shows the existing versus recommended yellow and red times for the intersection
- **1C** - The southbound left-turn opposing northbound through traffic has a total of 11 right angle crashes. Eight crashes in three years is one of the criteria for warranting a protected-only left-turn phase according to the 'Manual on Uniform Traffic Control Device (MUTCD). Also, a northbound nearside head is recommended even though there is adequate stopping sight distance according the 2011 AASHTO Greenbook. Since the left-turn crash volume warrants, it is recommended to install a protected-only signal head for the southbound left-turn.
- **2A, 2B, 2C, 2D** – Adjust red clearance intervals. The red times are currently set with insufficient clearance times according to the SCDOT's most recent Signal Design Guidelines suggest. **Table 4** shows the existing versus recommended red times for the intersection.

Southbound (White Horse Road)

- **4** - A right-in right-out only movement from the Bi-Lo driveway using a concrete median is recommended. Restricting left-turns out of and into the Anderson Road Plaza driveway is expected to eliminate the 4 right angle crashes.
- **5** – There are 8 rear-end crashes just past the intersection at the Anderson Road Plaza driveway from cars stopping to turn right into the shopping center driveway. There are

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high speeds on White Horse Road. Install an advanced shopping center sign to re-direct traffic to turn right at the intersection and then left into the shopping center.

- **6A, 6B, 6C** - A right-in right-out only movement from the K & S driveways using a concrete median is recommended. Restricting left-turns out of and into the K & S driveway entrance one will eliminate the 7 right angle crashes and driveway entrance two will eliminate the 14 right angle crashes.
- **7** - Adjust red clearance intervals. The red times are currently set with insufficient clearance times according to the SCDOT's most recent Signal Design Guidelines suggest. **Table 4** shows the existing versus recommended red times for the intersection.
- **8** - A 'Signal Ahead' advanced warning sign was recently installed. This sign is expected to address the 6 rear-end crashes leading up to the intersection.

Eastbound (Anderson Road)

- **9, 12** - Install a larger advanced signal ahead warning sign W3-3 with name plate 'White Horse Road' to give motorists advance warning of the approaching intersection. There are 6 rear end crashes approaching the intersection. Picture 1 shows the eastbound view approaching this intersection; the small advance signal sign is just pasted the crosswalk sign.



Picture 1

- **10, 13** - Restripe pavement markings: There are side swipe and right angle crashes due to improper lane changes and poor pavement marking conditions. Newly painted

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pavement markings including arrows, stop bar and lane lines are expected to help motorists become more aware of the laneage when approaching the intersection.

- **11** - A right-in right-out only movement from the Bi-Lo driveway using a concrete median is recommended. Restricting left-turns out of and into the Bi-Lo driveway is expected to eliminate the 4 right angle crashes.
- **12** - Adjust red clearance intervals. The red times are currently set with insufficient clearance times according to the SCDOT's most recent Signal Design Guidelines. **Table 4** shows the existing versus recommended red times for the intersection.

Northbound (White Horse Road)

- **16** – Install a nearside signal ahead to warn drivers of upcoming signal and to provide adequate time to stop. This sign is expected to address the 4 rear-end crashes leading up to the intersection.
- **17, 18** - Restripe pavement markings: There are 7 side swipe crashes due to improper lane changes and poor pavement marking conditions. Newly painted pavement markings including arrows, stop bar and lane lines are expected to help motorists become more aware of the laneage when approaching the intersection.
- **19** - Adjust red clearance intervals. The red times are currently set with insufficient clearance times according to the SCDOT's most recent Signal Design Guidelines. **Table 4** shows the existing versus recommended red times for the intersection.

Westbound (Anderson Road)

- **20** – Install an advanced 'Library' sign to address the 2 rear-end crashes leading up to the library driveway.
- **21** - A right-in right-out only movement from the Subway driveway using a concrete median is recommended. Restricting left-turns out of and into the Subway driveway is expected to eliminate the 2 right angle crashes

Long-Term Considerations (refer to Figures 4 and 6 for the numbering scheme below and the corresponding considerations)

In the Intersection

- **1A, 1B, 1C, 1D, 2A, 2B, 2C, 2D** – There are a total of 17 right angle crashes in the intersection occurring at night. There is no lighting around the area and therefore it should be considered.
- **1A, 1B, 1C, 1D** – A consideration to widen all four legs of the intersection to offset the left-turn lanes is expected to help reduce the right angle crashes in the intersection. The offset left-turn lanes are expected to enhance visibility for the left-turning drivers allowing them to make better decisions when selecting gaps in the opposing through traffic stream.

1A - The eastbound left-turn opposing westbound through traffic has a total of 3 right angle crashes. Eight crashes in three years is one of the criteria for warranting a protected-only left-turn phase. During the AM peak hour, there are 158 vehicles turning left with 151 opposing through vehicles. During the PM peak hour, there are 198 vehicles turning left with 443 opposing through vehicles.

1B - The northbound left-turn opposing southbound through traffic has a total of 6 right angle crashes. Eight crashes in three years is one of the criteria for warranting a protected-only left-turn phase. During the AM peak hour, there are 118 vehicles turning left with 1051 opposing through vehicles. During the PM peak hour, there are 180 vehicles turning left with 885 opposing through vehicles.

- **1D** – The westbound left-turn opposing eastbound through traffic has a total of 7 right angle crashes. Eight crashes in three years is one of the criteria for warranting a protected-only left-turn phase and therefore should be considered. During the AM peak hour, there are 118 vehicles turning left with 412 opposing through vehicles. During the PM peak hour, there are 202 vehicles turning left with 235 opposing through vehicles.

Southbound (White Horse Road)

- **4, 6A, 6C** - There is unlimited access to driveways and no turn lanes creating several conflict points. It is recommended that an approximate 380 foot concrete median be constructed from the stop bar northward just passed the second K & S driveway entrance.
- **5** – Construct a northbound right-turn lane for vehicles turning into the Big Lots shopping center to address the 8 rear end crashes. We do not have turning volume counts at this location as this consideration is primarily driven by the number of rear end collisions.

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- **6B** – Construct a left-over into the second K & S driveway entrance. This will allow refuge for the left-turning traffic into the K & S shopping center, but will restrict the left-turns out.
- **7** – Construct a southbound right-turn lane for vehicles turning the K & S shopping center and to help address the 8 rear end crashes. We do not have turning volume counts at this location as this consideration is primarily driven by the number of rear end collisions.

Eastbound (Anderson Road)

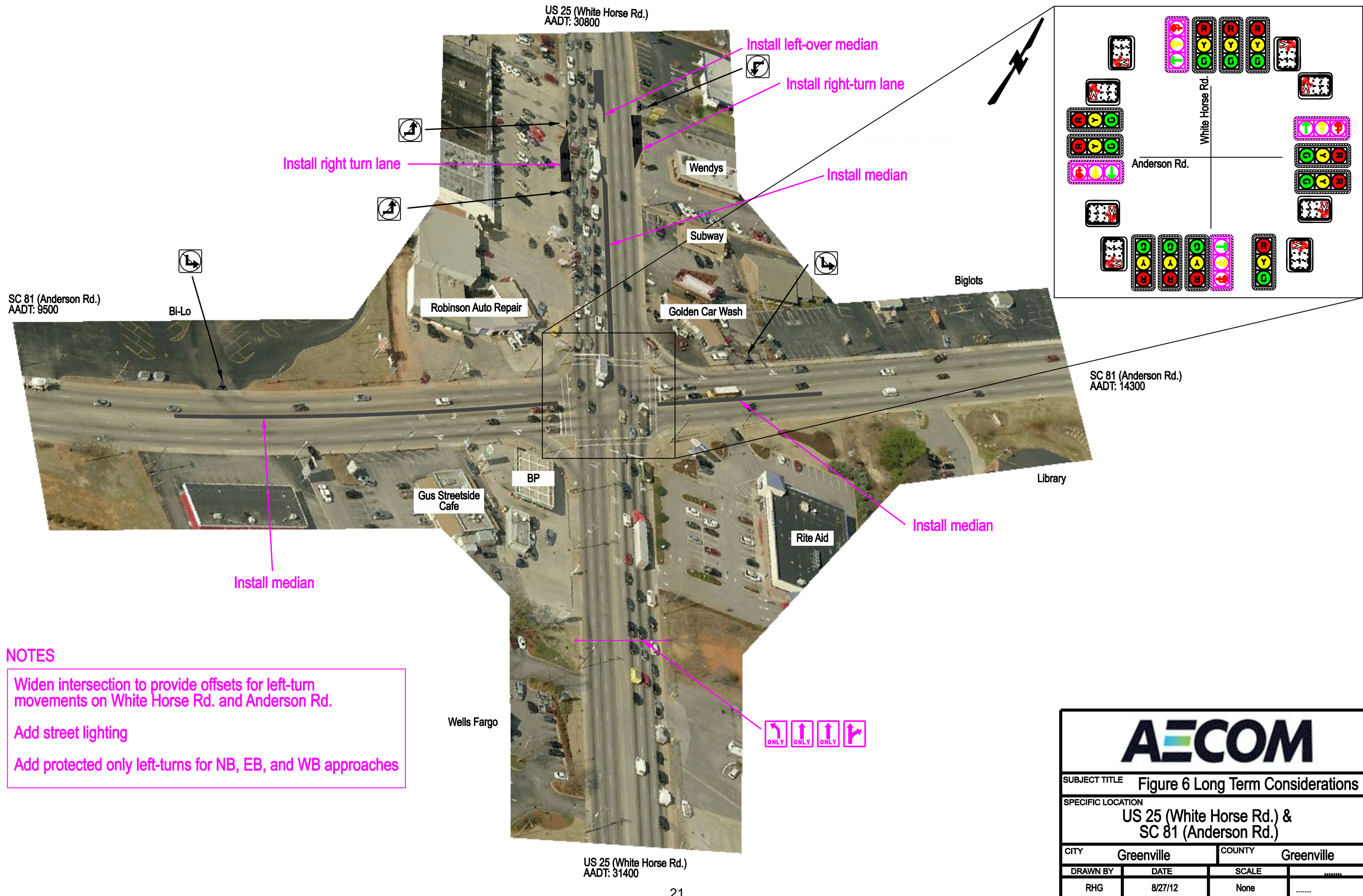
- **11, 13** - There is unlimited access to driveways and no turn lanes creating several conflict points. It is recommended that an approximate 430 foot concrete median be constructed from the stop bar westward just passed the Bi-Lo shopping center entrance.

