
Road Safety Review

US 78 (King Street)
Between Huger Street & Line Street
Charleston County, SC



May 26, 2021

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1.0 Introduction

1.1 Objective

The objective of this road safety review is to identify existing potential safety hazards specific to pedestrian and bicyclist activity that exist throughout the corridor and to provide recommendations for improvements. The improvements recommended include short-term improvements, such as pavement markings and maintenance activities, and long-term improvements, such as those requiring a construction project.

1.2 Background

The section of US 78 (King Street) selected for the road safety review was based on the crash frequency and severity involving pedestrians and bicyclists on the corridor in recent years. The section reviewed begins at Huger Street and continues south to Line Street. The segment is approximately 0.5-mile in length. The figures below provide an overview of the corridor location.

Figure 1 – Location Map

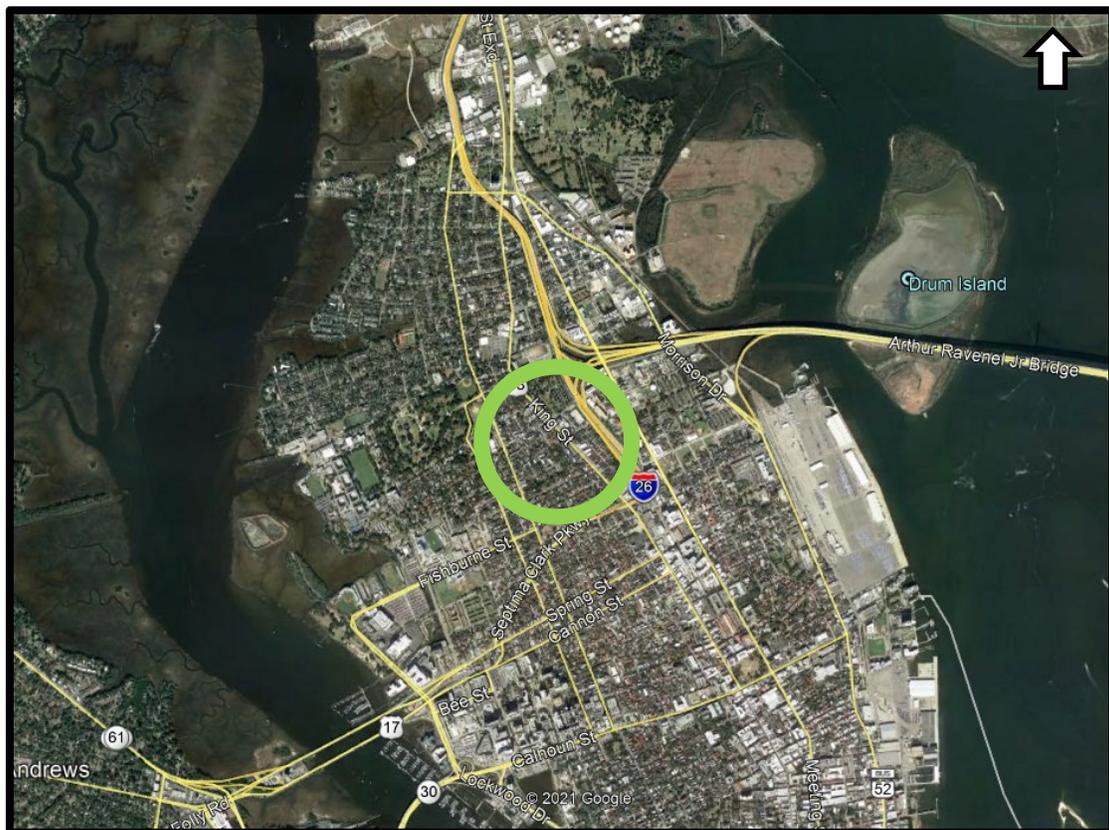


Figure 2 – Corridor Limits



The segment under review is mixed-use, with both commercial and residential land uses. Development is well established, though the area has recently experienced and continues to experience revitalization as properties redevelop. Some redevelopment has resulted in greater density in the immediate vicinity, particularly as related to residential uses. The roadway cross section varies throughout the study area. The roadway is two lanes between Huger Street and Carolina Street, but transitions to three lanes between Carolina Street and Line Street (one northbound and two southbound lanes). Observations of traffic volumes indicate that while volumes are heavier during the morning and afternoon peaks, there are not extreme peak volume differences. Commuters using the corridor to access the southern portion of the City of Charleston peninsula travel south in the morning, and then travel the reverse pattern during the evening peak. King Street is one of several routes commuters use in the area. The speed limit on this section of King Street is 25 mph.

The road safety review included participants representing multiple government agencies and community partners. A list of the attendees for the field review conducted on March 26, 2021 is provided below. All participants attended the pre-meeting in the field, while some were unable to attend the entire corridor walk-through.

- Keith Benjamin, City of Charleston
- Michael Mathis, City of Charleston
- Clark DeCiantis, City of Charleston
- Matt Ojala, City of Charleston
- Peter Shahid, City of Charleston Councilman
- Mike Seekings, City of Charleston Councilman
- Sarah Cox, BCDCOG
- Kyle James, BCDCOG
- Josh Johnson, SCDOT District Six

- Adam Payne, SCDOT District Six
- Katie Zimmerman, Charleston Moves
