Regional Transit Framework Plan

Travel Market Analysis

Prepared for the Berkeley-Charleston-Dorchester Council of Governments

May 4, 2018 (FINAL)

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Introduction

The Regional Transit Framework Plan aims to establish a true multi-modal transit network, including high-capacity service with premium transit infrastructure in key corridors. This approach has the potential to attract a broader range of Charleston-area residents than today's transit network, by providing a mobility option that is both time and cost-competitive with many peak-period automobile trips.

To identify key corridors for transit service, it is important to understand the region's most prevalent travel patterns, regardless of mode. BCDCOG maintains a regional Travel Demand Model to estimate current and future traffic volumes between and within 15 designated districts (**Figure 1)**. The model shows that the top three travel flows are internal trips in the North Charleston, Mount Pleasant, and West Ashley / James Island districts. The top three external travel flows are between the North Charleston and Goose Creek, Summerville, and West Ashley / James Island districts, respectively.

The regional travel flow analysis is the first step in identifying key transit corridors. However, additional analyses, discussed in this memo, are necessary to identify specific potential alignments.

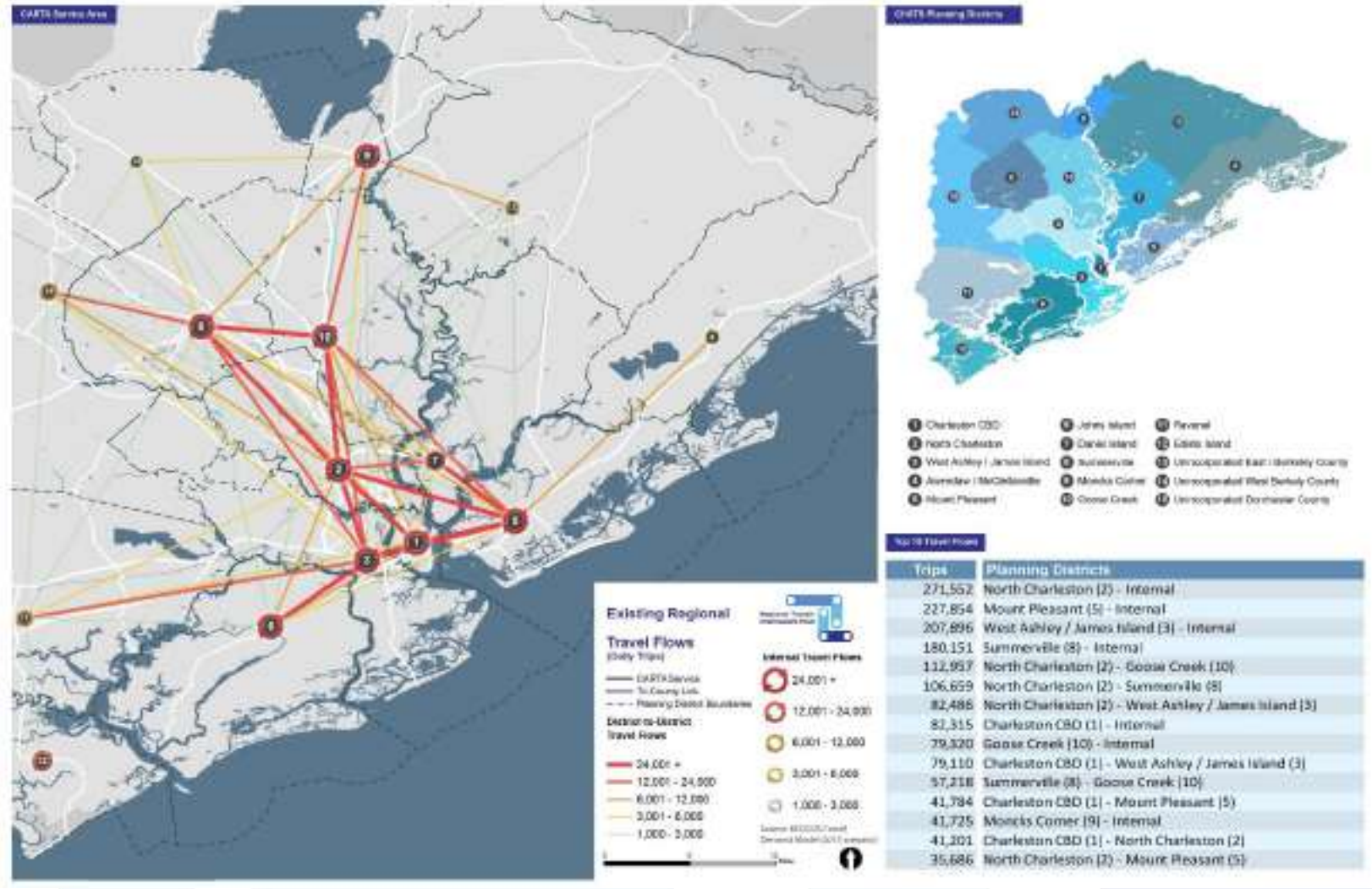
Market Analysis

More than any other factor, the effectiveness and efficiency of public transportation is determined by density. Where there are higher concentrations of people and/or jobs, transit ridership tends to be higher. At the same time, most transit agencies have a mandate to provide comprehensive service in the communities they serve, and to provide mobility for residents with no other means of transportation.

The purpose of the Market Analysis is to both identify the existing strongest transit corridors in the BCD region and to highlight areas with relatively high transit need. Thus, this memo is divided into two primary parts: ***Transit Potential*** and ***Transit Need***. Transit potential is an analysis of population and employment density, while transit need focuses on socio-economic characteristics such as income, automobile availability, age, and disability status that are indicative of a higher propensity to use transit.

In addition to density and socio-economic characteristics, transit use is influenced by the built environment. In particular, there are certain land uses, such retail centers, civic buildings, multifamily housing, educational institutions, medical facilities, and major employment centers that tend to generate transit trips at a higher rate than other types of land uses. These ridership generators are included in the maps describing Transit Potential and Transit Need.

Figure 1 | Regional Travel Flows (All Modes)



Trips	Planning Districts
271,552	North Charleston (2) - Internal
227,854	Mount Pleasant (5) - Internal
207,896	West Ashley / James Island (3) - Internal
180,151	Summerville (8) - Internal
112,957	North Charleston (2) - Goose Creek (10)
106,659	North Charleston (2) - Summerville (8)
82,486	North Charleston (2) - West Ashley / James Island (3)
82,315	Charleston CBD (1) - Internal
79,320	Goose Creek (10) - Internal
79,110	Charleston CBD (1) - West Ashley / James Island (3)
57,218	Summerville (8) - Goose Creek (10)
41,784	Charleston CBD (1) - Mount Pleasant (5)
41,725	Moncks Corner (9) - Internal
41,201	Charleston CBD (1) - North Charleston (2)
35,686	North Charleston (2) - Mount Pleasant (5)

Transit Potential

As mentioned, transit service is generally most effective in areas with high concentrations of residents and/or businesses. Combining both residential and employment densities shows the locations with the highest potential to support transit service and generate strong transit ridership.

Population Density

Public transportation is most efficient when it connects population and employment centers where people can easily walk to and from bus stops. The reach of local transit is generally limited to within one-quarter mile to one-half mile of the transit line (depending on the built environment), or a 10-minute walk. As such, the size of the travel market is directly related to the density of population in that area. As a general rule, a density of greater than five people per acre[1] is needed to support base-level fixed-route transit service (service every 60 minutes). **Figure 2** shows the population density of the study area. The yellow color indicates densities where fixed-route service begins to make sense; areas with darker colors can support more frequent service.

[1] Source: TCRP Report 16: Transit and Urban Form

The highest population density in the region is in the Charleston Peninsula. Other areas of relatively high population density include the following:

- Neighborhoods along Savanah Highway and Sam Rittenberg Boulevard, between the Ashley River and the Stono River in West Ashley
- The I-26/US 78 corridor
- Neighborhoods along Dorchester Road and along Ashley Phosphate Road
- Several large apartment complexes and mobile home parks south of Red Bank Road
- Neighborhoods along Coleman Boulevard and the US 17 corridor in Mt. Pleasant
- Portions of James Island between Camp Road and Fort Johnson Road

Commuter services usually have a larger capture area than local routes and are more dependent on park-and-rides than on walk-up traffic. Understanding the population distributions in the three-county region can help highlight challenges and opportunities related to potential park-and-ride locations.

Employment Density

The location and number of jobs is a second strong indicator of transit demand, as traveling to and from work accounts for the largest single segment of transit trips in most markets. Additionally, transit that serves areas of high employment density provides key connections to job opportunities. Like population density, the employment density that can typically

support a base-level of fixed-route service is greater than five jobs per acre. This density corresponds to the yellow colored areas in **Figure 3**. Higher employment densities can support greater frequency.

The highest employment density in the region is in the Charleston Peninsula, especially south of Septima Clark Parkway. Other areas of relatively high employment density include the following:

- Retail and commercial strips along Savanah Highway and I-526 including the Citadel Mall and Skylark Drive in West Ashley
- Government and office facilities along Leeds Avenue in North Charleston
- Retail and light industrial facilities south of the I-26/I-526 interchange in North Charleston
- Retail and medical destinations along I-26 including Trident Medical Center and Northwoods Mall
- South Carolina Port Authority North Charleston Terminal and the Naval Weapon's Station in Hanahan
- Retail strips along Coleman Boulevard and the US 17 corridor in Mt. Pleasant

Figure 2 | Population Density by TAZ

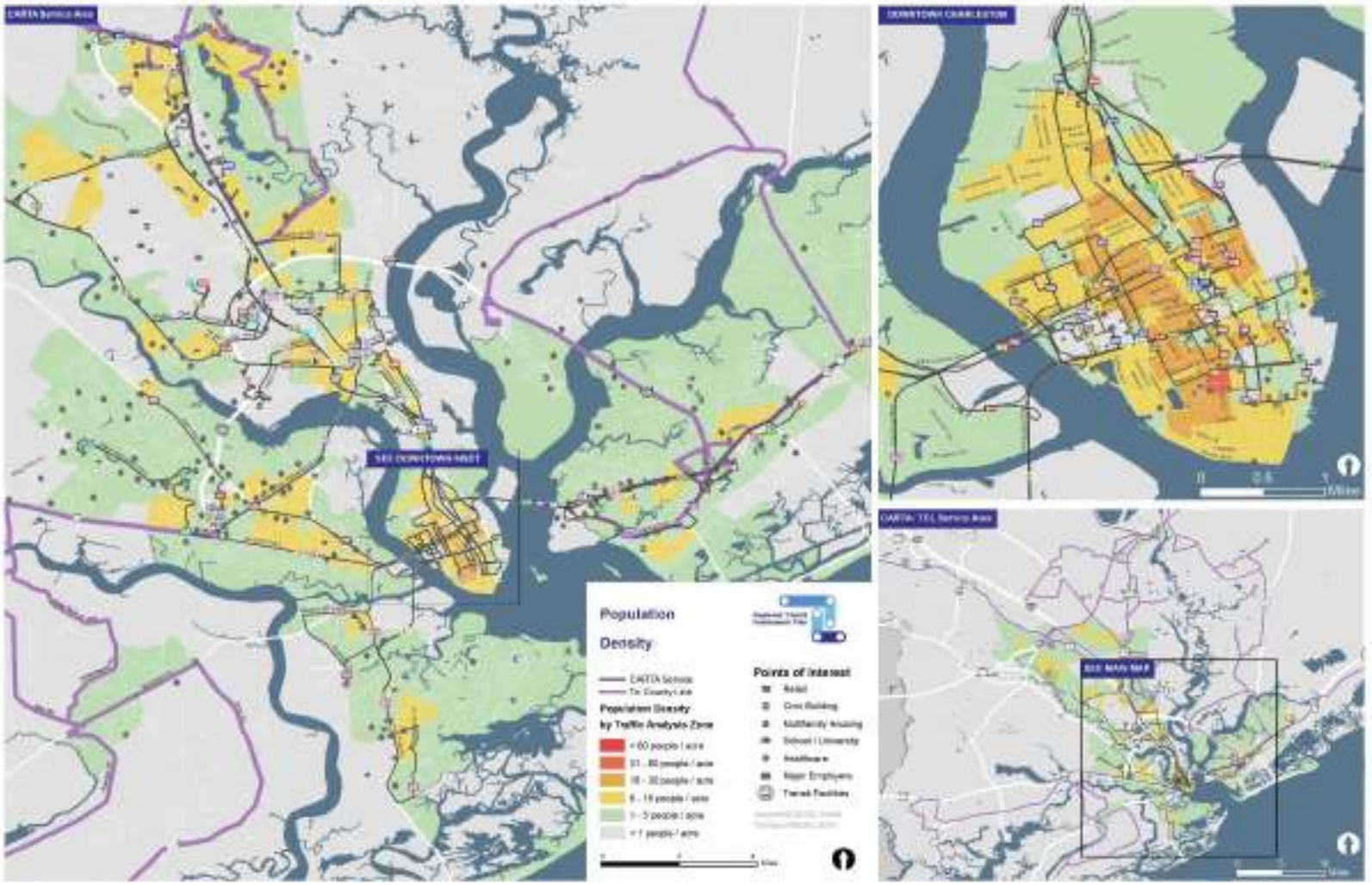
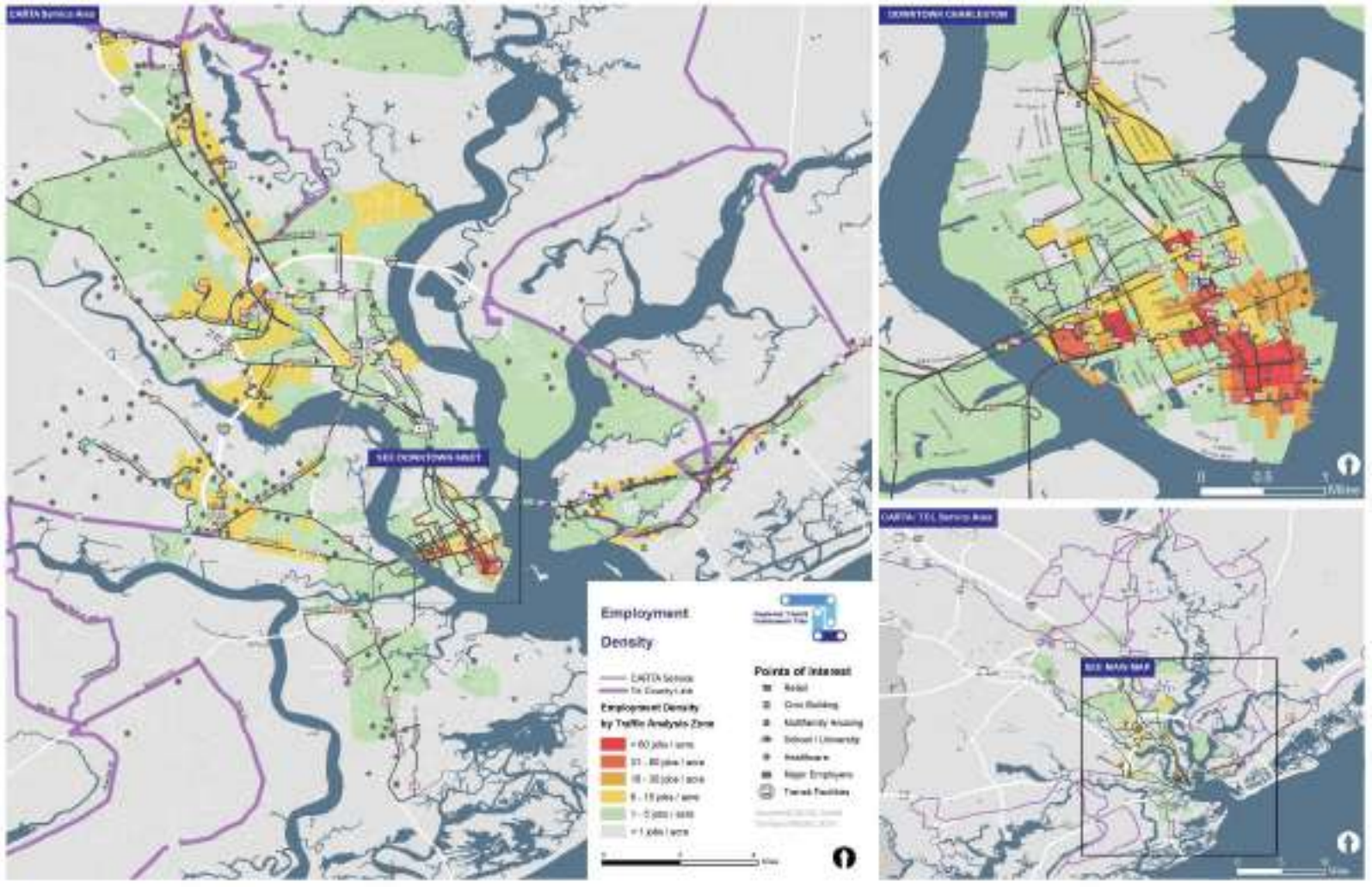


Figure 3 | Employment Density by TAZ



Transit Potential

Transit potential, shown in **Figure 4**, is a composite of the population and employment densities for each traffic analysis zone (TAZ), and is an indicator of the viability of fixed route service in a particular area. Downtown Charleston has the highest transit potential in the region, with several blocks having more than 60 residents and/or jobs per acre. Other areas of relatively high transit potential include the following:

- West Ashley between the Ashley River and just west of I-526, including Citadel Mall and Bon Secours St. Francis Hospital
- North Charleston, along the I-26/US 78 corridor, Leeds Avenue, Dorchester Road, Ashley Phosphate Road, Red Bank Road, Remount Road, and the Naval Weapons Station in Hanahan
- Mt. Pleasant, along Coleman Boulevard and the US 17 corridor
- James Island, along Maybank Highway and along Folly Road.

The higher the transit potential is of an area, the higher the likelihood of that area generating substantial transit ridership. This conclusion can be tested by comparing actual transit ridership to the estimated transit potential. **Figure 5** shows a heatmap of CARTA ridership collected via automated passenger counters in October and November of 2017. While actual ridership is a function of where service is available, **Figure 5** shows that in those corridors where there is transit service, there is a clear correlation between high ridership and high transit potential.

