

Summer Flounder

The recreational and commercially important summer flounder are managed under the Summer Flounder, Scup, and Black Sea Bass Fishery Management Plan directed by the MAFMC (NMFS 2008). The summer flounder ranges from the shallow estuarine and outer continental shelf waters from Nova Scotia to Florida to the northern Gulf of Mexico (NEFSC 1999). Summer flounder exhibit seasonal inshore/offshore migration patterns from late spring through early fall in estuaries and sounds, and migrate offshore on the outer continental shelf during the winter (NEFSC 1999; ASMFC 2014b).

The adults primarily inhabit sandy substrates but can also be found in seagrass beds, marsh creeks, and sand flats. They are quick predators, ambushing their prey and making full use of their camouflage and bottom positioning for efficient predation on small fish and squid. Crustaceans make up a large percentage of their diet (ASMFC 2014b; NEFSC 1999). The EFH habitats within the study area support the larval, juvenile, and adult developmental life stages of the summer flounder (NMFS 2008; ASMFC 2014b).

3.8 TRAFFIC AND TRANSPORTATION

This section describes the infrastructure of the existing transportation system within the Transportation Study Area (TSA). The section is broken down into the following sections: Roadways, Railroad, Port of Charleston, Pedestrian and Bicycle, and Transit.

The TSA, as shown in Figure 3.8-1, covers a greater area than the general study area due to the need to analyze the impacts to the surrounding transportation network as a result of the Navy Base ICTF, two existing rail-truck intermodal facilities (CSX's Bennet Yard and NS's 7-Mile Yard), and three Port facilities that handle containerized cargo (Future HLT, Wando Welch, and North Charleston port facilities). As shown in Figure 3.8-1, the TSA includes the entire I-526 corridor from US 17 in West Ashley to US 17 in Mount Pleasant and the portion of the I-26 corridor from Aviation Avenue (Exit 211A) to US 17 (Exit 220B). The TSA also includes 48 analyzed existing roadway intersections and 11 analyzed existing roadway at-grade rail crossing locations generally bounded by I-526 to the north, the Cooper River to the east, Stromboli Avenue to the south, and I-26 to the West in North Charleston. Impacts to pedestrian, bicycle, and transit facilities and from historical roadway crash data are limited to the study area.




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Sources: SCDOT, ESRI, and SCDNR GIS Data Clearing House.



Source: Esri, DigitalGlobe, GeoEye, i-cubed, USDA, USGS, AEX, Getmapping, Aerogrid, IGN,

NAVY BASE ICTF EIS	
Transportation Study Area Figure 3.8-1	 US Army Corps Of Engineers Charleston District

3.8.1 Roadways

This section describes the characteristics and operations of the roadways within the TSA that are likely to be impacted by building the Navy Base ICTF. The section is broken down into two sub-sections; North Charleston Surface Streets and Controlled Access Facilities. The North Charleston Surface Streets section includes the roadways and intersections in and around the study area. The Controlled Access Facilities section includes I-26, I-526, and US 17.

The operations analysis is documented in the Transportation Analysis Technical Memorandum (Appendix F). Individual freeway segments and intersections were evaluated for level of service (LOS) based on methodologies from the 2010 Highway Capacity Manual (HCM) guidance (Transportation Research Board 2010). Each segment was developed based on guidance from HCM 2010 and includes basic freeway, weave, and ramp merge and diverge locations. Year 2013 volumes from the Project traffic forecasts (Appendix F) for both morning and evening peak hours were evaluated. The freeway analysis was conducted using the Highway Capacity Software (HCS) 2010 (Build 6.41) (McTrans) while the intersection analysis was conducted using Synchro (Version 9, Build 900, Revision 46) (Trafficware 2014).

The LOS is a qualitative measure describing the flow of traffic. The LOS is defined with letter designations from A to F that can be applied to both roadway segments and intersections. LOS A represents the best operating conditions and LOS F represents the worst. LOS A to C are considered Good, LOS D is considered Fair, and LOS E or F are considered Poor. FHWA does not have regulations or policies that require specific minimum LOS values for projects. The recommended values from HCM are regarded by FHWA as guidance and generally accepted as the industry standard.

Although LOS A to LOS F can be used to describe best to worst operating conditions for both freeway segments and intersections, the specific descriptions of each LOS for freeway segments and intersections are not the same. Table 3.8-1 describes the traffic conditions experienced under each LOS designation for roadway segments. Table 3.8-2 describes the traffic conditions experienced under each LOS designation for signalized and stop-controlled intersections.

The LOS is a qualitative measure describing the flow of traffic. The LOS is defined with letter designations from A to F that can be applied to both roadway segments and intersections.

3.8.1.1 Controlled Access Facilities

Interstate 26

I-26 is designated as an east-west facility, although it runs in a primarily southeast-northwest direction between its termini in Kingsport, Tennessee and Charleston, South Carolina. I-26 intersects with I-77 and I-20 in Columbia, South Carolina approximately 100 miles from the Project site.

Additionally, I-26 intersects with I-95, the major north-south interstate on the east coast, approximately 50 miles from the Project site.

Table 3.8-1
Definitions of Levels of Service for Freeway Segments

LOS	Description	Threshold Values	
		Basic Freeway (Density in pc/mi/ln) ¹	Merge, Diverge, and Weave (Density in pc/mi/ln) ¹
A	Free flow. Individuals are unaffected by others in traffic stream. Freedom to select speed and maneuver is extremely high.	≤11	≤10
B	Free flow, but the presence of other vehicles begins to be noticeable. Slight decline in freedom to maneuver.	>11-18	>10-20
C	Stable flow, but the beginning of the range in which the influence of traffic density on operations becomes marked. Maneuvering requires substantial vigilance. Average travel speeds may begin to show some reduction.	>18-26	>20-28
D	High density flow in which ability to maneuver is severely restricted by increasing volumes. Only minor traffic disruptions can be absorbed without effect.	>26-35	>28-35
E	Flow at or near capacity. Unstable. Most traffic disruptions will cause queues to form and service to deteriorate.	>35-45	>35
F	Breakdown flow. Traffic exceeds capacity. Queues form behind such locations, which are characterized by extremely unstable stop-and-go waves.	>45 $v/c > 1^2$	$v/c > 1^2$

Source: 2010 Highway Capacity Manual, Transportation Research Board, 2010.

1. Threshold values for density are in passenger cars per mile per lane (pc/mi/ln).
2. Volume to Capacity ratio. Values greater than one indicate the volume is greater than the capacity of the roadway.