- Savannah Brennan, Charleston Moves

2.0 Corridor Data Review

2.1 Traffic Volume Data

The nearest SCDOT count station on King Street is located at the south end of the review segment, near Line Street. The AADT data at this count station is provided in the below table. A review of the AADT data indicates traffic volumes decreased overall between 2015 and 2019. However, upon examination of the data, it is likely that several of these years contain estimated volumes only. The decrease in volumes in 2017 implies an actual count in that year while the other years are likely estimated volumes. Due to the relatively built out nature of the corridor and location on the peninsula, it is likely that traffic volumes have experienced flat to moderate growth in recent years.

Table 1 – AADT Count Data (Station 180)

<i>2015</i>	<i>2016</i>	<i>2017</i>	<i>2018</i>	<i>2019</i>
12,800	12,800	10,300	10,700	11,000

2.2 Pedestrian and Bicyclist Observations

A field observation was conducted on Thursday, March 11, 2021 in the early evening. During the observation, pedestrians and bicyclists were observed along the entire study segment. Bicyclists appeared to primarily use the segment as a through route and traveled within the travel lanes. Some pedestrians passed through the segment while others had destinations on the corridor. Pedestrians used the sidewalk on both sides of King Street and included individuals as well as small and large groups. While counts were not formally collected, it is estimated that roughly 100 pedestrians and 15 bicyclists were observed in the corridor during a one-hour time period.

Additional field observations were included as part of the field walk-through on Friday, March 26, 2021 during the late morning hours. Pedestrian and bicyclist activity was similar during this time period.

2.3 Crash Data

Crash data was collected by SCDOT for the time period between January 1, 2016 and September 30, 2020. During this time period, a total of 87 crashes occurred within the study segment. Of these, 70 involved vehicles only, nine involved pedestrians, and eight involved cyclists. The pedestrian and bicycle crash data was analyzed in detail, and is summarized in the table and figures below.

During the crash report review, it was noted that several unique collisions have occurred on the corridor. For example, the April 26, 2018 crash involved a driver getting out of their vehicle and being sideswiped. For the purposes of the crash report, they were considered a pedestrian. There were also cases of a pedestrian under the influence, a driver under the influence, and a driver swerving to avoid a cyclist and driving onto the sidewalk. However, there were also several more typical collisions, such as drivers sideswiping cyclists in the same lane or pedestrians crossing the roadway in front of oncoming traffic.

