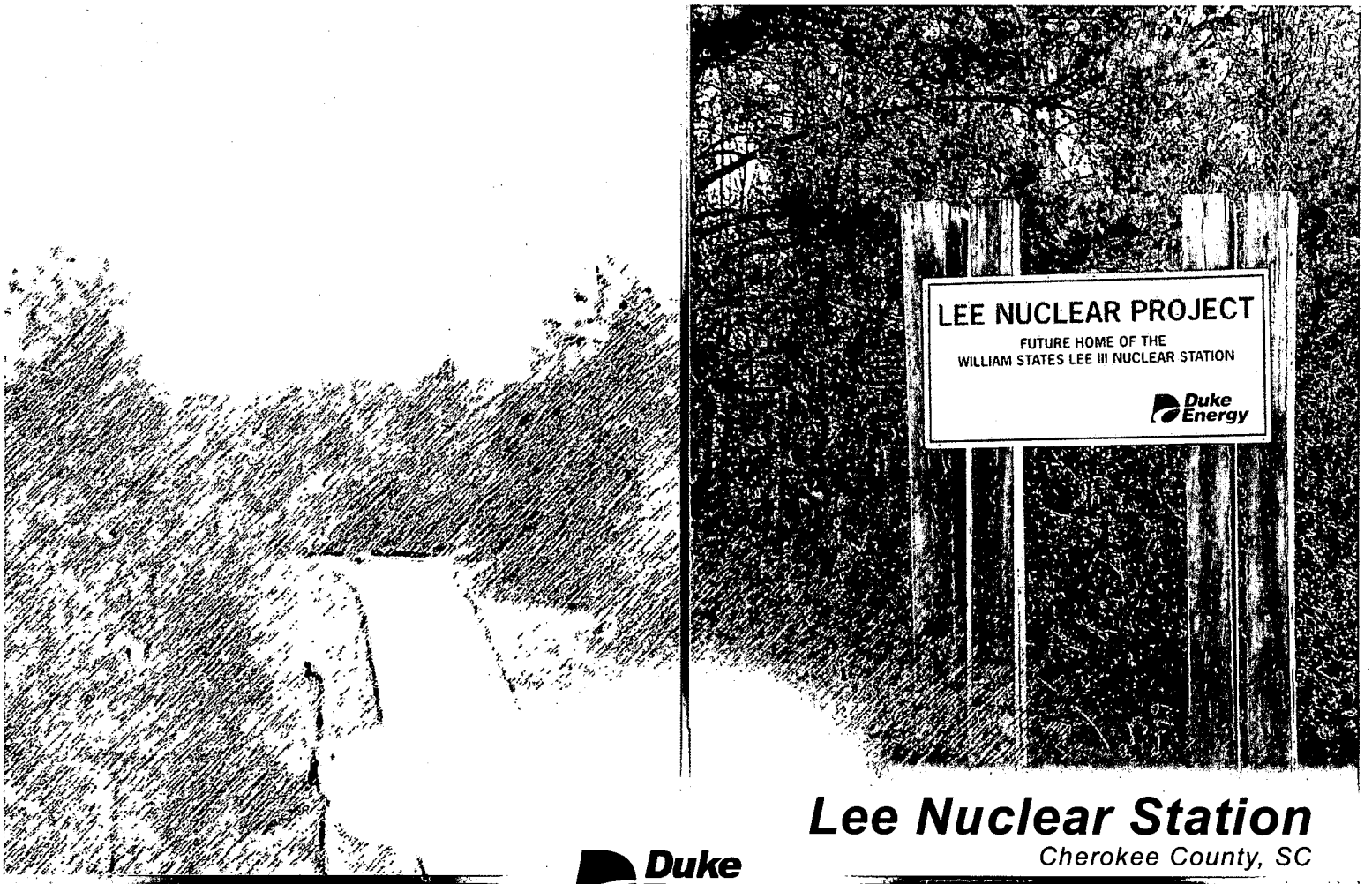
Attachment 28S

Kimley-Horn and Associates, 2009

Lee Nuclear Station, Cherokee County, SC

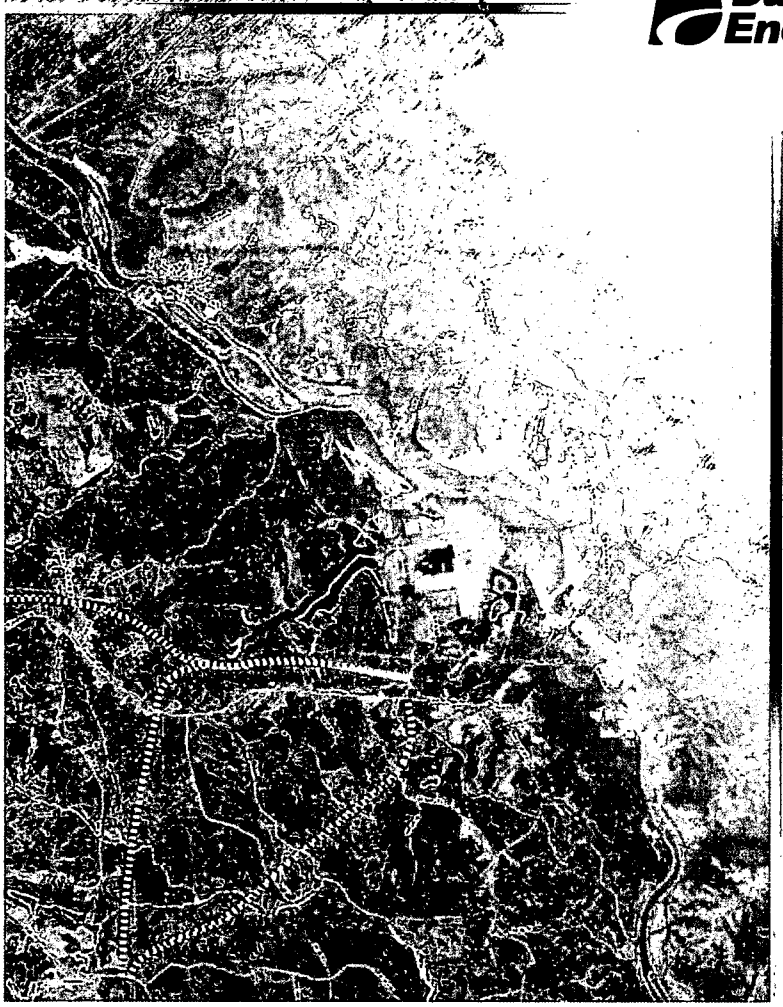
Transportation Assessment Executive Summary



Lee Nuclear Station

Cherokee County, SC

Duke Energy®



Transportation Assessment
Executive Summary

November 2009

Kimley-Horn and Associates, Inc.

Transportation Assessment
Executive Summary

for

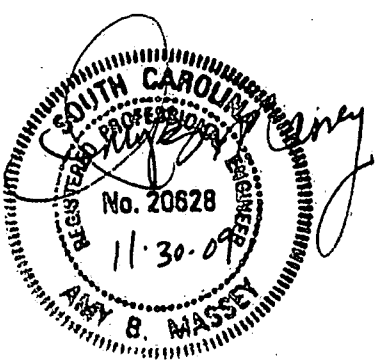
Lee Nuclear Station

Cherokee County, South Carolina

Prepared for:

Duke Energy

Charlotte, North Carolina



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Introduction

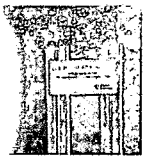
The proposed Lee Nuclear Station is located on the north side of McKowns Mountain Road in the vicinity of Sardis Road in Cherokee County, South Carolina. The objectives of this transportation assessment are to:

- Project the vehicular traffic impact of the proposed station construction traffic.
- Provide a broad brush review of various access options for transporting construction traffic within the identified study area.
- Recommend specific capacity improvements to accommodate the construction traffic at the identified study intersections.

Construction of the proposed facility is anticipated to begin in January 2012 and peak in 2016. Unit 1 is anticipated to be complete in 2018, and Unit 2 is anticipated to be complete in 2019. Therefore, the focus of the study is peak morning and evening traffic in the future construction year peak of 2016.[1]

Based on information provided by the station contractors, Shaw Power, Stone & Webster Nuclear Services, a peak construction workforce of approximately 4,400 construction workers and approximately 115 Duke Energy employees is projected. To be conservative, a workforce of 5,000 was considered in this study. Shaw Power, Stone & Webster Nuclear Services anticipates that 70 percent of the workforce will work during the dayshift from 7:00 AM to 5:30 PM, and 30 percent of the workforce will work during the nightshift from 5:30 PM to 4:00 AM.

[1] Anticipated construction timeframes have changed per Duke Energy during the finalization of this document: Begin construction 2015, peak construction 2019, Unit 1 completion 2021, and Unit 2 completion 2022. Regardless of the timeframes, under the assumptions evaluated in this study, the level of site impact is expected to be consistent with that studied in this Assessment. The recommended improvements could change if future background conditions are different from what was evaluated in this study.



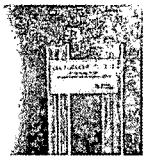
Once in operation, an outage lasting approximately 30 days will occur every 18 months for maintenance on one reactor. In addition to the 1,000-person operations staff, a workforce of approximately 1,500 maintenance workers will be required to service the reactor. Traffic associated with daily operations combined with outages also was reviewed as part of this study in anticipation that the selected access option would accommodate the peak periods of station traffic after the construction phase.
Due to the magnitude of directional trips expected to enter and exit the station site, the following access strategies were considered to accommodate the site construction traffic:

- Single Dayshift with Capacity Improvements
- Staggered Dayshift with Capacity Improvements
- Van/Bus Transportation
- Rail Transportation
- Construction of a New Road with Capacity Improvements
- Construction of a New Bridge Over the Broad River

The study area, shown in Figure 3.1, includes the following intersections:

- Shelby Highway & I-85 Southbound Ramps
- Shelby Highway & I-85 Northbound Ramps
- SC 329 & Shelby Highway
- SC 329 & US 29 (Cherokee Street)
- SC 329 & SC 105/McKowns Mountain Road
- McKowns Mountain Road & Site Driveway

Capacity analyses were performed for the AM and PM peak hours at the study intersections under the following conditions.