Table 3.8-2
Definitions of Levels of Service for Intersections

LOS	Description ¹	Threshold Values	
		Signalized (Delay in sec/veh) ²	Stop-Controlled (Delay in sec/veh) ²
A	Short cycle length or outstanding progression. Most vehicles travel through intersection without stopping.	≤10	≤10
B	Short cycle length or very good progression. More vehicles stop than LOS A.	>10-20	>10-15
C	Short cycle length or good progression. Few individual cycle failures may occur. A number of vehicles stop but some do not.	>20-35	>15-25
D	Long cycle length or poor progression. Many vehicles stop and noticeable amount of individual cycle failures.	>35-55	>25-35
E	Long cycle length and poor progression. Frequent individual cycle failures.	>55-80	>35-55
F	Long cycle length and very poor progression. Intersection queue does not clear during most signal cycles.	>80 $v/c > 1^2$	>50 $v/c > 1^2$

Source: 2010 Highway Capacity Manual, Transportation Research Board, 2010.

1. The LOS description is only applicable to signalized intersections. For stop-controlled intersections, the delay represents how long the average stop- or yield-controlled vehicle will have to wait.
2. Threshold values for delay are in seconds per vehicle s (sec/veh).
3. Volume to Capacity ratio. Values greater than one indicate the volume is greater than the capacity of the roadway.

Within the TSA, I-26 is an urban freeway with a concrete barrier median. The highway is an eight-lane facility from the west end of the TSA to I-526 where it becomes a six-lane facility. The speed limit is 60 mph through North Charleston but drops down to 50 mph west of the Rutledge Avenue ramp until it terminates at US 17 in downtown Charleston. I-26 includes 13 interchanges within the TSA including a system interchange with I-526.

Year 2013 average daily volumes along I-26 vary within the TSA. West of I-526, the interstate serves as much as 140,000 vehicles per day. Between the I-526 and Rutledge Avenue interchanges, daily volumes are approximately 90,000 vehicles per day. East of Rutledge Avenue, daily volumes drop to around 61,000 vehicles per day approaching US 17.

Under existing conditions, consistent with commuter traffic patterns into and out of Charleston, most of the congestion occurs in the eastbound direction in the morning and westbound in the evening. Approximately 4 percent of the total analyzed segments currently operate at Poor LOS and 23 percent operate at Fair LOS, which is nearing unstable traffic flow. A summary of the I-26 freeway segment LOS by direction and peak hour is shown in Table 3.8-3.

Table 3.8-3
I-26 Existing Operations

LOS	Eastbound		Westbound	
	AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour
Good	19 Segments (46%)	38 Segments (93%)	36 Segments (97%)	20 Segments (54%)
Fair	19 Segments (46%)	2 Segments (5%)	1 Segment (3%)	14 Segments (38%)
Poor	3 Segments (8%)	1 Segment (2%)	0 Segments (0%)	3 Segments (8%)

Source: Appendix F.

Note: Segments include basic freeway, weave, and ramp merge and diverge locations, which may vary in number between eastbound and westbound I-26.

Interstate 526

I-526, also referred to as the Mark Clark Expressway, forms a partial loop around the east, north and west portion of the greater Charleston area. The approximate 19-mile freeway runs from US 17 in West Ashley to US 17 in Mount Pleasant, connecting with I-26 to provide a bypass of downtown Charleston. I-526 is signed eastbound and westbound.

I-526 is a four-lane urban freeway facility with either a depressed median or constructed on a raised viaduct. The speed limit is 60 mph from the west end of the freeway to International Boulevard, 55 mph from International Boulevard to Rhett Avenue, 60 mph from Rhett Avenue to Daniel Island, 65 mph from Daniel Island to Long Point Road, and 55 mph from Long Point Road to the east end of the freeway. I-526 consists of 14 interchanges including a system interchange with I-26.

The year 2013 daily volumes range from approximately 74,000 to 84,000 vehicles on the section of I-526 serving North Charleston from Leeds Avenue to Virginia Avenue. West of Leeds Avenue the daily volumes remain around 74,000 vehicles to Paul Cantrell Boulevard where the volume drops down to 37,000 vehicles per day. East of Virginia Avenue, daily volumes drop to approximately 66,000 vehicles, then range from 49,000 to 59,000 vehicles between Clements Ferry Road and Hungryneck Boulevard.

Under existing conditions, the majority of the congestion occurs between International Boulevard and Clements Ferry Road. Approximately 9 percent of the total analyzed segments currently operate at Poor LOS and 39 percent operate at Fair LOS, which is nearing unstable traffic flow. A summary of the I-526 freeway segment LOS by direction and peak hour is shown in Table 3.8-4.

Table 3.8-4
I-526 Existing Operations

LOS	Eastbound		Westbound	
	AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour
Good	22 Segments (49%)	22 Segments (49%)	20 Segments (47%)	28 Segments (65%)
Fair	16 Segments (36%)	20 Segments (44%)	18 Segments (42%)	14 Segments (33%)
Poor	7 Segments (16%)	3 Segments (7%)	5 Segments (12%)	1 Segment (2%)

Source: Appendix F.

Note: Segments include basic freeway, weave, and ramp merge and diverge locations, which may vary in number between eastbound and westbound I-526.

U.S. Highway 17

US 17 is a north-south highway that runs from Florida to Virginia. In Charleston, US 17 serves as a major connection between downtown Charleston and the commercial and residential areas of the West Ashley section of Charleston to the west and Town of Mount Pleasant to the east.

Within the TSA, US 17 is an eight-lane expressway between I-26 and Coleman Boulevard with a speed limit of 55 mph. This section of US 17 includes the Arthur Ravenel Jr. Bridge over the Cooper River. East of Coleman Boulevard to I-526, US 17 is a six-lane median divided expressway with a speed limit of 45 mph. Access to this portion of US 17 is limited to the five signalized intersections and two interchanges at Bowman Road and I-526.

The year 2013 average daily traffic on US 17 between I-26 and Coleman Boulevard is 82,600 vehicles. From Coleman Boulevard east to I-526, the daily volumes range from 43,400 to 47,400 vehicles.

Under existing conditions, the freeway elements of US 17 within the TSA experience little congestion. All the freeway segments operate at Good LOS except for during the AM peak hour at two locations that operate at Fair LOS. A summary of the US 17 freeway segment LOS by direction and peak hour is shown in Table 3.8-5. Of the five signalized intersections along US 17, four (80 percent) operate at Good LOS, one operates at Fair LOS (20 percent), and none operate at Poor LOS in both the AM and PM peak hours. A summary of the US 17 signalized intersection operations is shown in Table 3.8-6. The worst of the AM and PM peak hour LOS for the existing intersections is shown in Figure 3.8-2.