Figure 4 | Transit Potential by TAZ

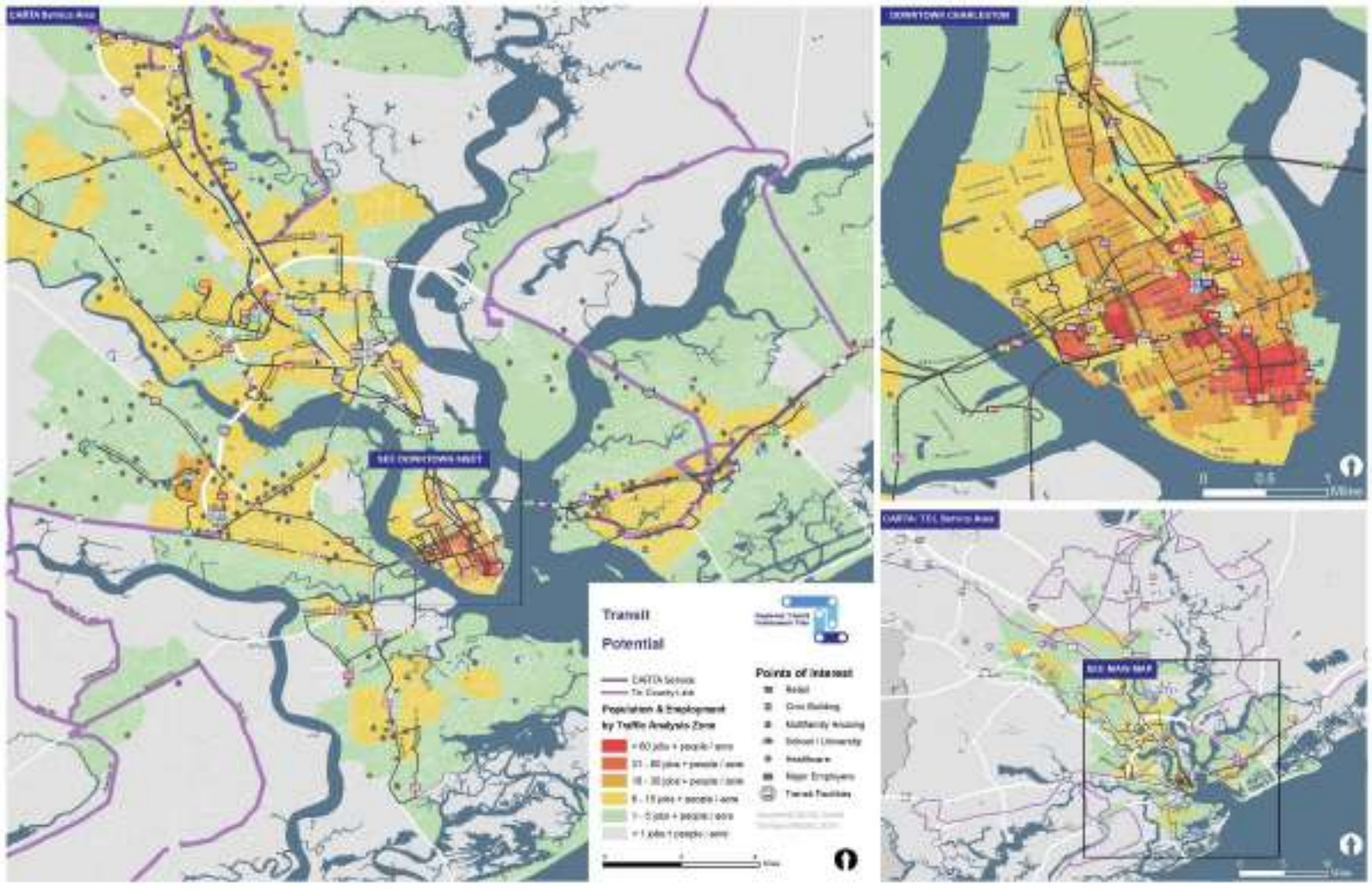
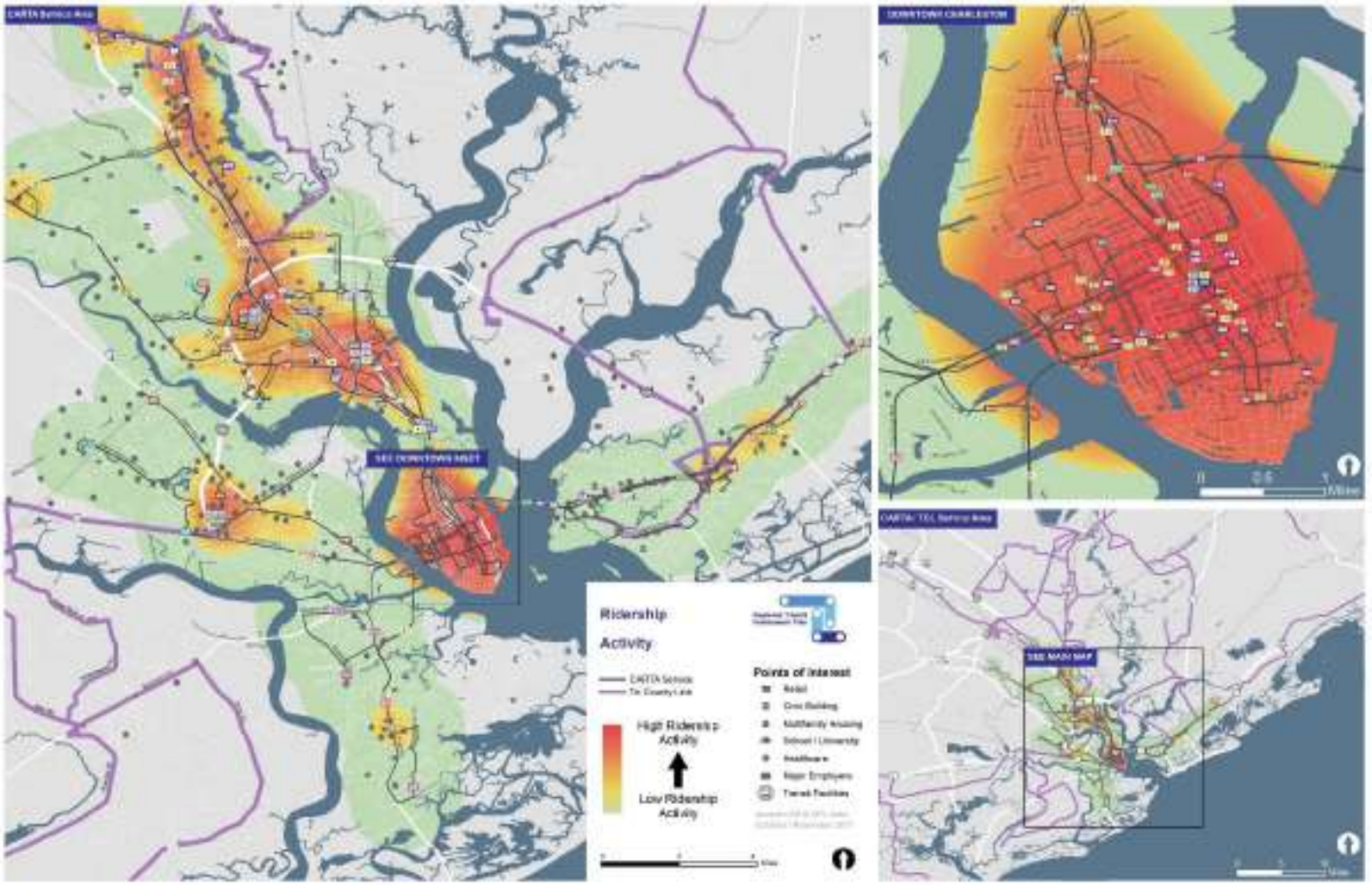


Figure 5 | CARTA Ridership Heat Map



Transit Need

Above all else, public transportation is a mobility tool. Certain population subgroups have a higher likelihood or propensity to use transit as their primary means of local and regional transportation than the population in general. These groups include:

- ***People without access to an automobile***, whether it be by choice or due to financial or legal reasons, often have no other transportation options besides using transit.
- ***Persons with disabilities***, many of whom can't drive and/or have difficulty driving.
- ***Low-income individuals***, typically because transit is less expensive than owning and operating a car.
- ***Youth / young adults***, who are either too young to drive, or have in recent years been shown to have a greater interest in transit, walking, and biking than in driving.
- ***Older adults***, who as they age, often become less comfortable or less able to operate a vehicle.

Identifying areas with relatively high concentrations of these population subgroups can help determine where the need for transit service in the study area is greatest. The maps that follow (**Figure 6** – **Figure 10**) show the density of each of the five high-transit-propensity population subgroups by Census block group. The maps utilize a Jenks Natural Breaks Classification Method to assign each block group to one of five density categories. The density ranges differ for each demographic analysis, as some measure individuals while others measure households; and some are simply more common (e.g. low-income populations) than others (e.g. zero-vehicle households).

For each demographic analysis, a score of 1-5 is assigned to each block group depending on which natural break category it falls into. If a block group falls into the highest density category for a demographic analysis, it is assigned 5 points for that particular analysis. Block groups that fall into the lowest-density natural break category for a particular population sub-group receive 1 point for that analysis.

The Transit Need Index map (**Figure 11**) shows the composite Transit Need score for each block group based on the sum of its scores in each individual demographic analysis. If a block group falls in the highest density category for each of the five demographic analyses, it will end up with a Transit Need Index value of 25 (5+5+5+5+5). The lowest possible Transit Needs Index is 5 (1+1+1+1+1).

The highest transit need in the region is in the Charleston Peninsula, especially near East Bay Street, south of Septima Clark Parkway, and near Beaufain Street. Other areas of relatively high transit need include the following:

- Ashley River Road in West Ashley, between Old Town Road and Sam Rittenberg Boulevard
- North Charleston, especially along Dorchester Road, Ashley Phosphate Road, and Otranto Road
- Goose Creek, along Harbour Lake Drive

- Hanahan and North Charleston, between I-526 and Yeamans Hall Road

It should be noted that when planning fixed-route transit service, and especially premium service with high frequency and high capacity, transit need should not be considered independently of transit potential. In some locations, the density of transit-dependent population groups may be relatively high, but if the total population is still quite low, the potential to generate substantial fixed-route transit ridership will remain low.