- 2007 Existing Conditions
- 2016 Background Conditions
- 2016 Construction Conditions (Single Dayshift)
- 2016 Construction Conditions (Staggered Dayshift)
- 2020 Operations & Maintenance Conditions (Single Dayshift)
- 2020 Operations & Maintenance Conditions (Single Dayshift of Operations Staff & Staggered Dayshift of Maintenance Staff)

Lee Nuclear Station
Transportation Assessment

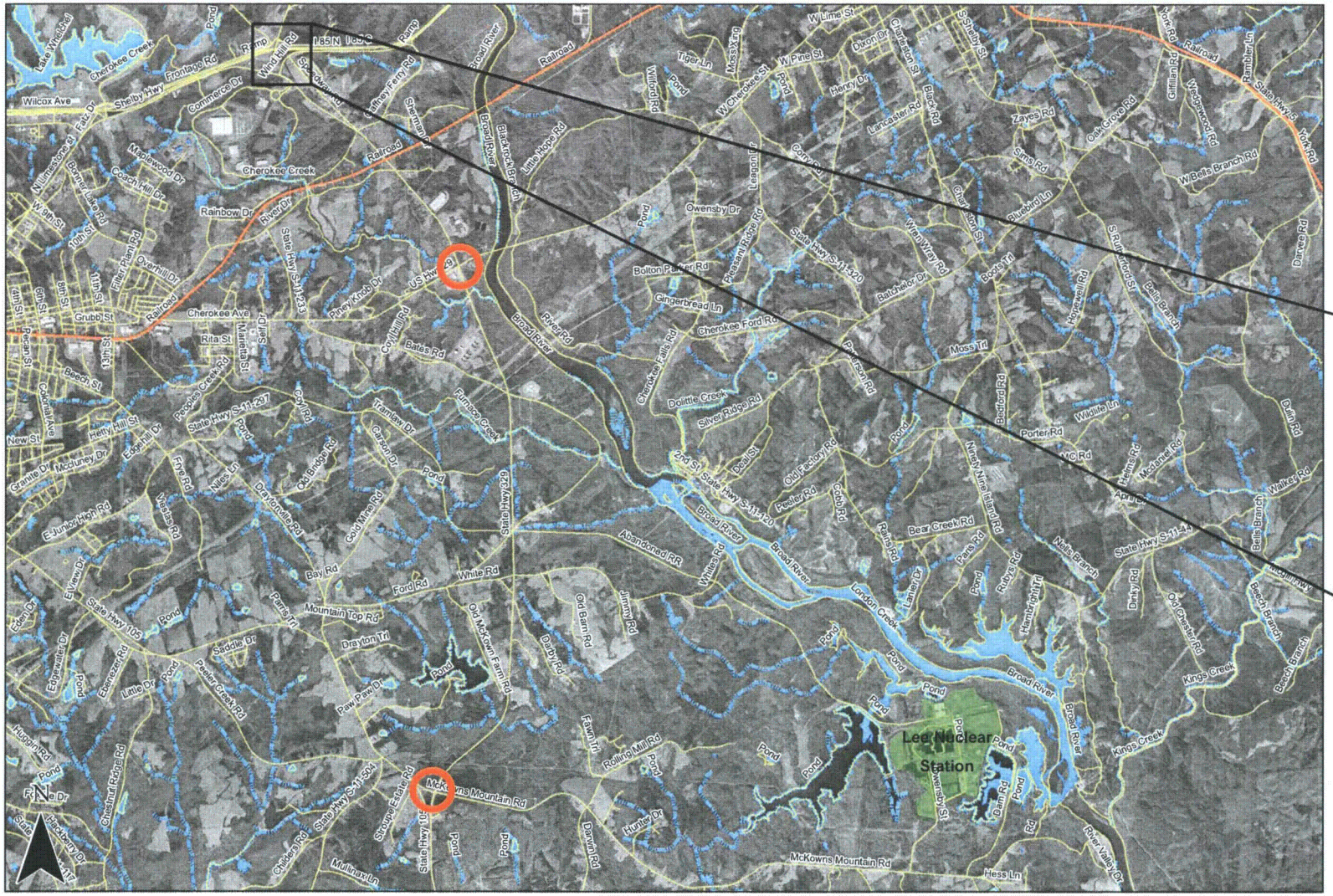


Figure 3.1
Study Area

- Proposed Lee Nuclear Station
- Water
- Railroad
- Streams/Creeks
- Study Intersections

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A preliminary environmental review was performed to identify potential environmental issues/constraints associated with the access strategies. Environmental features within the defined project areas that were reviewed as part of the analysis include: wetlands, streams, floodplains, protected species, and historical/archeological resources.

The scope of this study was prepared in conjunction with Duke Energy and communicated to the Cherokee County Local Advisory Committee (LAC). Study scope and assumptions were confirmed initially with South Carolina Department of Transportation (SCDOT) staff in 2007.

It should be noted that all figure numbers included in this Executive Summary are consistent with those referenced in the full Transportation Assessment.

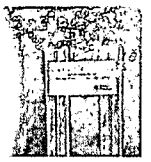
Access Strategies

The following assumptions apply in the traffic analyses performed for the access strategies described in this section:

- 1.5-percent annual growth rate applied to existing traffic.
- A workforce of 5,000 employees.
- Two trips were considered for each employee; one trip from their origin to their destination (the site) and a return trip from their destination to their origin.
- A vehicle occupancy rate of 1.4 persons per vehicle.
- 70-percent dayshift to 30-percent nightshift split; therefore, analyses evaluate dayshift traffic.
- The inbound trips for the nightshift workforce were not considered because it was assumed that those employees would be arriving at the Station during the hour before the dayshift departs.
- Peak hour of generator was used since more trips are generated by the site than exist in the background condition.
- Trip distribution of site traffic:
  - 70 percent move into the two-county project area and commute to/from the site:
    - 35 percent to/from Cherokee County
    - 35 percent to/from York County
  - 30 percent commute to/from surrounding counties (i.e.: Mecklenburg County, Gaston County, and Cleveland County, NC; and Spartanburg County, SC)
- All of the projected construction traffic to/from the south was assumed to travel via SC 329/western McKowns Mountain Road within the peak traffic flow to be conservative. Some of this traffic may utilize the portion of McKowns Mountain Road on the southeastern side of the site, as traffic tends to balance itself and take the path of least resistance over time.

The following general assumptions apply to projecting costs:

- Planning-level cost opinions are provided in 2009 dollars.
- Values provided are mid-range order of magnitude costs based on available North Carolina Department of Transportation (NCDOT) data. Data was obtained from NCDOT bid tabs as a readily available resource.



- Approximated items include pavement, drainage, and traffic signal costs.
- Gravel was considered for parking areas; however, paving may be required as part of a conditional use permit, by local codes/ordinances, and or permitting process.
- Potential right-of-way acquisition costs are not included (except with bus transportation/park-and-ride).
- Permitting and other soft costs are not included.
- Costs for all strategies except 'Single Dayshift with Capacity Improvements' assume a staggered dayshift.

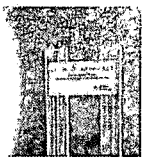
Single Dayshift with Capacity Improvements

The projected daily trip generation potential of the proposed development is 7,142 trips (5,000 employees multiplied by two trips to/from the site, divided by a vehicle occupancy rate of 1.4 employees per vehicle). The projected peak-hour trip generation potential of the proposed development is 2,500 vehicles inbound in the AM peak hour and 2,500 vehicles outbound during the PM peak hour (70 percent of daily trips assigned to enter during the AM peak and exit during the PM peak).

The single dayshift construction peak directional traffic demand on McKowns Mountain Road is expected to exceed the maximum theoretical capacity of 1,700 passenger cars per hour per lane (pcphpl) per *HCM*, with 2,509 pcphpl (2,500 site plus nine background vehicles) eastbound in the AM peak hour and 2,540 pcphpl (2,500 site plus 40 background vehicles) westbound in the PM peak hour; therefore, widening to a four-lane facility would be required under single dayshift construction conditions.

The intersection and roadway improvement needs determined based on the capacity analysis for the single dayshift construction traffic are shown in Figure 4.4. The planning-level opinion of probable construction cost for the recommended intersection and roadway improvements is approximately $46.2 million.

The recommended roadway and intersection improvements for the single dayshift scenario could be operational in approximately two to three years allowing one year to plan, design, and permit and one to two years to construct. Right-of-way acquisition



could occur during the design phase, but potentially could delay the schedule. Furthermore, construction phasing and maintenance of traffic (traffic control) could impact progress during construction.

The level of improvement called for in the Operations and Single Dayshift Maintenance scenario is generally lower than that recommended in the Single Dayshift Construction scenario. The traffic during outage periods is anticipated to be less intensive than the peak construction conditions based on previous Duke Energy experience building and operating similar facilities.