Table 3.8-5
US 17 Existing Freeway Operations

LOS	Northbound		Southbound	
	AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour
Good	10 Segments (100%)	11 Segments (100%)	8 Segments (80%)	11 Segments (100%)
Fair	0 Segments (0%)	0 Segments (0%)	2 Segments (20%)	0 Segments (0%)
Poor	0 Segments (0%)	0 Segments (0%)	0 Segments (0%)	0 Segments (0%)

Source: Appendix F.

Note: Segments include basic freeway, weave, and ramp merge and diverge locations, which may vary in number between northbound and southbound US 17.

Table 3.8-6
US 17 Existing Intersection Operations

LOS	AM Peak Hour	PM Peak Hour
Good	4 Intersections (80%)	4 Intersections (80%)
Fair	1 Intersection (20%)	1 Intersection (20%)
Poor	0 Intersections (0%)	0 Intersections (0%)

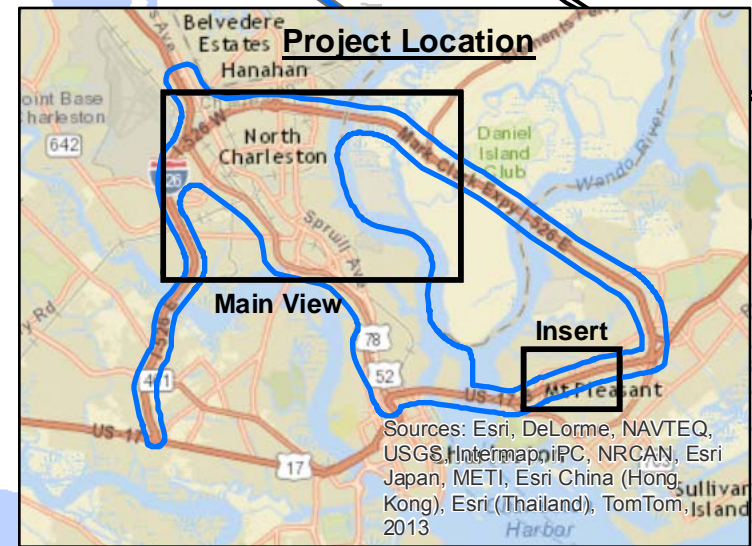
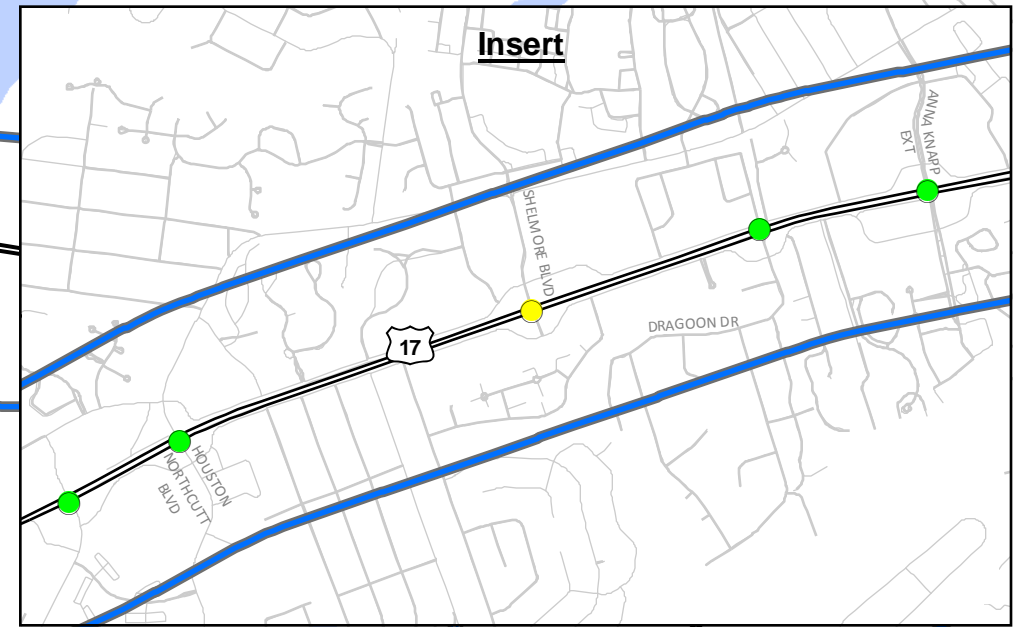
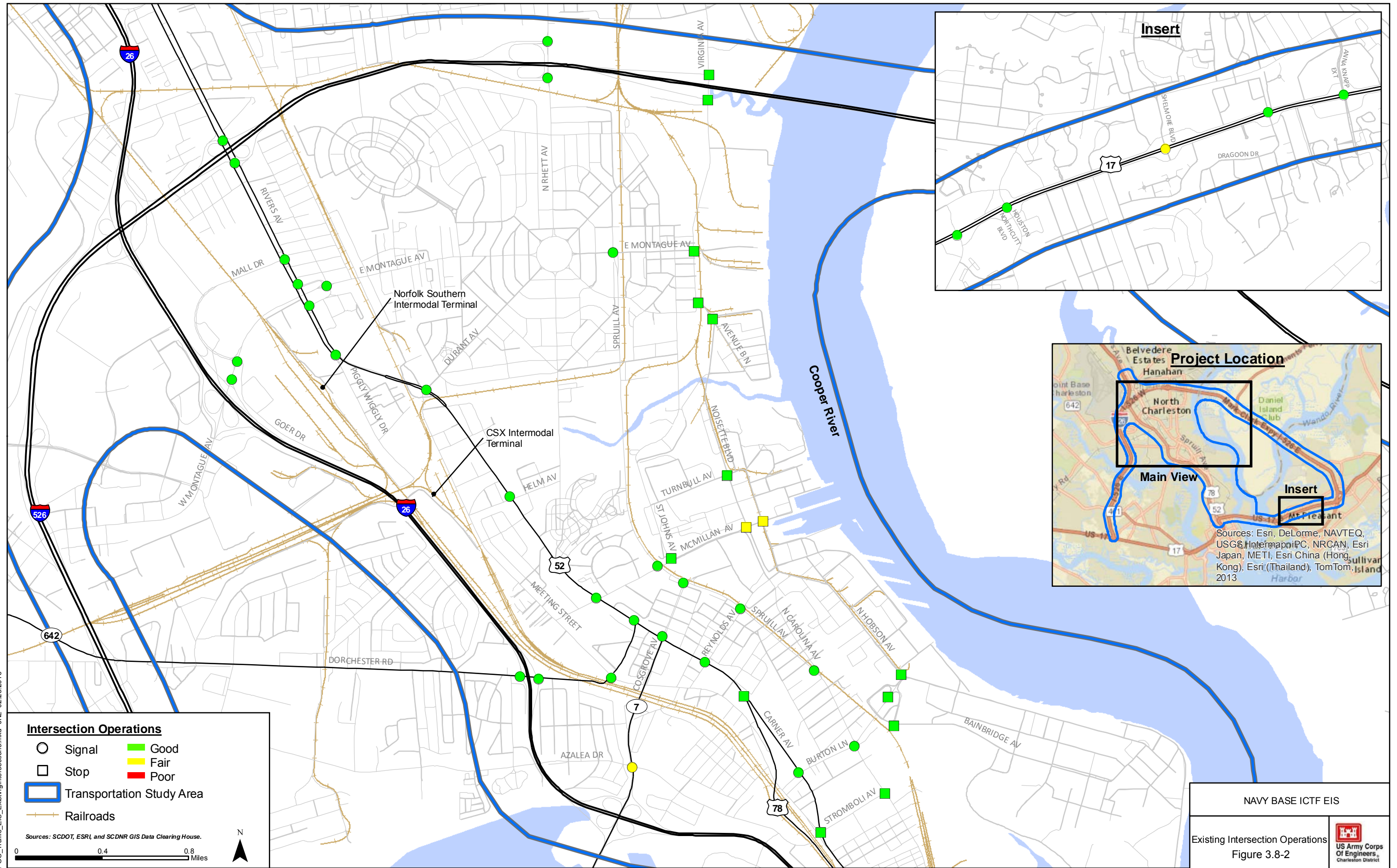
Source: Appendix F.