Northbound (White Horse Road)

- **17, 18** - Installing overhead lane marking signs is recommended to address the 7 side swipe northbound crashes. The signs are expected to guide for motorists into the correct lane when approaching the intersection.

Westbound (Anderson Road)

- **21** - There is unlimited access to driveways and no turn lanes creating several conflict points. It is recommended that an approximate 250 foot concrete median be constructed from the stop bar eastward just passed the left-turn storage lane.



Economic Analysis

Overview and Implementation

An evaluation of the proposed considerations using an economic analysis to determine the benefit cost (B/C) ratio was requested by SCDOT. The purpose of the benefit cost ratio is to analyze the cost benefit associated with reducing crashes upon installation of the considerations. The greater the B/C ratio, the more benefits and cost savings for SCDOT. The benefits of installing the considerations include reducing the number of crashes and their severity. The costs occur in the design, implementation, operation and maintenance of the considerations. Since each crash is associated with a cost, any reduction in crashes provides savings. The type of crash and its associated cost are determined by SCDOT using property losses and monetary value of lost quality of life.

The Crash Reduction Factor (CRF) is the percent of crashes reduced for a given consideration. The CRF is used for specific types of crashes and the consideration determined to improve that type of crash. The B/C ratio, Crash Reduction Factor, and net benefit calculations are developed from SCDOT equations. The equations used are shown in the cost justification analysis **Appendix E**.

Results

Table 8 shows the considerations ranked by B/C ratio including the annual cost, annual benefit, and net benefit. The intersection did experience one injury 3 and one fatal crash. The majority of the crashes were PDO (no injury) and Injury 1 with very few Injury 2 type crashes. The greatest benefit savings based on cost would be to increase the red clearance interval on the White Horse Road approaches. Three considerations (Coordinate signals on White Horse Road, provide law enforcement along white horse road, and offset left-turns on Anderson Road) calculated a negative net benefit; therefore, they were not considered for near-term or long-term considerations.

Table 8: Economic Analysis: US 25 (White Horse Rd) @ SC 81 (Anderson Rd) Benefit / Cost Analysis Summary Table

Considerations	Annual Cost	Annual Benefit	Net Benefit	B/C
Increase the Red Clearance Interval on White Horse Road approaches	\$41	\$15,060	\$15,019	367.32
Install Advance Warning Sign EB Approach (Anderson Rd) 'Signal Ahead'	\$51	\$7,920	\$7,869	155.29
Improve Street Lighting on All Approaches	\$1,750	\$212,040	\$210,290	121.17
Increase the Red Clearance Interval on Anderson Road approaches	\$41	\$4,020	\$3,979	98.05
Provide a Protected Only SB (White Horse Rd) Left-turn Phase	\$260	\$14,210	\$13,950	54.65
Install 'No Left-turn' Sign and Right-In and Right-Out at Northern Shopping Center Driveway onto White Horse Rd	\$85	\$3,542	\$3,457	41.67
Increase the Yellow Change Interval on White Horse Rd Approaches	\$41	\$1,410	\$1,369	34.39
Provide a Protected Only NB (White Horse Rd) Left-turn Phase	\$260	\$8,738	\$8,478	33.61
Install Library Guide Sign prior to Driveway	\$51	\$1,380	\$1,329	27.06
Provide a Protected Only WB (Anderson Rd) Left-turn Phase	\$260	\$4,247	\$3,987	16.33
Install "No Left-turn" Sign and Right-in Right-out at Southern Shopping Center Driveway onto White Horse Rd	\$85	\$1,375	\$1,290	16.18
Install a 100' NB Right-turn lane into Big Lots Shopping Center	\$2,161	\$31,265	\$29,104	14.47
Install "No Left-turn" Sign and Right-in Right-out at First Bi-Lo Driveway onto Anderson Rd	\$85	\$1,208	\$1,123	14.22
Install "No Left-turn" Sign and Right-in Right-out at Subway Driveway onto Anderson Rd	\$85	\$1,208	\$1,123	14.22
Install "No Left-turn" Sign and Right-in Right-out North of Wendys onto White Horse Rd	\$136	\$1,917	\$1,781	14.09
Increase the Yellow Change Interval on Anderson Rd Approaches	\$132	\$1,695	\$1,563	12.84
Repaint Eastbound Approach on Anderson Rd	\$61	\$630	\$569	10.33
Repaint Northbound Approach on White Horse Road	\$61	\$525	\$464	8.61
Install a 100' SB Right-turn lane into K & S Diner/Shopping Center	\$2,161	\$15,210	\$13,049	7.04
Install Raised Median on White Horse Rd (North Leg)	\$1,216	\$6,833	\$5,617	5.62
Install Flashing Yellow Arrow on Each Approach	\$1,250	\$6,853	\$5,603	5.48
Install Raised Median on Anderson Rd (West Leg)	\$1,216	\$3,042	\$1,826	2.50
Install Raised Median on Anderson Rd (East Leg)	\$675	\$1,375	\$700	2.04
Provide a Protected Only EB (Anderson Rd) Left-turn Phase	\$260	\$490	\$230	1.88
Install Overhead Lane Designation Signs on NB Approach (White Horse Rd)	\$511	\$880	\$369	1.72
Install Northbound Nearside Signal Head on White Horse Road	\$260	\$389	\$129	1.50
Offset Left-turns on White Horse Road	\$6,754	\$7,493	\$739	1.11
Coordinate Signals on White Horse Road	\$2,645	\$2,266	(\$379)	0.86
Provide Law Enforcement Along White Horse Road	\$20,452	\$6,960	(\$13,492)	0.34
Offset Left-turns on Anderson Road	\$5,403	\$1,547	(\$3,856)	0.29

NEAR-TERM AND LONG-TERM ACTION PLAN

An economic analysis was established for each consideration to determine if the near-term and long-term considerations were economically feasible. The analysis calculates the annual cost, annual benefit, net benefit and benefit to cost (B/C) ratio for each consideration. The cost analysis per item is shown in **Appendix E**.

The majority of the recommended considerations calculated a positive B/C ratio to generate savings for the SCDOT. The considerations with negative B/C ratio were removed from the recommended considerations and action plan. The Benefit/Cost Summary Table is shown in **Table 8**.

The following near-term considerations are expected to have an installation period of less than 6 months and total cost less than \$10,000. It is recommended that the following be implemented as soon as possible.

Near-term Action Items	Total Cost
Increase the Red Clearance Interval on White Horse Road approaches	\$200
Install Advance Warning Sign EB Approach (Anderson Rd) 'Signal Ahead'	\$250
Increase the Red Clearance Interval on Anderson Road approaches	\$200
Provide a Protected Only SB (White Horse Rd) Left-turn Phase	\$2,500
Install 'No Left-turn' Sign and Right-In and Right-Out at Northern Shopping Center Driveway (NW Corner) onto White Horse Rd	\$875
Increase the Yellow Change Interval on White Horse Rd Approaches	\$200
Install Library Guide Sign prior to Driveway on Anderson Rd	\$250
Install "No Left-turn" Sign and Right-in Right-out at Southern Shopping Center Driveway (NW Corner) onto White Horse Rd	\$875
Install "No Left-turn" Sign and Right-in Right-out at First Bi-Lo Driveway onto Anderson Rd	\$875
Install "No Left-turn" Sign and Right-in Right-out at Subway Driveway onto Anderson Rd	\$875
Install "No Left-turn" Sign and Right-in Right-out North of Wendys onto White Horse Rd	\$1,125
Increase the Yellow Change Interval on Anderson Rd Approaches	\$400
Repaint Eastbound Approach on Anderson Rd	\$300
Repaint Northbound Approach on White Horse Road	\$300
Install Overhead Lane Designation Signs on NB Approach (White Horse Rd)	\$2,500
Install Northbound Nearside Signal Head on White Horse Road	\$2,500

The near-term action items are listed in order of highest to lowest B/C ratio. The total cost of these items is \$13,350. These may all be installed with minimal technical evaluation and under a 6 month time period.

The following items are considered long-term because they are expected to take more than 6 months for installation or cost of over \$10,000 needing further technical evaluation. They are also listed by decreasing B/C ratio.

US 25 and SC 81 SCDOT Safety Project (Greenville County) - 06

Long-term Action Items	Total Cost
Improve Street Lighting on All Approaches	\$12,000
Provide a Protected Only NB (White Horse Rd) Left-turn Phase	\$2,500
Provide a Protected Only WB (Anderson Rd) Left-turn Phase	\$2,500
Install a 100' NB Right-turn lane into Big Lots Shopping Center	\$40,000
Install a 100' SB Right-turn lane into K & S Diner/Shopping Center	\$40,000
Install Raised Median on White Horse Rd (Southbound)	\$22,500
Install Flashing Yellow Arrow on Each Approach	\$12,000
Install Raised Median on Anderson Rd (Eastbound)	\$22,500
Install Raised Median on Anderson Rd (Westbound)	\$12,500
Provide a Protected Only EB (Anderson Rd) Left-turn Phase	\$2,500
Offset Left-turns on White Horse Road	\$125,000

These long-term action items will cost \$294,000 to implement.

The protected only NB, SB, WB left-turn phase recommendations are categorized as long-term rather than near-term because this consideration is not warranted based on the three years of crash data.