Figure 6 | Zero-Vehicle Household Density

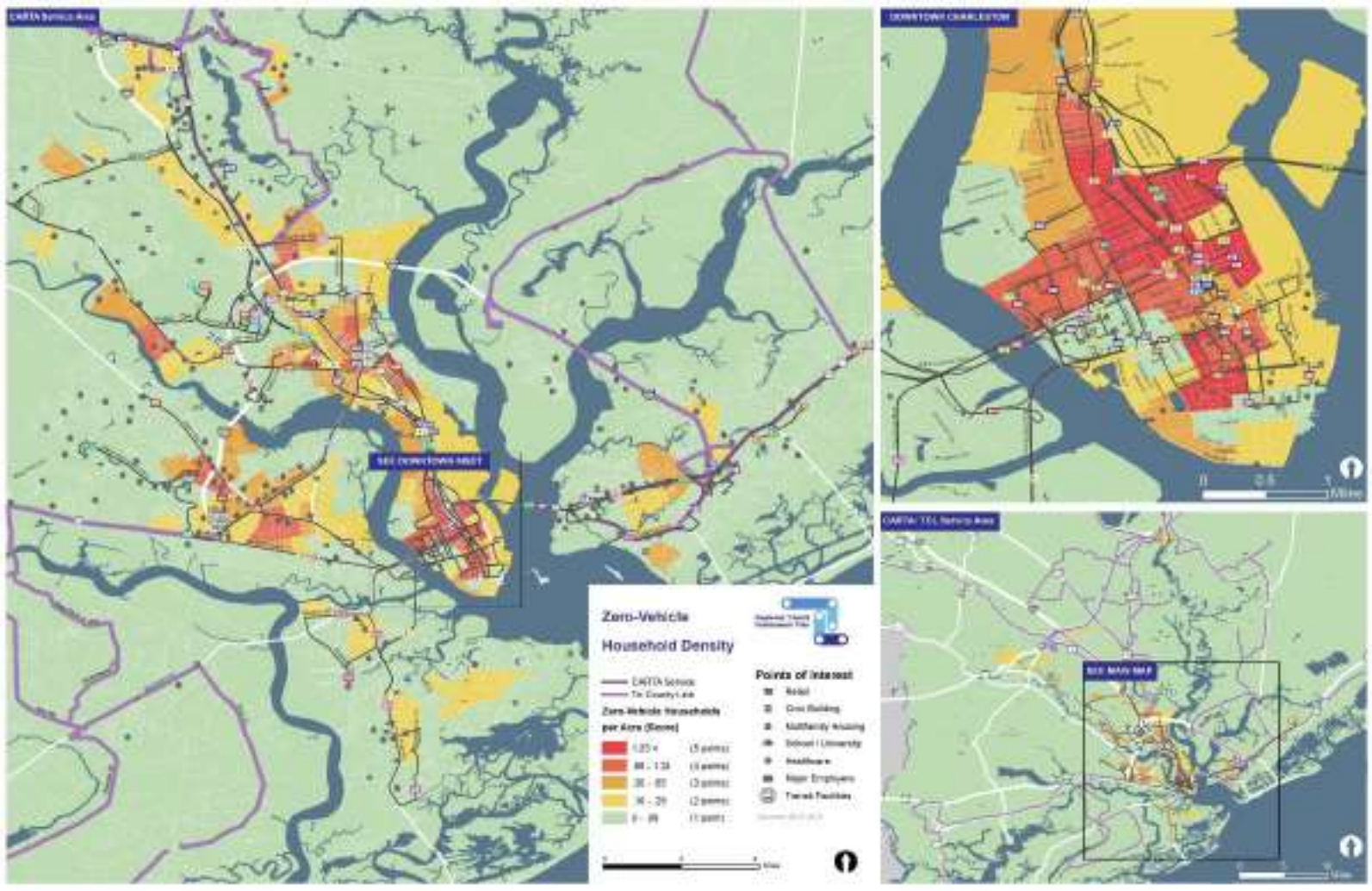


Figure 7 | Disabled Population Density

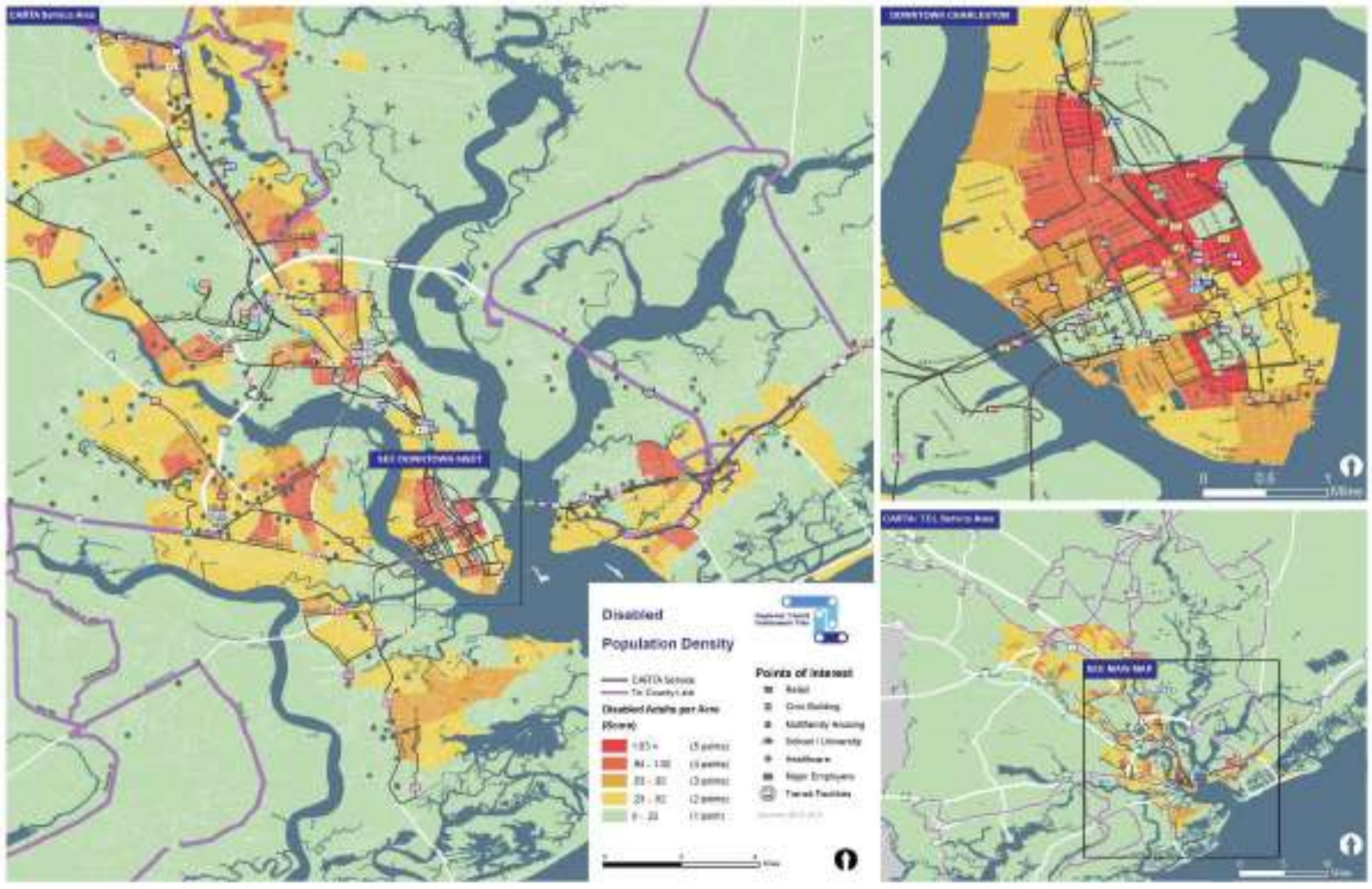


Figure 8 | Low Income Population Density

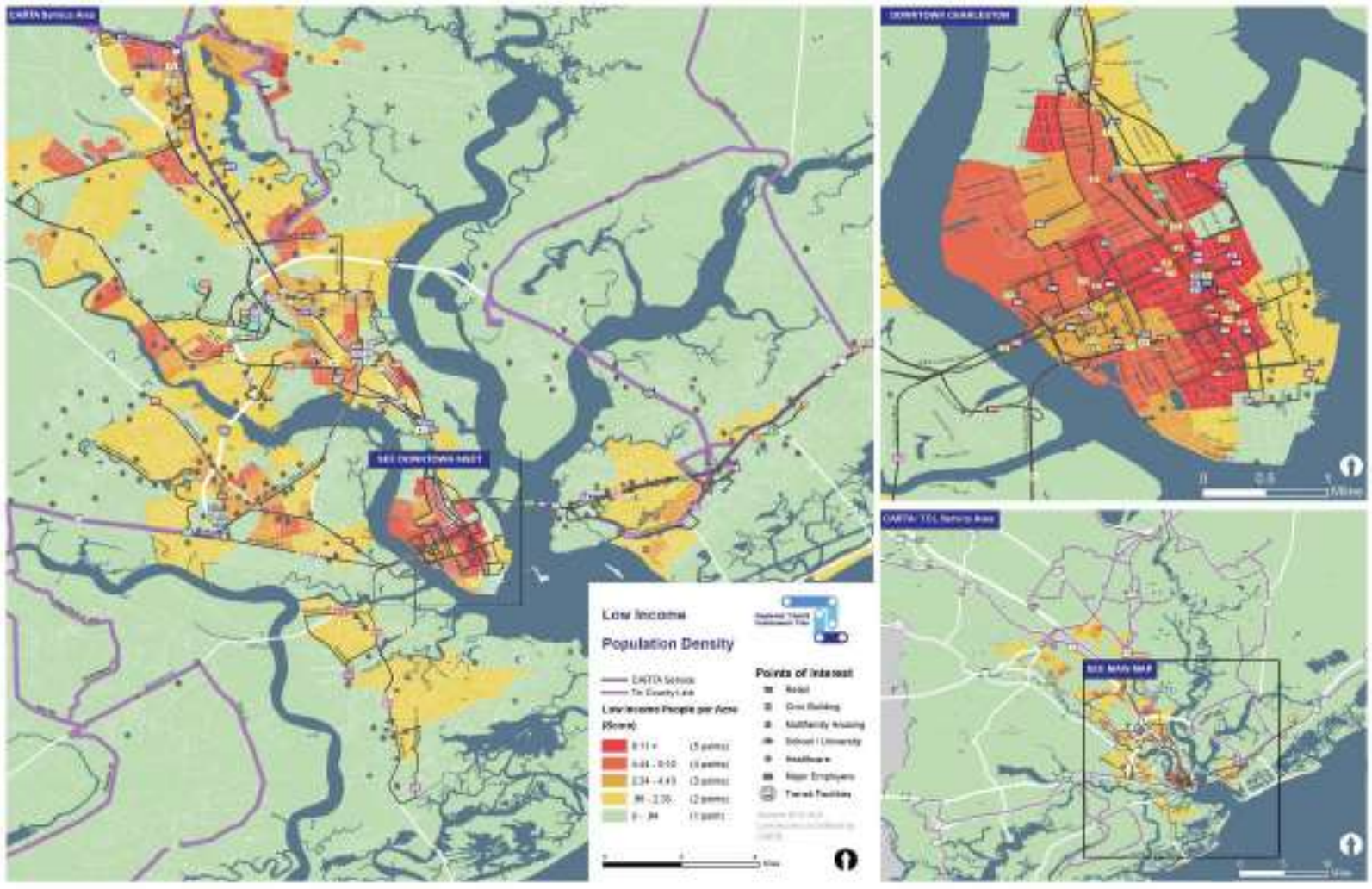


Figure 9 | Youth / Young Adult Population Density

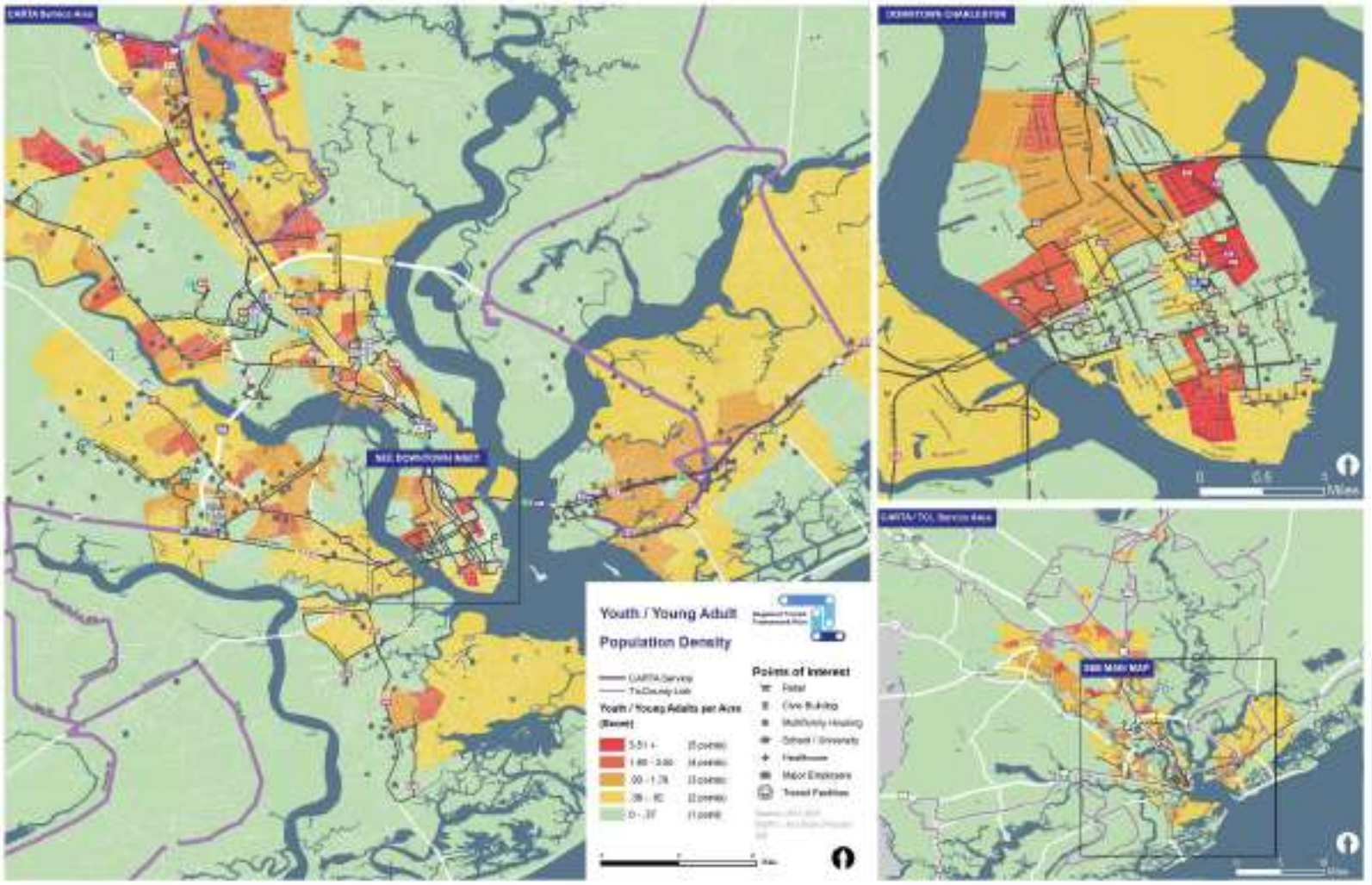


Figure 10 | Older Adult Population Density

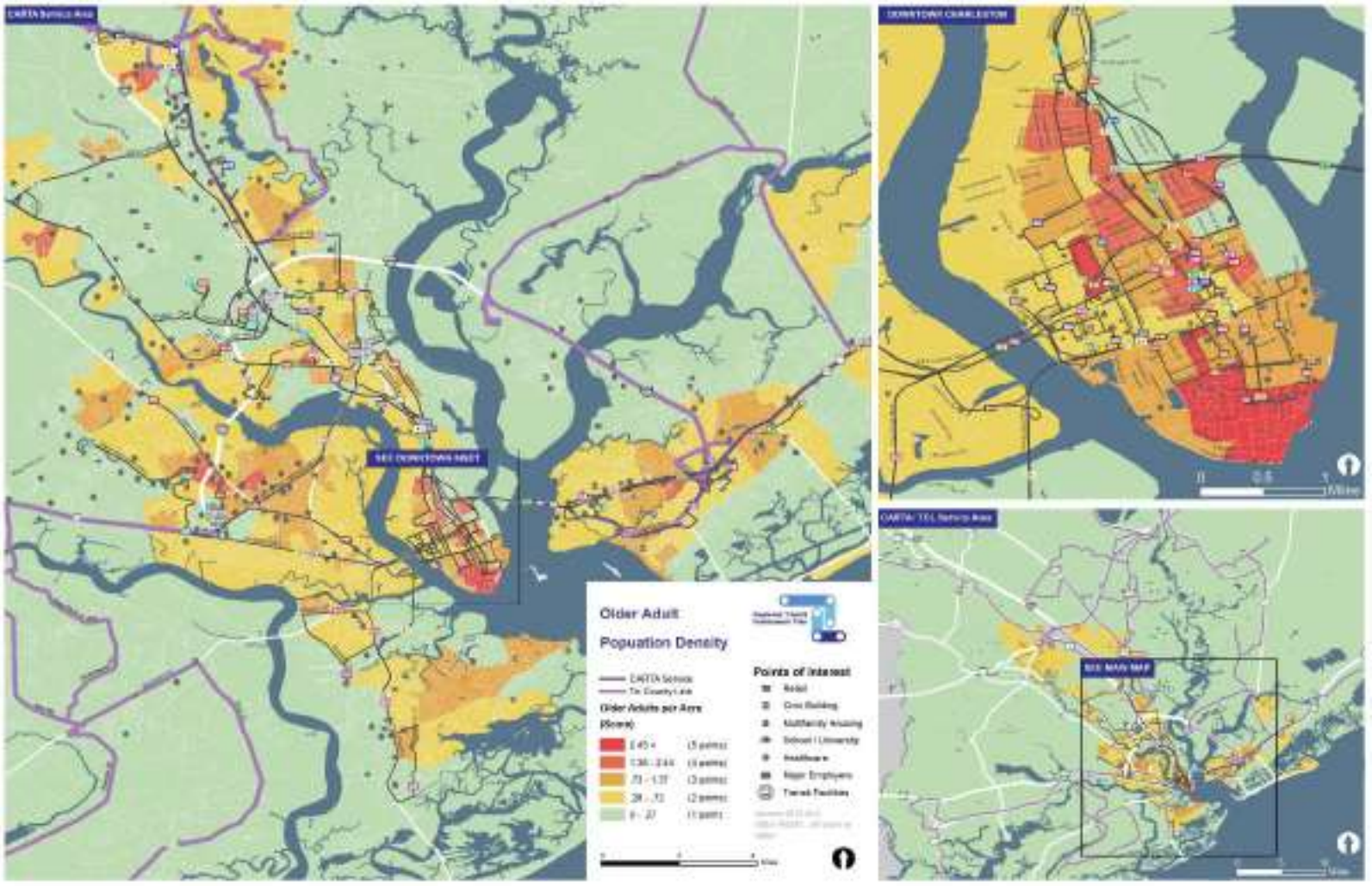
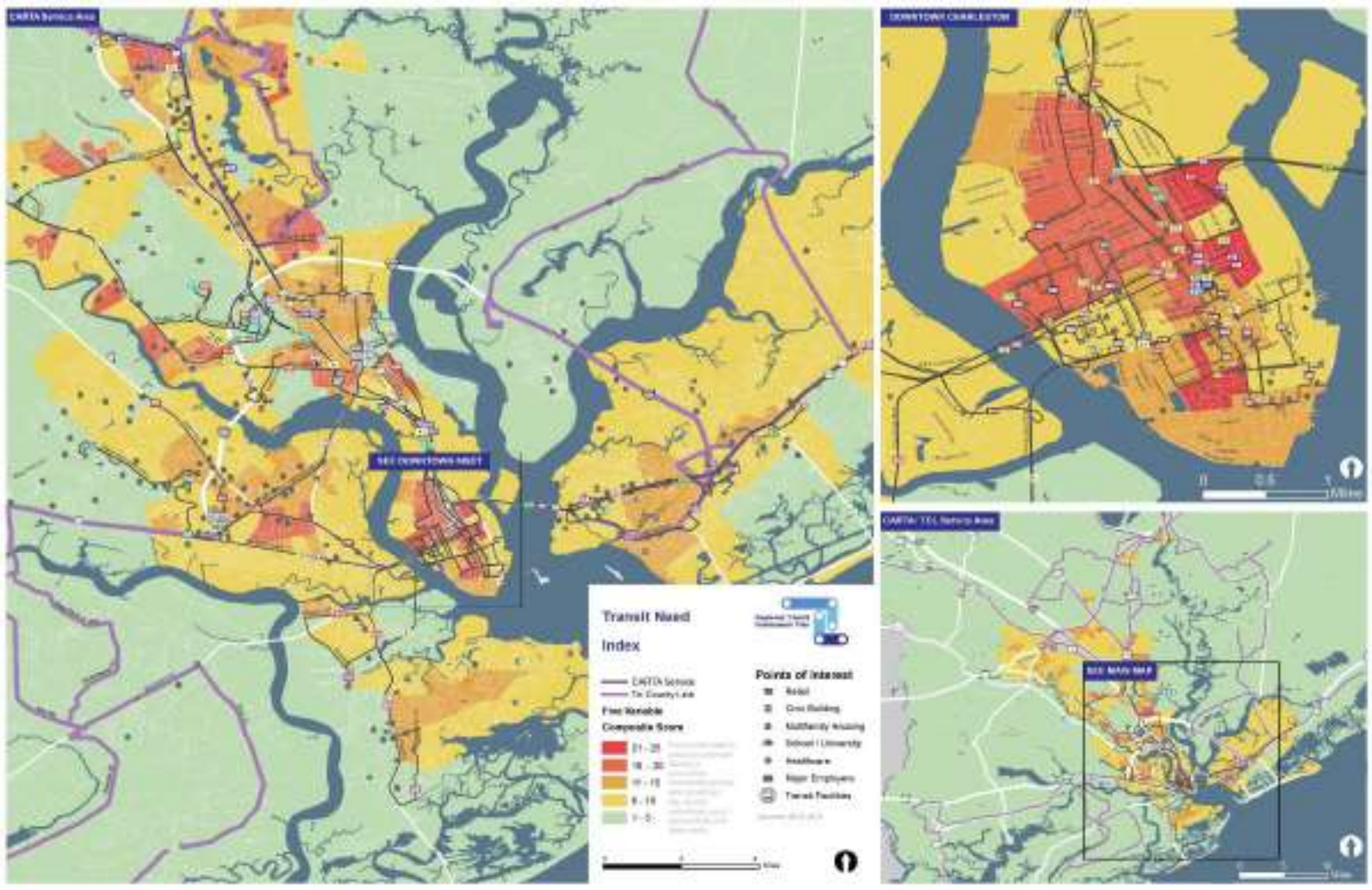


Figure 11 | Transit Need Index



Gaps Analysis

Ensuring that the people most likely to use transit have adequate access to service and adequate levels of service is vital to any region. The Gaps Analysis consists of two distinct components. First, the Local Service Gaps Analysis compares the need and potential for transit service to the availability of local transit service. Secondly, the Commuter Service Gaps Analysis compares the distribution of workers associated with major employment clusters to the alignment and stop locations of CARTA and TCL commuter services.

Local Service Gaps Analysis

The transit potential and the transit need outlined in the previous sections highlight where densities are most supportive of local transit service (transit potential), and where concentrations of residents with high propensities to use transit exist (transit need). A combined index of these measures therefore illustrates where there are high concentrations of likely transit riders living in areas with the densities needed to support local transit service. These dense areas with high concentrations of likely transit riders should have adequate local transit service in terms of frequency and service hours.

In this analysis, the amount of local service provided during peak periods and midday periods is compared geographically to the combined index of Transit Need and Transit Potential, and any mismatches are highlighted to illustrate where service increases, including potential high capacity transit could be justified.

The purpose of this analysis is to provide a foundation for identifying areas of potential service enhancements. The conclusions reached are then coupled with those reached in the rest of the travel market analysis memo.

Transit Need/Transit Potential

Figure 12 illustrates the combined index of Transit Need and Transit Potential, where areas without enough density to support transit (less than 6 combined people and jobs per acre) are removed. The areas with the highest transit need identified in the Transit Need section also have the highest combined index of Transit Need and Transit Potential, including:

- In the Charleston Peninsula, especially near East Bay Street, south of Septima Clark Parkway, and near Beaufain Street.
- Ashley River Road in West Ashley, between Old Town Road and Sam Rittenberg Boulevard
- North Charleston, especially along Dorchester Road, Ashley Phosphate Road, and Otranto Road
- Goose Creek, along Harbour Lake Drive
- Hanahan and Charleston, between I-526 and Yeamans Hall Road

Local Service Provided

To measure the amount of local transit service provided during peak periods, the number of trips per hour passing through each TAZ were summed, and then the totals were divided into five groups using the breaks displayed in **Table 1**, which represent natural breaks adjusted to

more standardized trips per hour. Each group was then given a score from 1 to 5, with the group with the lowest amount of service given a 1 and the highest amount of service given a 5. The same process was done for the midday period as well. The highest group (score of 5) had more than 20 local trips per hour, while the lowest group (score of 1) had less than two local trips per hour.

Table 1: Service Provided Breaks

Local Trips/Hour	Score
0-1	1
2-5	2
6-11	3
12-19	4
20+	5

Figure 13 illustrates the index of local peak service provided, while **Figure 14** illustrates the index of local midday service provided.

Figure 12 | Combined Index of Transit Need & Transit Potential

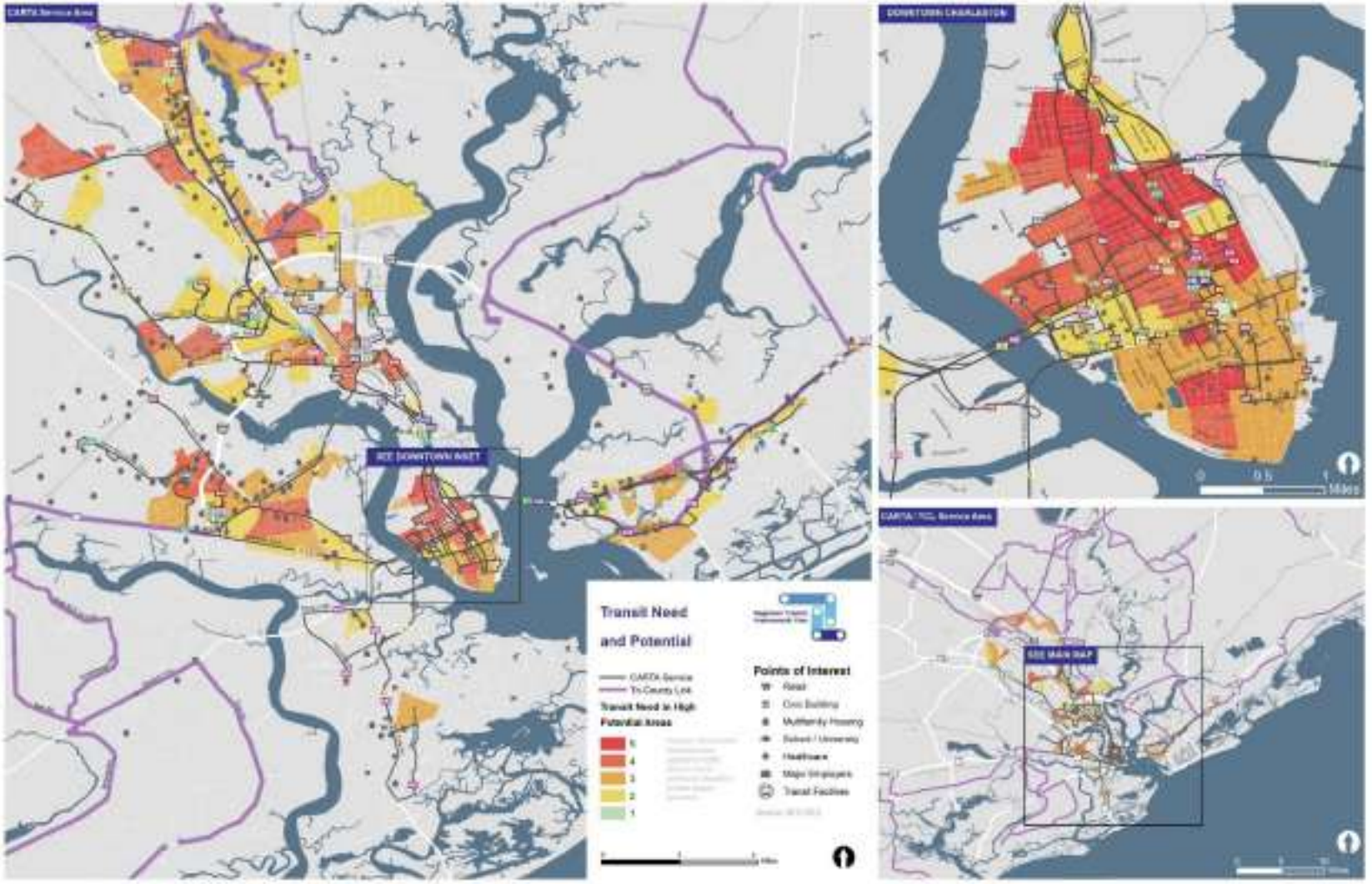


Figure 13 | Index of Local Peak Period Service Provided by TAZ

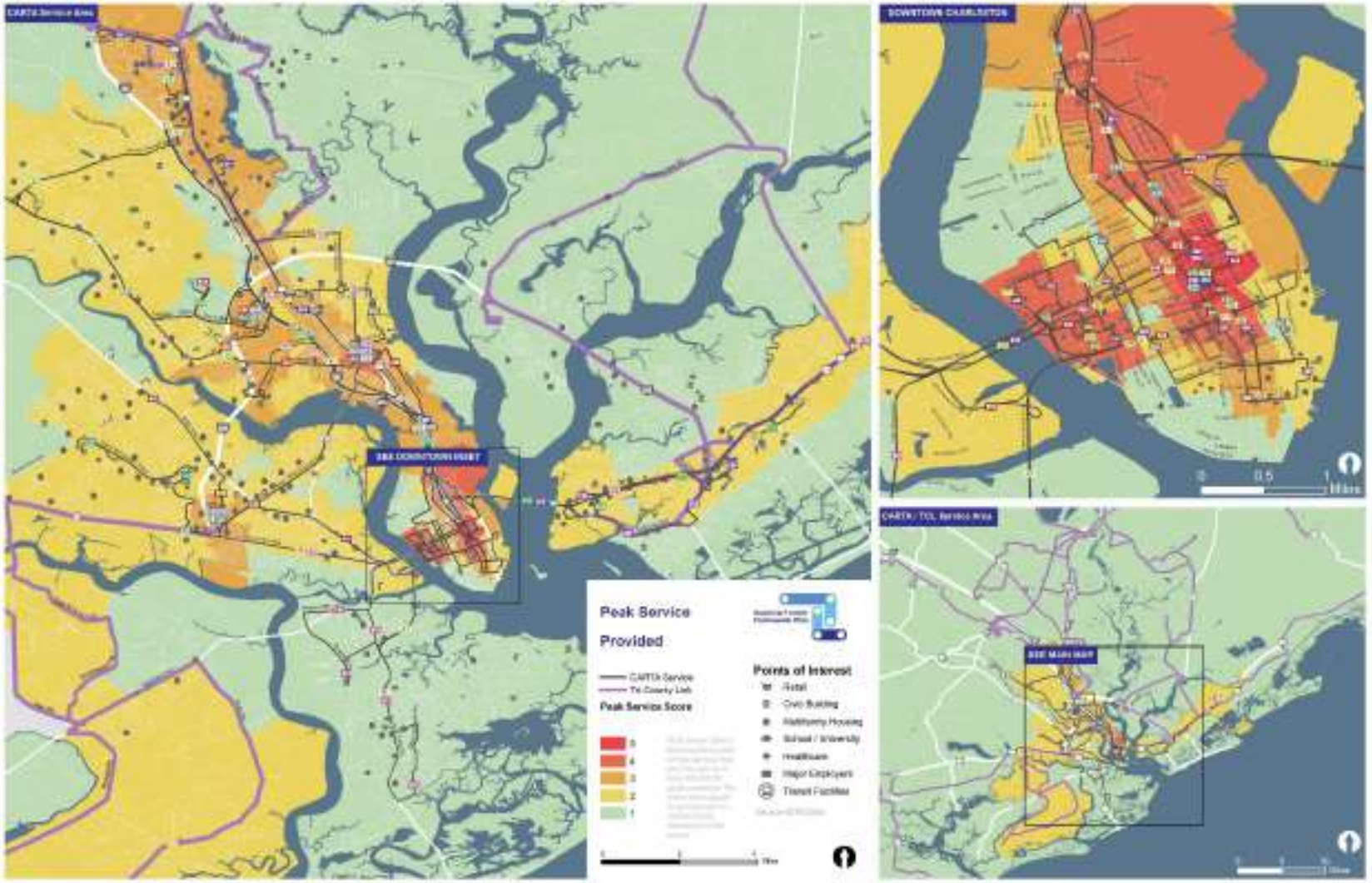
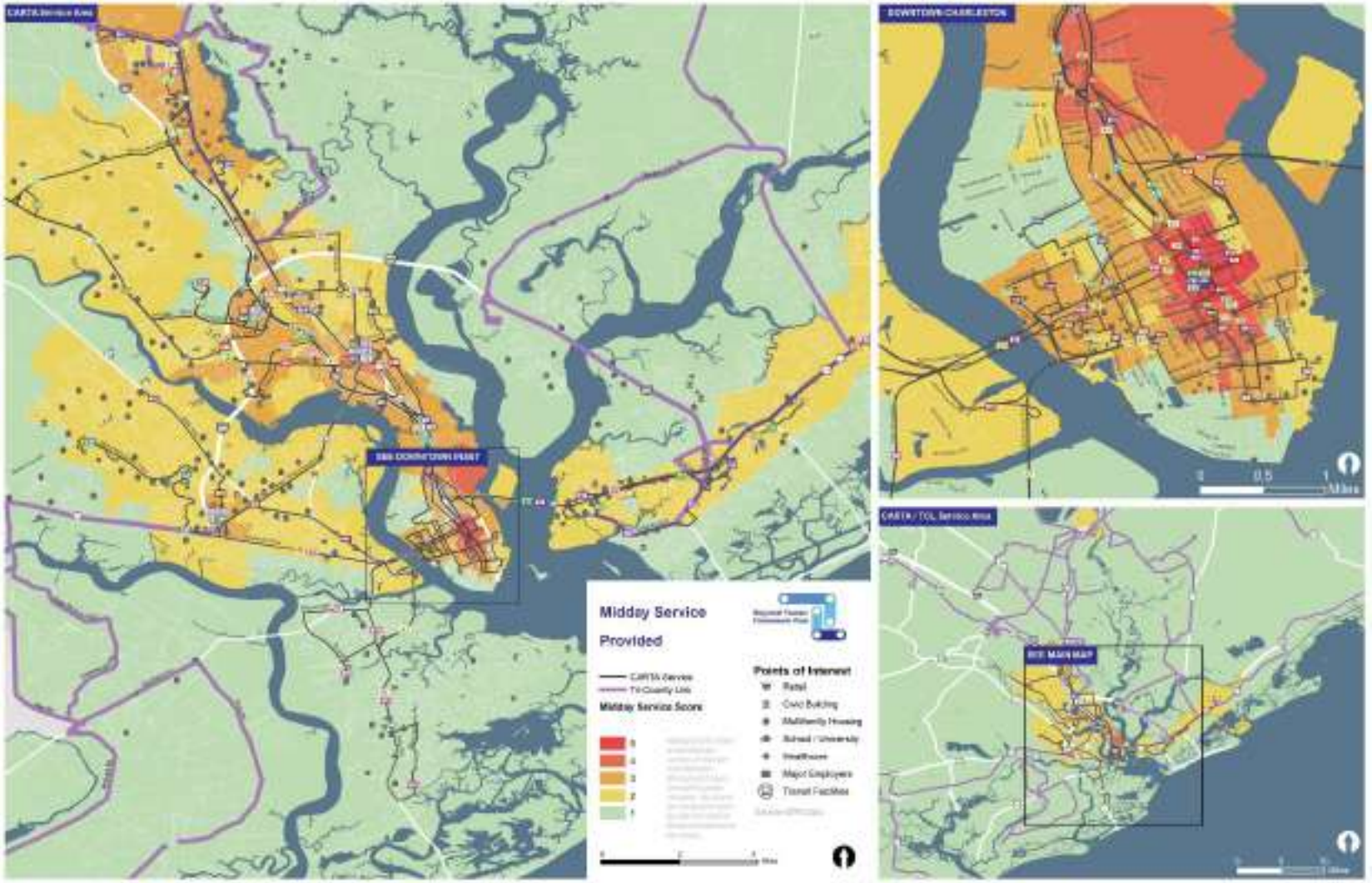


Figure 14 | Index of Local Midday Service Provided by TAZ



During peak periods, the highest amount of local service (service score groups 4 and 5) is provided in the following areas:

- Downtown Charleston around the Charleston Visitor's Center;
- Charleston Westside around the Medical University of South Carolina (MUSC);
- The US 52 and US 78 corridors between downtown Charleston and North Charleston; and
- North Charleston near Dorchester Road and Cosgrove Road.