3.8.1.2 North Charleston Surface Streets

U.S. Highway 52/U.S. Highway 78 (Rivers Avenue/Carner Avenue)

In North Charleston, US 52 and US 78 run on the same alignment from Carner Avenue to University Boulevard/Goose Creek Road. US 52 and US 78 serve as an alternate route to I-26 from Charleston to Goose Creek and Summerville, respectively. Within the TSA, US 52/78 between Aviation Avenue and Piggly Wiggly Drive is a six-lane urban principal arterial with a depressed median and a speed limit of 45 mph. East of Piggly Wiggly Drive the highway transitions to a five-lane principal arterial including a two-way left-turn lane and has a speed limit of 35 mph. US 52 continues onto Carner Avenue which is a two-lane principal arterial with a 35 mph speed limit. The year 2013 average daily traffic on US 52/78 steadily drops from Aviation Avenue to Hampton Avenue. US 52/78 serves 44,700 vehicles west of Remount Road, 34,500 vehicles per day from Remount Road to I-526, 25,600 vehicles per day from I-526 to Piggly Wiggly Drive, 16,700 vehicles per day from Piggly Wiggly Drive to Dorchester Road, 8,500 vehicles per day from Dorchester Road to Carner Avenue, and then drops down to 4,200 vehicles per day on the Carner Avenue segment.

Within the TSA, US 52/78 has 13 signalized intersections and two unsignalized intersections that were included in the capacity analysis.



- Intersection Operations**
- Signal
 - Stop
 - Good
 - Fair
 - Poor
 - ▭ Transportation Study Area
 - Railroads

Sources: SCDOT, ESRI, and SCDNR GIS Data Clearing House.

0 0.4 0.8 Miles



SC Highway 7 (Cosgrove Avenue)

SC-7 connects the West Ashley area of Charleston to North Charleston and I-26 and serves as an alternate route to I-526. The TSA includes the portion of SC-7, known as Cosgrove Avenue, between I-26 and Spruill Avenue. Cosgrove Avenue is a four-lane principal arterial with a speed limit of 45 mph from I-26 to Azalea Drive, which decreases to 35 mph from Azalea Drive to Spruill Avenue.

In the year 2013, Cosgrove Avenue carried approximately 15,000 vehicles per day from I-26 to US 52 and 6,700 vehicles per day from US 52 to Spruill Avenue.

Within the TSA, Cosgrove Avenue has three signalized intersections that were included in the capacity analysis.

SC Highway 642 (Dorchester Road)

SC-642 (Dorchester Road) runs from US 17 Alternate in Summerville, South Carolina to US 52 in North Charleston, providing an alternate route to I-26. The TSA includes Dorchester Road between I-26 and US 52. Between I-26 and Meeting Street, Dorchester Road is a four-lane principal arterial with a striped out median transitioning to a two-lane principal arterial between Meeting Street and US 52. The speed limit along this portion of Dorchester Road is 35 mph.

The segment of Dorchester Road within the TSA serves approximately 6,700 vehicles per day.

Within the TSA, Dorchester Road has four signalized intersections that were included in the capacity analysis.

Spruill Avenue (S-32)

Spruill Avenue, located completely within the TSA, runs from US 52 to Montague Avenue providing a crossing over Noisette Creek. Spruill Avenue is a three-lane facility that includes a two-way left-turn lane. The functional classification of Spruill Avenue between Burton Lane and McMillan Avenue is a principal arterial, which changes to a minor arterial north and south of this segment. The speed limit is 35 mph south of Reynolds Avenue and 40 mph north of Reynolds Avenue.

The year 2013 average daily traffic on Spruill Avenue between Montague Avenue and McMillan Avenue is 8,300 vehicles, increasing to approximately 9,300 vehicles south of McMillan Avenue.

Spruill Avenue has six signalized intersections and one stop-controlled intersection that were included in the capacity analysis.

Montague Avenue (S-62)

Montague Avenue runs from Dorchester Road to Virginia Avenue, part of which forms the primary east-west roadway through the North Charleston business district. Within the TSA Montague Avenue is a minor arterial except for the section from Spruill Avenue to Virginia Avenue, which is a collector. The roadway cross section also varies along Montague Avenue within the TSA. From I-26 to Mall Drive, Montague Avenue is a six-lane median divided facility, four-lane median divided from Mall Drive to Piedmont Avenue, five-lane painted median from Piedmont Avenue to Park Circle, two-lane median divided from Park Circle to Jenkins Avenue, and two-lane undivided with angled on-street parking from Jenkins Avenue to Virginia Avenue.

From west to east within the TSA, the year 2013 average daily traffic volume on Montague Avenue decreases. From I-26 to Mall Drive, the year 2013 average daily traffic volume is 27,600 vehicles, 14,100 vehicles between Mall Drive and Piedmont Avenue, 6,800 vehicles from Piedmont Avenue to Park Circle, and 3,400 vehicles from Park Circle to Virginia Avenue.