Table 2 – Crash Summary Table

<i>Date</i>	<i>Time</i>	<i>Severity</i>	<i>Bike/Ped</i>	<i>Contributed</i>	<i>Cause</i>
9/19/18	13:30	0	Bike	Driver	Improper Lane Usage
10/14/19	19:00	0	Bike	Driver	---
4/21/18	17:42	0	Bike	Driver	FYRW
11/10/19	10:55	2	Bike	---	Improper Action
9/9/19	14:00	0	Ped	---	Inattention
8/20/20	14:20	1	Bike	Driver	Inattention
9/1/18	03:25	0	Bike	---	Swerving
3/2/19	11:11	2	Ped	Ped	Inattention
3/17/19	23:16	0	Ped	Ped	FYRW
12/3/18	22:58	1	Ped	Ped	Illegally in Roadway
2/14/21*	-	4	Ped	Driver*	DUI*
7/11/20	01:50	2	Ped	Ped	Under Influence
6/21/18	18:30	1	Bike	Cyclist	FYRW
9/26/18	21:15	2	Ped	Ped	Inattention
5/4/19	22:50	1	Ped	Ped	FYRW
5/12/19	21:00	4	Bike	Driver	DUI
4/26/18	14:38	1	Ped	Driver	---
8/30/18	23:13	3	Ped	Ped	FYRW

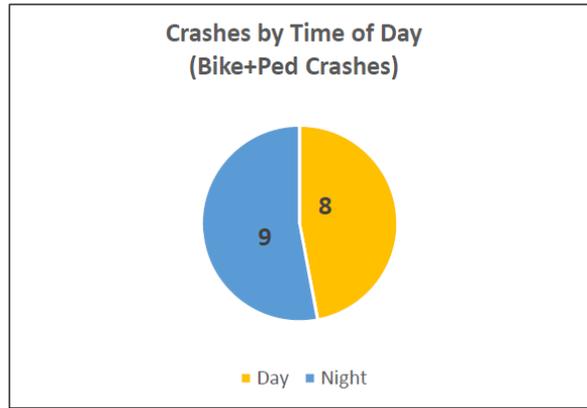
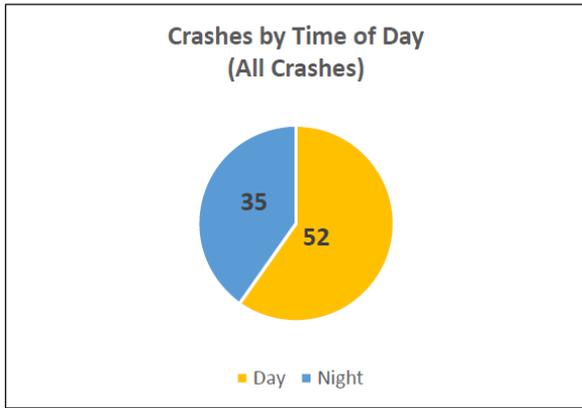
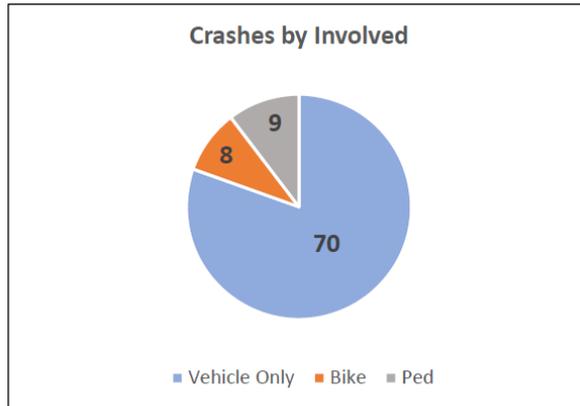
*2/14/21 Crash is outside of study timeframe, but resulted in a pedestrian fatality involving alleged DUI. Actual crash report was not reviewed.

Cause: FYRW = Failure to Yield Right-of-Way; DUI = Driving Under the Influence

Severity: 0 = Property Damage Only; 1 = Possible Injury; 2 = Minor Injury; 3 = Serious Injury; 4 = Fatal

Note: Crashes are listed in order from the north end of the segment to the south end.