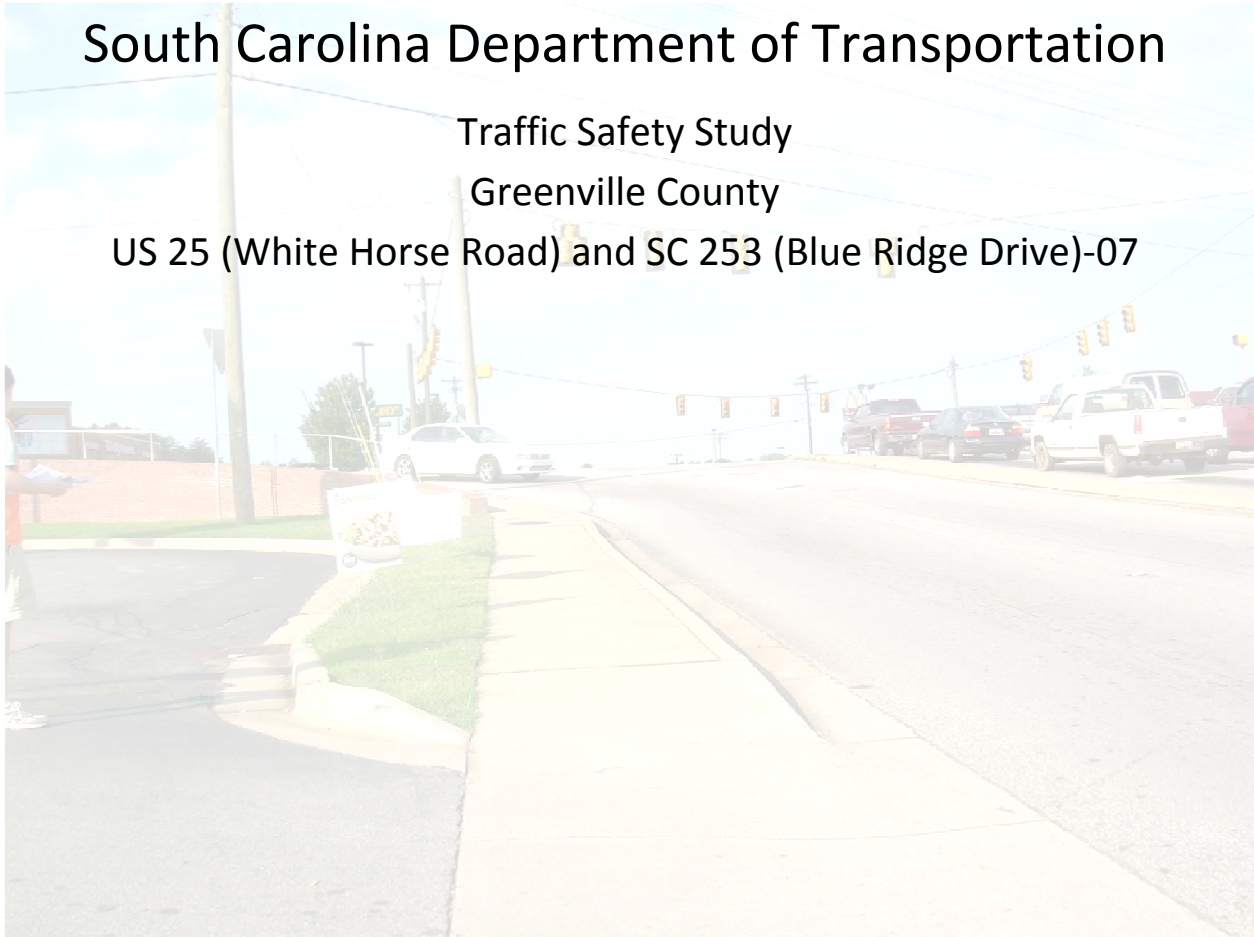
March 2013

South Carolina Department of Transportation

Traffic Safety Study

Greenville County

US 25 (White Horse Road) and SC 253 (Blue Ridge Drive)-07



Prepared for:

South Carolina Department of Transportation



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INTRODUCTION

Project Background

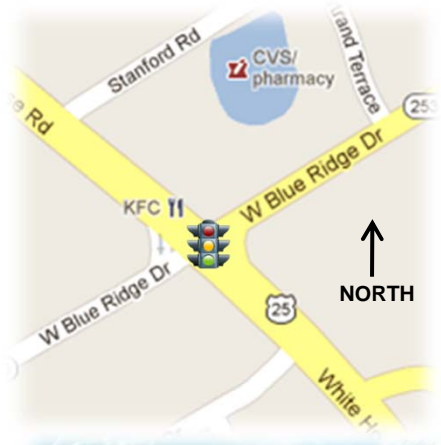
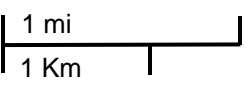
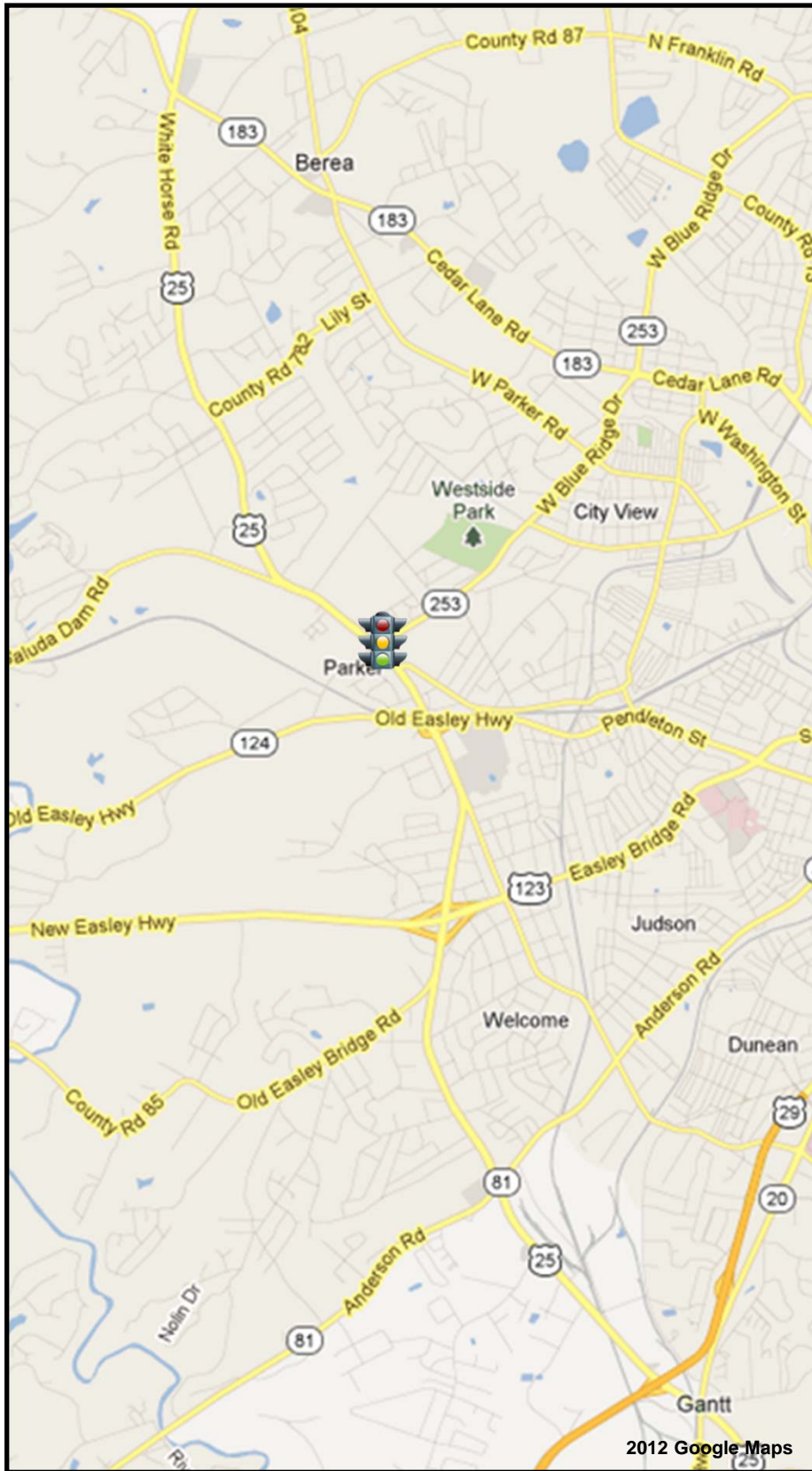
The South Carolina Department of Transportation (SCDOT) has requested a comprehensive traffic safety study at 15 signalized intersections in South Carolina. The goal of this study is to identify near-term and long-term considerations and develop near-term and long-term action plan based on crash data information and observations in the field. Cost benefits differentiating from the near-term and long-term considerations will be provided to assist the SCDOT in future project planning. This report focuses on the signalized intersection at US 25 (White Horse Road) and SC 253 (W. Blue Ridge Drive) located in Greenville, South Carolina. The intersection is in Greenville County and in SCDOT's District 3.

Existing Roadway Characteristics

The signalized intersection is maintained by the SCDOT and controlled by a 170 controller. The signal is a part of an uncoordinated signal system along US 25 (White Horse Road). Multiple retail and business driveways are in the close proximity to the intersection. The two major roadways, White Horse Road and W. Blue Ridge Drive are described below.

US 25 (White Horse Road) is a north-south six-lane roadway with a two-way center left-turn lane with multiple signals and driveways. The southbound approach carries an AADT of 26,900. The northbound approach carries 26,900 AADT. The truck percentage averages 3 percent for the AM peak and 2 percent for the PM peak. The bus percentage is less than 1 percent for both directions during the peak hours. The posted speed limit is 45 mph.

