

# Wave Transit Short Range Transit Plan



**Final Report**  
April 2018

# TABLE OF CONTENTS

<b>EXECUTIVE SUMMARY .....</b>	<b>9</b>
Public Engagement.....	11
Financial Outlook .....	12
Implementation Plan .....	13
Downtown Trolley .....	23
UNC Wilmington Seahawk Shuttle .....	23
 <b>OVERVIEW AND STUDY APPROACH .....</b>	 <b>27</b>
Study Goals and Methodology .....	28
 <b>EXISTING CONDITIONS .....</b>	 <b>30</b>
Background Documents .....	32
Summary of Route Profiles .....	33
Fares and Funding .....	34
Assessment of Existing Service .....	38
 <b>MARKET ANALYSIS .....</b>	 <b>43</b>
Population.....	44
Employment.....	44
Travel Flows .....	46
Transit Potential Index .....	48
Implications for the SRTP.....	48
 <b>STAKEHOLDER AND PUBLIC INPUT .....</b>	 <b>51</b>
Surveys.....	52
Online Project Tools.....	52
Meetings and Interviews .....	53
Goals and Objectives .....	58
Summary of Input .....	60

<b>PREFERRED ALTERNATIVE .....</b>	<b>65</b>
<b>Evaluation Process .....</b>	<b>66</b>
<b>Public/Stakeholder Response to Alternatives .....</b>	<b>66</b>
<b>Cost-Neutral Alternatives/Recommendations .....</b>	<b>69</b>
<b>Future Alternatives/Recommendations .....</b>	<b>73</b>
<b>Downtown Trolley .....</b>	<b>77</b>
<b>UNCW Seahawk Shuttle .....</b>	<b>79</b>
<b>Improvements by Others .....</b>	<b>81</b>
<b>Potential On-Demand Service .....</b>	<b>81</b>
<b>IMPLEMENTATION PLAN .....</b>	<b>87</b>
<b>Phased Operating Plan .....</b>	<b>88</b>
<b>Service Standards and Ongoing Evaluation .....</b>	<b>89</b>
<b>Other Recommendations to Support Service .....</b>	<b>91</b>
<b>FINANCIAL PLAN .....</b>	<b>101</b>
<b>Operating .....</b>	<b>102</b>
<b>Capital .....</b>	<b>103</b>
<b>ACKNOWLEDGEMENTS .....</b>	<b>106</b>
<b>APPENDIX A .....</b>	<b>107</b>
<b>Market Analysis, Existing Conditions, Peer Review</b>	
<b>APPENDIX B .....</b>	<b>108</b>
<b>Route Profiles</b>	
<b>APPENDIX C .....</b>	<b>109</b>
<b>Public Engagement Memo</b>	



# TABLE OF FIGURES

<b>Figure 1  </b> Proposed Cost-Neutral and Future Recommendations Table.....	<b>15</b>
<b>Figure 2  </b> Map of Existing Wave Transit Service .....	<b>20</b>
<b>Figure 3  </b> Map with Proposed Cost-Neutral Service Changes.....	<b>21</b>
<b>Figure 4  </b> Map with All Proposed Service Changes .....	<b>22</b>
<b>Figure 5  </b> Average Daily Passengers Per Route (2016) .....	<b>33</b>
<b>Figure 6  </b> Average Passengers per Vehicle Hour by Route.....	<b>34</b>
<b>Figure 7  </b> Wave Transit 2018 Adopted Revenue Budget.....	<b>35</b>
<b>Figure 8  </b> Fare Comparison with Peer Agencies .....	<b>35</b>
<b>Figure 9  </b> Wave Transit Five Year Forecast Chart.....	<b>36</b>
<b>Figure 10  </b> Peer System Operating Environments.....	<b>37</b>
<b>Figure 11  </b> Peer Agency Fixed-Route Performance Metrics (2015) .....	<b>38</b>
<b>Figure 12  </b> Operating Revenue Sources from Peer Systems.....	<b>40</b>
<b>Figure 13  </b> Location of Major Employers.....	<b>45</b>
<b>Figure 14  </b> Employment-Based Travel Flows (2014) .....	<b>47</b>
<b>Figure 15  </b> Transit Potential Index .....	<b>49</b>
<b>Figure 16  </b> SRTTP Wikimapping Page.....	<b>52</b>
<b>Figure 17  </b> September Meeting at Forden Station.....	<b>53</b>
<b>Figure 18  </b> Steering Committee's Prioritized Goals/Value.....	<b>55</b>
<b>Figure 19  </b> Wave Transit Park(ing) Day Outreach.....	<b>57</b>
<b>Figure 20  </b> Project Goals .....	<b>58</b>
<b>Figure 21  </b> Which of the following describe the reasons that you use Wave Transit? .....	<b>59</b>
<b>Figure 22  </b> Do you support greater local and regional financial support for Wave Transit?.....	<b>60</b>
<b>Figure 23  </b> How did you pay for your fare today? (On-board) / How do you typically pay for your fare on Wave Transit (Online)?.....	<b>61</b>
<b>Figure 24  </b> If possible, would you purchase pass products with a credit or debit card?.....	<b>61</b>
<b>Figure 25  </b> Downtown Trolley – Increased coverage area might require a longer riding time. Would you be willing to ride... ..	<b>62</b>
<b>Figure 26  </b> Which of the following describe the reasons that you use the Seahawk Shuttle?.....	<b>63</b>