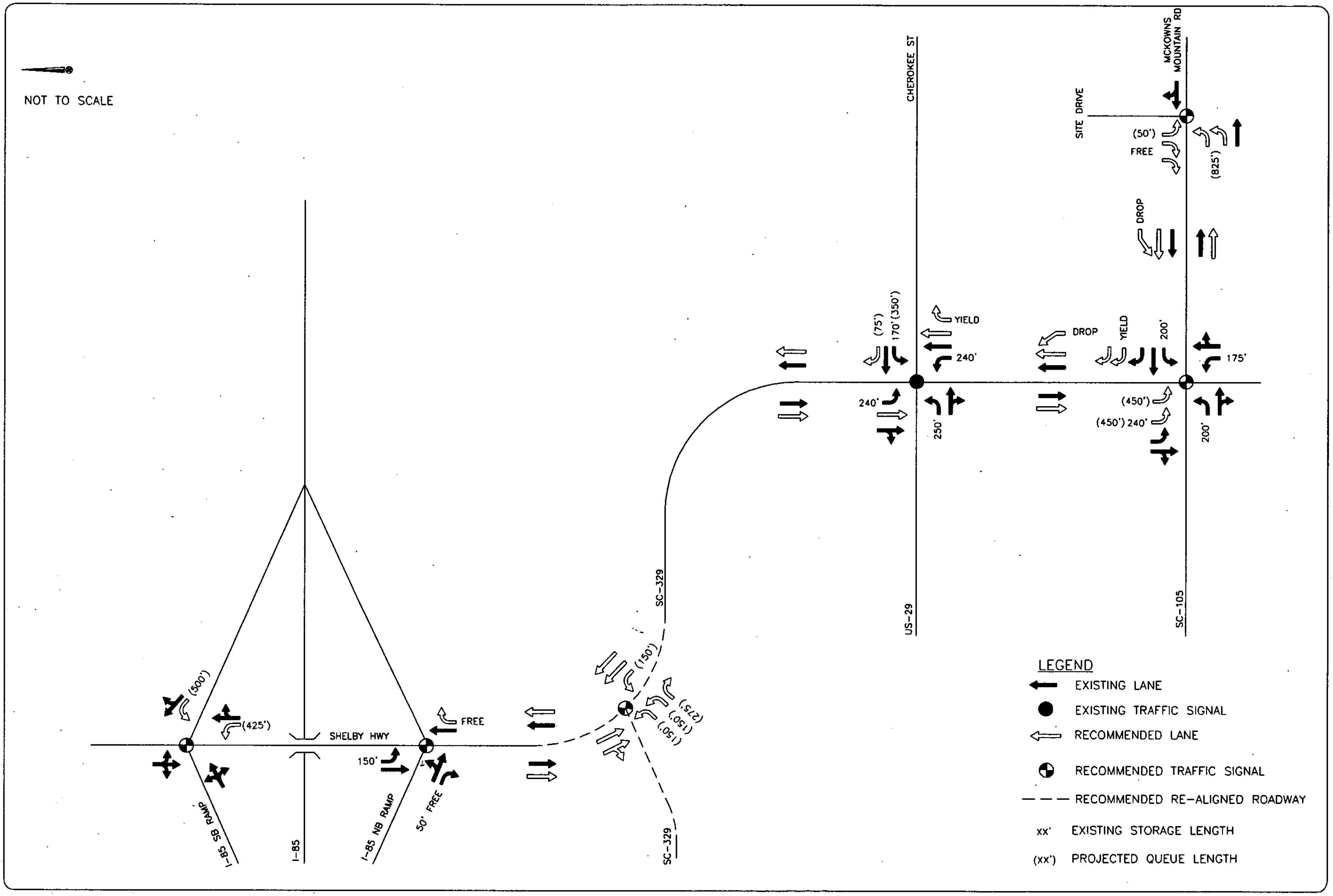


FIGURE 4.4

2016 SINGLE DAYSHIFT CONSTRUCTION ROADWAY LANEAGE NEEDS

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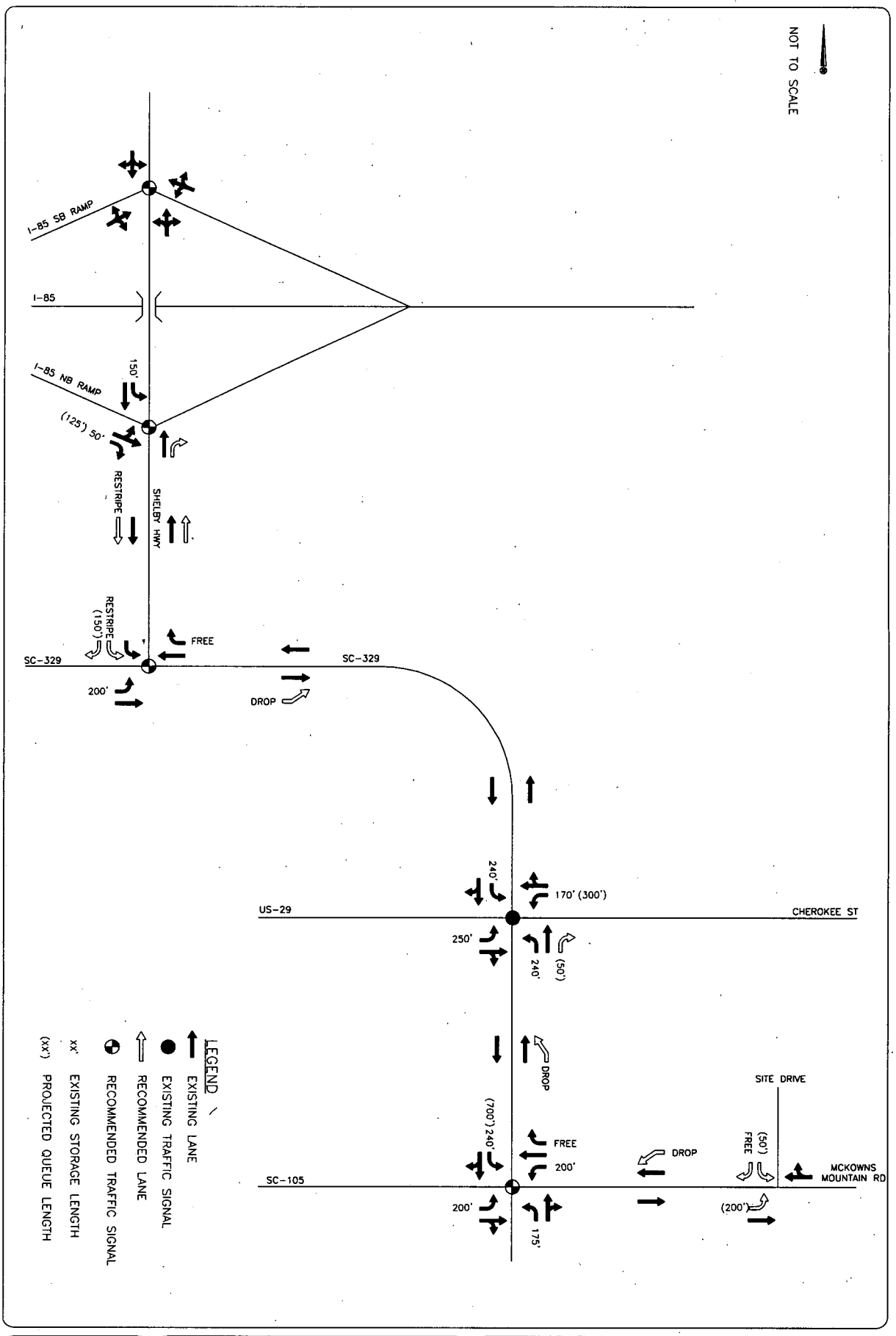
Staggered Dayshift with Capacity Improvements

Staggering the dayshift would allow for the dispersion of site construction traffic over two morning hours and two afternoon hours. Under a staggered dayshift scenario, it is envisioned that half of the dayshift workforce would begin and end work an hour after the other half begins and ends. The projected trip generation potential of the proposed development is 1,250 vehicles inbound (2,500 single dayshift vehicles divided by two) in the AM peak hour and 1,250 vehicles outbound during the PM peak hour.

The staggered dayshift construction peak directional traffic demand on McKowns Mountain Road is not expected to exceed the maximum theoretical capacity of 1,700 passenger cars per hour per lane (pcphpl) provided by *HCM*, with 1,307 pcphpl (1,250 site plus 57 background vehicles) eastbound in the AM peak hour and 1,290 pcphpl (1,250 site plus 40 background vehicles) westbound in the PM peak hour.

The recommended intersection and roadway improvements for the 2016 staggered dayshift construction conditions are shown in Figure 5.3. Additional improvements may be needed in conjunction with the addition of site traffic to improve the I-85 interchange ramps interaction with and proximity to frontage roads. Supplemental review is recommended to determine potential opportunities to make incremental improvements.

The planning-level opinion of probable construction cost for the recommended intersection and roadway improvements ranges from approximately $3.2 million to $4.1 million.



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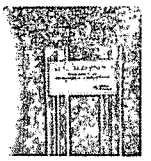
LEE NUCLEAR STATION
TRANSPORTATION ASSESSMENT

2016 STAGGERED DAYSHIFT CONSTRUCTION
RECOMMENDED ROADWAY LANEAGE

FIGURE
5.3



The recommended roadway and intersection improvements in the staggered dayshift scenario have the potential to be operational in roughly one and a half to two years considering that they may take approximately one year to plan, design, and permit and under one year to construct. Right-of-way acquisition could occur during the design phase, but could potentially delay the schedule if landowners are unwilling to sell. Additionally, construction phasing and maintenance of traffic (traffic control) could impact progress during construction.