SC 253 (W. Blue Ridge Drive) is a four-lane east-west roadway at the intersection with White Horse Road. The roadway geometry consists of four lanes with a two-way left-turn lane. The posted speed limit is 45 mph for the westbound approach and 25 mph for the eastbound approach. West of the intersection the speed limit decreases to 25 mph and the roadway narrows to two lanes. The eastbound approach carries 21,600 AADT. The westbound approach carries 21,600 AADT. The truck percentage for the eastbound approach is 3 percent. The truck percentage for the westbound approach is 1 percent. Both the east and westbound approaches have a bus percentage less than 1. **Figure 1** depicts the location map and study area and **Figure 2** depicts the existing geometry, existing signal phasing, signs, traffic control, layout and configuration of the intersection.



Northbound



Southbound



Eastbound



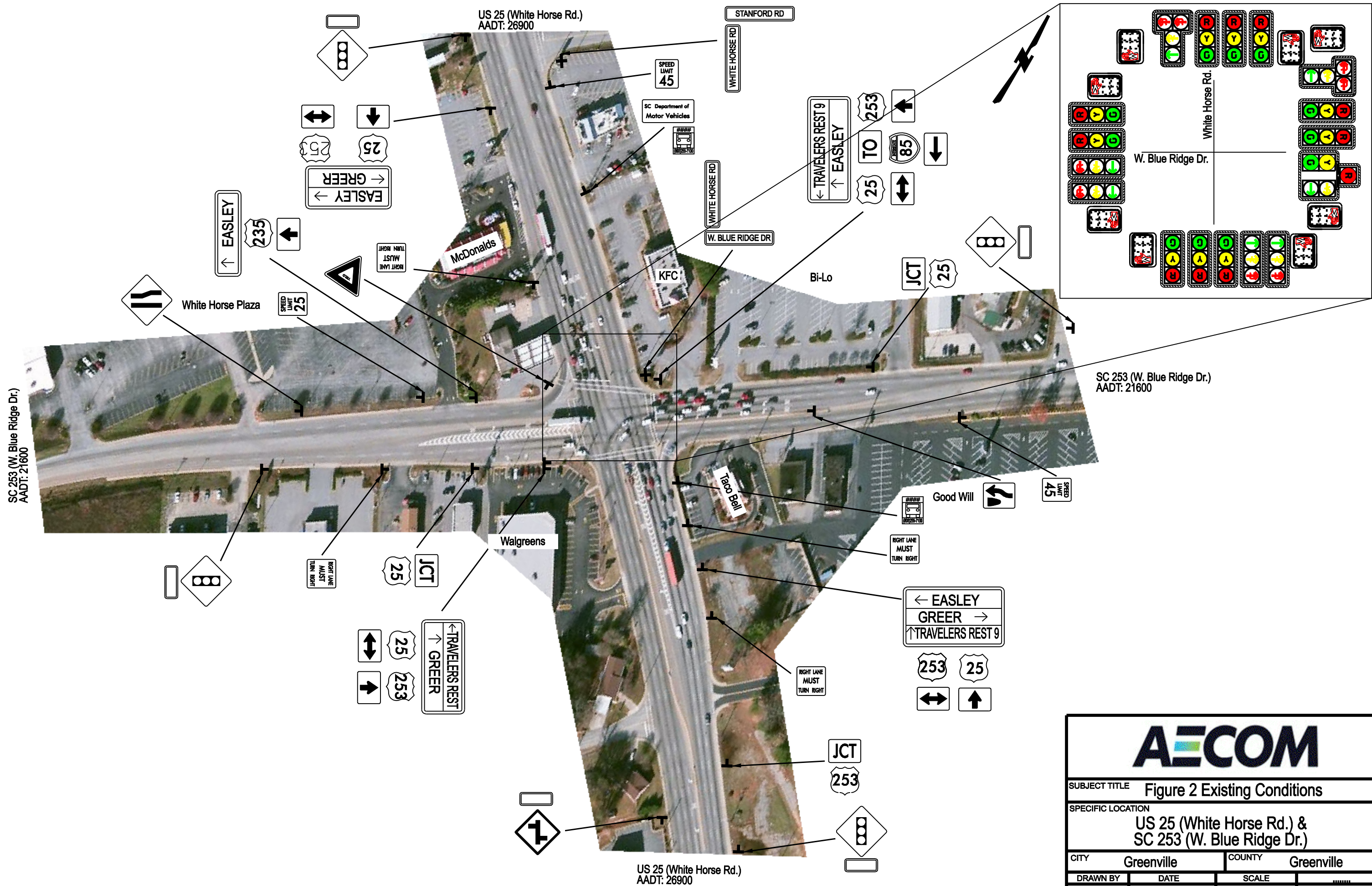
Westbound



Location Map
 SCDOT- US 25 (White Horse Rd) &
 SC 253 (Blue Ridge Dr)
 Greenville, South Carolina

Project No. 60268052
 Date: 9-21-12

Figure
 1



AECOM			
SUBJECT TITLE Figure 2 Existing Conditions			
SPECIFIC LOCATION US 25 (White Horse Rd.) & SC 253 (W. Blue Ridge Dr.)			
CITY	Greenville	COUNTY	Greenville
DRAWN BY	DATE	SCALE	
SWC	11/21/2012	None	

TRAFFIC DATA SUMMARY

Count Data

The intersection turning movement count traffic data at the study intersection was conducted by AECOM. The traffic counts were performed during the 7:00 AM to 9:00 AM and 4:00 PM to 6:00 PM weekday peak periods. The traffic counts at the intersection were summarized in 15 minute intervals. The counts were conducted on September 12, 2012 for the AM and PM peak hours. The existing traffic count data is shown in **Figure 3**.

The 15 minute counts were converted into hourly volumes. A right-turn on red count was conducted manually during the traffic count to incorporate a percentage of right-turn on reds for the analysis. The count data along with the right-turn on red count data is shown in **Appendix A**.

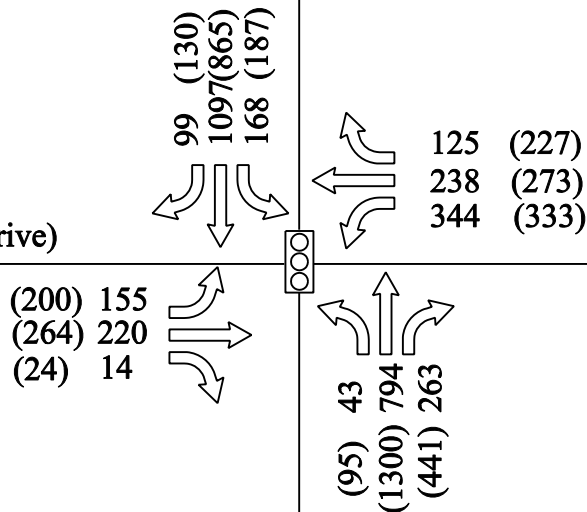
Weekday Morning Peak (AM): Two hours (7:00 to 9:00 AM) of weekday morning peak hours were analyzed as AM peak hours. The weekday traffic volumes between 7:30 to 8:30 AM were selected as the highest AM peak hour.

Weekday Afternoon Peak (PM): Two hours (4:00 to 6:00 PM) of weekday afternoon peak hours were analyzed. The weekday traffic volumes between 5:00 to 6:00 PM were selected as the highest PM peak hour.

Speed Study

The intersection speed study was conducted by AECOM on September 12, 2012. There were 100 speeds collected at each leg of the intersection using a speed radar gun. A (15th, 50th, and 85th) percentile speeds, mean, standard deviation and mode were determined for each leg. The average speed southbound and northbound (White Horse Road) was 42 mph with an 85th percentile speed of 46 mph. The eastbound (W. Blue Ridge Drive) average speed was 39 mph with an 85th percentile speed of 43 mph. The westbound (W. Blue Ridge Drive) average speed was 40 mph with an 85th percentile speed of 43 mph. The 85th percentile speeds for the northbound and southbound directions during the speed study were just above the 45 mph posted speed limit. The westbound 85th percentile speed was just below the 45 mph speed limit. The eastbound 85th percentile speed was 43 mph (18 mph higher than the assumed posted speed limit of 25 mph). In the field, there was not a posted speed limit for the eastbound direction prior to the signal; however, a 25 mph speed limit was posted for the westbound direction just west of the signal as shown in **Figure 2**. Based on the available information, the eastbound direction was assumed to be 25 mph, but had speed characteristics of a roadway without posted speed limit. The Speed Study Data Form for each leg of the intersection is shown in **Appendix B**.

SC 253 (Blue Ridge Drive)



US 25 (White Horse Road)

EXISTING DELAY AND LOS
11.1 B (17.2 B)



2012 EXISTING PEAK HOUR TRAFFIC VOLUMES FIGURE 3

X (## X) Intersection AM and
PM Peak Delay and LOS



Existing Signal

X AM Peak Hour Traffic Volume
(## X) PM Peak Hour Traffic Volume

All Distances in Feet
Drawing Not to Scale

NAME OF INTERSECTION

US 25 (WHITE HORSE ROAD) &
SC 253 (BLUE RIDGE DRIVE)

AECOM

OPERATIONAL AND CAPACITY ANALYSIS

An operational and capacity analysis of US 25 (White Horse Road) and SC 253 (W. Blue Ridge Drive) was performed to optimize the existing traffic conditions during the two peak periods of the day. Existing peak hour traffic volumes (**Figure 3**) were used for weekday traffic.

Analysis Methodology

A series of operational analyses were performed on the study intersection using the existing peak hour traffic data, existing roadway and intersection geometrics, and traffic controls. The operational analysis was performed using Synchro/SimTraffic 7.0 software (Build 773, Rev 8).

The Synchro software program uses the methodologies presented in the Highway Capacity Manual 2000. The Highway Capacity Manual 2000 (HCM) was developed by the Transportation Research Board (TRB). It contains concepts, guidelines, and procedures for computing the capacity and quality of service of various highway facilities, including freeways, signalized and unsignalized intersections, and rural highways. The HCM is a nationally recognized reference manual, and its use is widely accepted in the design and evaluation of roadway facilities.