Within the TSA, Montague Avenue has four signalized intersections and two unsignalized intersections, including the unsignalized I-26 Eastbound Ramp Terminal intersection, that were included in the capacity analysis.

McMillan Avenue (S-48)

McMillan Avenue, located completely within the TSA, runs from Meeting Street to North Hobson Avenue, connecting Spruill Avenue and US 52 to the former Charleston Naval Base. West of Spruill Avenue, McMillan Avenue is a four-lane undivided local road with a speed limit of 35 mph. East of Spruill Avenue, McMillan Avenue is a four-lane divided principal arterial with a speed limit of 30 mph.

The year 2013 average daily traffic on McMillan Avenue is 8,400 vehicles.

McMillan Avenue has two signalized intersections and three unsignalized intersections that were included in the capacity analysis.

Virginia Avenue (S-58)

Virginia Avenue runs from Buist Avenue to Remount Road, with a partial interchange (to and from the west) at I-526. The road is a major truck route to and from the North Charleston Port Terminal and industrial land uses along the Cooper River. Virginia Avenue from Buist Avenue to I-526 is a five-lane collector road that includes a two-way left-turn lane with a speed limit of 45 mph.

The year 2013 average daily traffic on Virginia between I-526 and Buist Avenue is 6,600 vehicles.

Within the TSA, Virginia Avenue has four unsignalized intersections that were included in the capacity analysis.

North Rhett Avenue/South Rhett Avenue (S-60)

North Rhett Avenue/South Rhett Avenue runs from Liberty Hall Road in Goose Creek to Helm Avenue in North Charleston, providing an alternative route to I-26. Park Circle in North Charleston is the transition point between North Rhett Avenue and South Rhett Avenue. Within the TSA, North Rhett Avenue between I-526 and Park Circle is a four-lane minor arterial with a painted median and a speed limit of 40 mph.

The year 2013 average daily traffic on North Rhett Avenue between I-526 and Park Circle is 31,000 vehicles.

Within the TSA, North Rhett Avenue has two signalized intersections that were included in the capacity analysis.

Clement Avenue/Burton Lane/Naval Base Road/Viaduct Road (S-22/S-145/S-86)

This road, which changes names from Clement Avenue to Burton Lane to Naval Base Road to Viaduct Road within the TSA, serves as a connection between Spruill Avenue and Carner Avenue and the old Charleston Naval Base. The road is a two-lane local road between Meeting Street and Spruill Avenue with a speed limit of 25 mph. Between Spruill Avenue and Hobson Avenue, Viaduct Road is a principal arterial with two eastbound lanes and one westbound lane and has a speed limit of 30 mph.

The year 2013 average daily traffic is 3,400 vehicles west of Spruill Avenue and 6,900 vehicles east of Spruill Avenue.

Within the TSA, this road has two signalized intersections, one unsignalized intersection, and an interchange with Bainbridge Avenue that were included in the capacity analysis.

North Charleston Intersection Operations

Within North Charleston, the majority of the intersections operate with little delay. The year 2013 existing scenario included 28 signalized intersections and 15 stop-controlled intersections within North Charleston. During the AM peak hour, all 28 signalized intersections and 14 stop-controlled intersections currently operate at Good LOS (98 percent of total intersections), one stop-controlled intersection operates at Fair LOS (2 percent of total intersections), and none operate at Poor LOS (0 percent of total intersections). During the PM peak hour, 27 signalized intersections and 14 stop-controlled intersections currently operate at Good LOS (95 percent of total intersections), one signalized intersection and one stop-controlled intersection operate at Fair LOS (5 percent of total intersections), and none operate at Poor LOS (0 percent of total intersections). The worst of the AM and PM peak hour LOS for the existing intersections is shown in Figure 3.8-2. A summary of the North Charleston intersection operations is shown in Table 3.8-7.

Table 3.8-7
North Charleston Existing Intersection Operations

LOS	AM Peak Hour		PM Peak Hour	
	Signalized	Stop-Controlled	Signalized	Stop-Controlled
Good	28 of 28 Intersections	14 of 15 Intersections	27 of 28 Intersections	14 of 15 Intersections
Fair	0 of 28 Intersections	1 of 15 Intersections	1 of 28 Intersections	1 of 15 Intersections
Poor	0 of 28 Intersections	0 of 15 Intersections	0 of 28 Intersections	0 of 15 Intersections

Source: Appendix F.

The I-26 ramp terminal intersections at Cosgrove Avenue and I-26 Eastbound ramp terminal intersection at Montague Avenue are neither signalized nor stop-controlled. The ramp terminal intersections act as merge, diverge or weave elements along Cosgrove Avenue and Montague Avenue. All 10 of the elements operate at Good LOS during both the AM and PM peak hours.

Roadway Crash Data

This section provides a summary of historical crash data for major roadways within the TSA, as shown in Figure 3.8-1. The data provided by the SCDOT was collected between January 1, 2011, and October 31, 2014, over a period of approximately 3.8 years. A summary of the number of total crashes, fatal crashes, and injury crashes by corridor is provided in Table 3.8-8. The Cosgrove Avenue corridor had the highest number of crashes with the majority of the crashes occurring between the I-26 ramps and Azalea Drive.

Table 3.8-8
Number of Crashes by Corridor

Corridor	Boundaries	Length (miles)	Total Crashes	Fatal Crashes	Injury Crashes
Spruill Avenue	Meeting Street to Montague Avenue	3.9	76	1	31
Rivers Avenue	McMillan Avenue to Carner Avenue	0.8	102	1	45
Carner Avenue	Rivers Avenue to Meeting Street/ Stromboli Avenue	0.7	7	0	4
Noisette Boulevard	Avenue B to McMillan Avenue	1.0	6	0	1
N. Hobson Avenue	Noisette Boulevard to Viaduct Road	0.8	4	0	2
McMillan Avenue	Meeting Street to N. Hobson Avenue	0.5	32	0	14
Cosgrove Avenue	I-26 Ramps to Avenue E	1.1	111	0	37
Viaduct Road/ Naval Base Road/ Burton Lane	Carner Avenue to N. Hobson Avenue	0.6	4	0	2

Source: SCDOT Crash Reports contained in Appendix F.

3.8.2 Railroads

The Charleston region is serviced by two freight rail operators, CSX and NS, and Amtrak for passenger service. This section discusses the existing intermodal facilities, at-grade rail crossing crash history and impact to the operations of the roadway network, and passenger rail service in the TSA. A map showing the railways by operator, intermodal facilities, and the analyzed at-grade rail crossing locations is included as Figure 3.8-3.