Figure 3 – Crash Statistics Summary



As seen in the above crash summary table and graph, approximately half of the pedestrian and bicycle crashes occurred during nighttime conditions, which is a higher percentage than vehicular crashes occurring at night. Based on field observations, this could be due to the similar pedestrian and bicycle volumes occurring during all times of day while vehicular traffic is higher during daytime hours.

3.0 Findings and Recommendations

3.1 Positive Findings

The following were identified as positive measures and features that are already in place within the study area that enhance pedestrian and bicycle safety:

- Sidewalks exist along both sides of King Street for the entire length of the corridor.
- Some crosswalks with countdown pedestrian signals are in place at the signalized intersections with Huger Street, Sumter Street, and Line Street.
- Pedestrian-level lighting is present between Carolina Street and Line Street.
- Some areas surrounding the corridor are experiencing redevelopment which is enhancing access to affordable housing, transit, and infrastructure.
- Transit exists along the corridor, including the circulator service (numbered routes) and DASH service. A standard size bus is used for these routes.

3.2 Potential Corridor Improvements

Some improvements apply to multiple locations on the corridor. For clarity on specific recommendations related to intersections, intersection recommendations will be addressed in the next section of this report. Additionally, there are some recommendations that will provide benefit to the corridor as a whole. Short-term improvements include the following:

- Repair sections of sidewalk that have become severely cracked and unlevel.
- Review speed limit sign locations and install as needed within the study segment.
- Review school speed zone and remove school speed signing since the roadway is already posted at 25 mph. Retain other school-related signing.
- Through redevelopment, review and modify property access to limit conflict points on the roadway and sidewalk.
- Through redevelopment, resurfacing, or other construction, upgrade driveway and intersection ramps to be ADA-compliant.



3.2.1 Corridor Cross Section

The cross-section of the corridor was discussed to determine if a change in lane widths or assignments could provide a benefit for pedestrians and bicyclists. Between Huger Street and Carolina Street the roadway is approximately 34 feet wide (curb to curb). This provides a 12-ft northbound travel lane and a total of 22 feet in the southbound direction shared between the travel lane and informal on-street parking. Narrow turn lanes are established at the intersections with Huger Street and Sumter Street using pavement markings within the available 34-ft space. While bike lanes may be able to be accommodated with an elimination of on-street parking, the

parking is important to nearby businesses, and an evaluation of where that parking would be relocated would be required. The City has indicated a desire to review this informal on-street parking to provide regulation, such as metering, drop-off and pick-up only, or resident-only parking. Delivery truck loading should also be considered, as concerns have been raised that these trucks using the wide outside lanes for loading cause abrupt and sometimes difficult maneuvers for vehicular and bicycle traffic, thus increasing their potential conflict. The road width would not be sufficient at the intersections with Huger Street and Sumter Street to provide both the necessary left-turn lanes and bike lanes without widening.

The southbound direction of King Street transitions within the intersection at Carolina Street to provide two southbound lanes and no on-street parking. This causes an issue with lane continuity approaching Line Street because the inside lane is then required to turn left at Line Street, except between 7:00-9:00 AM and 4:00-6:00 PM. The King Street RSA recommends evaluation of this condition to require the left-turn condition during all times of the day. With that potential change in lane assignments, the extension of two southbound lanes between Carolina Street and Line Street becomes less critical. This may allow one of the lanes to be eliminated and the space repurposed to accommodate other uses. A traffic analysis would be required to determine the feasibility of eliminating the lane. This change in lanes would be similar to a “road diet” and is shown conceptually in the figure below. Prior to commencing a review for a possible road diet, the vision for the entire King Street corridor should be considered, as this alternative would only provide bike lanes for approximately 0.15 miles without impacting areas outside of this short segment. It is not recommended to formally create bike lanes for this short segment only, but a road diet of this nature could provide for other uses of the space such as wider sidewalks, pedestrian bulb outs, raised medians, or on-street parking if bike lanes prove infeasible for the corridor. The City of Charleston Design Division has developed conceptual ideas for the area that may be considered in the evaluation; however, these will need to be fully vetted by all parties as part of the analysis.