SimTraffic was used to create simulations of the study operation, which allows for the examination of the effects arising from a unique combination of traffic conditions, traffic control, and roadway/intersection geometrics throughout a roadway network. SimTraffic calculates a range of performance measures of effectiveness, such as delay per vehicle, directly from the simulations. SimTraffic was primarily used to determine the maximum queue lengths.

At a signalized intersection, the total delay is dependent upon a number of factors, including when a driver approaches the intersection, the driver's position in the queue, and the traffic signal cycle length and green times. The control delay for a signalized intersection is determined for each lane group (e.g. left-turn lane group, through lane group, and right-turn lane group) and aggregated for each approach and for the intersection as a whole.

The HCM defines traffic operations in terms of six levels of service (LOS). Each LOS represents a range of driver delay. **Table 1** presents the LOS criteria for signalized intersections, which is directly related to the overall intersection control delay value.

Table 1: Level of Service Definitions for Signalized Intersections

LOS	Signalized Intersection	Definition
A	≤ 10 sec	EXCELLENT. Favorable progression. Many vehicles do not stop at all.
B	10-20 sec	VERY GOOD. Good progression. More vehicles stop than LOS A.
C	20-35 sec	GOOD. Fair progression. Some drivers may wait through more than one red light.
D	35-55 sec	FAIR. Unfavorable progression. Congestion becomes more noticeable.
E	55-80 sec	POOR. Poor progression. Drivers wait through several red lights/cycles. Excessive queue lengths/back-up of vehicles.
F	≥ 80 sec	FAILURE. Intersection does not have the capacity to handle the number of vehicles arriving at the intersection. Unacceptable delays with continuously increasing queue lengths.

EXISTING OPERATIONAL ANALYSIS

Existing Intersection Timing/Phasing Combination

The SCDOT District 3 provided signal design and partial timing plans for the study intersection as shown in **Appendix C**. The existing signal design plans do not reflect the timings in the field. Signal phasing was verified in the field and the Synchro plans generated for this intersection reflect the correct signal phasing.

US 25 (White Horse Road) and SC 253 (W. Blue Ridge Drive) is uncoordinated and controlled with a 170 controller. The existing cycle length is 120 seconds for the AM peak and 140 seconds for the PM peak hour. There are protected left-turns on all four approaches of White Horse Road and W. Blue Ridge Drive. There is a right-turn overlap for eastbound W. Blue Ridge Drive right-turning vehicles.

Intersection Operating Condition with Existing Signal Phasing/Timing

The existing hourly flow and Level of Service (LOS) for the study intersection was calculated based on the average control delay from the four approaches. The Synchro software program was used to summarize the results shown in **Table 2**. The Synchro output files are provided in **Appendix D**.

Table 2: Summary of Delay and LOS for Intersection (Existing)

APPROACH	MOVEMENT	AM Peak		PM Peak	
		Delay (sec)	LOS	Delay (sec)	LOS
Eastbound (SC 253)	Left	53.4	D	66.3	E
	Through	37.6	D	45.4	D
	Right	8.7	A	7.4	A
	Overall	42.9	D	52.1	D
Westbound (SC 253)	Left	59.9	E	73.0	E
	Through /Right	38.2	D	53.7	D
	Overall	48.8	D	61.4	E
Northbound (US 25)	Left	50.0	D	55.3	E
	Through	26.5	C	38.1	D
	Right	4.6	A	9.1	A
	Overall	22.2	C	32.0	C
Southbound (US 25)	Left	68.5	E	64.3	E
	Through	31.5	C	38.9	D
	Right	13.6	B	13.0	B
	Overall	34.6	C	40.0	D
INTERSECTION		34.5	C	42.1	D

Deficiencies/Problems of the Existing Timing Plan

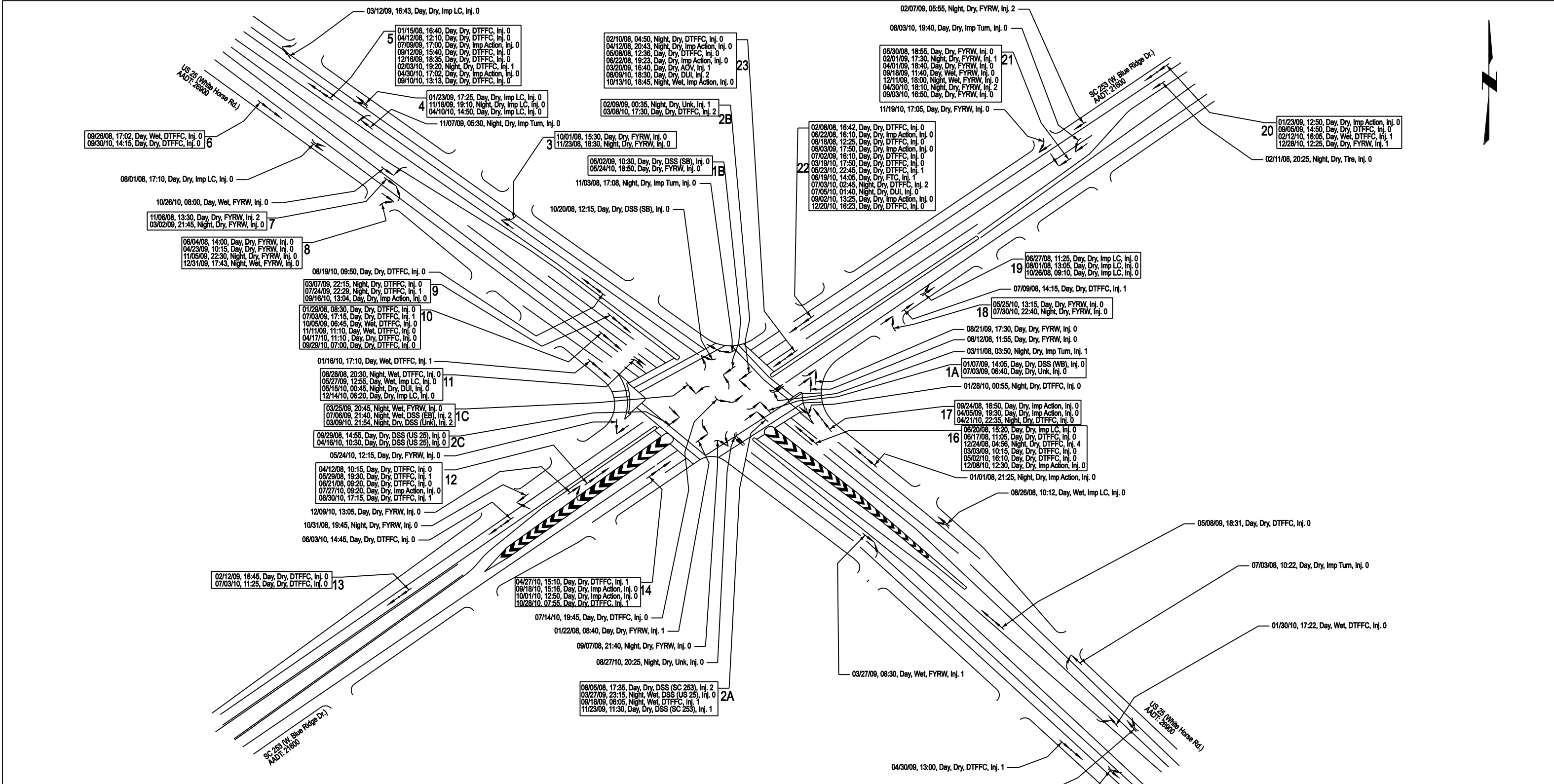
The AM peak hour is operating at LOS C and PM peak hour is operating at LOS D. There were no significant queues observed at the intersection.

Existing Crash Data Analysis

A safety and economic loss analysis was conducted at the intersection utilizing the historic crash data. Historic crash data including the Collision Diagram for the most recent three year period (2008-2010) was provided by SCDOT as shown in **Figure 4**. The crash data was examined to determine the frequency and type of crashes that had occurred at the intersections during the three year analysis period.

A summary of the crash diagram analysis is shown in **Table 3**. The potential causal factors were determined from the *National Cooperative Highway Research Program (NCHRP), A Guide for Reducing Collisions at Signalized Intersections* and used to recommend near-term and long-term considerations supported by the crash data. The location numbers that correspond with the crash type are described in the crash diagram analysis shown in **Figure 4**. The majority of the crashes at this intersection have been right angle, rear end and side swipe. The right angle crashes were located in the intersection at the second Bi-Lo driveway. The westbound approach of W. Blue Ridge Drive had a heavy number of rear end crashes and right angle crashes. The north, south and eastbound approaches had a few right angle crashes at driveways and rear end crashes approaching the intersection. There were nine injury 2 crashes and one fatality at this intersection.

In the crash diagram analysis, a thorough examination of each type and location of crash was conducted. The analysis describes in detail the following: location of crash, number and type of crash, and potential casual factors and considerations. The considerations are categorized into near-term and long-term as shown in **Figures 5 and 6**.



LEGEND

DSS - Disregarded Sign or Signal
Inatt - Inattention
DTFFC - Driving Too Fast for Conditions
FYRW - Failure to Yield Right of Way
ROR - Ran off Road
FTC - Followed Too Closely
AOV - Aggressive Operation of Vehicle
SAO - Swerving to Avoid Object
DUI - Under the Influence
Imp LC - Improper Lane Change

RA = Right Angle
RE = Rear End
SS = Side Swipe
HO = Head On
OC = Out of Control
HA = Hit Animal
OTH = Other

YR	2008	2009	2010	Total
RA	13	21	14	48
RE	20	18	32	70
SS	8	5	4	17
HO	0	0	0	0
OC	1	1	1	3
HA	0	0	0	0
OTH	1	0	0	1
Total	43	45	51	139

Night - 38
Day - 101

Wet - 20
Dry - 119

Total = 139
AADT = 48500
Years = 3.0
01/01/08 - 12/31/10
CR = 2.617
SI = 4.030

PDO - 106
Inj. 1 - 23
Inj. 2 - 9
Inj. 3 - 0
Fatal - 1

SCDOT

South Carolina Department of Transportation

TRAFFIC ENGINEERING
DIVISION
COLUMBIA, S.C.