During the midday period, the highest amount of service (service score groups 4 and 5) is provided in several of the same areas, including:

- Downtown Charleston around the Charleston Visitor's Center;
- The US 52 and US 78 corridors between downtown Charleston and North Charleston; and
- North Charleston near Dorchester Road and Cosgrove Road.

To determine which areas do not currently have enough local peak period transit service based on their estimated transit need (and therefore constitute gaps in the network), the combined index of Transit Need and Transit Potential scores were subtracted from the index of peak service provided. TAZs with a negative score therefore have less local transit service than is needed. These show up in red in **Figure 15**. TAZs with positive scores may have more local transit service than is needed. These show up in green in **Figure 15**. The TAZs with negative or neutral scores are candidates for peak period service increases that could be fulfilled by implementing premium transit/high capacity transit service that connects with major employment areas.

The same process was used for the midday period. The TAZs with negative or neutral scores are candidates for increased midday service to ensure that transit-dependent people have access to service during non-peak periods and also access to jobs with non-traditional work schedules.

Figure 15 illustrates the local gap analysis for peak periods while **Figure 16** illustrates the local gap analysis for the midday period.

Figure 15 | Peak Period Local Gap Analysis

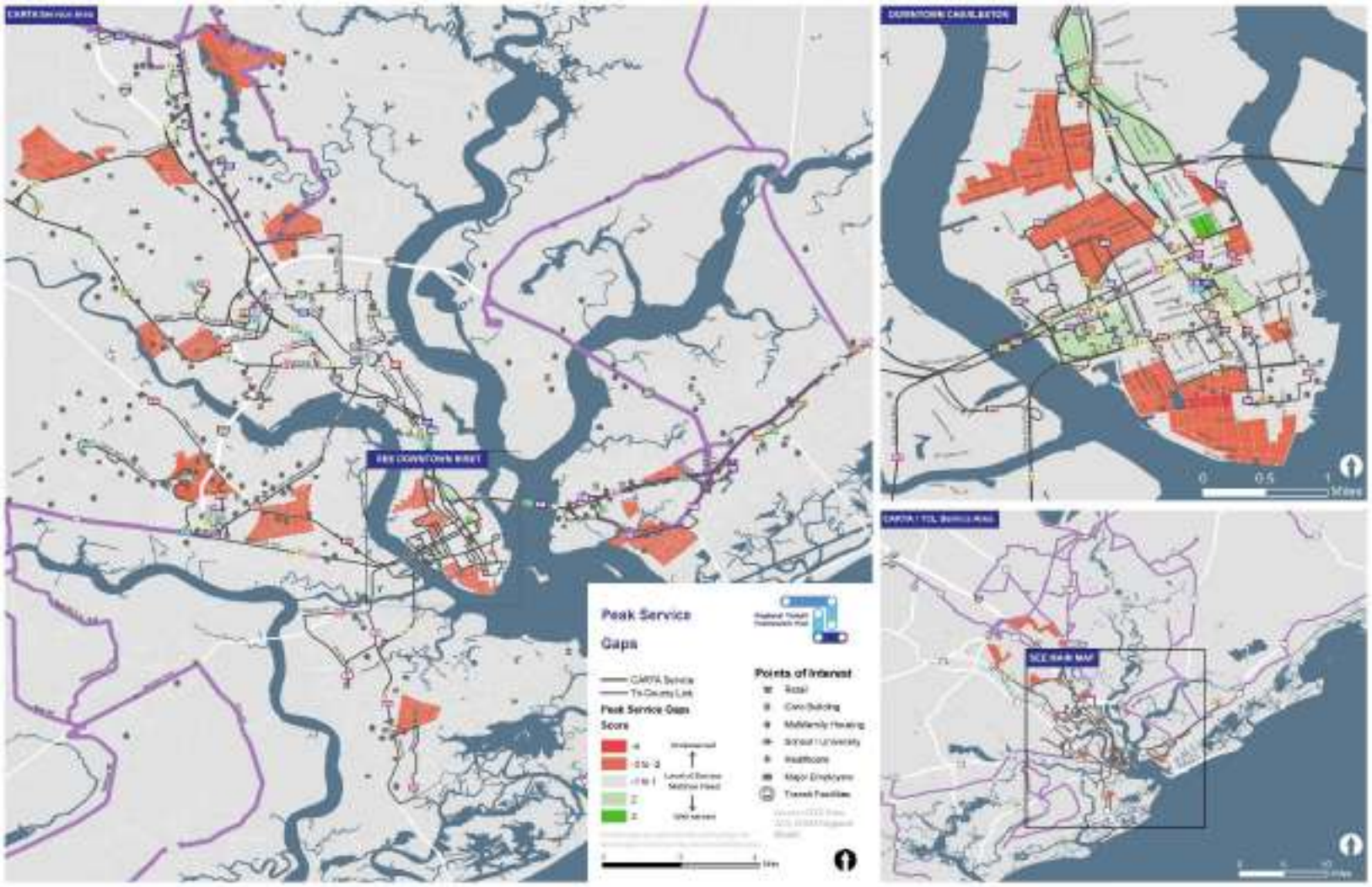
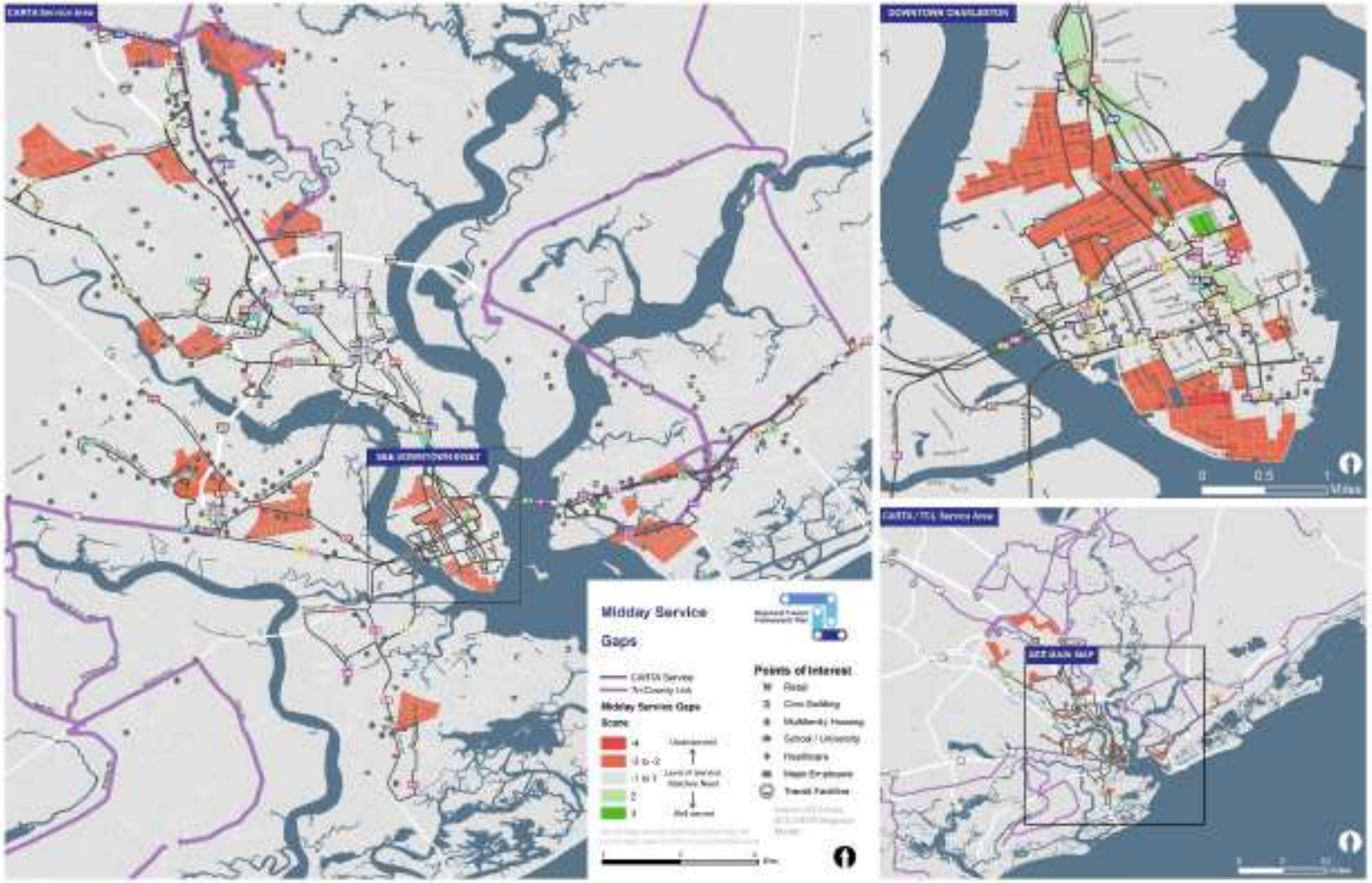


Figure 16 | Midday Period Local Gap Analysis



During peak periods, areas with less service than is needed are scattered throughout the region, including TAZs in downtown Charleston, West Ashley, North Charleston, Goose Creek, Sangaree, Summerville, Mount Pleasant, and James Island. **Table 2** summarizes the specific corridors that serve these TAZs and the current local bus routes that operate along them.

While more service is provided than needed along US 52 and US 78 in the Neck area as well as the area around MUSC, this is due to the high volume of trips that connect to Charleston from outlying areas with high transit need.

During the midday period, all of the same areas and corridors with less service than needed are present as during peak periods, plus the following additions:

- The Meeting Street/Morrison Drive area in Charleston near US 17; and
- University Boulevard/Otranto Road at Rivers Avenue in Goose Creek.

It should be noted that some parts of the region are conspicuously absent from the list of areas that are underserved, despite the fact that they have numerous activity centers, or apartment communities, but no current transit service. This includes Daniel Island and neighborhoods north of Bees Ferry Road. The reason that these areas are not showing up as underserved is because they fall within very large Traffic Analysis Zones, which dilute the calculated population and employment density of the zone. In these areas, the prevalence of key land uses or points of interest should be taken into consideration when planning for future service, even if the areas do not register as having a strong transit need or transit potential based on other analyses.

Table 2: Local Service "Gaps"

Area	Corridors	Local CARTA and Tri-County Link Routes	Peak/Midday
Downtown Charleston	Broad Street	20, 30, 201	Both
	Rutledge Avenue/Ashley Avenue	20, 21, 30, 31, 201, 213, 301	Both
	Bay Street	11, 201	Both
	Meeting Street/Morrison Drive near US 17	11, 40	Midday Only
West Ashley	Ashley River Road/Paul Cantrell Boulevard	33, 301	Both
	Ashley River Road/Highway 171/US 17	30, 33	Both
North Charleston	Yeamans Hall Road/Remount Road	13	Both
	Ashley Phosphate Road between Patriot Boulevard and I-26	12	Both
	Dorchester Road near Montague Avenue and Michaux Parkway	11, 12	Both
Goose Creek	Foster Creek Road/Red Bank Road	TCL 102	Both
	University Boulevard/Otranto Road at Rivers	10	Midday Only
Sangaree	Royle Road/College Park Road/US 17A	TCL 102	Both
Summerville	Old Trolley Road/Ladson Road	-	Both
James Island	Fort Johnson Road/Secessionville Road	31	Both
Mount Pleasant	Coleman Boulevard west of I-526	41	Both
	US 17 west of Bowman Road	40	Both

While many of the areas identified as having underserved service needs are scattered around the region, there are several corridors with existing CARTA service that emerge as potential candidates for more robust service than they currently have. These include the following:

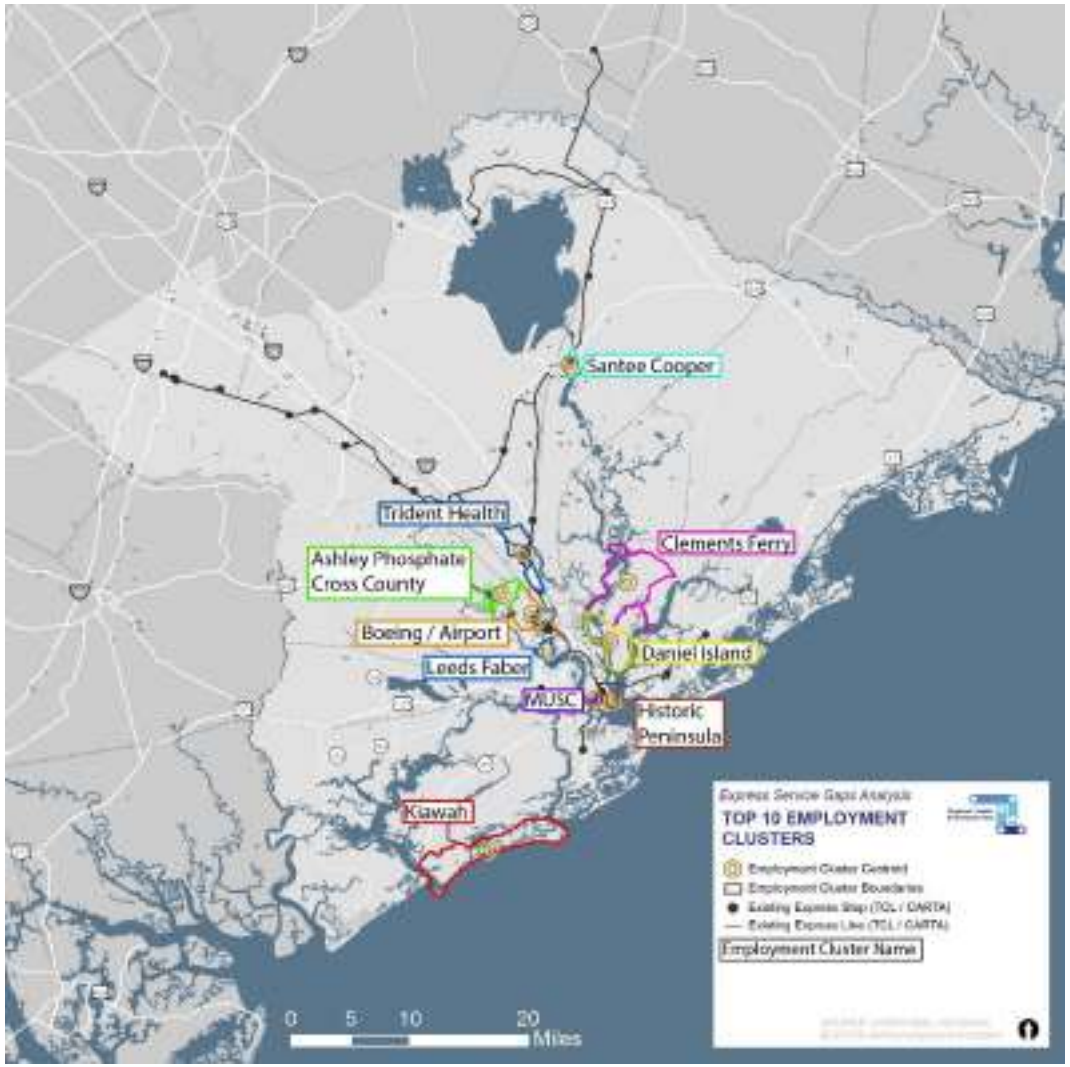
- Dorchester Road and Ashley Phosphate Road - CARTA Route 12
- Remount Road - CARTA Route 13
- Ashley River Road/Sam Rittenberg Boulevard – CARTA Routes 32, 33, and 301
- Coleman Boulevard - CARTA Route 41

Commuter Service Gaps Analysis

To identify gaps in the commuter service network, commuting patterns to the region's top employment clusters were compared to the existing network of commuter routes (CARTA XP routes and Tri-County Link Commuter Solutions routes). This comparison allows for an assessment of how well the commuter network connects workers to jobs.

As a first step, the study team identified ten major employment clusters in the region (**Figure 17**). Each cluster consists of one or more block group, selected in consultation with BCDCOG staff. The block groups included in each employment cluster were also selected to encompass contiguous development patterns.

Figure 17 | Top Employment Clusters in the Region



Employment Cluster Name	Emp. Total - LEHD	Served by Commuter Routes
MUSC	19,248	XP1, XP2, XP3
Boeing / Airport	19,127	XP3, XP4
Historic Peninsula	18,309	XP1, XP2
Trident Health	14,373	XP1, CS1
Ashley Phosphate / Cross County	8,841	XP3
Leeds / Faber	6,792	-
Daniel Island	5,430	-
Clements Ferry	3,106	-
Kiawah	2,897	-
Santee Cooper	2,206	CS1

After the selection of ten employment clusters, the study team analyzed the distribution of employee home address associated with each employment cluster using the US Census Bureau's Longitudinal Employer-Household Dynamics (LEHD) dataset. LEHD data is useful for identifying likely commuting patterns, but does have some limitations. For example, LEHD data excludes some military and federal workers and often aggregates workers from multiple sites to company headquarters. It also excludes self-employed and sole-proprietor workers, and therefore, LEHD employment totals are typically less than actual. Despite these limitations, LEHD data is the best available data source of its kind.

The final step of the commuter service gaps analysis was to identify whether or not there is a direct commuter service connection between Census blocks that include large numbers of employees associated with a particular employment cluster, and the cluster itself. For each employment cluster, the top five block groups, in terms of number of residing employee, were identified.

The commuter service gaps analysis is illustrated for each of the ten employment clusters in the series of figures below. Two figures and a table are included for each employment cluster:

- The first figure illustrates the number of employees per Census block associated with the employment cluster.
- The second figure focuses on just the top five Census blocks, in terms of number of associated employees, and assesses whether each block has a "commuter service gap" or not.
    - Census blocks that are within three miles of a stop that is served by a commuter route connecting to the employment cluster are colored green and are not considered gaps.
    - Census blocks that do not meet this criteria are colored red and are considered gaps in the commuter service network.
- The table following the two figures summarizes key facts about the top five Census blocks highlighted in the preceding figures, including a description of the block, number of employees residing in the block, and the availability of commuter service between the block (or within three miles of the block) and the focus employment cluster.

Some connections between Census blocks and corresponding employment clusters can be made with one or more transfers between commuter routes. However, since transferring between commuter routes is often difficult due to their limited service levels, any connection that is not direct on a single commuter route was considered a gap.