The level of improvement called for in the Operations and Staggered Maintenance scenario is generally consistent with that recommended in the Staggered Construction scenario. The traffic during outage periods is anticipated to be less intensive than the peak construction conditions based on previous Duke Energy experience building and operating similar facilities.

Van/Bus Transportation

Van/bus transportation, also known as a shuttle system, would utilize two primary components: transportation and park-and-ride. Park-and-ride is a system that allows transportation users to go to a parking location, park their vehicles, and ride a form of public or private transportation to their ultimate destination. The parking location typically occurs outside of a city center and is designed to relieve road congestion along the roads leading into the center. The term park-and-ride tends to be synonymous with a parking area that is served by buses.

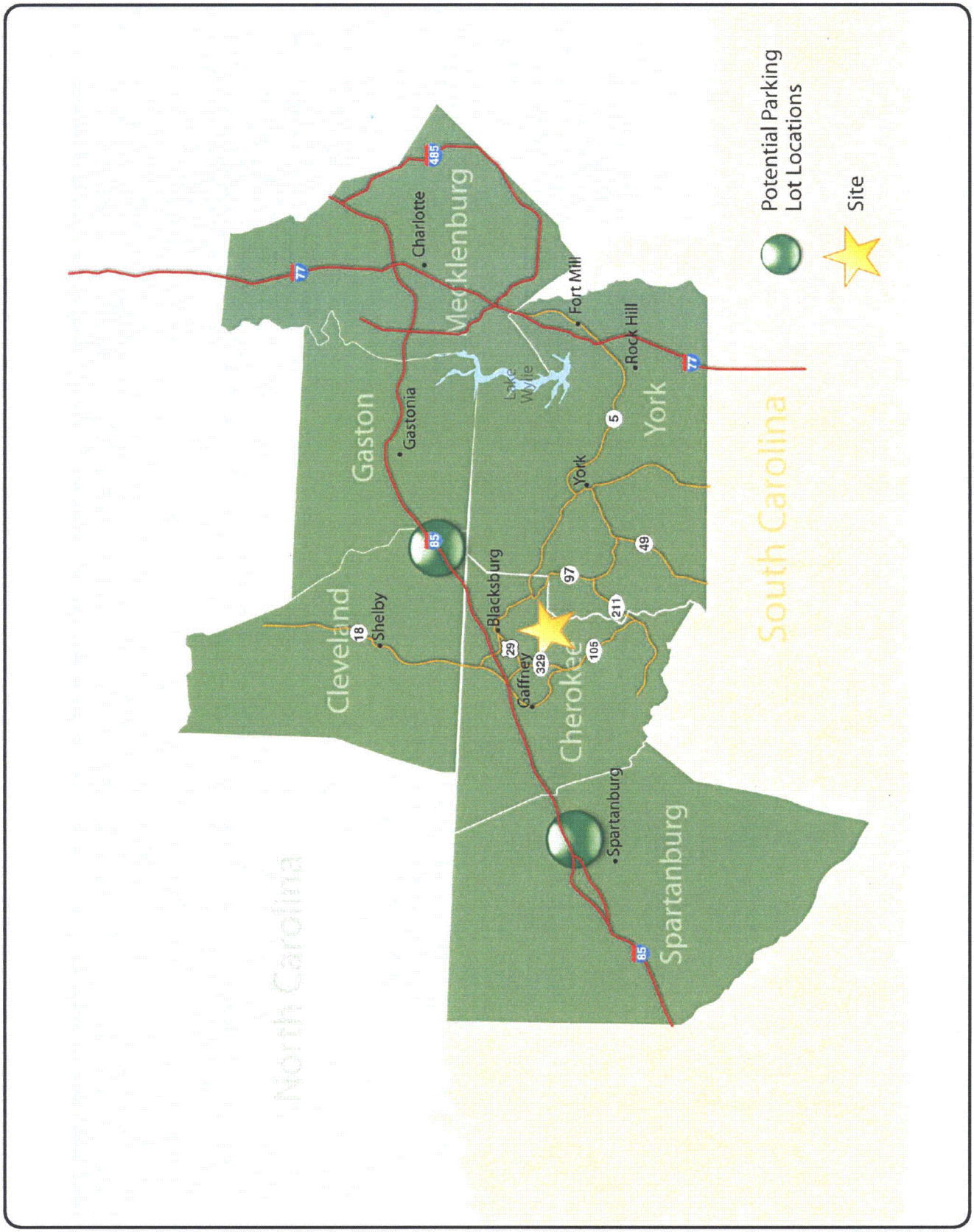
At the peak of construction, approximately 3,600 parking spaces would be required for a workforce of 5,000 employees based on a 1.4 vehicle occupancy rate. Approximately 22 acres is required to provide approximately 3,600 parking spaces and associated drive aisles. A series of regional lots located in the larger vicinity of the project may represent a more efficient strategy. Based on the projected distribution of the construction workforce, two general areas were selected for consideration: Spartanburg/Gaffney area

and Kings Mountain area. A park-and-ride facility in each of the two areas would need to accommodate approximately 1,800 parking spaces, or approximately 11 acres each. Figure 8.1 shows possible sites where regional parking lots could be located.

A park-and-ride lot could be operational in eight to 12 months considering: property purchase and/or lease agreement, survey and data collection, obtaining the appropriate permits from the State and County, preparation of the park-and-ride lot, and construction of offsite roadway and intersection improvements. The potential need for land entitlement could further lengthen the process.

Under a regional park-and-ride scenario and considering the volume of passengers being transported between the work site and the park-and-ride facility daily, buses are the logical means of transportation. Given the mileage and time constraints of the staggered shift scenario, it is assumed that only one run could be accommodated within the hour. One run constitutes one trip to and from the park-and-ride facility. Under a local park-and-ride arrangement, vans could be considered since multiple trips could be facilitated during the staggered arrival. However, considering the local street impacts and the required roadway improvements associated with a park-and-ride facility within proximity of the construction site, a localized park-and-ride facility does not seem logical or efficient.

Assuming a staggered dayshift, approximately 38 buses would be required to transport the daytime construction workforce. Approximately 31 buses would be required to transport the daytime operation and staggered maintenance workforce during outages.



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LEE NUCLEAR STATION
TRAFFIC IMPACT ANALYSIS

REGIONAL PARKING LOTS

FIGURE
8.1

The primary cost of using bus transportation consists of park-and-ride facility cost and cost of purchasing or leasing buses.

The projected cost to transport the anticipated construction workforce under a staggered arrival and departure scenario and **purchasing** the bus fleet would be on the order of $9.5 million. With an approximate cost of $2 million for each of two gravel park-and-ride facilities, the total cost is projected to be on the order of $13.5 million. **Leasing** the bus fleet over a five-year period for the same scenario would be on the order of $29.6 million. The total cost is projected to be approximately $33.6 million considering the park-and-ride facilities.

While the bus transportation strategy would reduce the number of vehicles on the adjacent street network, the cost of implementing a bus shuttle service under a purchase or lease arrangement does not appear to be cost effective. While the purchase of the buses is cost effective when compared to leasing buses, other factors such as fleet maintenance, fleet management, driver employment, and fleet replacement would impact the actual cost of implementation. In addition, utilizing a purchased fleet of buses every 18 months may not be an ideal solution due to the amount of down time between outage periods.

Rail Transportation

With the development of the proposed Lee Nuclear Station, a railroad spur line will be constructed from an existing railroad line in Gaffney, SC to the nuclear facility. The rail spur line will be used to deliver equipment, construction materials, and pre-fabricated parts. According to Shaw, eight deliveries will arrive via the spur line per day. There is the potential to use this same rail line to accommodate passenger rail for employees. If the rail is to be used to move both passengers and freight, coordination between the two entities will be needed to avoid conflicts and rail sidings may be required. The length of the spur line depends on the number of cars as well as whether the workforce is staggered or not.

The majority of the required rail line will be constructed whether or not this alternative is implemented. For passenger rail to utilize the planned spur line, the spur line likely would be constructed using welded rail (providing a continuous rail surface that results in a smoother ride). The construction method for the planned spur line has not been confirmed at this time. For the purposes of this evaluation, it is assumed that welded rail will be used.

To load and unload the workforce, a platform may be required at the site and the park-and-ride lot. While a platform would provide for passenger loading efficiencies, other means, such as a sidewalk or other paved area, could also be considered.

A park-and-ride lot located on US 329 near the point of spur line crossing in the vicinity of Ford Road is the location considered to stage employee pickup and drop-off. The identified park-and-ride facility along SC 329 appears to be an auto salvage yard, which potentially could require environmental cleanup. The lot is located approximately 3.87 miles from the proposed Lee Nuclear Station site. A locomotive could likely make four trips during an hour from the park-and-ride location to the proposed Lee Nuclear Station.

Under a staggered construction scenario, five passenger cars, one cab car, and one locomotive would be required. A minimum platform length of 585 feet would be required.

Figure 8.2 shows the spur line that was abandoned in the 1970s. This is the assumed location of the proposed spur line. Realignment of the SC 329/Ford Road intersection to provide for two t-intersections (one to the north and one to the south of the rail line) may potentially be a safer and more economical alternative than the current plan to provide crossing gates on all four approaches to the railroad.

A portion of the offsite roadway improvements shown in Figure 5.3 are needed for the staggered rail scenario (I-85 to park-and-ride facility). The planning-level opinion of

probable cost for the intersection and roadway capacity improvements from I-85 to the park-and-ride facility is approximately $1.7 million.