SUBJECT TITLE

Figure 4: Collision Diagram

SPECIFIC LOCATION

US 25 (White Horse Rd.) & SC 253 (W. Blue Ridge Dr.)

CITY

Greenville

COUNTY

Greenville

DRAWN BY

CLW

DATE

10/11/11

SCALE

None

ACCIDENT DATES

01/01/08 - 12/31/10

Table 3: Crash Diagram Analysis for US 25 (White Horse Road) at SC 253 (W. Blue Ridge Drive)					
Location of crash	Location #	Type of Crash	Potential Causal Factor	Considerations	
				Near-Term	Long- Term
In the Intersection	1A	(2) SB left-turns opposing through traffic (DSS, Unk)	vehicles making left-turn on red, sight distance	Adjust yellow and red time at intersection	
	1B	(2) WB left-turns opposing through traffic (DSS, FYRW)	vehicles making left-turn on red, sight distance	Adjust yellow and red time at intersection	
	1C	(3) NB left-turns opposing through traffic (DSS, FYRW) (all night)	vehicles making left-turn on red, sight distance	Adjust yellow and red time at intersection	Add lighting to intersection
	2A	(4) Right Angle EB and NB through (DSS, DTTFC)(2 night)	too many distractions	Adjust red time at intersection	Add lighting to intersection
	2B	(2) Right Angle WB and NB through (Unk, DTTFC)(1 night)	too many distractions	Adjust red time at intersection	Add lighting to intersection
	2C	(2) Right Angle EB and SB through (DSS)	too many distractions	Adjust red time at intersection	
Southbound (White Horse Rd)	3	(2)Right Angle into/out of KFC (FYRW)	speed, fail to yield right of way	Install right-in/right-out only at KFC	Install median on North leg of intersection from signal to just past shopping center driveway
	4	(3) Side Swipe (Imp LC)	Stanford Road entrance needs more advance warning	Install advance cross street warning sign with name plate for Stanford Rd	
	5	(8) Rear End NB (DTFFC, Imp Action)	speed, approaching next intersection	Install advance cross street warning sign with name plate for Stanford Rd	
	6	(2) Rear End SB (DTFFC)	speed	Coordinate signals	
	7	(2) Right Angle out of White House Plaza shopping center(FYRW)	speed, crossing too many lanes	Install right-in/right-out only at White House Plaza shopping center driveway, striping driveway	Install median on North leg of intersection from signal to just past shopping center driveway
	8	(4) Right Angle out of White House Plaza shopping center(FYRW)	speed, too many distractions, sight distance	Install right-in/right-out only at White House Plaza shopping center driveway, striping driveway	Internal circulation issues with McDonalds driveway
	9	(3) Rear End SB (left-turn lane)(DTFFC, Imp Action)	speed	Coordinate signals	
	10	(6) Rear End SB (DTFFC, Imp Action)	speed, too many distractions, sight distance	Retro reflective plates on the 45 mph sign, recently installed signal ahead warning sign and reflective backplates, coordinate signals	
	11	(3) Side swipe SB (right-turn lane) (DTFFC, Imp Action)			
Eastbound (W. Blue Ridge Dr)	12	(5) Rear End SB (left-turn lane)(DTFFC, Imp Action)	speed		
	13	(2) Rear End WB (DTFFC)	speed, too many distractions		
	14	(6) Rear End EB (DTFFC, Imp Action)	speed, too many distractions	Adjust red time at intersection, move signal ahead sign around the curve	
Northbound (White Horse Rd)	15	(2) Side Swipe (Imp LC)	speed, too many distractions		
	16	(6) Rear End NB (DTFFC, Imp Action)	speed, too many distractions, iimproper lane changes	Retro reflective plates on the 45 mph sign, recently installed signal ahead warning sign and reflective backplates, install nearside heads since over 45 mph, coordinate signals	
	17	(3) Rear End NB (right-turn lane) (DTFFC, Imp Action)	speed, too many distractions	Retro reflective plates on the 45 mph sign, recently installed signal ahead warning sign, install nearside heads, coordinate signals	
Westbound (W. Blue Ridge Dr)	18	(2) Right Angle out of Taco Bell(FYRW)	speed, driveway too close to intersection		
	19	(3) Side Swipe (Imp LC)	speed, too many distractions, sight distance		
	20	(2) Rear End WB (DTFFC, Imp Action, FYRW)			
	21	(7) Right Angle out of Bi-Lo (FYRW)	inattention	Install right-in/right-out only at second Bi-Lo shopping center driveway	Extend median on East leg of intersection from signal to just past Bi-Lo shopping center driveway
	22	(12) Rear End WB (DTFFC, Imp Action)	speed, too many distractions	Adjust red time at intersection, install nearside thru and left-turn signal head (sight distance due to trucks)	
	23	(7) Rear End SB (left-turn lane)(DTFFC, Imp Action)	speed, too many distractions	Adjust red time at intersection, install nearside thru and left-turn signal head (sight distance due to trucks)	

CAPACITY ANALYSIS PROPOSED IMPROVEMENTS SUMMARY

The signal timing/phasing combination at all the study intersections were modified and/or revised to address the operational and safety deficiencies. The existing signal timings were optimized to improve operations along with the following recommended improvements:

1. Change westbound red to 2.3 second, retained existing yellow and red times for all other phases
2. Timings/Splits were optimized using Synchro software

The operational condition results (intersection delay and LOS) at the study intersection during peak times of day are summarized in **Table 4**. The Synchro output files are provided in **Appendix F**.

Table 4: Summary of Delay and LOS for Intersection (Proposed)

APPROACH	MOVEMENT	AM Peak		PM Peak	
		Delay (sec)	LOS	Delay (sec)	LOS
Eastbound (SC 253)	Left	56.0	E	72.3	E
	Through	40.3	D	39.2	D
	Right	7.2	A	7.1	A
	Overall	45.4	D	51.2	D
Westbound (SC 253)	Left	49.3	D	56.6	E
	Through/Right	35.8	D	32.6	C
	Overall	42.4	D	42.2	D
Northbound (US 25)	Left	52.1	D	55.0	E
	Through	29.3	C	36.9	D
	Right	5.2	A	7.1	A
	Overall	24.4	C	30.7	C
Southbound (US 25)	Left	53.5	D	62.7	E
	Through	28.4	C	33.5	C
	Right	11.9	B	10.0	B
	Overall	30.2	C	35.5	D
INTERSECTION		32.5	C	36.5	D

The results show the intersection is expected to operate at LOS C for the AM and LOS D for the PM peak periods.

The Synchro/Sim Traffic recommended storage versus existing storage for the left-turn lanes on all approaches using the existing data (**Appendix D**) and proposed data (**Appendix F**) shows the turn lane lengths are adequate to store the existing and future queues of left-turn traffic.

Table 5 shows the improvements made in delay by comparing the existing delay and LOS to the proposed improvements.

Table 5: Comparison of Existing and Proposed Improvements Delay and LOS

APPROACH	AM Peak		PM Peak	
	Existing Delay (LOS)	Proposed Delay (LOS)	Existing Delay (LOS)	Proposed Delay (LOS)
EASTBOUND (SC 253)	42.9 (D)	45.4 (D)	52.1 (D)	51.2 (D)
WESTBOUND (SC 253)	48.8 (D)	42.4 (D)	61.4 (E)	42.2 (D)
NORTHBOUND (US 25)	22.2 (C)	24.4 (C)	32.0 (C)	30.7 (C)
SOUTHBOUND (US 25)	34.6 (C)	30.2 (C)	40.0 (D)	35.5 (D)
INTERSECTION	34.5 (C)	32.5 (C)	42.1 (D)	36.5 (D)

Our analysis included optimizing the intersection splits while using the existing cycle lengths. The overall delay and LOS was improved from the existing to the proposed. The westbound PM peak improved from a LOS E to a LOS D.

Proposed Cycle Lengths (Actuated-Uncoordinated)

For the proposed cycle lengths, the existing cycle length of 120 seconds was used for the AM peak. The PM peak had an existing cycle length of 140 seconds and was dropped to 120 seconds for the proposed. **Table 6** shows the cycles lengths for existing and proposed.

Table 6: Cycle Lengths

	Cycle Length	
	AM	PM
Existing	120	140
Improvements	120	120

NEAR-TERM AND LONG-TERM CONSIDERATIONS

Recommended considerations were determined by studying the crash data which included the number of crashes, location of crash, type of crash, and potential causal factor using the *NCHRP* as a resource. After this data was analyzed, near-term and long-term recommended considerations were determined. The following considerations were determined using crash patterns from **Figure 4** and summarized in **Table 3** described below. The considerations are shown in **Figures 5** and **6**.

Near-term Considerations (refer to Figures 4 and 5 for the numbering scheme below and the corresponding consideration)

In the Intersection

- **1A, 1B, 1C**, – Adjust red and yellow clearance intervals. There are eight left-turn crashes associated with these type of crashes. The red and yellow times are currently set with insufficient clearance times according to the SCDOT's most recent Signal Design Guidelines suggest.
- **2A, 2B, 2C** - Adjust red clearance intervals. Eight right-angle crashes are associated with drivers disregarding the signal.