Figure 18: MUSC Home Location of Employees

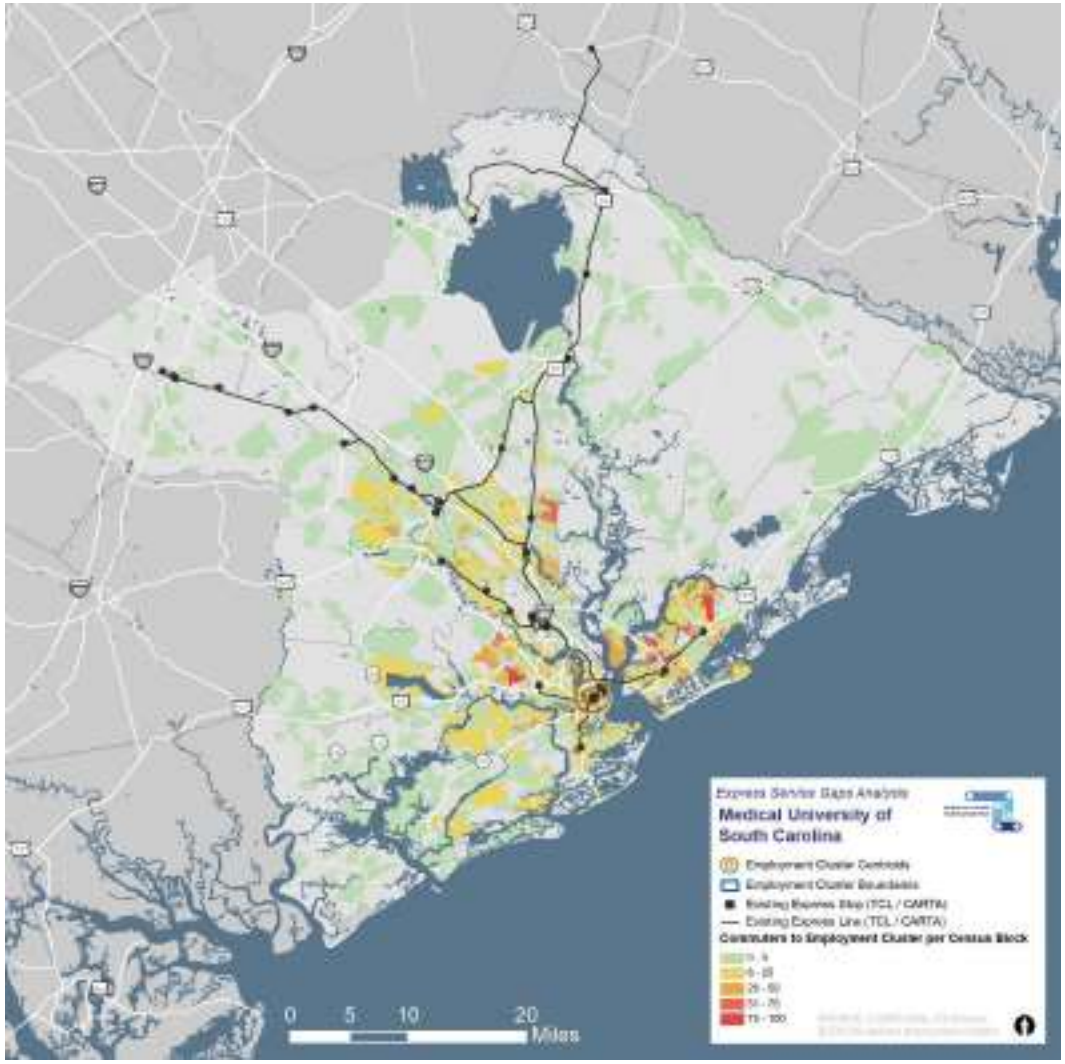


Figure 19: MUSC Commuter Service Gaps

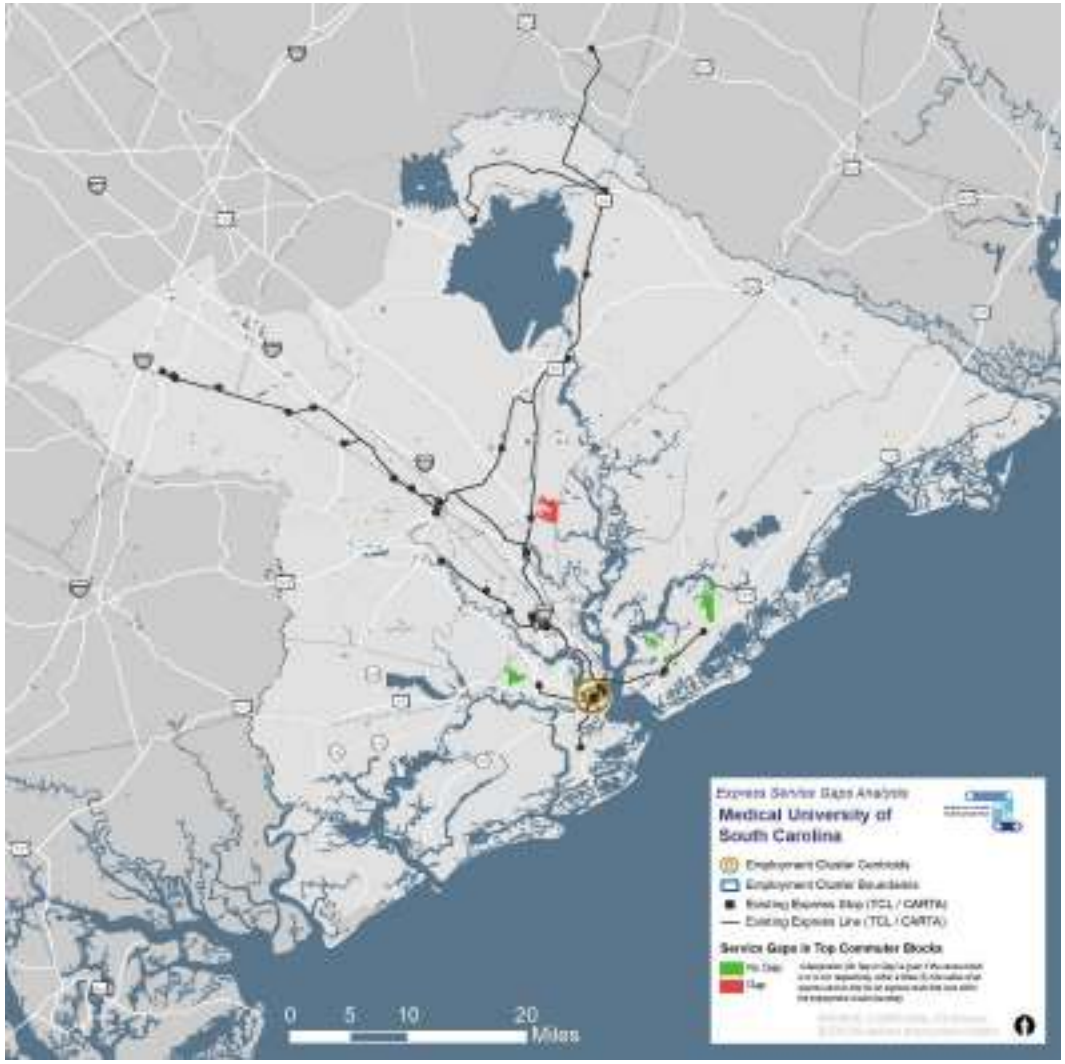


Table 3: MUSC Commuter Service Gaps

Block ID	Description	Emp. Total	All Routes Serving Origin	Routes Connecting Origin to Emp. Cluster	Gap
450190046124000	Mount Pleasant, northeast of US 17 and Isle of Palms Con	91	XP2	XP2	No
450190056002009	West Ashley, south of Glen McConnell Pkwy	91	XP2	XP2	No
450190046084005	Residential area around Mount Pleasant Regional Airport	78	XP2	XP2	No
450190046142015	Mount Pleasant, northeast of I-526 and Long Point Road	77	XP2	XP2	No
450150208071016	Goose Creek, northwest of Liberty Hall Road and Henry E Brown Jr Blvd	72	CS1	-	Yes

CARTA Route XP2 connects The Medical University of South Carolina (MUSC) with four out of the top five most populous origins for its commuting workforce. While Goose Creek has express service with TCL Route CS1, this service does not serve MUSC. An extension of CARTA Route XP1 to Goose Creek could improve this connection.

Figure 20: Boeing / Airport Home Location of Employees

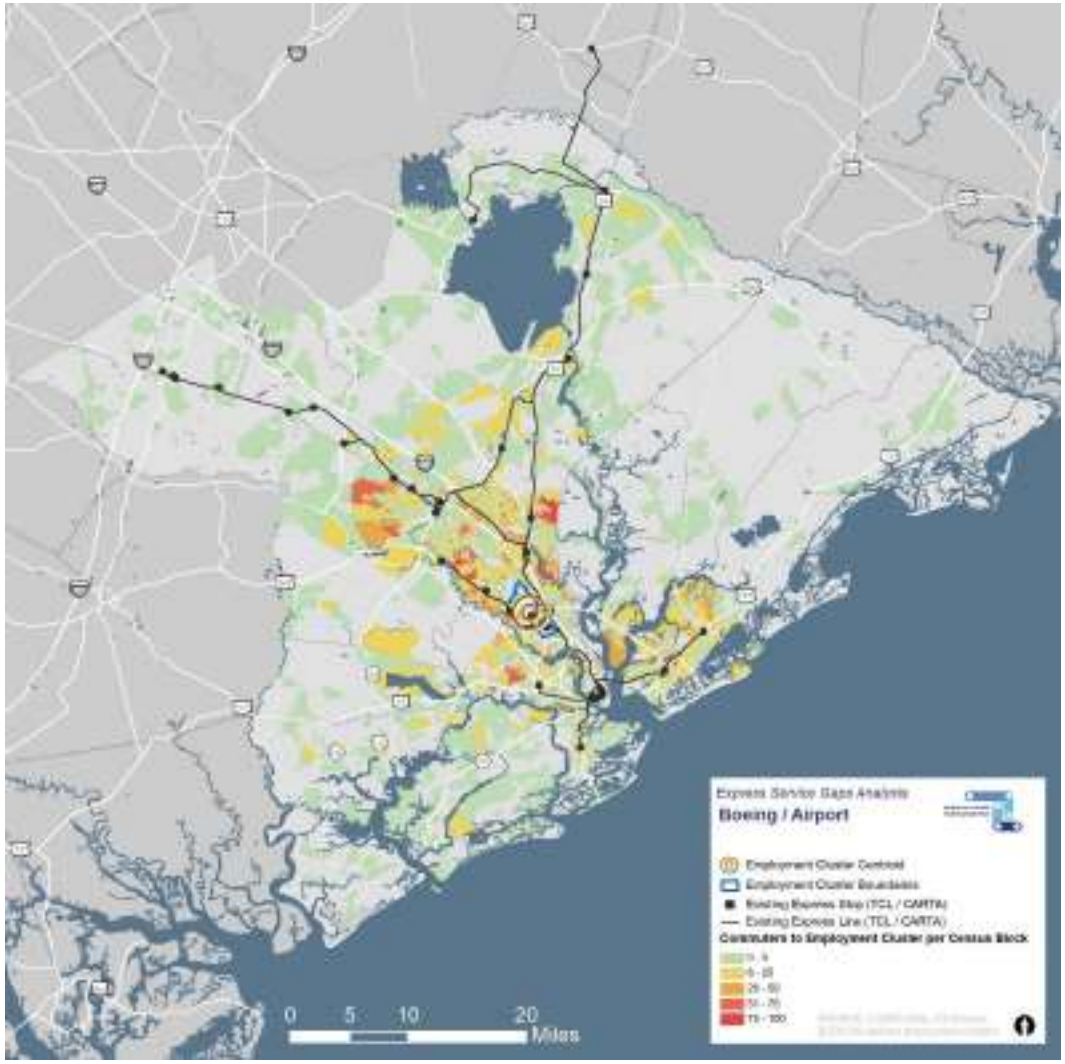


Figure 21: Boeing / Airport Commuter Service Gaps

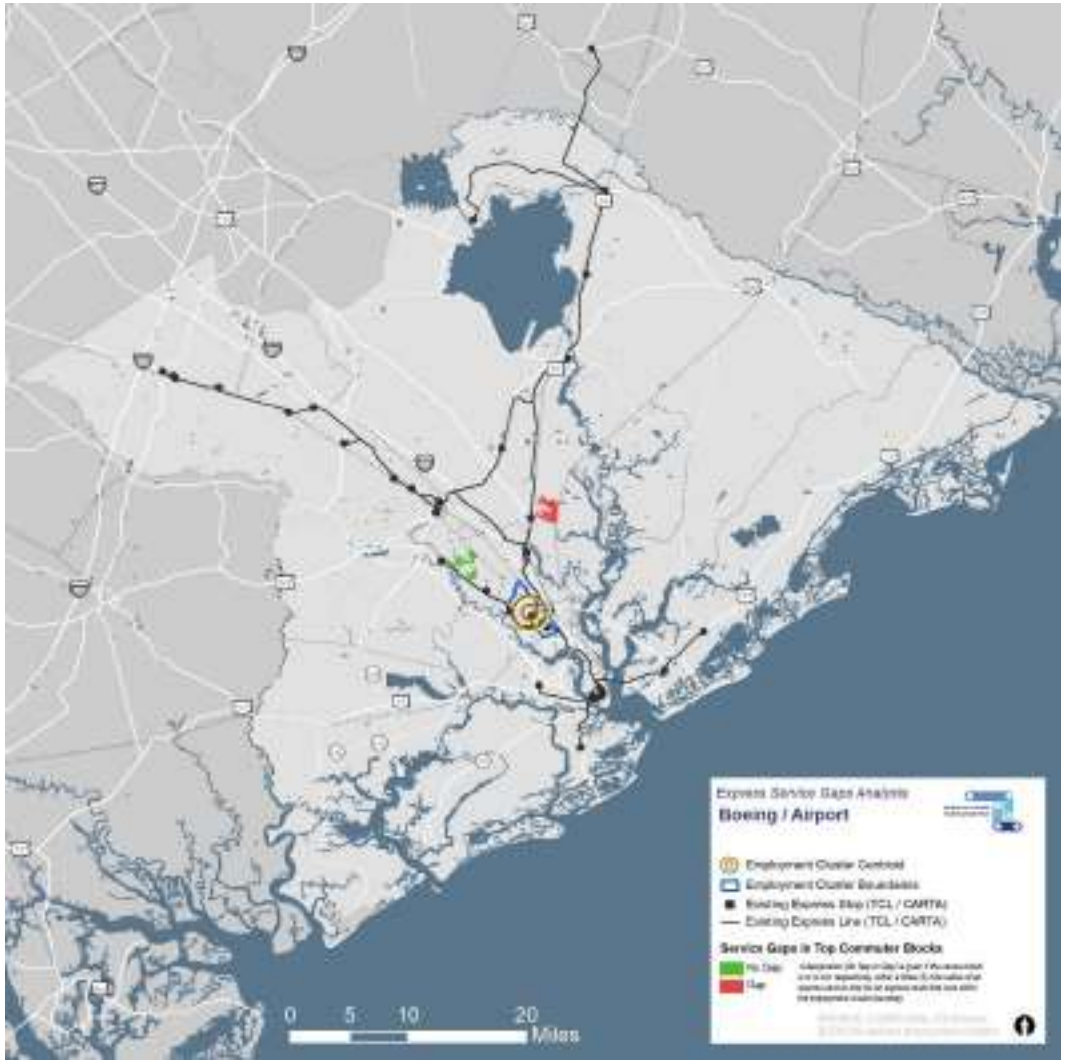


Table 4: Boeing / Airport Commuter Service Gaps

Block ID	Description	Emp. Total	All Routes Serving Origin	Routes Connecting Origin to Emp. Cluster	Gap
450150208071016	Goose Creek, northwest of Liberty Hall Road and Henry E Brown Jr Blvd	116	CS1	-	Yes
450350108161000	Summerville, northeast of Dorchester Rd and Wescott Blvd	94	XP3	XP3	No
450190031141027	Apartments just north of Northwoods Mall	82	CS1,CS2,XP1	-	Yes
450350108172000	Summerville, between Patriot Blvd and Dorchester Rd	77	XP3	XP3	No
450350108162013	Summerville, north of Westcott Blvd and Patriot Blvd	73	XP3	XP3	No

CARTA Route XP3 connects Charleston International Airport and the adjacent Boeing plant to three out of the five most populous origins for their commuting workforce. While Goose Creek and the Northwoods Mall are connected by CARTA Route XP1 and TCL Routes CS1 and CS2, none of these routes serve the airport area. Rerouting TCL Route CS1 or a similar service to the airport would address this gap.

Figure 22: Historic Peninsula Home Location of Employees

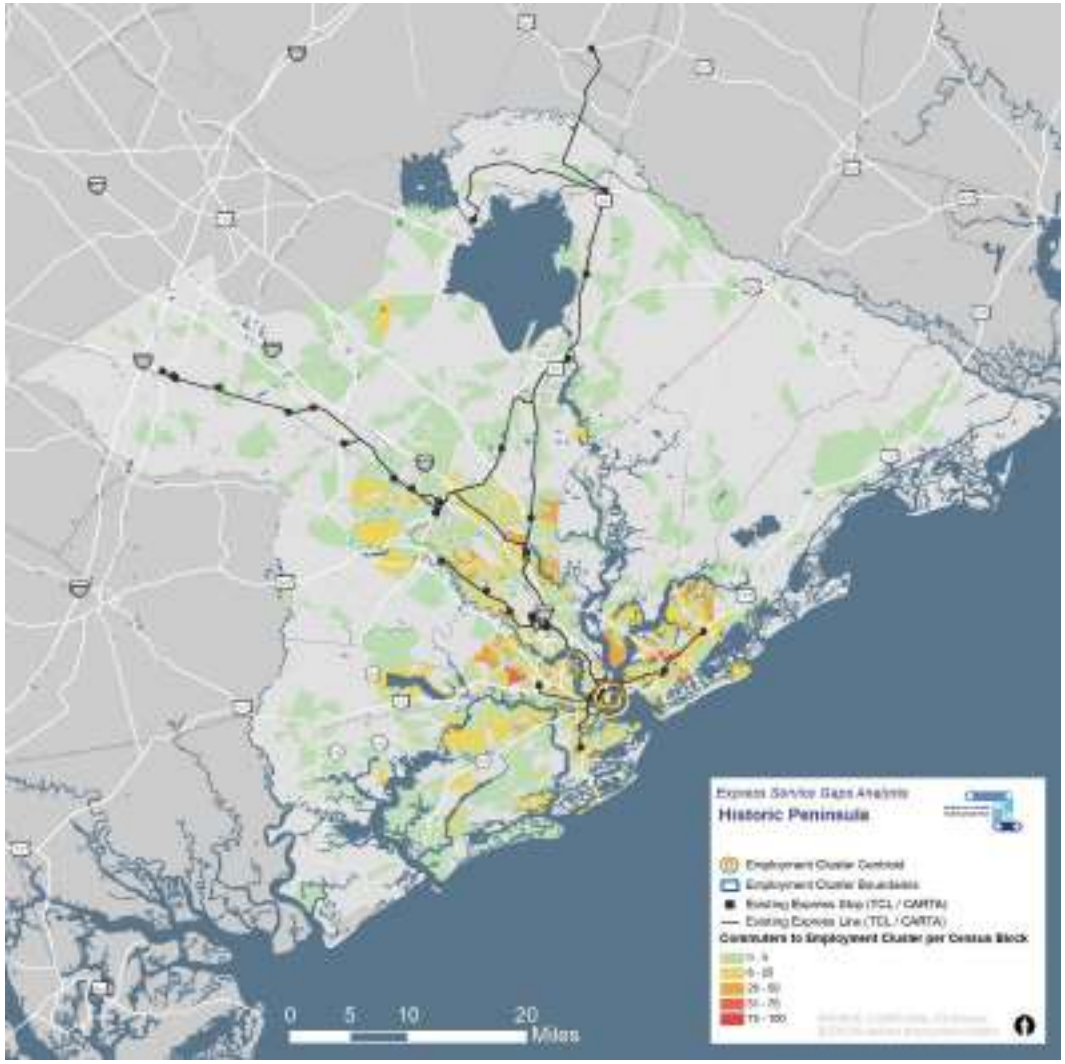


Figure 23: Historic Peninsula Commuter Service Gaps

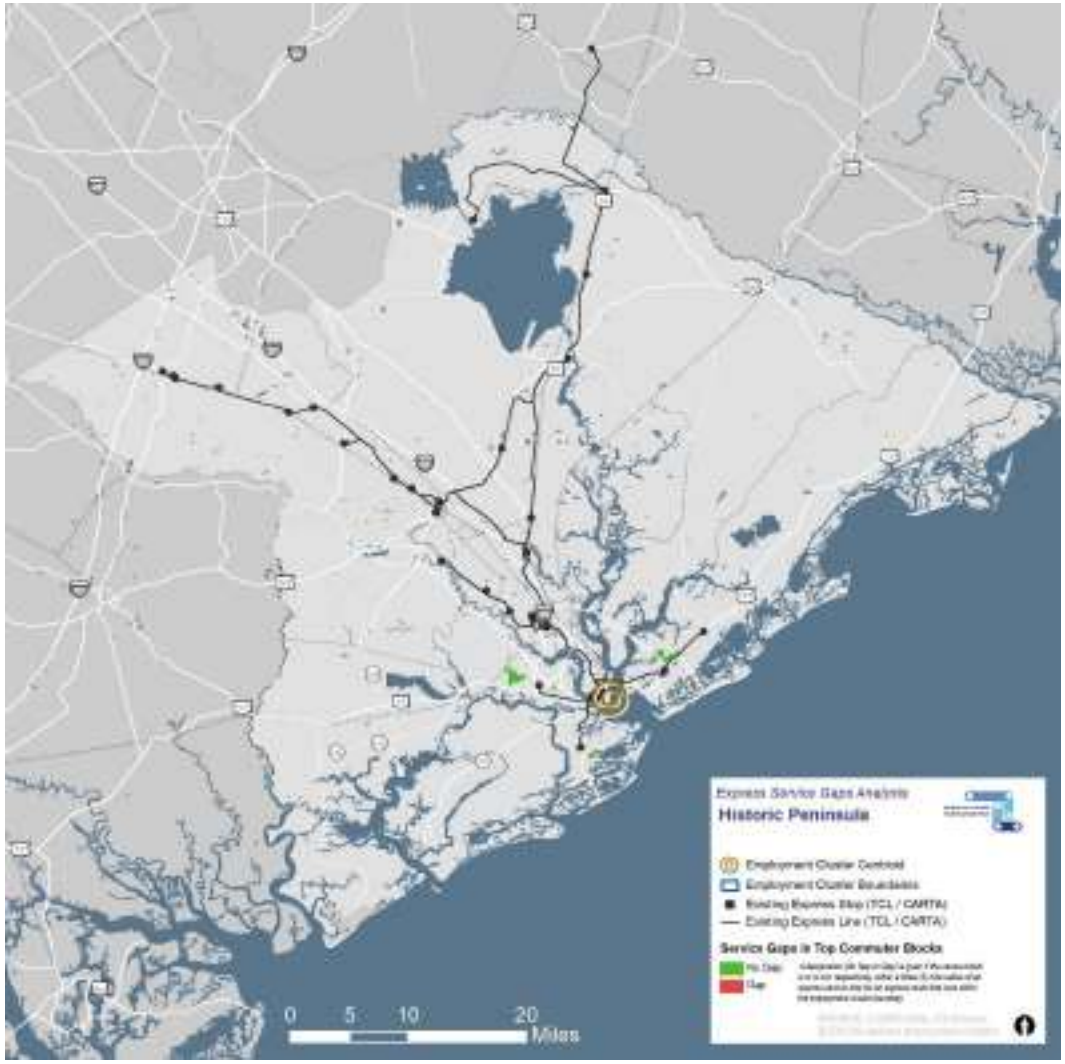


Table 5: Historic Peninsula Commuter Service Gaps

Block ID	Description	Emp. Total	All Routes Serving Origin	Routes Connecting Origin to Emp. Cluster	Gap
450190046124000	Mount Pleasant, northeast of US 17 and Isle of Palms Con	101	XP2	XP2	No
450190056002009	West Ashley, south of Glen McConnel Pkwy	71	XP2	XP2	No
450190020053023	James Island, west of Secessionville Rd (around Westchester)	54	XP1	XP1	No
450190027021030	Neighborhood around Brookwood Circle	54	XP2	XP2	No
450190046121000	Mount Pleasant, southeast of I-526 and Long Point Rd	53	XP2	XP2	No

Charleston's Historic Peninsula is directly connected to all five of the most populous origins for its commuting workforce by CARTA Routes XP1 and XP2.