Figure 5 – Road Diet Example for Bike Lanes



3.2.2 Corridor Crosswalk Locations

The width of King Street between curbs creates a longer crossing distance for pedestrians than is desirable. In areas with high pedestrian crossing demand, the width should be reviewed to determine the feasibility of modifying curb lines or constructing bulb outs to shorten the crossing distance and improve sight distance. These improvements can be made with or without formally marking a crosswalk at any location. However, a new or relocated crosswalk may be justified depending upon the pedestrian demand in the area.

During the field review, the study team offered information from past observations that pedestrians tend to cross throughout the entire corridor at uncontrolled locations, and that parking, street trees, ride-share drop-offs, and stopped delivery trucks make some of these locations undesirable for pedestrian crossings. By determining locations that it is desired for pedestrians to cross, such as at a traffic signal or at one or two properly placed uncontrolled crosswalks, pedestrian demand may be condensed somewhat to these more desirable locations. It is understood that some pedestrians will continue to cross at other points on the corridor regardless of the provided accommodations.

Corridor master planning, property redevelopment, and pedestrian demand are some factors to consider when selecting a crosswalk location. At a minimum, the crosswalk should include pedestrian warning signs; however, enhanced devices such as Rectangular Rapid Flashing Beacons (RRFBs) may be considered with the installation of the crosswalk. These devices require an engineering report and interim approval from the Federal Highway Administration (FHWA) for installation. Retroreflective strips may also be considered for the sign posts or additional delineators or Retroreflective Raised Pavement Markers (RRPMs) installed on the median.

3.2.3 Corridor Lighting

Pedestrian-level lighting exists on the corridor in some locations. The lighting is not considered as street lighting because it does not fully illuminate the travel lanes. This lighting provides some element of comfort and safety for pedestrians, but shadows exist between the light posts. These shadows can reduce safety if a pedestrian is crossing the roadway in a shadowed area or a bicyclist is traveling in and out of shadowed areas. As seen in the image, shadows occur for both the roadway and sidewalk due to the light spacing and street trees. Any locations where pedestrians are expected to regularly cross during dark conditions should be reviewed to ensure adequate lighting, and overall corridor lighting should be reviewed to ensure adequate lighting for vehicles and bicycles.



3.2.4 Corridor Planning

During the field review, traffic signal locations for the study segment were discussed. A cursory review indicates that the existing signals on the corridor are equally-spaced at 0.25 miles for the locations of Huger Street, Sumter Street, and Line Street. This provides for optimal signal timings and coordination and helps to mitigate queues during peak times. However, the intersection at Carolina Street provides similar access to the road network as Sumter Street and also connects to the off ramp from US 17. Carolina Street is not eligible for a traffic signal as long as Sumter Street remains signalized, but consideration may be given to relocating the signal to Carolina Street. The off ramp from US 17 was also discussed during the field review. The off ramp provides convenient access to King Street from US 17 South (no access from I-26 East), but the ramp has a tight radius and leaves a short weave condition on Carolina Street approaching King Street. If this ramp were eliminated entirely, traffic would access King Street by turning right onto Coming Street and right onto Carolina Street. This route would only increase travel distance by approximately 500 feet. Elimination of the ramp could be considered as an alternative in the traffic analysis. Any signal relocation study must evaluate the impacts to this off ramp (whether retained or eliminated) and the road network as a whole. Existing and projected traffic volumes and an origin-destination evaluation should be included in the analysis.

Due to the complex nature of the various interrelated elements discussed as potential corridor improvements, it is recommended that a comprehensive planning and traffic analysis be conducted for this segment of King Street. This analysis is beyond the capabilities of this safety review. The analysis should not only consider the 0.5-mile segment between Huger Street and Line Street, but the impacts to King Street north and south of the study segment.

3.3 Potential Intersection Improvements

Several specific potential intersection improvements were noted at intersections along the corridor. The potential improvements are listed below. Some improvements can be implemented in the near future, while others must be considered as development continues or funding becomes available.