Southbound (White Horse Road)

- **3** - Install a "No Left-turn" sign and right-in right-out only movement from the second KFC driveway using a concrete median is recommended. Restricting left-turns out of and into the driveway is expected to correct the two right-angle crash pattern.
- **4, 5** – Install an advanced cross street warning sign with name plate for Stanford Road. There are eleven rear-end crashes located at Stanford Road.
- **7, 8** – Install a "No Left-turn" sign and right-in right-out only movement from the White House Plaza shopping center driveway using a concrete median is recommended. Restricting left-turns out of and into the driveway is expected to correct the six right-angle crash pattern.
- **9, 10** – Coordinate signals along White Horse Road. The signals are currently uncoordinated.
- **10** – Install retro-reflective backplates on the 45 mph sign and nearside heads southbound since the speed limit is 45 mph. There are recently installed signal ahead warning sign and retro-reflective backplates. There are six rear-end crashes approaching the intersection southbound.

Eastbound (W. Blue Ridge Drive)

- **14** – Relocate the existing advanced signal ahead warning sign around the curve so it is more visible to approaching traffic. There are six rear-end crashes approaching the intersection eastbound.

Northbound (White Horse Road)

- **16, 17** – Install retro-reflective backplates on the 45 mph sign and nearside heads southbound since the speed limit is 45 mph. There are recently installed signal ahead warning sign and retro-reflective backplates. There are six rear-end crashes approaching the intersection northbound.

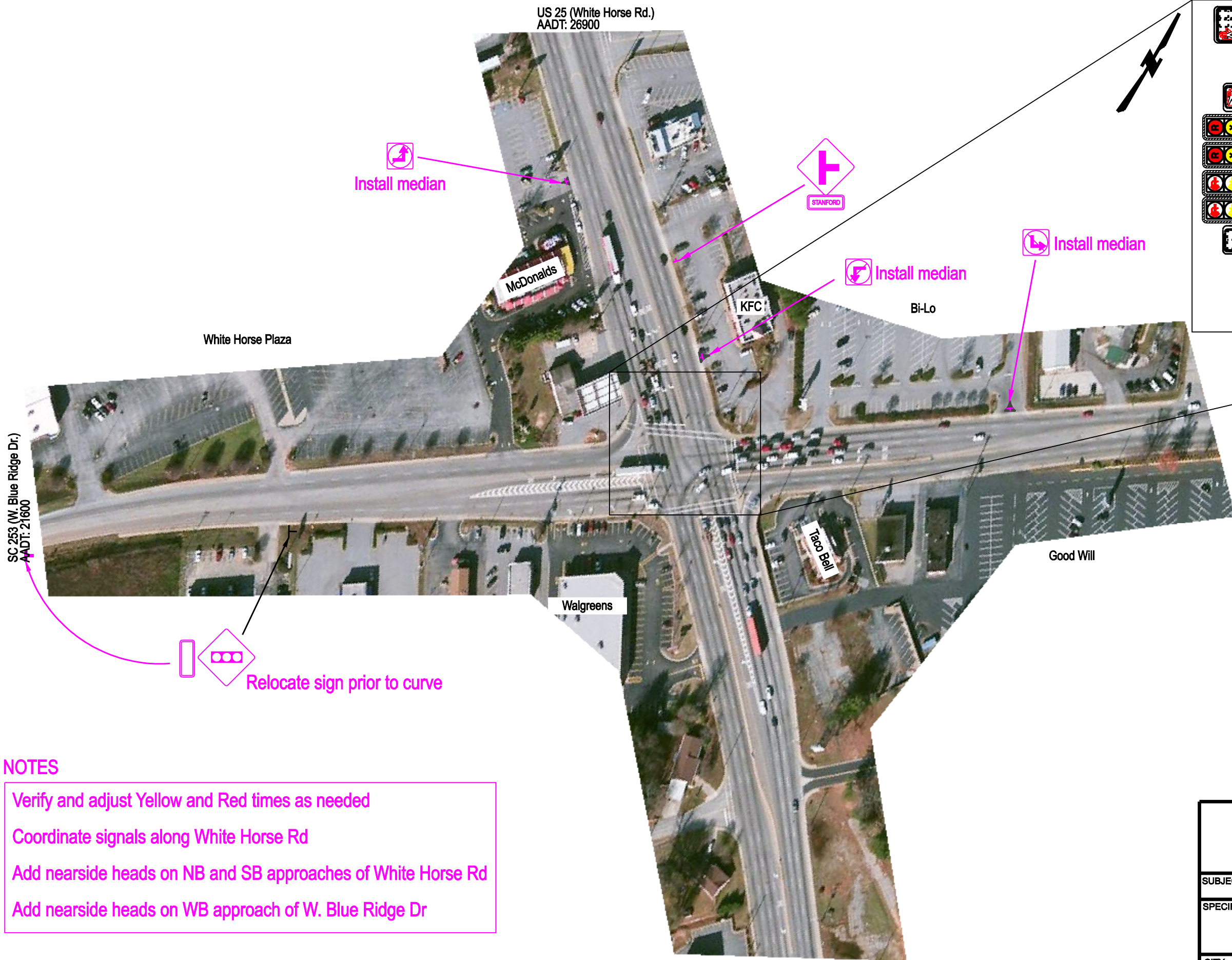
Install nearside signal heads. The speed limit is 45 mph or above for the northbound vehicles.

Coordinate signals along White Horse Road. The signals are currently uncoordinated.

Westbound (W. Blue Ridge Drive)

- **21**– Install a “No Left-turn” sign and right-in right-out only movement from the second Bi-Lo shopping center driveway using a concrete median is recommended. Restricting left-turns out of and into the driveway is expected to correct the seven right-angle crash pattern.
- **22, 23**- Adjust red clearance intervals. Eight rear-end crashes are associated with the westbound approach to this intersection.

Install nearside thru and left-turn signal heads. Sight distance is restricted when truck traffic approaches the +6% grade intersection.



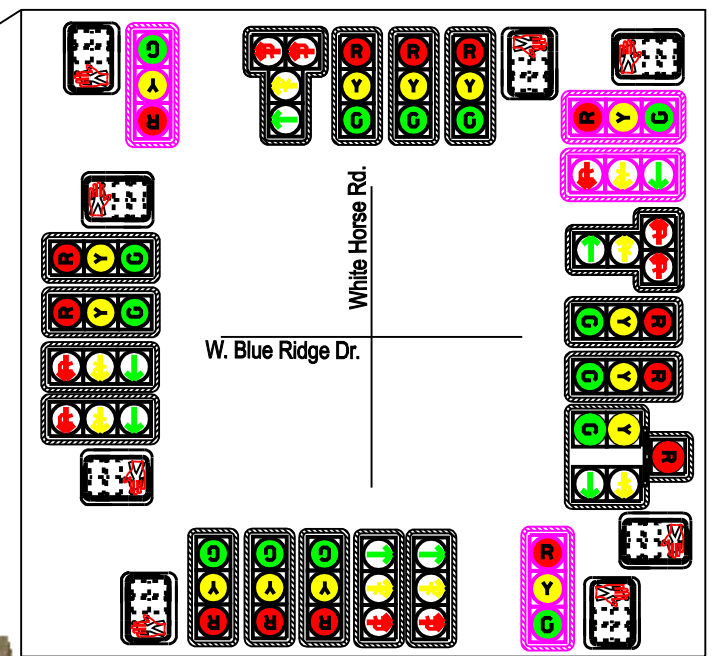
US 25 (White Horse Rd.)
AADT: 26900

White Horse Plaza

SC 253 (W. Blue Ridge Dr.)
AADT: 21600

SC 253 (W. Blue Ridge Dr.)
AADT: 21600

US 25 (White Horse Rd.)
AADT: 26900



NOTES

- Verify and adjust Yellow and Red times as needed
- Coordinate signals along White Horse Rd
- Add nearside heads on NB and SB approaches of White Horse Rd
- Add nearside heads on WB approach of W. Blue Ridge Dr

AECOM			
SUBJECT TITLE Figure 5 Near Term Considerations			
SPECIFIC LOCATION US 25 (White Horse Rd.) & US 253 (W. Blue Ridge Dr.)			
CITY	Greenville	COUNTY	Greenville
DRAWN BY	DATE	SCALE	
SWC	11/23/12	None	

Long-term Considerations (refer to Figures 4 and 6 for the numbering scheme below and the corresponding consideration)