The approximate planning-level opinion of probable cost for the rail system ranges from $13 million to $15 million under a staggered dayshift scenario. The following costs were not considered with rail transportation:

- Salary for a conductor
- Salary for a railroad engineer
- Operating and maintenance costs
- Construction cost for a maintenance facility

One option may be to lease the rolling stock from the railroad. The rolling stock would include the necessary equipment to operate the system. In addition, negotiations can include the train team of the conductor, engineer, and crew.

The new railroad spur line is assumed to be built before construction at the proposed Lee Nuclear Site begins. Beyond the construction of the proposed spur line, designing, permitting, and constructing offsite intersection and roadway improvements associated with the park-and-ride lot could be complete in roughly two years. The parking lot could be designed, permitted, and constructed during the same time the offsite intersection and roadway improvements are being implemented. Driveway/encroachment permits and capacity improvements likely would be needed for access to the parking site. Time and effort to locate and purchase/lease a locomotive, passenger cars, and staff should be factored in as well.

The requirements called for in the Operations and Staggered Maintenance scenario are less than those recommended in the Staggered Construction scenario. The traffic during outage periods is anticipated to be less intensive than the peak construction conditions based on previous Duke Energy experience building and operating similar

facilities. Utilizing rail transportation every 18 months may not be an ideal solution due to the amount of down time between outage periods.

Lee Nuclear Station
Transportation Assessment

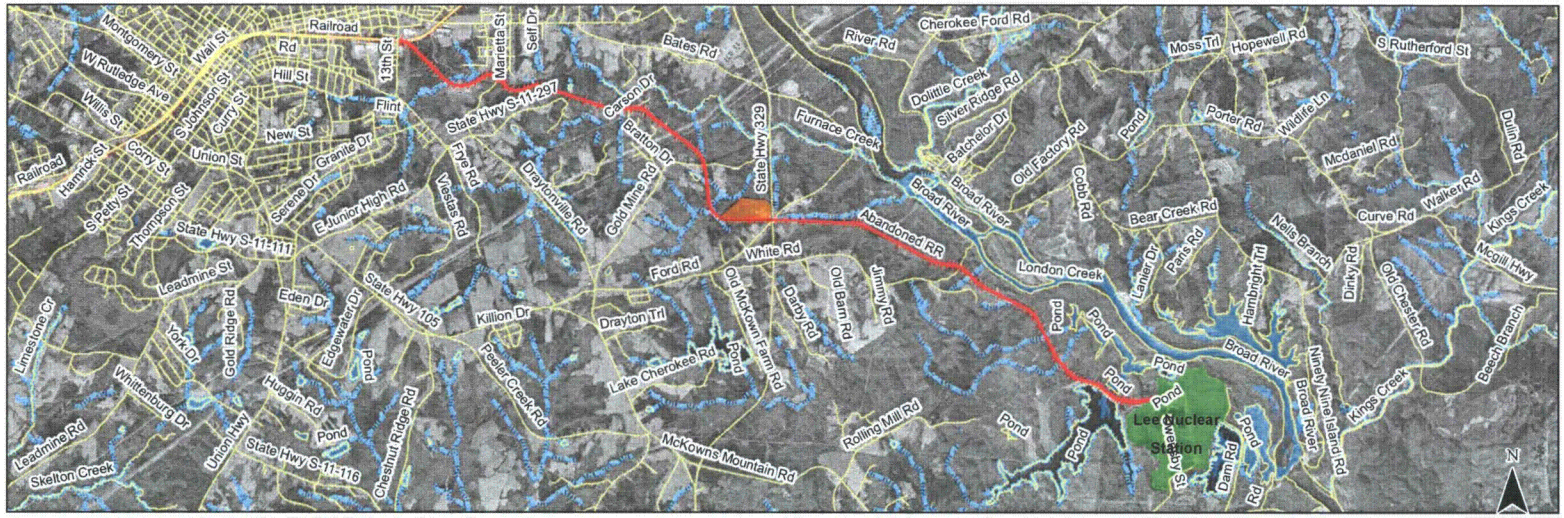
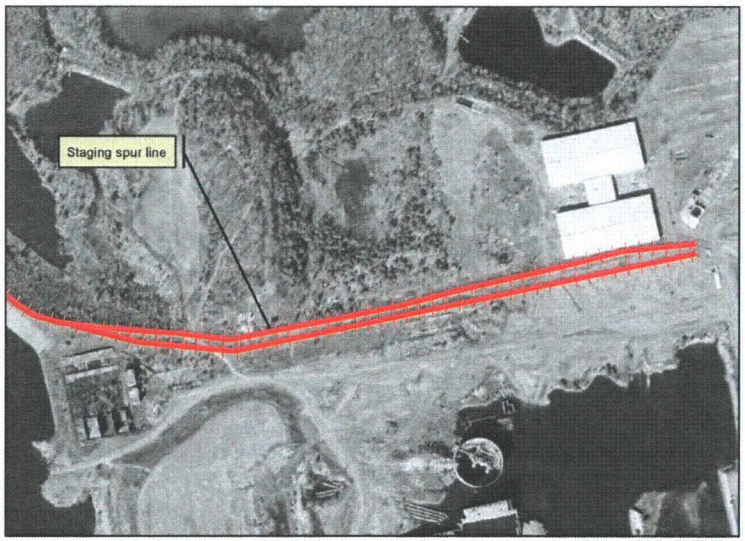


Figure 8.2
Rail Transportation

- Proposed Lee Nuclear Station
- Pontential Parking Lot Options
- Proposed Railroad Spur Line
- Water
- Railroad
- Streams/Creeks

0 0.45 0.9 1.8 Miles



Mitigation Summary	
Item	**Cost**
Rail	$1 million/mile
Locomotive	$5.4 million (new) - $2.7 million (used)
Cab car	$2.5 million
Passenger Car	$2 million (new) - $300,000 (used)
Platform	$500,000 - $1 million
Staggered (4 runs per hour)	
Spur Line Length	330'-500'
Passenger Cars	2 (85' length)
Cab Car	1 (85' length)
Locomotive	1 (75' length)
Platform	1
Non-Staggered (4 runs per hour)	
Spur Line Length	565'-700'
Passenger Cars	2 (85' length)
Cab Car	1 (85' length)
Locomotive	1 (75' length)
Platform	1

Alternative Information

- Staging spur line required for loading and unloading of passengers.
- Staging spur line required at site and parking area.
- Welded rail required for passenger transport.
- Average travel speed 30 mph.
- Number of trains dependent upon staggering or non-staggering.

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New Road with Capacity Improvements

To alleviate congestion on McKowns Mountain Road, a new two-lane roadway was considered as a potential option to provide access for staggered dayshift construction traffic. Three potential roadway locations were provided by Duke Energy to be reviewed in this planning study. The three routes are shown in Figure 8.3 and are described below. One other option discussed is a parallel route to the future railroad track. Based on conversations with Duke Energy, there are topographic issues with this alignment that would result in significant amounts of cut and fill; therefore, the 'railroad' alignment has not been considered in this planning study.

Route A is projected to be approximately 3.6 miles long. The route begins at SC 329 north of McKowns Mountain Road, intersects Rolling Mill Road, and terminates at the station. Based on US Geological Survey (USGS) topographic data, the route is shown to go through McKowns Mountain; possible grading issues could be encountered at that location. It is anticipated that the portion of the new road from SC 329 to the site would be designed and constructed as a private road and would be maintained by Duke Energy. An overpass over Rolling Mill Road could be constructed or a traffic signal could be installed.

Route B is projected to be approximately 3.9 miles long. The route begins at SC 329/SC 105 south of McKowns Mountain Road, intersects McKowns Mountain Road, and includes two 'blue line' (potential stream) crossings prior to terminating at the station. It is anticipated that the portion of the new road from SC 329 to McKowns Mountain Road would be designed and constructed as a private road and would be maintained by Duke Energy.

Route C is projected to be approximately 3.0 miles long. The route begins at SC 329/SC 105 south of McKowns Mountain Road, and includes two 'blue line' (potential stream) crossings prior to terminating at the station and McKowns Mountain Road. It is anticipated that the portion of the new road from SC 329 to McKowns Mountain Road would be designed and constructed as a private road and would be maintained by Duke Energy.