3.8.2.1 Intermodal Facilities

Within the TSA, there are two existing intermodal facilities: CSX's Ashley Junction and NS's 7-Mile. The reported combined capacity of the two intermodal facilities is approximately 498,800 annual TEUs (see Appendix B), which is a standard volume unit for describing a facility's cargo handling capability.

CSX Ashley Junction Intermodal Facility

The CSX Ashley Junction intermodal facility is located between I-26 and Meeting Street, about halfway between East Montague Avenue and Dorchester Road. Truck traffic enters and exits through the access on Meeting Street located directly across from Macon Avenue. Ashley Junction includes five working tracks with grounded trackside storage, as well as storage for chassis and containers on chassis.

Norfolk Southern 7-Mile Intermodal Facility

The NS 7-Mile intermodal facility is located between I-26 and Rivers Avenue/Piggly Wiggly Drive, just south of East Montague Avenue. Truck traffic enters and exits through an access at the end of Goer Drive, which connects to East Montague Avenue. The 7-Mile yard has a single loading track and both grounded and wheeled storage for containers and chassis.

3.8.2.2 At-Grade Rail Crossings

The at-grade rail crossing analysis includes 11 locations in the North Charleston area, which are shown in Figure 3.8-3. The 11 locations include a total of 14 rail line crossings, meaning some locations cross multiple tracks. Although other at-grade rail crossings are located within the TSA, only rail crossings along the path of the intermodal trains between the Navy Base ICTF and existing CSX and NS intermodal yards in the build alternatives were considered in the analysis. The exception is the CSX rail crossings of Tuxbury Lane and Cherry Hill Lane east of Meeting Street. These two locations were not analyzed due to low volume on the roadways and lack of connectivity due to the Cooper River. The impact associated with intermodal trains from the Navy Base ICTF would be similar to or less than the analyzed rail crossing of Pittsburgh Avenue. The impacts at the Tuxbury Lane and Cherry Hill Lane rail crossings are discussed qualitatively in Section 4.8.

3.8.2.2.1 *Crash History*

The Project includes a safety summary of 13 existing at-grade rail crossing locations (the 11 crossings that were analyzed plus CSX crossings of Tuxbury Lane and Cherry Hill Lane that were only qualitatively evaluated as described in Section 3.8.2.2). Crash data were obtained for these locations going back to 1975; the first year of data that was available from the FRA website (FRA 2016). From 1975 to 2013, there were 44 crashes involving vehicles and trains, none of which were fatal but injuries were reported for eight of the crashes. Slow train and vehicle speeds are likely to have contributed to there being zero fatalities and the low percentage of injury crashes. The average train speed in the accidents was 7.5 mph with the train traveling 10 mph or less in 84 percent of the crashes. The vehicle speed in 82 percent of the crashes was 20 mph or less.

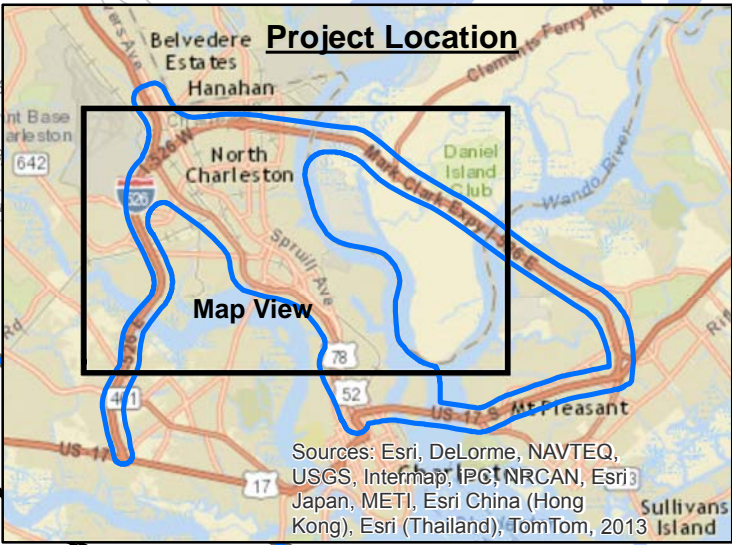
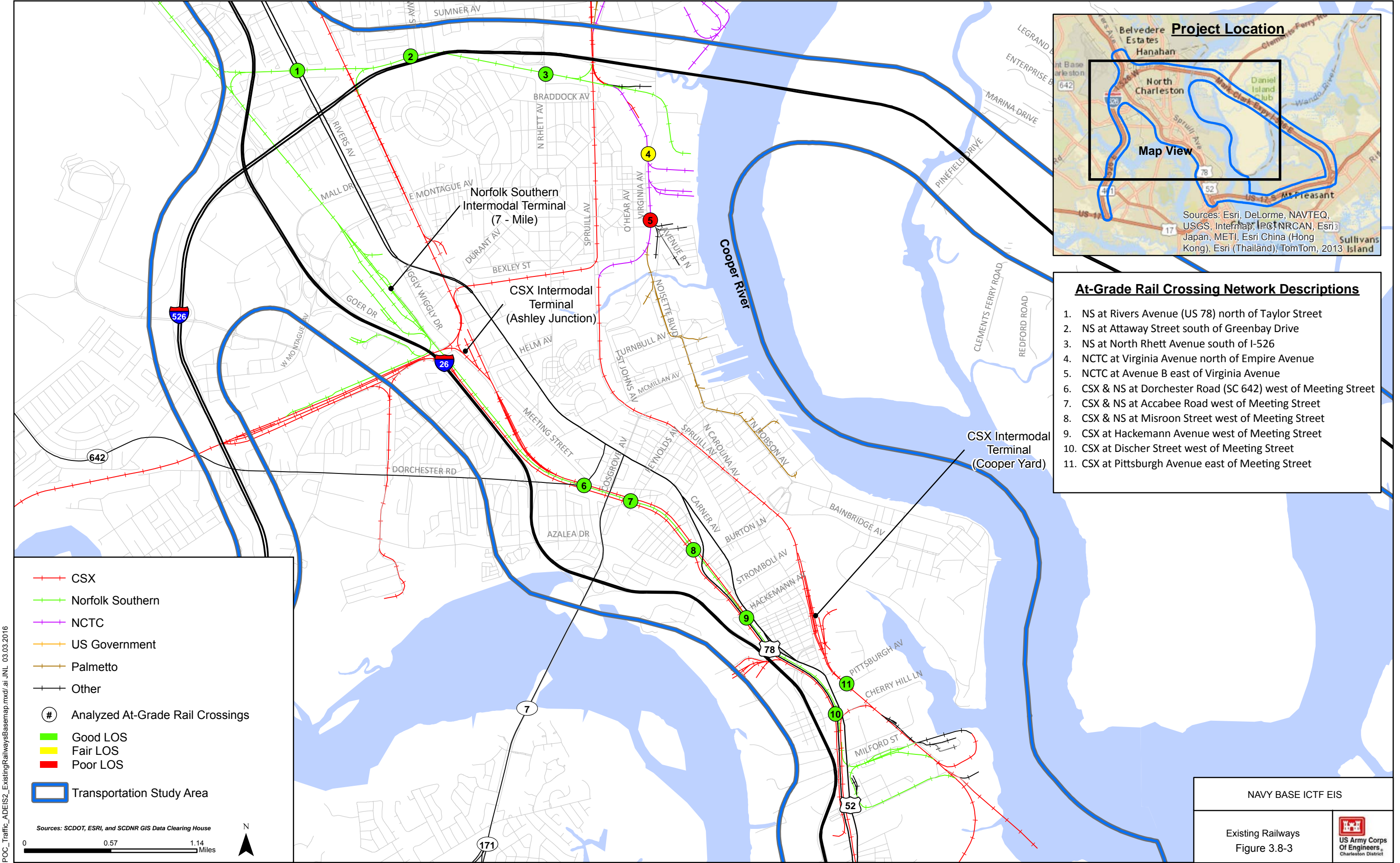
The data shows that the addition of at-grade crossing safety equipment around 1990 reduced the number of crashes to over half of the total number of crashes that occurred in the 15 years prior to 1990. The most common driver action listed as the cause of the crash was “Did not stop.” Crossing gates appear to be effective in preventing crashes as only one of the 44 crashes occurred at a location with gates present.