Figure 24: Trident Health Home Location of Employees

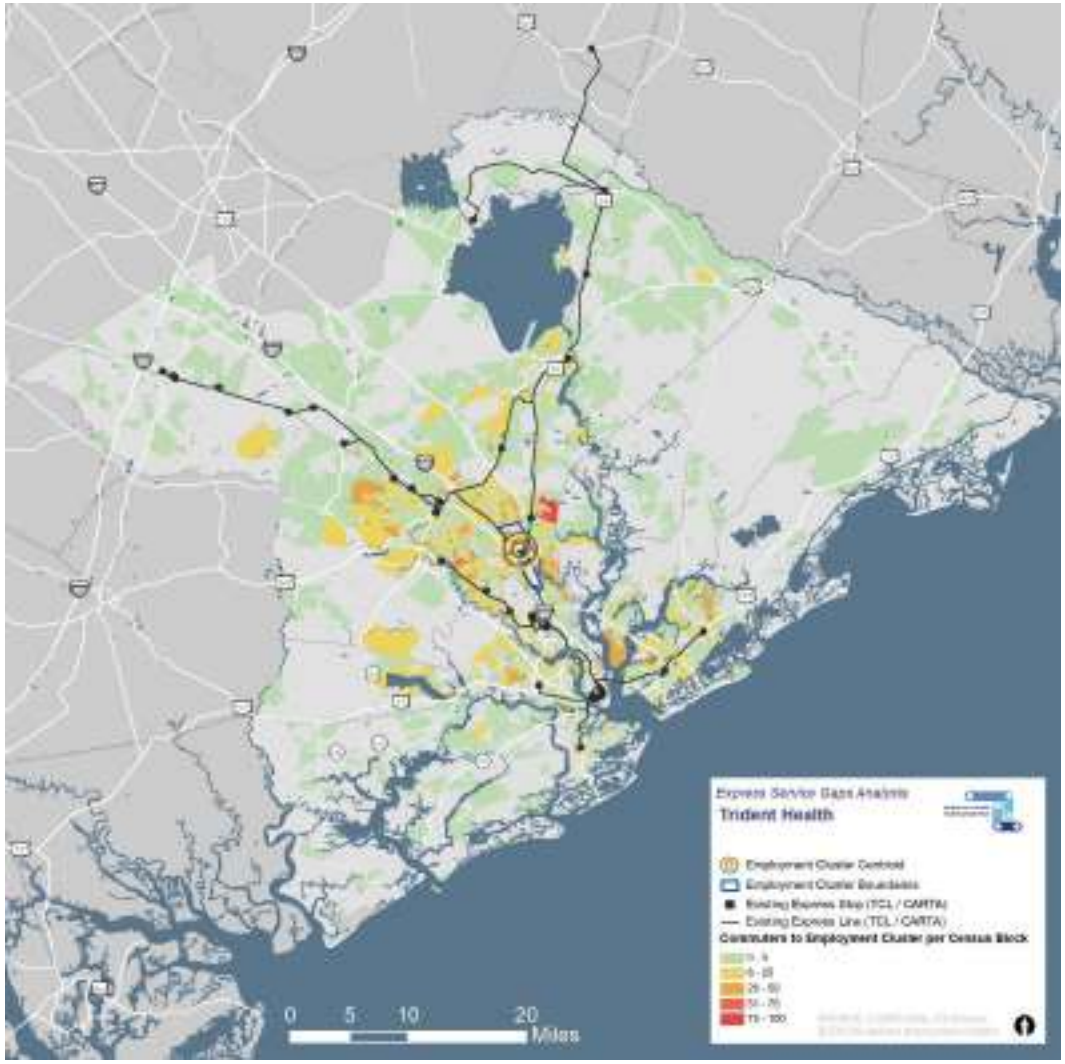


Figure 25: Trident Health Commuter Service Gaps

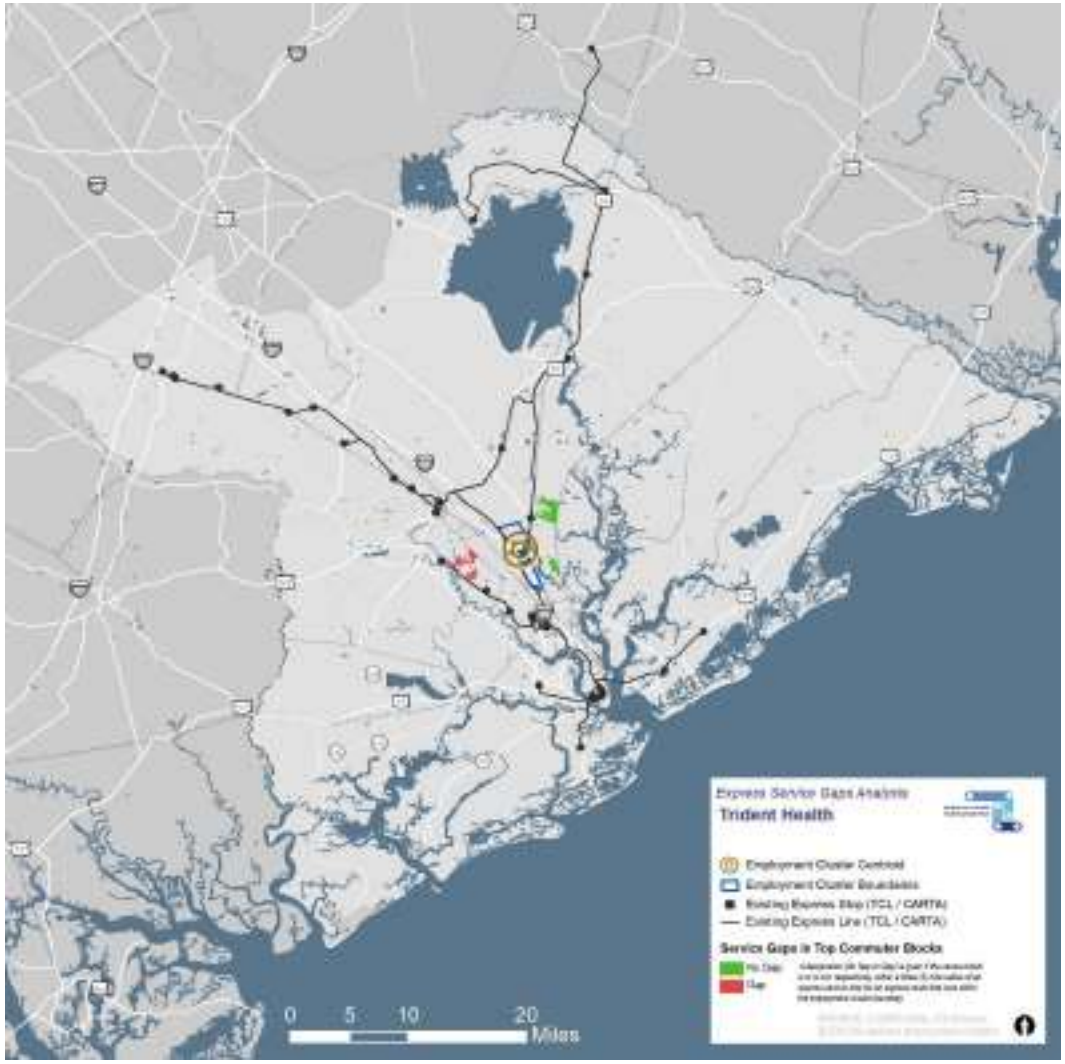


Table 6: Trident Health Commuter Service Gaps

Block ID	Description	Emp. Total	All Routes Serving Origin	Routes Connecting Origin to Emp. Cluster	Gap
450150208071016	Goose Creek, northwest of Liberty Hall Road and Henry E Brown Jr Blvd	109	CS1	CS1	No
450350108161000	Summerville, northeast of Dorchester Rd and Wescott Blvd	56	XP3	-	Yes
450350108172000	Summerville, between Patriot Blvd and Dorchester Rd	50	XP3	-	Yes
450350108162013	Summerville, north of Westcott Blvd and Patriot Blvd	50	XP3	-	Yes
450150208121010	Hanahan, north of Tanner Ford Blvd and N Rhett Ave	49	CS1,CS2,XP1	XP1	No

NOTE: Census Block 450190031141027 was omitted from the five most populous origins because it lies within the boundaries of the block groups making up the employment cluster.

TCL Route CS1 and CARTA route XP1 connect the Trident Health employment area to two of the five largest origins of its commuting workforce, however these routes only serve the park-and-ride lot on Rivers Avenue while the main hospital area is located on University Boulevard. A shuttle service between the hospital area and the Rivers Avenue Park-and-Ride lot would provide a better connection. While Summerville has express service with CARTA Route XP3, this service does not serve the Trident Health area. Extending Route XP3 east along Ladson Road could improve commuter connectivity to Trident Health.

Figure 26: Ashley Phosphate / Cross County Home Location of Employees

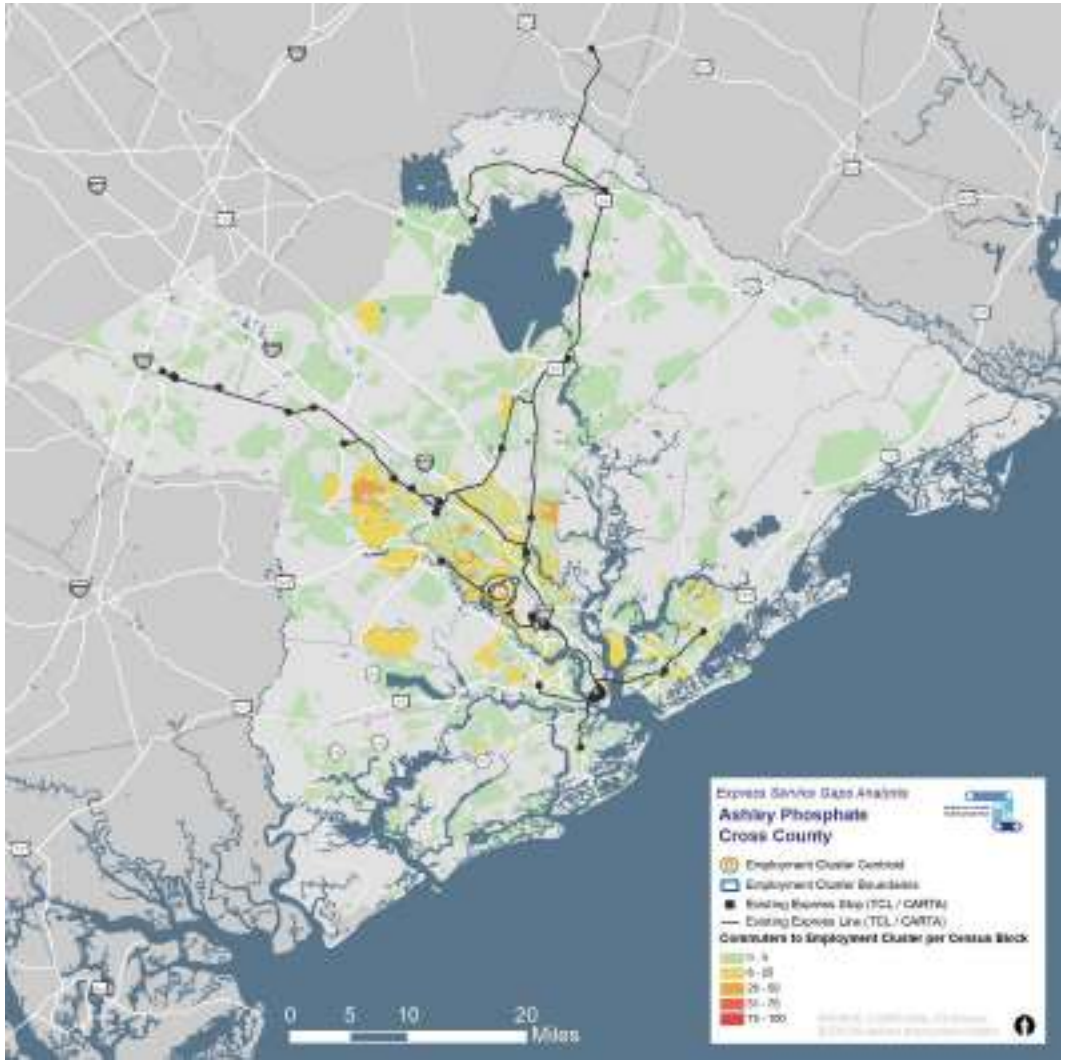


Figure 27: Ashley Phosphate / Cross County Commuter Service Gaps

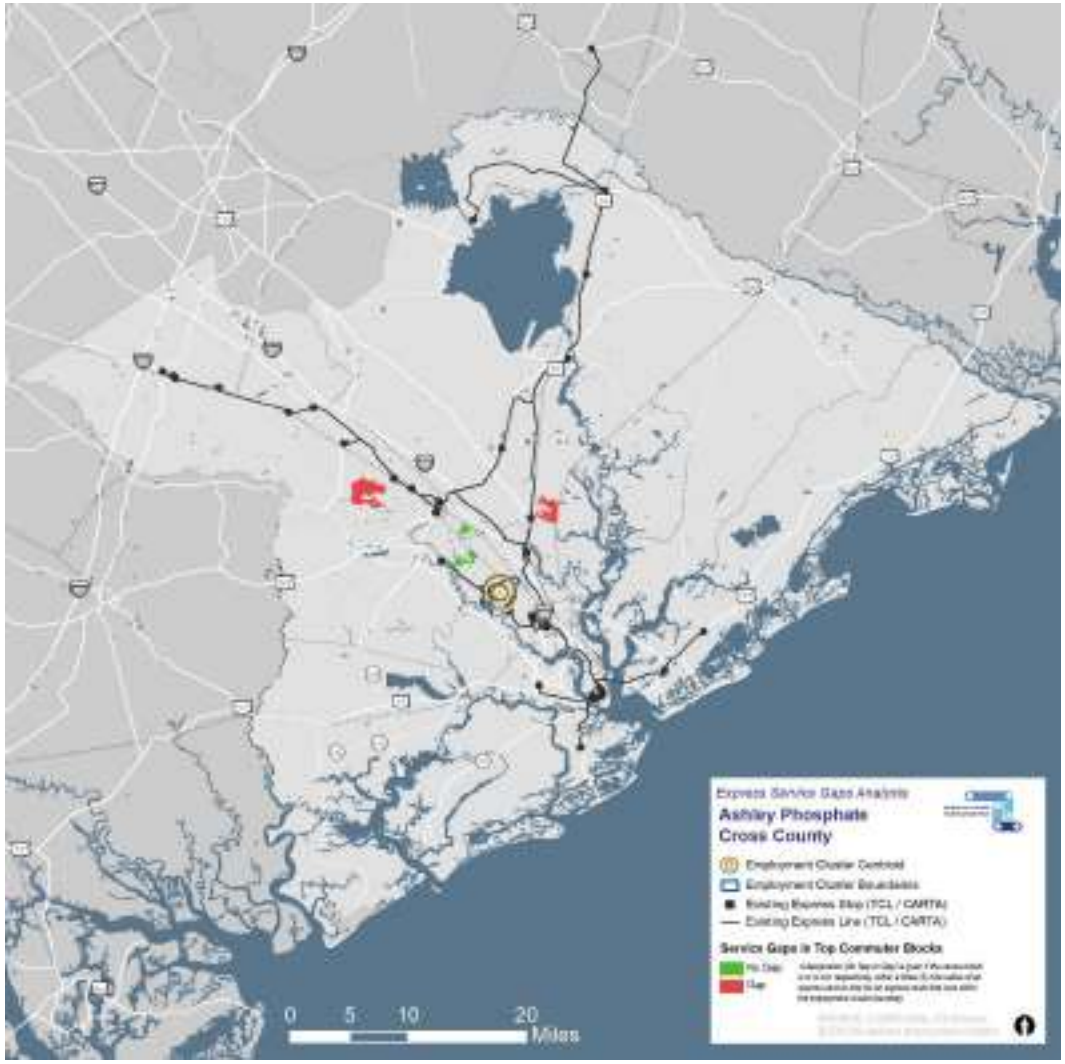


Table 7: Ashley Phosphate / Cross County Commuter Service Gaps

Block ID	Description	Emp. Total	All Routes Serving Origin	Routes Connecting Origin to Emp. Cluster	Gap
450150208071016	Goose Creek, northwest of Liberty Hall Road and Henry E Brown Jr Blvd	48	CS1	-	Yes
450350108161000	Summerville, northeast of Dorchester Rd and Wescott Blvd	48	XP3	XP3	No
450350105012003	Summerville, development off of W Butternut Rd	34	CS6	-	Yes
450350108162013	Summerville, north of Westcott Blvd and Patriot Blvd	34	XP3	XP3	No
450350108142000	Ladson, Southern Palms Jensen Communities	31	CS2,CS3,CS6,XP3	XP3	No

NOTE: Census Block 450350108203001 was omitted from the five most populous origins because it lies within the boundaries of the block groups making up the employment cluster.

CARTA Route XP3 connects Ashley Phosphate / Cross County (APCC) with three out of the five most populous origins for its commuting workforce. While Goose Creek and Ladson have express service by TCL Routes CS1 and CS6 respectively, neither service connects to APCC. Extending either TCL route to APCC could improve this connection.