Lee Nuclear Station
Transportation Assessment

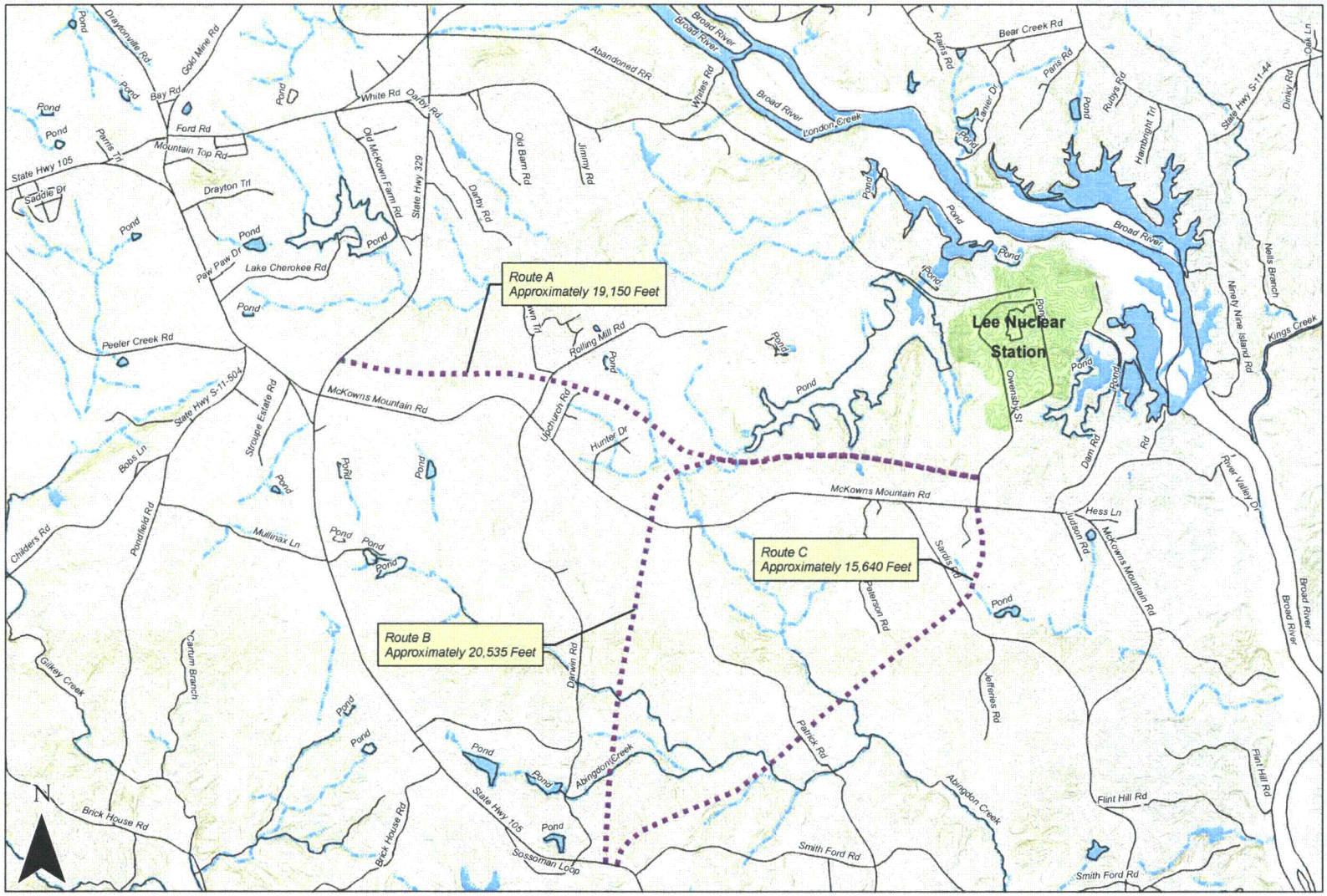

Figure 8.3
New Access Road

- Proposed Lee Nuclear Station
- Water
- Potential Road Locations
- Streams/Creeks
- USGS 10' Contours

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The planning-level opinion of probable construction costs for Route A is in the range of approximately $17.2-19.7 million, depending on the potential for realignment of the SC 329/Route A intersection. The planning-level opinion of probable construction costs for Route B is approximately $20.8 million and for Route C is approximately $17.6 million.

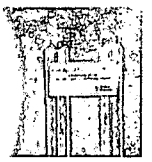
Beyond the construction of the two-lane new road, additional offsite roadway improvements are necessary to accommodate the traffic that will utilize the new roadway. To accommodate the traffic associated with Route A (under the staggered dayshift scenario), a portion of the offsite roadway improvements shown in Figure 5.3 are needed (I-85 to new road). The planning-level opinion of probable construction costs associated with the offsite intersection improvements $1.7 million.

Route A appears to be the most viable option of the three considered, given that Routes B and C appear more circuitous and less convenient for workers than Route A, have more road crossings, and more blue line crossings.

Right-of-way acquisition potentially could be an issue if landowners are unwilling to sell. Coordination with the County and/or State likely will be necessary.

A new road could be operational in roughly two to three years considering it may take approximately one year to design and permit a new roadway and one to two years to construct. The timeframe is dependent upon the funding source and specific permitting needs.

The level of improvement called for in the Operations and Staggered Maintenance scenario is generally consistent with that recommended in the Staggered Construction scenario. Additional capital costs would not be necessary to accommodate ongoing operations and maintenance activity at the plant (although Duke would be responsible for maintenance as a private roadway facility).



New Bridge

An additional crossing of the Broad River has been identified as another means of dispersing traffic. While this new bridge is not a stand-alone alternative, it represents yet another potential means to access the site.

The Broad River runs northwest to southeast through Cherokee County. The proposed location for a new bridge would be east of the proposed Lee Nuclear Station site, roughly half a mile north of the dam.

A bridge span of 600 feet was assumed for preliminary planning based on the mapped footprint of open water to be crossed. The mapped regulated floodplain at this location spans approximately 2,000 feet. Therefore, the actual span for the bridge would need to be determined based on further design and hydraulic analysis to evaluate the costs/benefits of filling portions of the floodplain versus additional span. A bridge feasibility and flood study would be necessary to determine the exact distance a new bridge would need to span. A new road also would need to be constructed to connect Ninety Nine Island Road to the bridge and the bridge to Dam Road. The proposed bridge location is shown in Figure 8.4.

The planning-level opinion of probable construction cost associated with a new bridge and new roadway approaches to the bridge is $9.9 million. The following costs were not considered: offsite roadway and intersection improvements, permitting costs, and maintenance costs.

It was assumed that the proposed bridge and road would be constructed directly to the station. It is expected that a bridge at this location would be a private facility built and maintained by Duke Energy for security reasons. Residents on the northeast side of the Broad River would be impacted. Unidentified capacity improvements would be needed through rural residential areas leading to the bridge deck. (More study would be needed to determine the extent of impact and levels of mitigation necessary.)

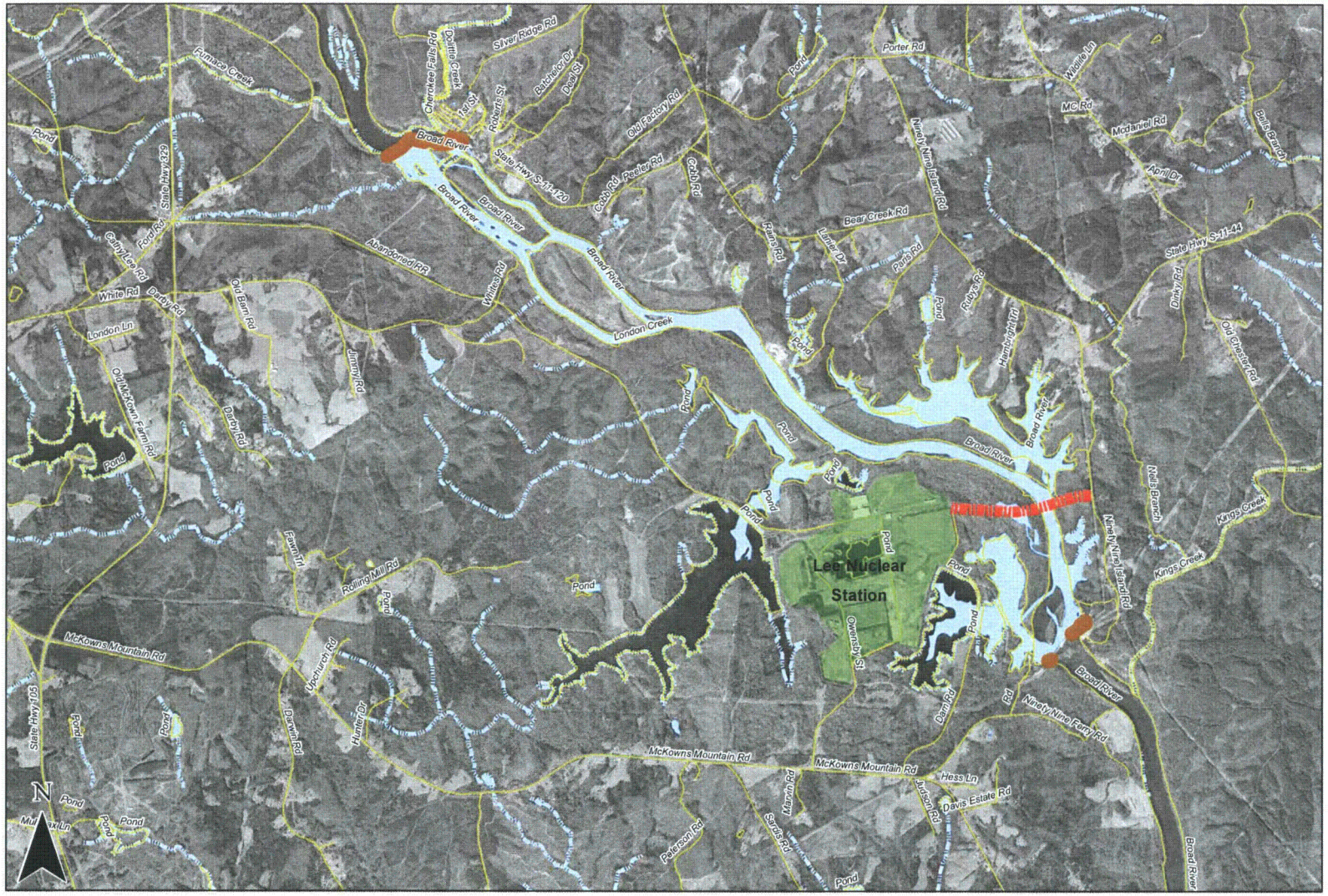
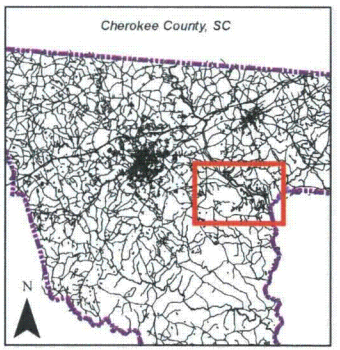


Figure 8.4
New Bridge Crossing
Broad River

- Proposed Lee Nuclear Station
- New Bridge Location
- Dam/Weir
- Streams
- Water

0 0.25 0.5 1 Miles



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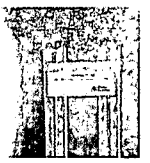
Duke Energy

A new bridge connecting Ninety Nine Island Road to Dam Road could be operational in roughly three and a half to five years considering:

- Corps of Engineers permitting.
- Hydrology flood study required for FEMA.
- Survey and data collection in the area.
- Engineering services and design of the new bridge and new roadway to the bridge.
- Construction of the new bridge and new roadway.
- Planning, design, and construction of other offsite roadway improvements to accommodate the additional traffic on the existing surface roadways north of the new bridge.