3.8.2.2.2 *Operations*

The rail crossing locations were analyzed during the AM peak hour, PM peak hour, and an off-peak hour to determine delays to the surrounding road network as a result of train crossings. The operations analysis was performed using VISSIM (Version 5.40) as documented in Appendix F. The existing conditions analysis was first performed assuming zero train crossings at each location to determine the average vehicle delay resulting from the roadway network intersections and vehicular traffic. The same network was then analyzed with a train occurrence to determine how much additional delay is added as a result of the train occurrence. The difference in total network delay in hours between these two scenarios is the delay attributed to the at-grade rail crossing. The delay represents the total time all vehicles would wait in hours over the course of a day due to train occurrences at the rail crossing.

The delay represents the total time all vehicles would wait in hours over the course of a day due to train occurrences at the rail crossing.

The number of daily train occurrences and average crossing time was determined from a rail simulation model provided by Palmetto Railways. The daily delay to the at-grade rail crossings was determined by multiplying the daily train occurrences by the delay from the peak hours and off-peak hour analyses. If the number of daily train occurrences was less than or equal to three per day, then the occurrences were distributed evenly between the three analyzed hours. If the number of train occurrences was greater than three, then the one occurrence was assumed in each the AM and PM peak hours and the remaining occurrences were assumed to be in the off-peak hour.



- ### At-Grade Rail Crossing Network Descriptions
1. NS at Rivers Avenue (US 78) north of Taylor Street
 2. NS at Attaway Street south of Greenbay Drive
 3. NS at North Rhett Avenue south of I-526
 4. NCTC at Virginia Avenue north of Empire Avenue
 5. NCTC at Avenue B east of Virginia Avenue
 6. CSX & NS at Dorchester Road (SC 642) west of Meeting Street
 7. CSX & NS at Accabee Road west of Meeting Street
 8. CSX & NS at Misroon Street west of Meeting Street
 9. CSX at Hackemann Avenue west of Meeting Street
 10. CSX at Discher Street west of Meeting Street
 11. CSX at Pittsburgh Avenue east of Meeting Street

POC_Traffic_ADEIS2_ExistingRailwaysBaseMap.mxd/ai_JNL_03.03.2016

—+— CSX
—+— Norfolk Southern
—+— NCTC
—+— US Government
—+— Palmetto
—+— Other
Analyzed At-Grade Rail Crossings
 Good LOS
 Fair LOS
 Poor LOS
 Transportation Study Area

Sources: SCDOT, ESRI, and SCDNR GIS Data Clearing House

0 0.57 1.14 Miles

N

NAVY BASE ICTF EIS

Existing Railways
Figure 3.8-3

The analysis was also used to determine the queuing on roadways due to the at-grade rail crossings. Queue is defined as the distance in feet that vehicles back up. In addition to the queuing at the at-grade crossings, the analysis also examined if the at-grade crossing impacted queuing on any of the interstate off-ramps in the TSA.

Queue is defined as the distance in feet that vehicles back up.

The year 2013 existing at-grade rail crossing analysis results are shown in Table 3.8-9. The two locations with highest delay are Avenue B east of Virginia Avenue and Virginia Avenue north of Empire Avenue. Although both of these locations only have around one train occurrence per day, the duration of the train crossing is approximately a half hour. The location with next highest delay is North Rhett Avenue south of I-526. The network has fairly high daily volumes, approximately 15,000 vehicles per day, and has around five train occurrences per day.

Table 3.8-9
Year 2013 Existing At-Grade Rail Crossings Analysis Results

Map ID ¹	Roadway Segment at Rail Crossing	Daily Volume	Daily Other Commodity Trains		Total Delay to Roadway Network (hours)	Max Queue (feet)	Impact to Interstate Mainline
			Number of Train Crossings	Average Duration of Crossing (min:sec)			
1	Rivers Avenue (US 78)	31,100	2.2	03:53	61.0	2,125	No
2	Attaway Street	4,200	4.9	03:09	5.0	475	No
3	North Rhett Avenue	14,700	4.9	06:39	74.6	4,400	No
4	Virginia Avenue	8,100	1.1	25:51	99.8	3,675	No
5	Avenue B	6,600	1.1	34:23	141.1	>5,280	No
6	Dorchester Road (SC 642)	16,100	5.3	03:43	37.1	1,325	No
7	Accabee Road	3,000	5.3	02:38	2.4	200	No
8	Misroon Street	400	5.3	02:53	0.5	25	No
9	Hackemann Avenue	1,500	3.1	03:45	4.7	1,500	No
10	Discher Street	3,100	5.3	02:53	8.5	1,150	No
11	Pittsburgh Avenue	2,000	0.0	00:00	0.0	0	No

Source: Appendix F.