Figure 28: Leeds / Faber Home Location of Employees

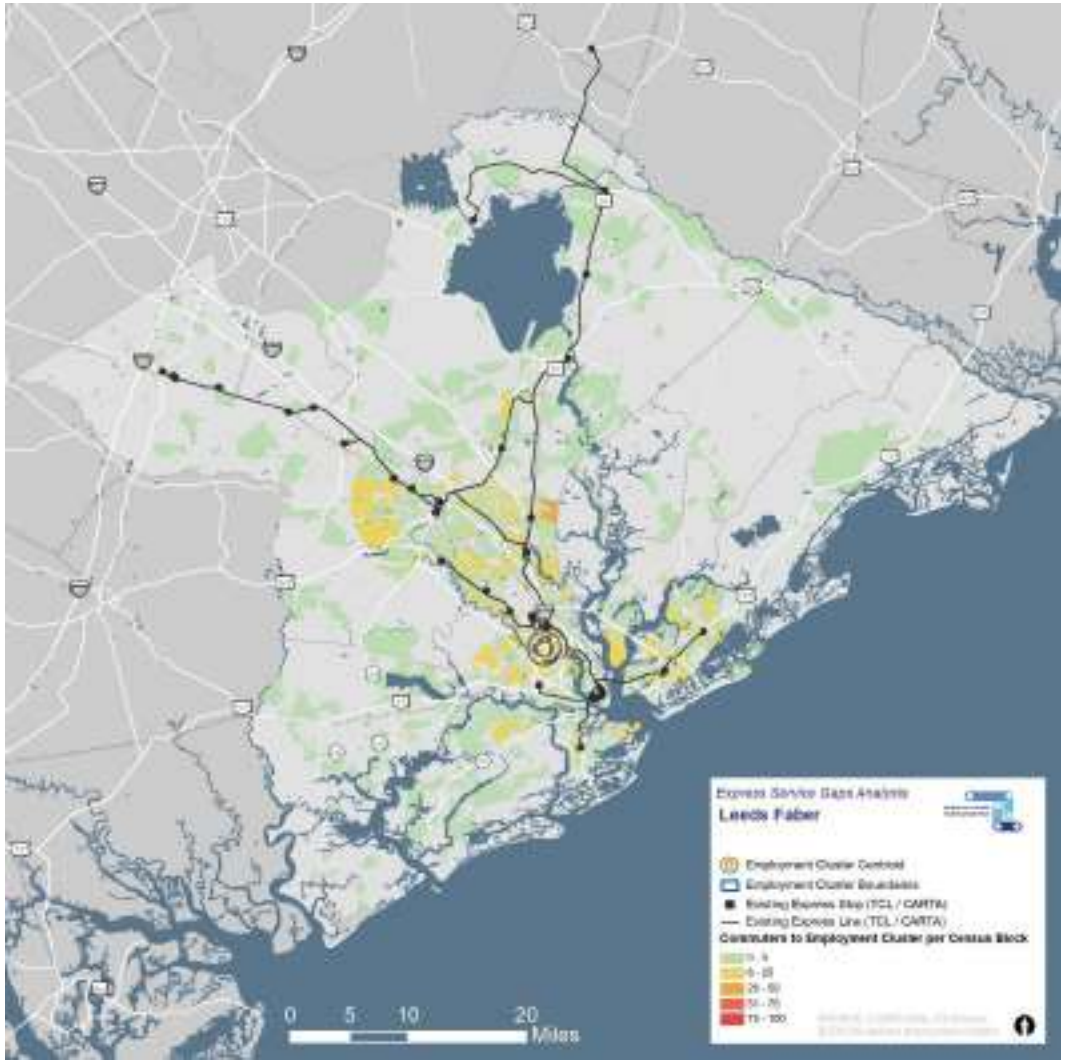


Figure 29: Leeds / Faber Commuter Service Gaps

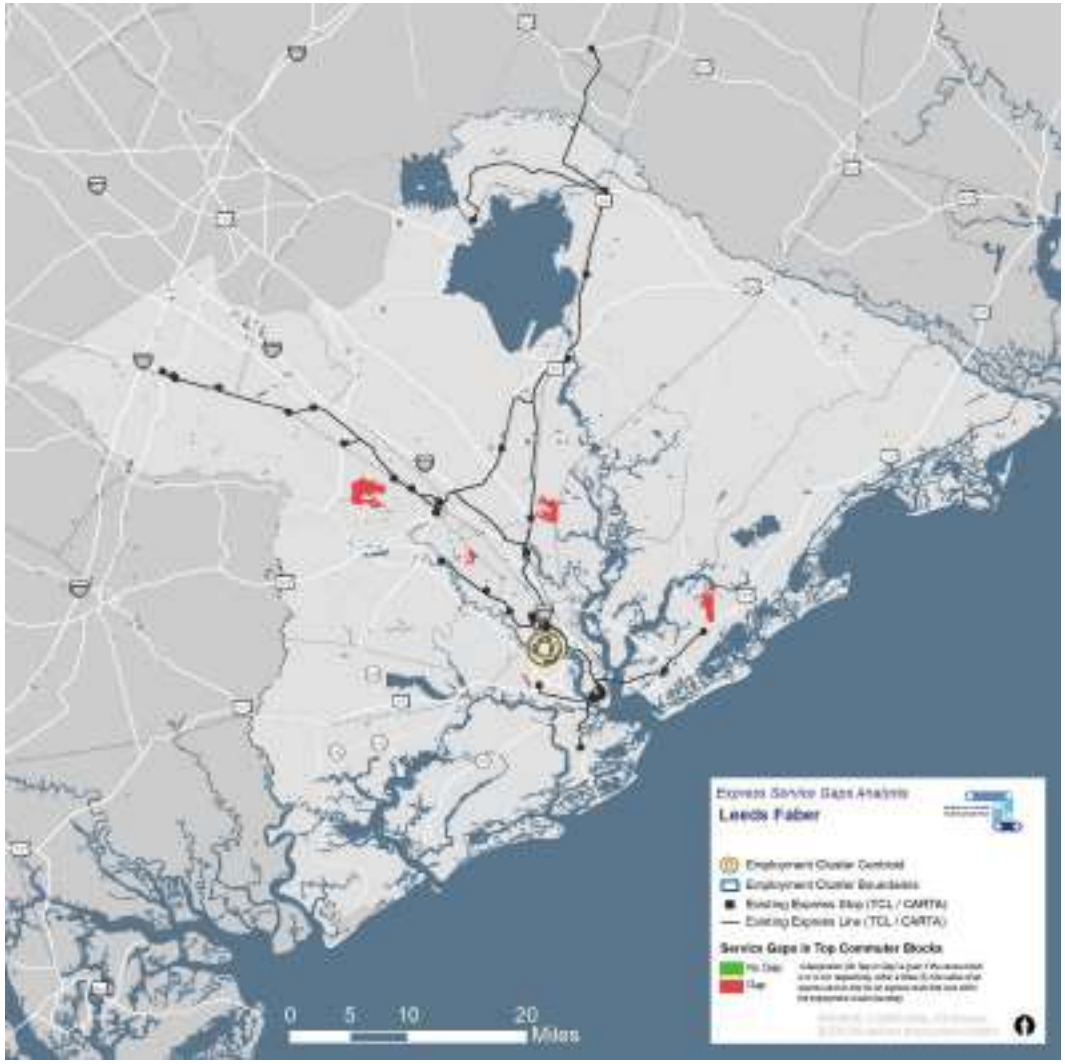


Table 8: Leeds / Faber Commuter Service Gaps

Block ID	Description	Emp. Total	All Routes Serving Origin	Routes Connecting Origin to Emp. Cluster	Gap
450150208071016	Goose Creek, northwest of Liberty Hall Road and Henry E Brown Jr Blvd	31	CS1	-	Yes
450190046084005	Residential area around Mount Pleasant Regional Airport	24	XP2	-	Yes
450190026141017	Charleston, off Henry Tecklenburg Dr and Savage Rd	21	XP2	-	Yes
450350108162013	Summerville, north of Westcott Blvd and Patriot Blvd	21	XP3	-	Yes
450350105012003	Summerville, development off W Butternut Rd	20	CS6	-	Yes

The Leeds / Faber employment area has no express service connection to any of the five largest origins of its commuting workforce, nor any express service at all. Two of the top five origins are served by TCL Route CS1 and CARTA Route XP3, which are the closest alignments to the employment area. Rerouting either line to serve Leeds Faber directly would provide better connectivity between the area and its workers. However, this would compromise the directness of Route XP3 in particular. Therefore, an extension of TCL Route CS1 may be a more preferable solution to serve commuters to the Leeds / Faber area.

Figure 30: Daniel Island Home Location of Employees

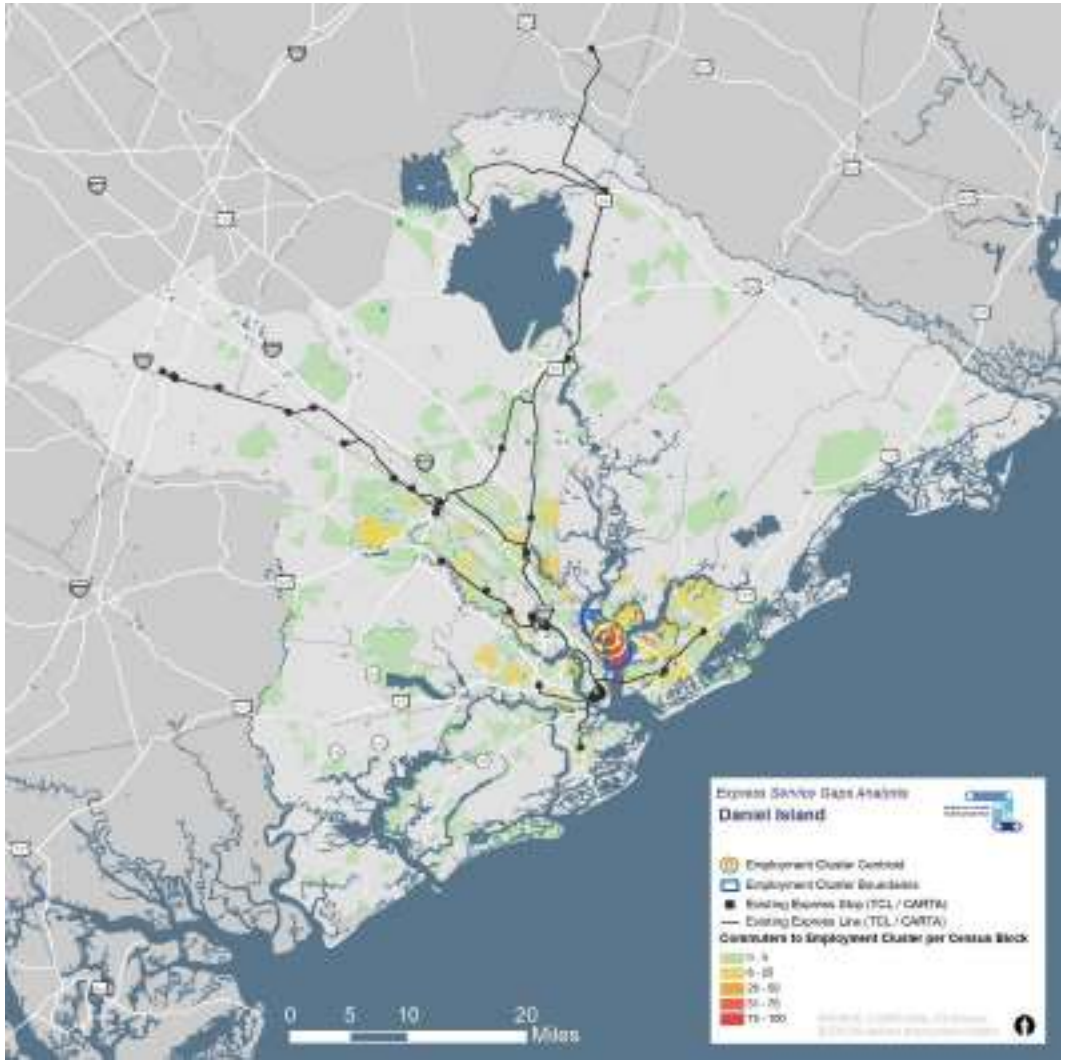


Figure 31: Daniel Island Commuter Service Gaps

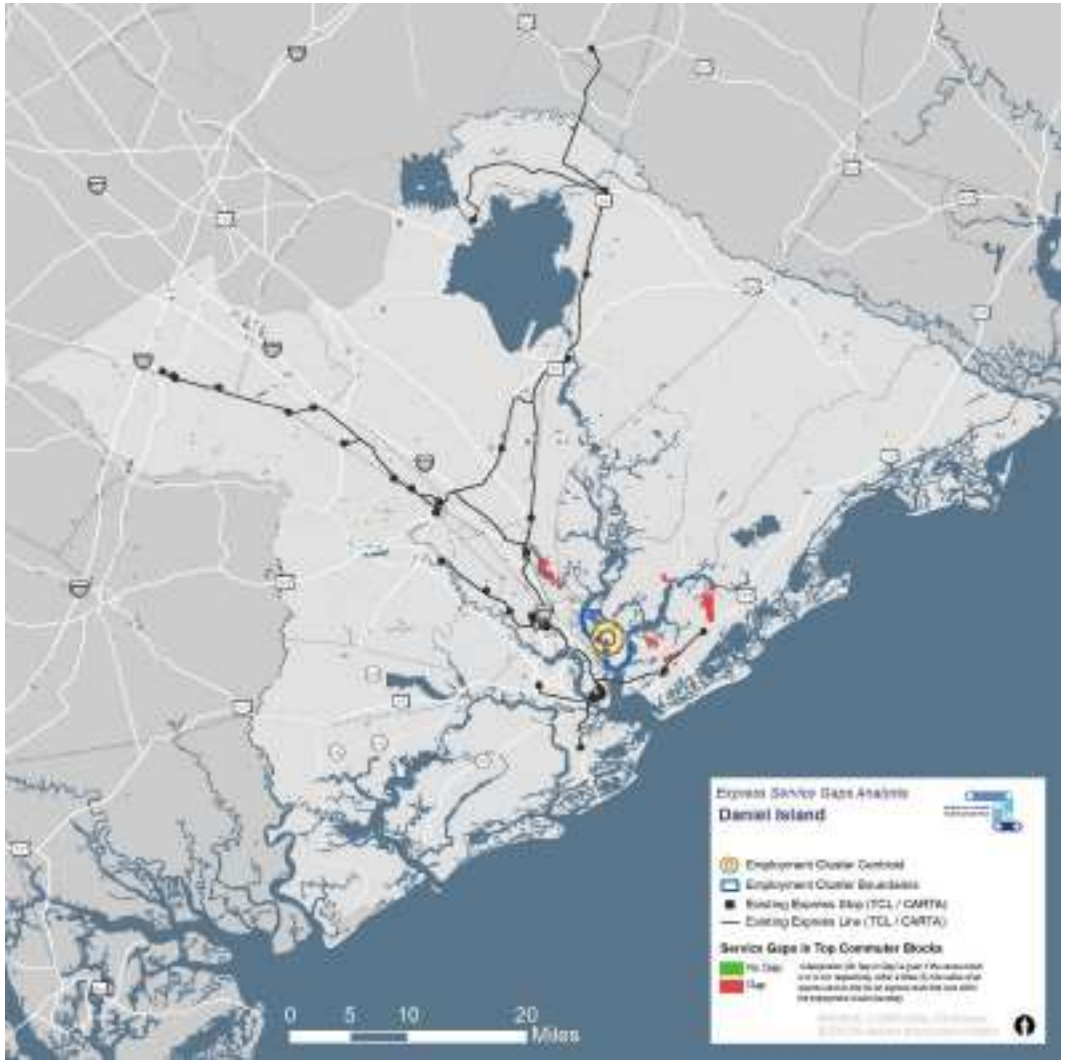


Table 9: Daniel Island Commuter Service Gaps

Block ID	Description	Emp. Total	All Routes Serving Origin	Routes Connecting Origin to Emp. Cluster	Gap
450190046124000	Mount Pleasant, northeast of US 17 and Isle of Palms Con	39	XP2	-	Yes
450190046142015	Mount Pleasant, northeast of I-526 and Long Point Road	32	XP2	-	Yes
450150208121027	Hanahan, southwest shore of Goose Creek Reservoir	28	CS1,CS2,XP1	-	Yes
450150204042014	South of Clements Ferry Road, just west of Wando	26	-	-	Yes
450190046084005	Residential area around Mount Pleasant Regional Airport	25	XP2	-	Yes

NOTE: Census Blocks 450150204031037 and 450150204031044 were omitted from the five most populous origins because it lies within the boundaries of the block groups making up the employment cluster.

Daniel Island has no express service connection to any of the five largest origins of its commuting workforce, nor any express service at all. Three out of these five origins are currently served by CARTA Route XP2 in Mount Pleasant. However, altering CARTA Route XP2 to serve Daniel Island would result in an indirect route with limited appeal. A more effective option would be a new service that connects Mount Pleasant to North Charleston via Daniel Island.

Figure 32: Clements Ferry Home Location of Employees

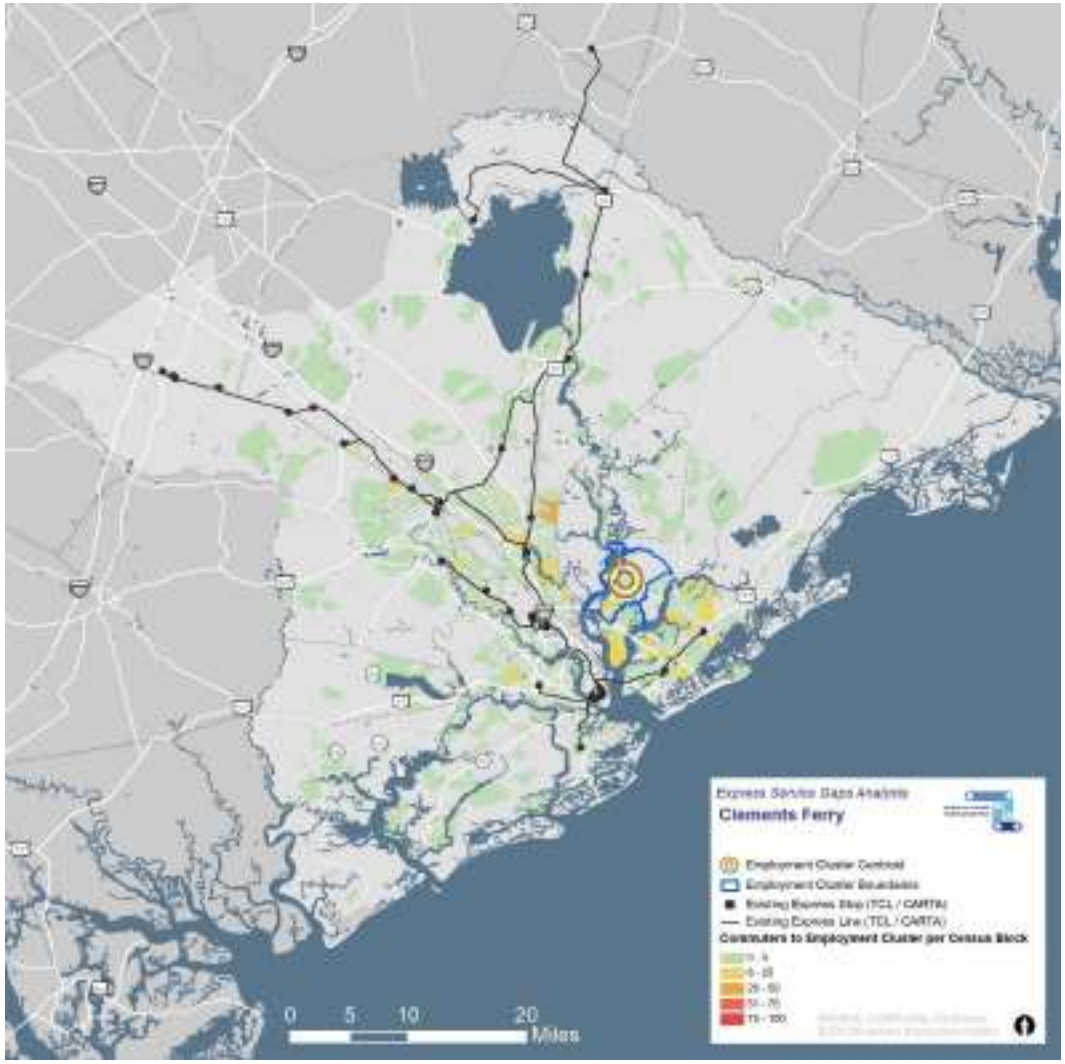


Figure 33: Clements Ferry Commuter Service Gaps

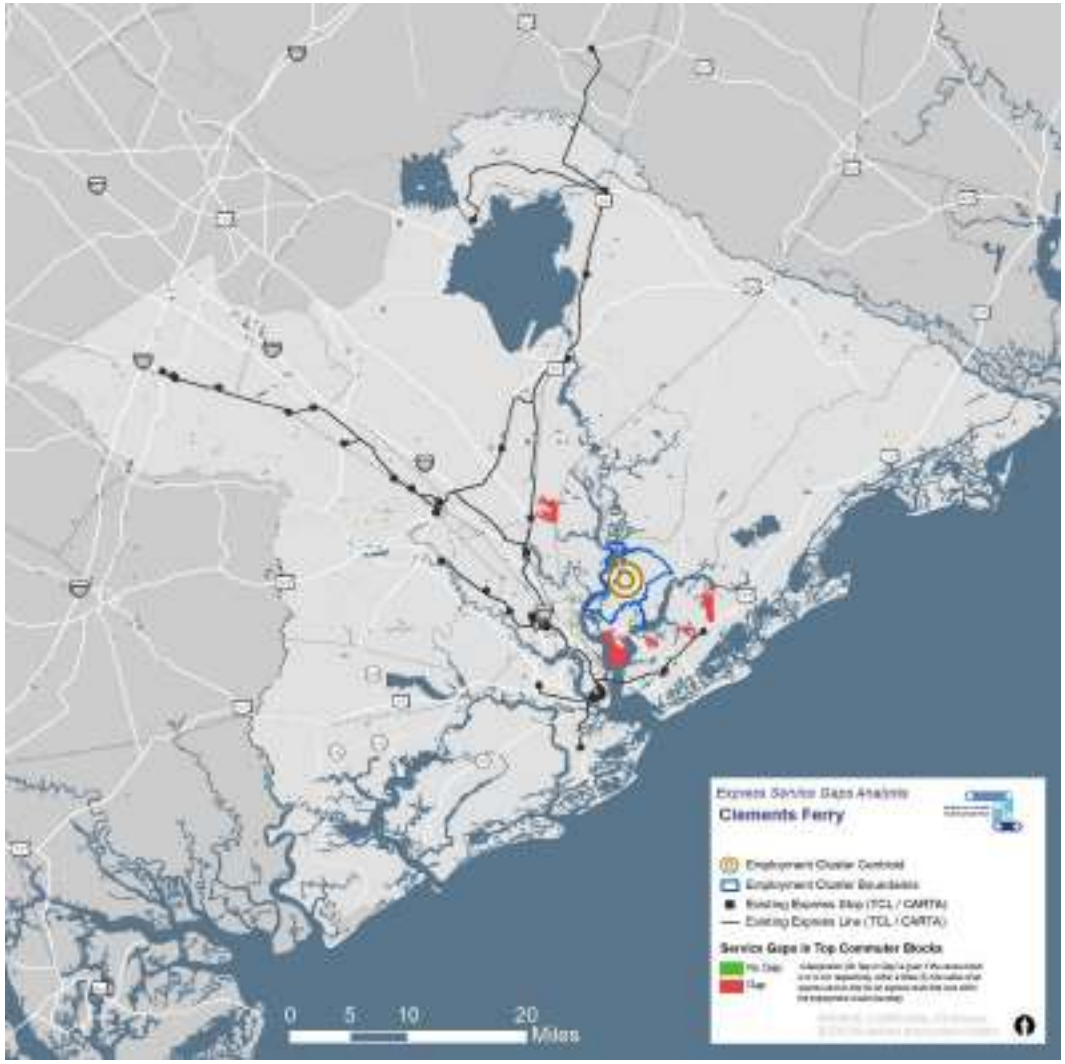


Table 10: Clements Ferry Commuter Service Gaps

Block ID	Description	Emp. Total	All Routes Serving Origin	Routes Connecting Origin to Emp. Cluster	Gap
450150208071016	Goose Creek, northwest of Liberty Hall Road and Henry E Brown Jr Blvd	27	CS1	-	Yes
450190046142015	Mount Pleasant, northeast of I-526 and Long Point Road	24	XP2	-	Yes
450190046084005	Residential area around Mount Pleasant Regional Airport	17	XP2	-	Yes
450150204031037	Southern, low-density tip of Daniel Island	15	XP1,XP2,XP3,XP4	-	Yes
450190046083006	Residential area, west of US 17 and SC-41	13	XP2	-	Yes

The Clements Ferry area has no express service connection to any of the five largest origins of its commuting workforce, nor any express service at all. Three out of these five origins are currently served by CARTA Route XP2 in Mount Pleasant. However, altering CARTA Route XP2 to serve the Clements Ferry area would result in an indirect route with limited appeal. A more effective option would be a new service that connects Mount Pleasant to North Charleston via the Clements Ferry area and Daniel Island.