Environmental Screening

A preliminary environmental review was performed to identify potential environmental issues/constraints associated with the access strategies. Environmental features within the defined project areas that were reviewed as part of the analysis include: wetlands, streams, floodplains, protected species, and historical/archeological resources. The evaluation utilized available GIS mapping and database resources to develop base mapping for analysis. The screening has been limited to a desktop review of readily available documentation, and has not included on-site field verification, hazardous materials assessment, nor Phase I Environmental Site Assessment.

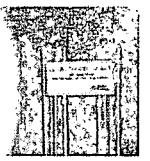
Order of magnitude study areas for each transportation option were defined based on a series of broad based assumptions, as design concepts have not been prepared.

The Bus Transportation option was not reviewed quantitatively, as specific park-and-ride sites have not been selected; in addition, the sites likely would be located outside of the overall project area. Therefore, study areas for this option were not identified and are not represented in this environmental screening.

The New Road Route A assumes a two-lane facility connecting the site with SC 329 involving a 1,000-foot swath of study width.

The New Bridge option assumes a two-lane facility connecting the site with Ninety Nine Island Road, involving a 1,000-foot swath of study width. The identified study area does not address the potential impact to Ninety Nine Island Road and beyond, as areas northeast of the bridge connection are outside the scope of the Transportation Assessment.

The following descriptions summarize potential issues/constraints for the access strategies associated with historic properties, flood hazards, streams/open waters, wetlands, and protected species.



Historic Properties

A review of South Carolina State Historic Preservation Office (SCSHPO) data revealed that there are numerous documented occurrences adjacent to or within the defined study areas:

- Single Dayshift study area: 8 documented occurrences of archaeology sites
  - I-85/Shelby Highway Interchange Area (1)
  - SC 329/US 29 Intersection Area (3)
  - SC 329/north of Furnace Creek (1)- Coopersville Ironworks Site and Susan Furnace Site listed on the National Register of Historic Places
  - SC 329/McKowns Mountain Road Area (2)
  - McKowns Mountain Road/Sardis Road Area (1)
- Staggered Dayshift study area: 4 documented occurrences of archaeology sites
  - I-85/Shelby Highway Interchange Area (1)
  - SC 329/US 29 Intersection Area (1)
  - SC 329/McKowns Mountain Road Area (2)
- Rail Transportation study area: 2 documented occurrences of archaeology sites
  - I-85/Shelby Highway Interchange Area (1)
  - SC 329/US 29 Intersection Area (1)
- New Road with Capacity Improvements study area: 4 documented occurrences of archaeology sites
  - I-85/Shelby Highway Interchange Area (1)
  - SC 329/US 29 Intersection Area (1)
  - McKowns Mountain Road/Sardis Road Area (2)
- New Bridge over the Broad River study area: no documented occurrences

Additional research and coordination with SCSHPO is necessary to determine the nature of these areas and whether they may impose development constraints for the access strategies. Based on this review, it is anticipated that a comprehensive cultural resource survey may be required by SCSHPO during the design/permitting phase, depending on

the selected access strategy, the specifics of the recorded occurrences, and whether federal or state permits are required.

Flood Hazards

FIRM mapping shows that the identified study areas are designated primarily as Zone C, determined to be areas of minimal flooding (outside of the 500-year floodplain). There are, however, two Zone A crossings located at SC 329/Cherokee Creek and SC 329/Peoples Creek, designated as being within the 100-year floodplain.

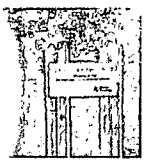
These two Zone A areas are associated with the 'Single Dayshift with Capacity Improvements' option only. These crossings would be subject to floodplain regulations and require further evaluation and coordination with Cherokee County floodplain administrator and/or FEMA for this option.

Streams/Open Waters and Water Quality

There are two SCDHEC impaired waters within the vicinity: Broad River and Cherokee Creek. Any development within the watershed of an impaired stream will likely require demonstration that the proposed activity will not further degrade the receiving water. Regardless of the access option, it is likely that SCDHEC will require storm water management due to the impaired status of the Broad River and Cherokee Creek.

A review of USGS topographic quadrangles and NWI mapping identified potentially jurisdictional stream channels in the immediate vicinity of the identified study areas. The following study areas cross USGS-mapped streams/tributaries:

- Single Dayshift study area: 1,830 LF total potential crossing length of Cherokee Creek, Peoples Creek, Toms Branch, Unnamed tributary (UT) to Broad River, UT to London Creek, UT, and London Creek.
- Staggered Dayshift study area does not include any crossings of USGS-mapped streams.



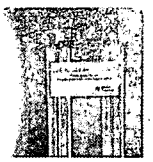
- Rail Transportation study area: 199 LF total potential crossing length of an unnamed tributary to the Broad River.
- New Road with Capacity Improvements study area: 6,872 LF total potential crossing length of UT to London Creek, McKowns Creek, UT to McKowns Creek, and UT to McKowns Creek. In addition, the New Road study area includes portions of the McKowns Creek impoundment, and open water area adjacent to the Lee Nuclear Station site, with a combined area of 2.6 acres based on NWI mapping.
- New Bridge study area: includes 11.2 acres of open water based on NWI mapping (impounded portion of the Broad River upstream from Ninety Nine Islands Dam).

Areas where existing roads cross topographic depressions and/or drainage swales upslope from mapped stream origination locations may contain regulated streams (typically ephemeral or intermittent). This potential for encountering unmapped streams would be applicable to any of the five options analyzed in this environmental screening.

If stream/open water crossings and/or encroachments are proposed, a Section 404 permit from the US Army Corps of Engineers (USACE) and Section 401 water quality certification from the SCDHEC would be required. Mitigation for the impacts would likely be required.

Wetlands

The NWI mapping shows a single wetland area within the immediate vicinity of the study areas, located at the southern tip of one of the UTs to McKowns Creek. This wetland is associated with the New Road study area, at approximately 0.5 acre. The NWI classification for this wetland system is non-forested, PEM1C- which is described as palustrine, emergent, persistent, and seasonally flooded. Further study would be necessary to determine whether the area is a jurisdictional wetland and to define the wetland boundaries. In addition, there are depressional areas and potential drainages associated with headwater areas that, although not shown on NWI maps, often do contain jurisdictional wetlands. Field investigation would be necessary to determine if wetlands are present within these drainage features. Final jurisdictional determination



will be required by the USACE. If impacts to wetland systems area proposed, a Section 404 permit from the USACE and Section 401 permit from the SCDHEC would be required. Mitigation for the proposed impacts would likely be required.

Threatened and Endangered Species

The U.S. Fish and Wildlife Service (USFWS) database for federally threatened (T) and endangered (E) species for Cherokee County, South Carolina lists the dwarf-flowered heartleaf plant (*Hexastylis naniflora*) as threatened in both federal and state categories. Based on communication with USFWS and responses received, the USFWS indicated that the area is not likely to contain suitable habitat for federally-protected species, that the proposed action will have no effect on resources under the jurisdiction of USFWS that are currently protected by the Endangered Species Act, and that no further action is required under Section 7(a)(2) of the Act.

Table 8.1 provides a quantitative comparison of potential environmental issues/constraints associated with the various access strategies reviewed.

Table 8.1
Environmental Issues/Constraints

Options	Streams/Creeks		Open Water		wetland area (acres)	100-year floodplain crossings	# SHPO occurrences
	# crossings	linear feet	# crossings	acres			
Single Dayshift with Capacity Improvements	8	1,830	0	0	0	2	8
Staggered Dayshift/ Capacity Improvements	0	0	0	0	0	0	4
Bus Transportation[1]	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Rail Transportation	1	200	0	0	0	0	2
New Road with Capacity Improvements[2]	6	6,872	2	2.6	0.5	0	4
New Bridge over Broad River[2,3]	0	0	2	11.2	0	1	0

[1] The Bus Transportation option has not been quantitatively evaluated, in that the locations of the park-and-ride lots would likely be outside the overall study area (outside Cherokee County), and the potential sites have not been identified. However, it is noted that use of an existing parking lot or previously developed site would presumably yield less overall environmental impact than development of a greenfield site.

[2] Characteristics of new location access strategies are not necessarily comparable to those of existing routes, in that identified study areas for facilities on new location involve a 1,000-foot width swath to account for potential variations in alignment within the corridor.

[3] The bridge option will likely involve additional impact to existing roadways on the northeastern side of the Broad River to provide access to the new bridge from the Blacksburg area.

Conclusion

A planning-level comparison of the evaluated access strategies is represented in Table 8.2, Access Strategy Matrix. The matrix compares initial cost, long-term cost, environmental issues/constraints, permitting agencies, implementation timeframe, and other general notes. The cost data included are not necessarily normalized. For example, the alternative of constructing a new bridge over the Broad River has a relatively low capital cost at $9.9 million; however, this cost does not include offsite roadway improvements and permitting. Construction phasing and maintenance of traffic (traffic control) could impact progress during construction. The timeframes are dependent upon the funding sources, facility ownership/maintenance, and specific permitting needs. The following notes provide a summary of the strategies reviewed.