In the Intersection

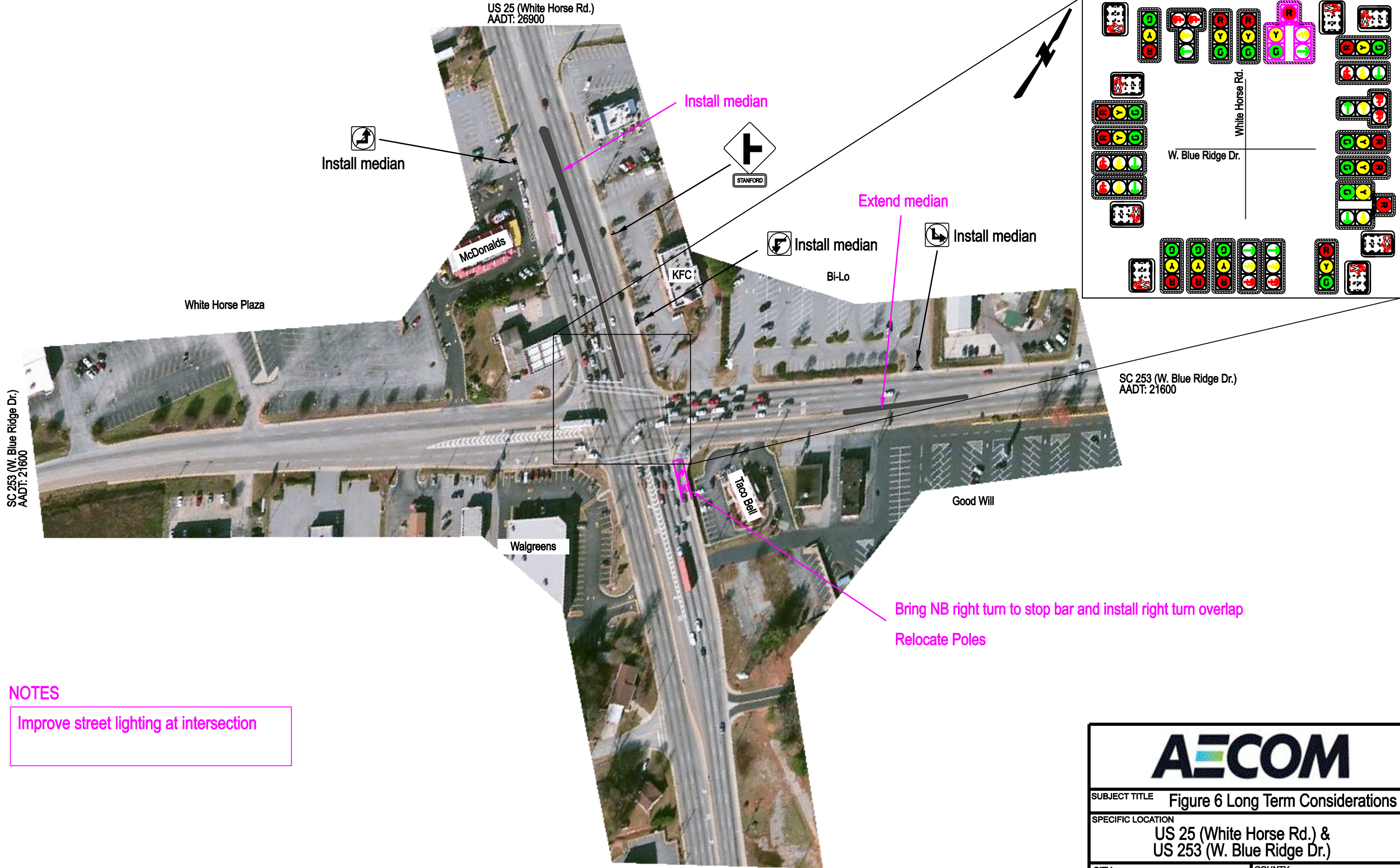
- **1C, 2A, 2B** – Six of the eight right-angle crashes in the intersection occur at night. There is no lighting around the area, therefore; intersection lighting should be considered.

Southbound (White Horse Road)

- **3, 7** – A consideration to install a concrete median on the southbound of White Horse Road is expected to prohibit left-turns into and out of the KFC and other driveways to / from White Horse Road. By installing a concrete median, these conflict points are reduced removing right-angle crashes and minimizing side-swipe crashes.
- **8** – A study on the internal circulation issues with the McDonalds driveway should be considered to address the four right-angle crashes out of the White House Plaza shopping center. The internal stem length between the McDonalds driveway and White Horse Road is approximately 8 feet. A consideration to close this driveway and creating a new driveway providing a stem length of at least 100 feet should be considered.

Westbound (W. Blue Ridge Drive)

- **21** – A recommendation to extend the concrete median on the westbound of White Horse Road will prohibit left-turns into and out of the second Bi-Lo shopping center and other driveways to / from Blue Ridge Drive. By installing a concrete median, these conflict points are reduced removing seven right-angle crashes.



NOTES

Improve street lighting at intersection

AECOM			
SUBJECT TITLE Figure 6 Long Term Considerations			
SPECIFIC LOCATION US 25 (White Horse Rd.) & US 253 (W. Blue Ridge Dr.)			
CITY	Greenville	COUNTY	Greenville
DRAWN BY	DATE	SCALE	
RHG	11/23/12	None	

Economic Analysis

Overview and Implementation

An evaluation of the proposed considerations using an economic analysis to determine the benefit cost (B/C) ratio was requested by SCDOT. The purpose of the benefit cost ratio is to analyze the cost benefit associated with reducing crashes upon installation of the considerations. The greater the B/C ratio, the more benefits and cost savings for SCDOT. The benefits of installing the considerations include reducing the number of crashes and their severity. The costs occur in the design, implementation, operation and maintenance of the considerations. Since each crash is associated with a cost, any reduction in crashes provides savings. The type of crash and its associated cost are determined by SCDOT using property losses and monetary value of lost quality of life.

The Crash Reduction Factor (CRF) is the percent of crashes reduced for a given consideration. The CRF is used for specific types of crashes and the consideration determined to improve that type of crash. The B/C ratio, Crash Reduction Factor, and net benefit calculations are developed from SCDOT equations. The equations used are shown in the cost justification analysis **Appendix E**.

Results

Table 7 shows the considerations ranked by B/C ratio including the annual cost, annual benefit, and net benefit. The intersection had nine injury 2, no injury 3, and one fatal crash. The majority of the crashes were PDO (no injury) and Injury 1 type crashes. The two greatest benefit savings based on cost would be to increase the yellow change interval and red clearance interval on White Horse Road approaches. Four considerations (Remove northbound right-turn lane channelization on White Horse Rd, install raised median on the eastbound of White Horse Road, install overhead guide sign on northbound approach of White Horse Road, and install Northbound on White Horse Road right-turn lane prior to Stanford Road) calculated a negative net benefit; therefore, they were not considered for near-term or long-term considerations.

Table 7: Economic Analysis: US 25 (White Horse Rd) @ US 253 (W. Blue Ridge Dr.) Benefit / Cost Analysis Summary Table

Considerations	Annual Cost	Annual Benefit	Net Benefit	B/C
Increase the Yellow Change Interval on White Horse Rd Approaches	\$41	\$44,115	\$44,074	1075.98
Improve Street Lighting on All Approaches	\$1,750	\$187,920	\$186,170	107.38
Increase the Red Clearance Interval on Blue Ridge Drive Approaches	\$41	\$3,780	\$3,739	92.20
Increase the Red Clearance Interval on White Horse Road Approaches	\$41	\$2,880	\$2,839	70.24
Install Stanford Rd Intersection Warning Sign prior to Road	\$51	\$2,580	\$2,529	50.59
Install Right-in/Right-out only on Blue Ridge Dr at Bi-Lo	\$85	\$2,083	\$1,998	24.51
Increase the Yellow Change Interval on Blue Ridge Dr Approaches	\$91	\$2,190	\$2,099	24.07
Install "No Left-turn" Sign and Right-in Right-Out from White Horse Plaza onto White Horse Rd	\$85	\$1,833	\$1,748	21.57
Install Nearside Signal Heads on Blue Ridge (East leg)	\$521	\$9,656	\$9,135	18.53
Install "No Left-turn" Sign and Right-in Right-Out at Second KFC Driveway onto White Horse Rd	\$85	\$875	\$790	10.29
Extend Raised Median on Blue Ridge Dr (East Leg)	\$608	\$4,625	\$4,017	7.61
Coordinate signals on White Horse Rd	\$2,645	\$12,843	\$10,198	4.86
Install Raised Median on White Horse Rd (North Leg)	\$1,148	\$2,875	\$1,727	2.50
Remove Northbound Right-turn Lane Channelization on White Horse Rd	\$2,702	\$2,253	(\$449)	0.83
Install Raised Median on Blue Ridge Dr (West Leg)	\$1,013	\$83	(\$484)	0.08
Install Overhead Guide Sign on NB Approach (White Horse Rd)	\$511	\$27	(\$484)	0.05
Install NB Right-turn lane on for Stanford	\$4,458	\$0	(\$4,458)	0.00

NEAR-TERM AND LONG-TERM ACTION PLAN

An economic analysis was established for each consideration to determine if the near-term and long-term considerations were economically feasible. The analysis calculates the annual cost, annual benefit, net benefit and benefit to cost (B/C) ratio for each consideration. The cost analysis per item is shown in **Appendix E**.

The majority of the recommended considerations calculated a positive B/C ratio to generate savings for the SCDOT. The considerations with negative B/C ratio were removed from the recommended considerations and action plan. The Benefit/Cost Summary Table is shown in **Table 7**.

The following near-term considerations are expected to have an installation period of less than 6 months and total cost less than \$10,000. It is recommended that the following be implemented as soon as possible.

Near-term Action Items	Total Cost
Increase the Yellow Change interval on White Horse Rd approaches	\$200
Increase the Red Clearance interval on Blue Ridge Dr approaches	\$200
Increase the Red Clearance interval on White Horse Rd approaches	\$200
Install Stanford Road Intersection Warning Sign prior to Road	\$250
Install Nearside Signal Heads on White Horse Road Northbound	\$2,500
Install Right-in Right-out on W. Blue Ridge Dr at Bi-Lo	\$875
Increase the Yellow Change interval on W. Blue Ridge Dr approaches	\$200
Install "No Left-turn" sign and Right-in Right-out from White Horse Plaza onto White Horse Rd	\$875
Install "No Left-turn" sign and Right-in Right-out from second KFC Driveway Onto White Horse Rd	\$875
Coordinate signals on White Horse Rd	\$10,000
Install nearside signal heads on Blue Ridge Dr (Westbound)	\$5,000

The near-term action items are listed in order of highest to lowest B/C ratio. The total cost of these items is \$21,175. These may all be installed with minimal technical evaluation and under a 6 month time period.

The following items are considered long-term because they are expected to take more than 6 months for installation or cost of over \$10,000 needing further technical evaluation. They are also listed by decreasing B/C ratio.

Long-term Action Items	Total Cost
Improve Street Lighting on All Approaches	\$12,000
Extend Raised Median on W. Blue Ridge Dr (Westbound)	\$11,250
Install Raised Median on White Horse Rd (Southbound)	\$21,250

These long-term action items will cost \$44,500 to implement.

US 25 and SC 253 SCDOT Safety Project (Greenville County) - 07

Street lighting can be expensive; therefore, this action item will need further technical evaluation. The crash data does not provide details into whether the lighting was a factor other than the crash occurred at night.