King Street & Huger Street

- Upgrade pedestrian ramps to be ADA compliant.
- Consider a leading pedestrian interval (also known as advance pedestrian signal) if determined feasible and desirable by the City of Charleston.
- Upgrade the existing 8” signal heads to 12” signal heads.
- Reduce the height of the new pedestrian signal heads to a standard height.

King Street & Congress Street

- Upgrade pedestrian ramps to be ADA compliant.
- Install crosswalks across Congress Street (stop-controlled approaches).

- Consider intersection bulb outs to shorten pedestrian crossing distance, with or without crosswalk across King Street.
- Consider a location for an uncontrolled crosswalk with bulb outs in the vicinity of Congress Street. The location should be determined partially based upon the signalized intersection locations (i.e. Sumter Street or Carolina Street) such that an uncontrolled crosswalk is not located less than 500 feet from a traffic signal. Pedestrian demand must be considered, including future demand from the Low Line project.



King Street & Race Street / I Street

- Upgrade pedestrian ramps to be ADA compliant.
- Install a crosswalk across Race Street and I Street (stop-controlled approaches).
- Race Street may be considered for conversion to two-way traffic if the roadway width is repurposed for a second travel lane depending upon the results of the King Street corridor planning effort.
- Close abandoned driveway for 698 King Street by installing vertical curb to prevent parking on the sidewalk. The business does not use the dropped curb section for property access. Extending the adjacent grass strip should be considered to reinforce the sidewalk separation.

King Street & Sumter Street

- Repair damaged pedestrian head in the northeast quadrant.
- Upgrade the existing 8" signal heads to 12" signal heads and add backplates.
- Consider a leading pedestrian interval (also known as advance pedestrian signal) if determined feasible and desirable by the City of Charleston.
- Review the need to retain the existing southbound right-turn lane from King Street onto Sumter Street and reallocate the space if the turn lane is not needed.
- Install signalized crosswalk across the southern intersection leg.
- Conduct comprehensive review to determine best signalized intersection location (see Corridor Improvements discussion) and remove traffic signal and pedestrian crosswalks at Sumter Street if signal is to be relocated.

King Street & Carolina Street

- Tighten intersection radius in southwest quadrant to reduce the turning speeds, pedestrian crossing distance, and occurrences of vehicles failing to come to a complete stop. Use design vehicle turning templates to determine minimum allowable radius.
- Consider eliminating one of the southbound lanes created at this intersection (see Corridor Improvements discussion). This may allow the intersection radius to be further tightened.

- Conduct comprehensive review to determine the best signalized intersection location and add a traffic signal and pedestrian crosswalks at Carolina Street if the signal is to be relocated to this location.
- Consider a location for an uncontrolled crosswalk with bulb outs in the vicinity of Carolina Street. The location should be determined partially based upon the signalized intersection locations (i.e. Sumter Street or Carolina Street) such that an uncontrolled crosswalk is not located less than 500 feet from a traffic signal. Pedestrian demand must be considered, including future demand from the Low Line project and nearby housing projects.

King Street & Engel Street

- Depending upon the comprehensive review of signalized intersection locations, consider Engel Street as the location for an uncontrolled crosswalk across King Street in lieu of Carolina Street. This location would provide for less turning conflicts. The location should be determined partially based upon the signalized intersection locations (i.e. Sumter Street or Carolina Street) such that an uncontrolled crosswalk is not located less than 500 feet from a traffic signal. Pedestrian demand must be considered, including future demand from the Low Line project.

King Street & Sheppard Street

- Remove one of the two uncontrolled crosswalks across King Street. Condensing pedestrians to a single uncontrolled crossing will enhance driver awareness of pedestrians.
- Construct intersection bulb outs or a raised median to shorten the uncontrolled crossing distance, depending upon road diet feasibility (see Corridor Improvements discussion).
- Install pedestrian warning signs at the uncontrolled crosswalk location to remain.