Single Dayshift with Capacity Improvements

- Single Dayshift with Capacity Improvements is not recommended due to the level of impact and associated costs.

Staggered Dayshift with Capacity Improvements

- Making capacity improvements to the existing roadway network is expected to have long-term benefits to Duke and the traveling public; the improvements made to accommodate construction traffic would be generally expected to accommodate site traffic during plant operations and outage periods.
- Lower capital costs are projected relative to other strategies reviewed.
- The public may associate this strategy with McKowns Mountain Road impact similar to what was experienced during the previous construction period. Therefore, supplemental strategies to address congestion on McKowns Mountain Road should be considered.
- Staggering the dayshift and making capacity improvements to the existing roadway network appears to have the least potential environmental issues.

Table 8.2 Access Strategy Matrix

Access Strategy	Cost		Potential Environmental Issues[2]	Anticipated Permitting Agencies[3]	Implementation Timeframe[4]	Notes
	Initial Cost[1]	Long-Term Cost				
Single Dayshift with Capacity Improvements	$46.2 million		*8 stream crossings *2 100-year floodplain crossings *8 SHPO recorded occurrences	SCDOT, FHWA, SCDHEC, USACE, FEMA/Cherokee County, SCSHPO	2 - 3 Years	*Right-of-way acquisition may be lengthy process and will impact property owners within the study area. *SCDOT maintained roadway. *Extreme level of improvement and scale of construction on existing roads. *Optimal site construction efficiency. *Public impact within study area. *Employee convenience of parking on site. *Minimal to moderate environmental permitting.
Staggered Dayshift with Capacity Improvements	$3.2 million - $4.1 million		4 SHPO recorded occurrences	SCDOT, SCDHEC, SCSHPO	1.5 - 2 Years	*Right-of-way acquisition may be lengthy process and will impact property owners within the study area. *SCDOT maintained roadway. *Employee convenience of parking on site. *Public impact to McKowns Mountain Road. *Minimal environmental permitting.
Bus Transportation (Staggered Dayshift)	$9.5 million for fleet of buses $4 million (2 11-acre lots) $3.4 million (single 22-acre parking lot)	Operation Cost, Maintenance Cost, Various Parking Lot Amenities, Parking Lot Maintenance, Lighting, Security, "Emergency" Transportation	To be determined based on site location(s)	SCDOT, SCDHEC, facility's home county/municipality	8 - 12 Months	*Adequate parking available at site. *Cost to lease a bus fleet is $34 Million over five years. *Driveway permit/land use permit for parking lot and roadway improvements at parking site (i.e. potential turn lanes and signals). *Employee inconvenience of parking off site. *Workers will have to be transported back to parking lot(s) if there is an emergency. *Additional bus traffic within study area. *Gravel as the paving material was considered in the cost of the parking lot(s). *Public benefit of reduced traffic impact in study area. *Minimal environmental permitting (depending on parking site specifics).
Rail Transportation (Staggered Dayshift)	$13 million - $15 million for rail $3.4 million for 22-acre parking lot $1.7 million for capacity improvements	Operations Cost, Maintenance Cost, Various Parking Lot Amenities, Parking Lot Maintenance, Lighting, Security, "Emergency" Transportation	*1 stream crossing *2 SHPO recorded occurrences	SCDOT, Cherokee County, Rail Agencies, SCDHEC, USACE, SCSHPO	2 - 5 Years	*Adequate parking available at site. *Roadway and intersection capacity improvements from I-85 to parking lot. *Track must have welded rail. *Potential environmental cleanup of parking site. *Workers will have to be transported back to parking lot if there is an emergency. *Public benefit of alternative to McKowns Mountain Road. *Minimal to moderate environmental permitting.
New Access Road (Staggered Dayshift)	$18.9 - $21.4 million	Roadway must be maintained by Duke Energy.	*6 stream crossings *2 open water crossings * 0.5 acres of wetland *4 SHPO recorded occurrences	SCDOT, SCDHEC, USACE, SCSHPO	2 - 3 Years	*Roadway and intersection capacity improvements from I-85 to new road. *Employee entrance via new road only. *New Road assumes Route A with/without realigned intersection at SC 329 and an overpass over Rolling Mill Road. *Assumes southbound left, westbound free-flow right, and signal at SC 329. *Consider access to adjacent properties. *Topography issues. *Right-of-way acquisition may be lengthy process and will impact property owners to the north of McKowns Mountain Road. *Public benefit of alternative to McKowns Mountain Road. *Moderate to extensive environmental permitting.
New Bridge (Staggered Dayshift)	$9.9 million for bridge alone	For security reasons, the bridge would be a private facility maintained by Duke Energy.	*2 open water crossings *1 100-year floodplain crossing	SCDOT, SCDHEC, USACE, FEMA/Cherokee County	3.5 - 5 Years	*May be used by all or some employees. How to force usage? *Impacts to residents on northeast side of Broad River not quantified. *Additional transportation impact assessment to determine impacts to roadway network that bridge connects with. *Potential extreme level of improvement and scale of construction to existing roads. *Flood study. *Public benefit of alternative and/or distribution of impact. *Extensive environmental permitting.

1. 2009 costs based on current NCDOT bids and not considering right-of-way and soft costs.
2. Reference Table 8.1 for details.
3. Additional agencies may be identified in planning/design process. NEPA requirements may apply depending on funding sources and necessary approvals.
4. Implementation timeframe does not consider right-of-way acquisition.

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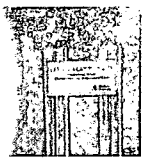


Bus Transportation

- Security, lighting, and various facilities would need to be provided and maintained on the parking site.
- Regional lot(s) relatively distant from the site (e.g. Kings Mountain) may be viewed as inconvenient for construction workers. In addition, "emergency" transportation would need to be provided from/to the lot for workers not following the typical work shift timeframes.
- This option may be viewed positively by the public, in that there would be significantly fewer vehicles impacting the roadways in the vicinity of the site (assuming regional lots located outside the study area).
- The Lee station site is large enough to accommodate parking for construction workers, so an off-site parking lot may be considered redundant.
- Driveway permits and capacity improvements likely would be needed for access to the parking site(s).

Rail Transportation

- A portion of the identified park-and-ride site along SC 329 appears to be an auto salvage yard that potentially could require environmental cleanup.
- A portion of the intersection capacity improvements associated with the staggered dayshift strategy would be needed (from I-85 to the park-and-ride facility).
- This option may be viewed positively by the public, in that there would be significantly fewer vehicles impacting McKowns Mountain Road.
- The station site is large enough to accommodate parking for construction workers, so an off-site parking lot may be considered redundant.
- Driveway/encroachment permits and capacity improvements likely would be needed for access to the parking site.

New Road

- A portion of the intersection capacity improvements associated with the staggered dayshift strategy would be needed (from I-85 to the new road).
- This option may be viewed positively by the public, in that there would be significantly fewer vehicles impacting McKowns Mountain Road.
- The environmental impact of roadway construction on new location is expected to be greater than utilizing the existing McKowns Mountain Road.
- Access to adjacent properties may be an issue.

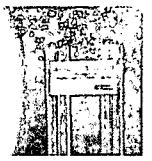
New Bridge

- Residents on the northeast side of the Broad River would be impacted. Unidentified capacity improvements would be needed through rural residential areas leading to the bridge deck. (More study would be needed to determine the extent of impact and levels of mitigation necessary.)
- Additional capacity improvements may be needed within the study area depending on the mix of site traffic that would be required to utilize the new bridge.

SCDOT right-of-way in this rural area may be prescriptive. Therefore, actual right-of-way likely would need to be purchased from adjacent property owners in order to construct the improvements.

Supplemental Strategies

- Reversible lanes could be evaluated considering the highly directional flow expected with construction traffic. However, this strategy is not recommended for further review, considering: the extent of overhead signage necessary may not be aesthetically pleasing in a rural setting such as McKowns Mountain Road, and vehicle queuing likely would occur in the system wherever the reversible lane system ends.
- Intelligent Transportation Systems (ITS) strategies can be used as a supplement to other access strategies. Cameras and/or detector loops could be installed at key



cross streets/driveways along McKowns Mountain Road to monitor vehicle presence and delay, and to potentially trigger metering at the site driveway (via manual or automatic options), and/or clear traffic queues turning to/from SC 329. More study would be needed to determine feasibility.

- Low tech strategies, such as police control at the site drive and/or pace vehicles along McKowns Mountain Road, could be utilized to help provide gaps for side street vehicles to turn out.

Based on the peak-hour employment levels, capacity analyses, costs associated with offsite roadway improvements, and a broad review of the various alternatives, the following conclusions are offered for consideration:

- Staggering the dayshift is recommended as the most effective option for minimizing the impact of construction traffic on the adjacent roadway system.
- Roadway and intersection capacity improvements recommended to accommodate the projected staggered construction traffic on the existing roadway network provide long-term benefits with lower capital cost projections relative to the other access strategies.

The following are additional enhancements suggested for consideration:

- Supplemental treatments, in the form of ITS or low tech strategies, should be reviewed further for potential application to McKowns Mountain Road to improve through traffic flow and access from side streets and drives during peak traffic periods. Existing geometric conditions along McKowns Mountain Road, such as horizontal/vertical alignment, lane widths, and shoulders should be reviewed as well.
- Additional strategies should be considered to reduce the potential for interaction and conflict between school buses/student pedestrians and construction traffic.
- Consideration should be given to improving the visibility and awareness of emergency signals at the Draytonville-McKowns Volunteer Fire Department.