1. Analyzed at-grade crossing locations are shown in Figure 3.8-3.

3.8.2.3 Passenger Rail

An Amtrak passenger station is located in North Charleston off of Gaynor Street, north of the Durant Avenue intersection with Rivers Avenue. The North Charleston station is served by the Silver Service/Palmetto route, which runs from Miami, Florida up the coast to New York City, New York.

Four trains servicing this route make stops at the station daily, two southbound and two northbound (Amtrak 2016).

3.8.3 Port of Charleston

The Port consists of five port facilities: Wando Welch, North Charleston, Columbus Street, Union Pier, and Veterans. Of the five port facilities, only Wando Welch and North Charleston handle intermodal containerized cargo. The Columbus Street port facility was recently converted from a container handling facility to a roll-on/roll-off, breakbulk, and project cargo facility. The HLT is currently being constructed to also handle containerized cargo. The locations of the Wando Welch, North Charleston, and future HLT port facilities are shown in Figure 3.8-1. The two existing port facilities that handle containers are described below.

Wando Welch

The Wando Welch port facility is located along the Wando River in Mount Pleasant. The site contains a total of 689 acres, which includes 28,768 grounded container slots and 4,707 wheeled container slots. Truck access is provided via Long Point Drive, which accesses I-526 less than 1 mile from Wando Welch. The Wando Welch port facility is currently rail served by the CSX Ashley Junction (approximately 14 miles) and Norfolk Southern 7-Mile (approximately 13 miles) intermodal yards by draying across public roads (South Carolina Port Guide 2015).

North Charleston

The North Charleston port facility is located along the Cooper River in North Charleston. The site is a total of 201 acres, which includes 19,650 grounded container slots and 2,319 wheeled container slots. Truck access is provided via Remount Road. The port facility is located approximately 1.5 miles from I-526 via Remount Road and North Rhett Avenue, and is on-dock rail served (rail service located within marine cargo terminal) and rail served with approximate distances via road to the CSX Ashley Junction and Norfolk Southern 7-Mile intermodal yards 6 miles and 5.5 miles, respectively (South Carolina Port Guide 2015).

3.8.4 Pedestrian and Bicycle Facilities

The sidewalk system is extensive throughout the TSA, and sidewalks were observed on most streets. There are no existing bike paths or trails in the TSA but dedicated bike lanes are located along Spruill Avenue. The *Bicycle and Pedestrian Facilities Map* from the City of North Charleston's 2008 Comprehensive Plan (Appendix F) shows existing sidewalk facilities in and around the study area.

The Safe Routes to School (SRTS) program utilizes federal funding to implement programs that incorporate events, programs, and infrastructure improvement projects to encourage students to walk and bike to school. The Chicora Elementary School is currently a SRTS partner school (SCDOT 2016). Chicora Elementary School is presently located in a temporary facility at 3795 Spruill Avenue while a new facility is being constructed next to the Military Magnet Academy located at 2950 Carner Avenue. The boundary for this school attendance zone includes the study area south of McMillan Avenue. North Charleston Elementary School is also an SRTS school. The school is located at 4921 Durant Avenue, which is outside the project study area. However, the school is located inside the transportation study area. The boundary for this school attendance zone includes the study area north of McMillan Avenue.



Spruill Avenue Bicycle Lane

3.8.5 Transit

The Charleston Area Regional Transportation Authority (CARTA) operates several bus routes through the study area. Every stop in the study area connects to the SuperStop located at the intersection of Rivers Avenue at Cosgrove Avenue. The following route information was obtained from the CARTA 2016 and is listed numerically by route number.

- Route 10 – Rivers Avenue. This route runs along Rivers Avenue to the west of the study area. This route operates weekdays with 20- to 30-minute headways, Saturdays with 30-minute headways, and Sundays with 1-hour headways.
- Route 11 – Dorchester/Airport. This route runs through the study area along Spruill Avenue to Dorchester Road. Daily service is provided with approximate 1-hour headways.
- Route 13 – Remount Road. This route connects the central study area with service along Spruill Avenue, McMillan Avenue, and Rivers Avenue to the North Charleston City Hall located to the north of the study area. This route operates Monday through Saturday with approximate 1-hour headways.

- Route 102 – North Neck. This route provides service between the CARTA SuperStop and downtown Charleston along Spruill Avenue, Rivers Avenue and King Street. Service is provided Monday through Saturday with 1-hour headways.
- Route 103 – Leeds Avenue. This route has a short connection along Spruill Avenue in the central section of the study area. Service is provided Monday through Saturday with 1-hour headways.
- Route 104 – Montague Avenue. This route runs along Spruill Avenue in the central section of the study area, north to Montague Avenue. Service is provided Monday through Saturday with 1-hour headways.

3.9 LAND USE AND INFRASTRUCTURE

3.9.1 Land Use and Zoning

3.9.1.1 Land Use

The study area for Land Use and Infrastructure, depicted on Figure 1.6-1, occupies 5,389 acres of classified land and includes the CNC and adjacent mixed residential and commercial land uses within portions of both the City of North Charleston and the City of Charleston. Land uses were determined using parcel data from the Charleston County Assessor's Office and are classified into the following categories: residential, commercial, industrial, government and institutional, parks and open space, and vacant. Land uses within the study area are mapped in Figure 3.9-1 and listed (with acres) in Table 3.9-1. The dominant land use (aside from vacant parcels) at the former Naval Base and the Port is Industrial, comprising 1,371 acres or 25 percent of the study area. Residential land use, comprising 1,030 acres or 19 percent of the study area, includes traditional neighborhoods with a mix of single and multi-family housing units. Numerous named neighborhoods are located within the study area such as Park Circle, Oak Park, Palmetto Gardens, Cameron Terrace, Liberty Hill, Olde North Charleston, Mixon Avenue, Whipper Barony, Chicora Place, Cherokee Place, Nafair, Windsor and Union Heights. Four parks, 1 recreation center, approximately 21 churches and 12 schools are also located within the study area. Small offices, businesses, and non-profit organizations are scattered throughout the study area, with the largest offices located on the northern portion of the former CNC (north of McMillan Avenue). New residential neighborhoods, developed as part of the City of North Charleston's community redevelopment program, also occupy these residential districts. These neighborhoods include River Place, The Villages of Noisette, West Yard Lofts, and Hunley Waters.

There are numerous opportunities for redevelopment or adaptive reuse of properties in the study area. There are many neglected or vacant residential and commercial properties, especially in the central and southern portions of the study area. Several community organizations have taken an interest in promoting the redevelopment and revitalization of these areas.