4.0 Summary and Responsible Parties

4.1 Safety Review Summary

The 0.5-mile segment of US 78 (King Street) between Huger Street and Line Street was selected for a road safety review based on the crash frequency and severity involving pedestrians and bicyclists on the corridor in recent years. A review of the pedestrian and bicyclist crash history from January 1, 2016 to September 30, 2020 revealed that crashes have occurred during various times of the day, but over half of the crashes took place during nighttime conditions. There was one fatality recorded within the study segment during this review period. The fatality occurred in 2019 due to a DUI.

Some positive findings were noted during the on-site field visit; however, numerous recommendations were developed that may improve the pedestrian and bicyclist crash rate on this segment of roadway. Some recommendations include low-cost improvements such as

general maintenance items and pavement marking improvements. There are also long term improvements that should be considered, such as the installation of a raised median for the purposes of access management and providing a pedestrian refuge at a designated crossing point.

Several of the long-term improvements require a comprehensive corridor study to determine traffic signal and pedestrian crossing locations as well as the feasibility of a road diet. This type study will require consideration of existing and future traffic volumes, pedestrian and bicycle demand, an origin-destination review, nearby developments, and future projects. This type study is beyond the scope and capabilities of this safety review and therefore becomes the overarching recommendation from this review.

4.2 Responsible Parties

To summarize and clarify the responsible parties for the proposed improvements, recommendations are summarized in the table below. The timeframe for the proposed improvements is also estimated. For the purposes of this report, short term improvements are expected to be completed within one year and long term improvements are expected to take at least one year to complete. Identification of a funding source will be necessary for long term improvements, as no specific funding source is currently identified. Long term improvements may also be revised over time based on development trends and funding opportunities.

Table 3 – Recommendations and Responsible Parties

<i>Recommendation</i>	<i>Responsible Party</i>	<i>Estimated Timeframe</i>
Repair severely cracked portions of the existing sidewalk	SCDOT	Short term
Review speed limit sign locations and install new sign assemblies as needed.	SCDOT	Short term
Remove 25 mph school speed limit signing since the corridor is posted at 25 mph.	SCDOT	Short term
Install crosswalks where missing across side street approaches	SCDOT	Short term
Adjust pedestrian signal operation, such as leading pedestrian intervals, at existing signals as necessary	City of Charleston	Short term
Construct sidewalk and driveway improvements listed for corridor and specific intersections	TBD	Long term
Conduct comprehensive corridor study to determine traffic signal and pedestrian crossing locations and feasibility of a road diet.	TBD	Long term
Implement corridor study findings agreed upon between SCDOT and City of Charleston	TBD	Long term
Enforce existing 25 mph speed limit when possible	City of Charleston	Ongoing

4.3 Funding Opportunities

There are no funding sources currently identified for the long term improvements previously discussed; however, there are several known opportunities to pursue funding. Charleston County reserves a portion of the Transportation Sales Tax (TST) funds for annual allocation projects. These projects are requested by other entities such as the City of Charleston or SCDOT and evaluated by Charleston County using objective criteria. Selection of a project depends upon current funding levels and the ranking of the project relative to other ongoing projects and new project requests. Charleston County also manages funding through the County Transportation Committee (CTC). This funding source follows a similar selection process to the TST funding. Projects using TST funds are eligible for purchasing Right-of-Way, while CTC projects are not. Either of these options can consider funding a comprehensive corridor study. Requests are typically submitted annually for TST projects each winter and for CTC projects each summer.

Two other funding sources include the City of Charleston or Berkeley-Charleston-Dorchester Council of Governments (BCDCOG). Funding would need to be requested and identified for a project, and may require reassigning funds from another source.

SCDOT has very limited funding options for long term improvements discussed in this report. Currently, SCDOT does not fund capacity or operations improvement projects. This corridor is not currently eligible for funding through the Highway Safety Improvement Program (HSIP). One potential source of funding for signal-related improvements is the SCDOT signal maintenance fund. This annual funding can be used to upgrade traffic signals, but not to eliminate or condense driveways.