Figure 34: Kiawah Island Home Location of Employees

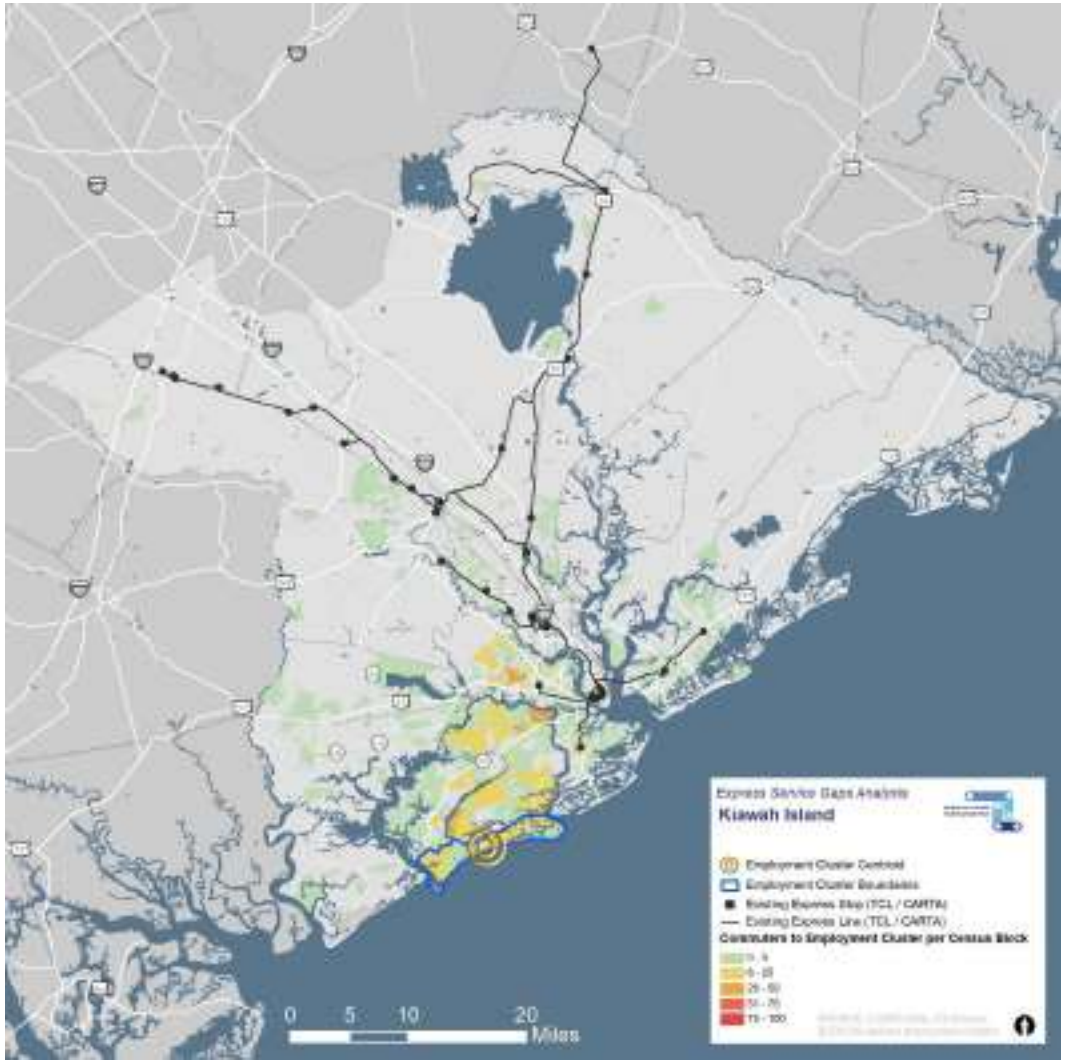


Figure 35: Kiawah Island Commuter Service Gaps

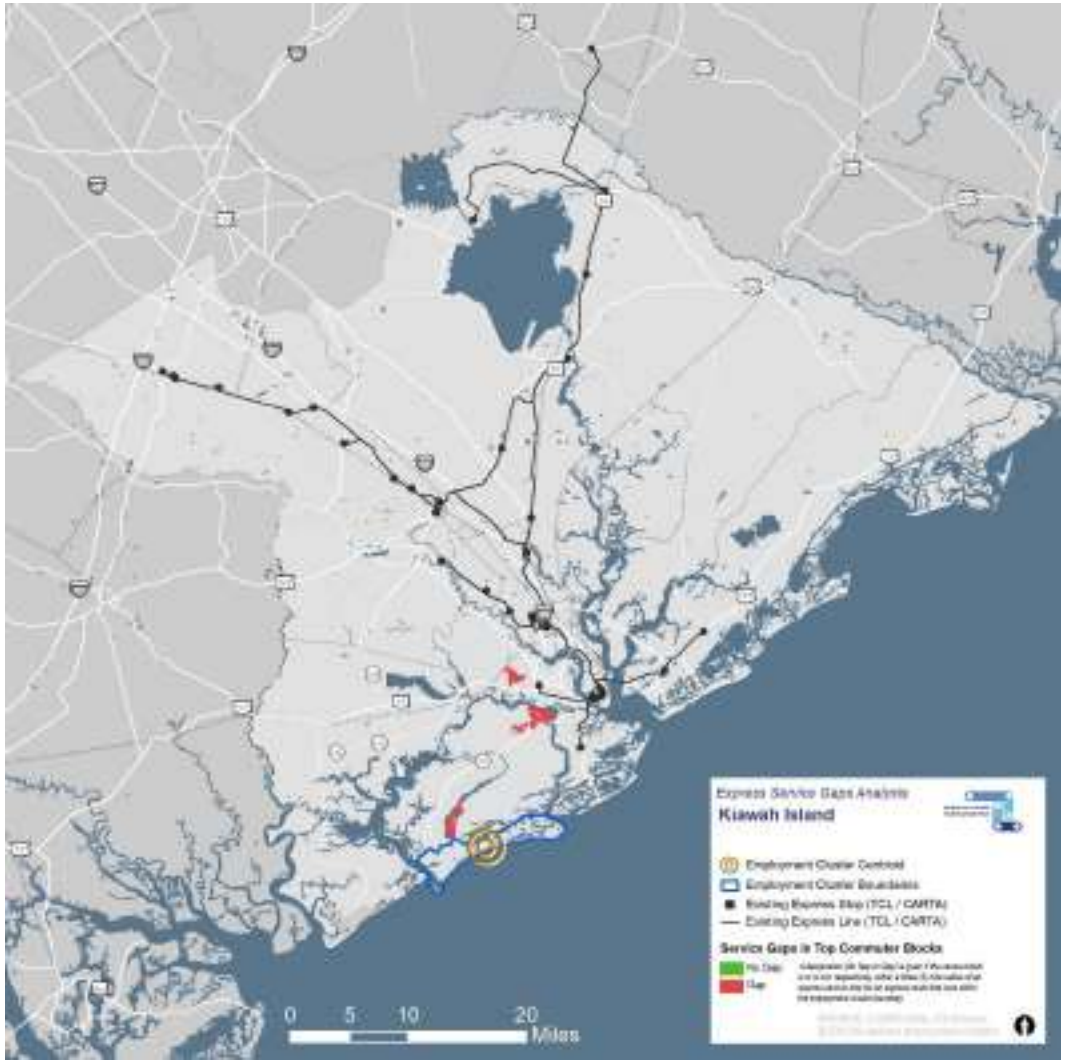


Table 11: Kiawah Island Commuter Service Gaps

Block ID	Description	Emp. Total	All Routes Serving Origin	Routes Connecting Origin to Emp. Cluster	Gap
450190021032118	South Johns Island, west of Betsy Kerrison Pkwy	31	-	-	Yes
450190021012027	Trophy Lake, northwest of Maybank Hwy and River Rd	29	-	-	Yes
450190056002009	West Ashley, south of Glen McConnel Pkwy	29	XP2	-	Yes
450190021012002	Off Headquarters Plantation Dr, west of Buzzards Roost Point	28	XP2	-	Yes
450190021012020	Northeast of River Rd and Maybank Hwy	24	-	-	Yes

Kiawah Island has no express service connection to any of the five largest origins of its commuting workforce, nor any express service at all. Only two out of five of these origins are near existing express service (CARTA's Route XP2). Extending the XP2 south and west towards Kiawah Island could establish this connection, however the alignment would be somewhat circuitous.

Figure 36: Santee Cooper Home Location of Employees

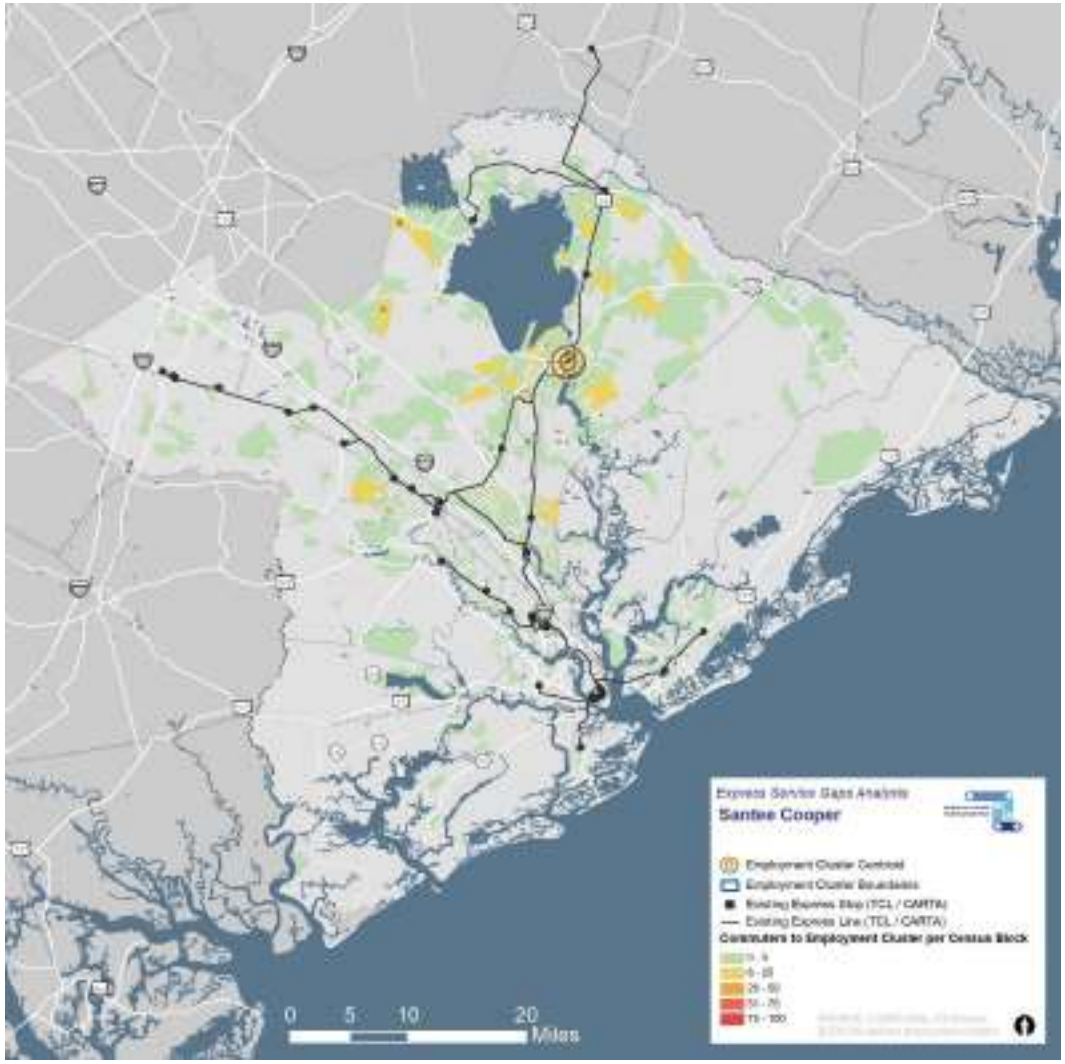


Figure 37: Santee Cooper Commuter Service Gaps

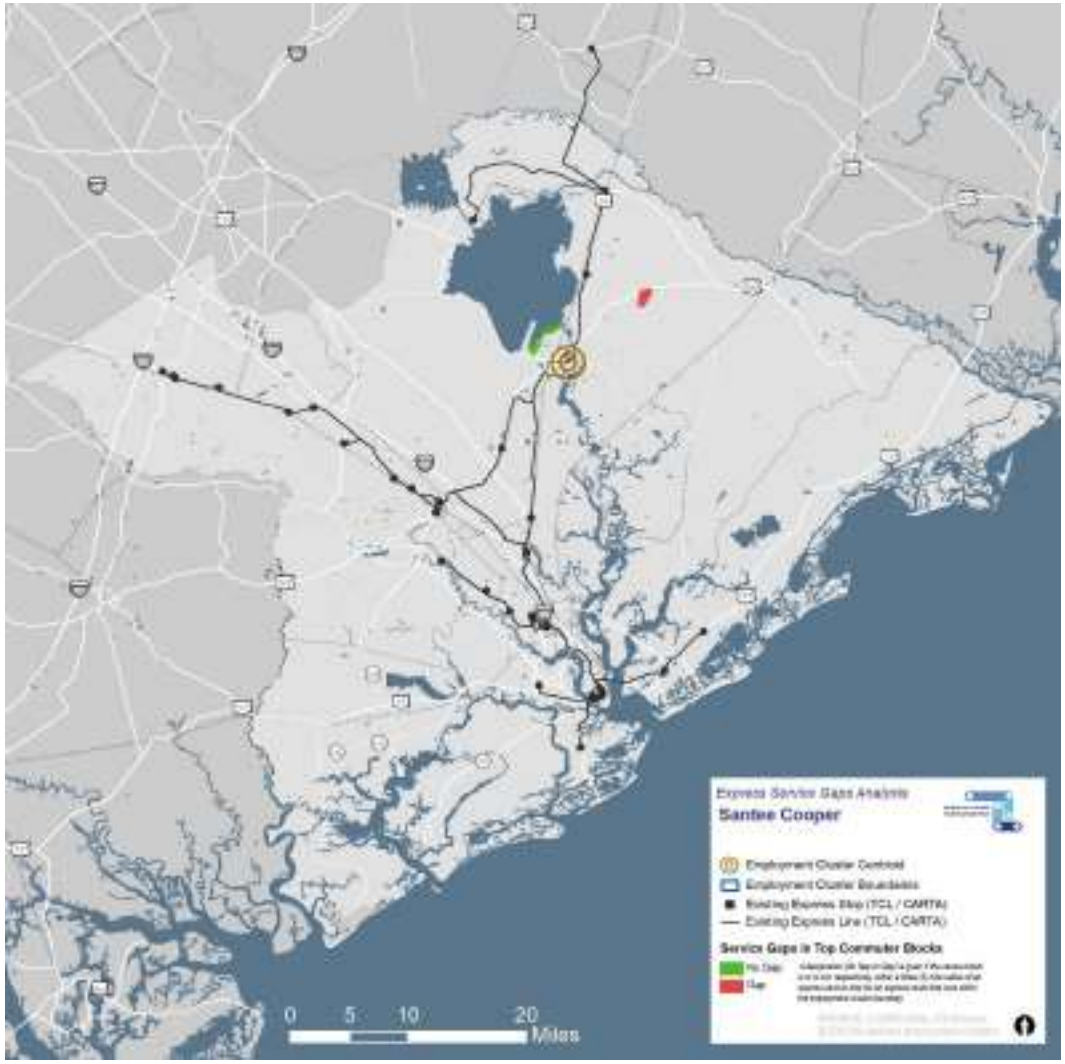


Table 12: Santee Cooper Commuter Service Gaps

Block ID	Description	Emp. Total	All Routes Serving Origin	Routes Connecting Origin to Emp. Cluster	Gap
450150205062014	Moncks Corner, southwest of Old US 52 and US 52	16	CS1,CS3,CS4,CS5	CS1,CS3,CS4,CS5	No
450150205043002	Moncks Corner, between US ALT 17 and Bonnoitt St	15	CS1,CS3,CS4,CS5	CS1,CS3,CS4,CS5	No
450150205033013	Moncks Corner, south shore of Lake Moultrie	14	CS1,CS3,CS4,CS5	CS1,CS3,CS4,CS5	No
450150205062009	Moncks Corner, southeast of Old US 52 and US 52	12	CS1,CS3,CS4,CS5	CS1,CS3,CS4,CS5	No
450150203012023	Bonneau, between US ALT 17 and Bethera Rd	12	-	-	Yes

TCL Routes CS1, CS3, CS4, and CS5 all connect Santee Cooper with four out of the five most populous origins for its commuting workforce. Bonneau (between US ALT 17 and Bethera Road) is the only origin not connected, due to its lack of any express service. Rerouting any of the four TCL routes to this area could improve this connection.

Overall, the commuter service gap analysis identified several potential improvements for the region's commuter service network. Many of these solutions include extending or rerouting existing commuter services and may not be feasible or desirable in the context of the larger plan. Rather, they should be considered further when developing the high capacity transit network and any feeder routes that would connect to it.

- **MUSC:** Extend CARTA Route XP1 to Goose Creek.
- **Boeing / Charleston International Airport:** Extend TCL Route CS1 or a similar service to the airport.
- **Trident Health:** Provide a shuttle service between the hospital area and the Rivers Avenue Park-and-Ride lot to provide a better connection to TCL Route CS1 and CARTA Route XP1. Extending Route XP3 east along Ladson Road could improve commuter connectivity to Trident Health as well.
- **Ashley Phosphate / Cross County :** Extend either TCL Route CS1 or CS6 to the area.
- **Leeds / Faber:** Extend TCL Route CS1 to serve Leeds / Faber directly.
- **Daniel Island:** Introduce a new service that connects Mount Pleasant to North Charleston via Daniel Island.
- **Clements Ferry:** Introduce a new service between Mount Pleasant and Clements Ferry via Daniel Island. This service could potentially be combined with the new service that connects Mount Pleasant to North Charleston via Daniel Island (as proposed for the Daniel Island employment area).
- **Kiawah Island:** Extend CARTA Route XP2 south and west towards Kiawah Island.
- **Santee Cooper**: Reroute any of TCL Routes CS1, CS3, CS4, or CS5 to Bonneau between US ALT 17 and Bethera Road.

While the top home Census blocks for the Historic Peninsula employment cluster were well served by the existing commuter service network, several of the potential improvements outlined for other employment clusters would also benefit this cluster, including the extension of Route XP2 towards Kiawah Island and the extension of Route XP1 to Goose Creek. Beyond express service, the region can perform targeted outreach to the employment clusters identified in this analysis and promote the Lowcountry Go. Lowcountry Go provides mobility options for commuters such as carpools, vanpools, public transit, walking, biking, and emergency ride home.

Key Findings

The findings of the Travel Market Analysis reinforce the recommendations of several previous planning studies including OurRegion OurPlan (OROP), Neck Area Master Plan, and the I-26ALT Study.

The OROP vision plan recommended strategic planning for rapid transit service along several corridors, including between Charleston and Ridgeville, Folly Beach, Ravenel, Mt. Pleasant, and Moncks Corner; as well as along I-526 between Mt. Pleasant and Savannah Highway, and between Moncks

Corner and East Edisto. The Travel Market Analysis found relatively high transit potential and transit need and some service gaps along segments of each of these corridors, but not yet along the full length of any of the corridors. This suggests a phased approach to rapid transit implementation. Based on the findings of the Travel Market Analysis, the corridor segments that are most suitable for rapid transit consideration in the short-term include the following:

- The Charleston peninsula
- West Ashley between the Ashley River and just west of I-526, including Citadel Mall and Bon Secours Street Francis Hospital
- North Charleston, along the I-26/US 78 corridor, Leeds Avenue, Dorchester Road, Ashley Phosphate Road, Red Bank Road, Remount Road, and the Naval Weapons Station in Hanahan
- Mt. Pleasant, along Coleman Boulevard and the US 17 corridor
- James Island, along Maybank Highway and along Folly Road.

A phased approach to rapid transit implementation is also envisioned in the Neck Area Master Plan, which recommends enhanced bus service in the Spine corridor (primarily Rivers Avenue) between the Charleston peninsula and I-526, with the eventual transition to full bus rapid transit (BRT) service as development conditions warrant. The Travel Market Analysis found this corridor to have high levels of transit ridership, based on stop-level data collected as part of the 2014 CARTA COA. The Neck Area Master Plan also recommended implementing commuter rail in the existing freight rail corridors to Summerville and/or Moncks Corner, and a combination of enhanced bus and express bus service in the Dorchester Road and I-26 corridors. These corridors are consistent with the findings of both the transit potential and regional travel flow analyses presented in this document.

The most detailed recommendations for rapid transit service in the region are those found in the I-26ALT Study, which presents a preferred alignment for BRT service that begins in downtown Summerville and travels along Richardson Street, Cedar Street, Doty Street, and Main Street before turning southeast on US 78 to North Charleston. The alignment then merges onto US 52 and continues southbound on Rivers Avenue, Carter Avenue, and Meeting Street into downtown Charleston to its terminus at Line Street. This alignment would tie together many of the neighborhoods identified in the Travel Market Analysis as having the highest transit need in the region and a need for service increases including the following:

- Charleston Peninsula, especially near the East Side and MUSC/West Edge.
- North Charleston, especially along Dorchester Road, Ashley Phosphate Road, and Otranto Road
- Hanahan and North Charleston, between I-526 and Yeamans Hall Road.