<b>Figure 27  </b> What type of improvements would make you MORE LIKELY to use Wave Transit? (Select all that apply)	<b>67</b>
<b>Figure 28  </b> Route 101 will add service to Creekwood, but will only serve Walmart hourly.	<b>67</b>
<b>Figure 29  </b> The following future recommendations will be implemented by Wave Transit with additional funding at an undetermined date. Please select only three projects that should be prioritized.	<b>68</b>
<b>Figure 30  </b> Proposed Fixed Route Cost-Neutral Recommendations	<b>70</b>
<b>Figure 31  </b> Service to New Downtown Multimodal Transportation Center	<b>71</b>
<b>Figure 32  </b> Proposed Route 101 Alternating Service to Creekwood (and Walmart)	<b>72</b>
<b>Figure 33  </b> New Route Alignment for Route 104 (and 207)	<b>72</b>
<b>Figure 34  </b> New Proposed Route 210 – 17th Street	<b>72</b>
<b>Figure 35  </b> Proposed Fixed-Route Future Recommendations	<b>73</b>
<b>Figure 36  </b> Proposed New Route 109 CFCC North	<b>77</b>
<b>Figure 37  </b> Proposed New Route 112 Porters Neck	<b>77</b>
<b>Figure 38  </b> Proposed New Route 302 Masonboro Loop Road	<b>77</b>
<b>Figure 39  </b> Proposed Downtown Trolley Recommendations	<b>78</b>
<b>Figure 40  </b> The SRTTP is considering introducing a nominal fare to ride the Downtown Trolley to emphasize the trolley’s value, and to help cover operating costs. Do you feel \$1 is a reasonable fare for riding the Downtown Trolley?	<b>78</b>
<b>Figure 41  </b> Proposed UNCW Seahawk Shuttle Recommendations	<b>79</b>
<b>Figure 42  </b> Proposed New and Extended Seahawk Shuttle Routes	<b>80</b>
<b>Figure 43  </b> Fixed Route Converted to On-Demand Service in 2018 (Research Triangle Park)	<b>83</b>
<b>Figure 44  </b> Proposed On-Demand Zones for Market East and Porters Neck	<b>84</b>
<b>Figure 45  </b> Proposed On-Demand Zones for Masonboro Loop and Greenville Loop Roads	<b>85</b>
<b>Figure 46  </b> Proposed On-Demand Zone for Creekwood	<b>85</b>
<b>Figure 47  </b> Proposed On-Demand Zone for Wrightsville Beach	<b>85</b>
<b>Figure 48  </b> Proposed Additional Wave Transit Service Guidelines	<b>90</b>
<b>Figure 49  </b> Benefits and Drawbacks of Magnetic Stripe Technology	<b>92</b>
<b>Figure 50  </b> Smartcard Used in Atlanta	<b>92</b>
<b>Figure 51  </b> Benefits and Drawbacks of Smartcards	<b>93</b>
<b>Figure 52  </b> Phone Used as Flash Pass in Portland, OR	<b>94</b>
<b>Figure 53  </b> Bar Code Scanner in Nassau County, NY	<b>94</b>
<b>Figure 54  </b> Benefits and Drawbacks of Smartphone-Enabled Fare Payment	<b>95</b>

**Figure 55 |** Off-board Fare Payment in Manhattan .....95

**Figure 56 |** Ticket Vending Machine in Dallas .....96

**Figure 57 |** Wave Transit Bus Stop with Shelter.....98

**Figure 58 |** CNG-Powered Wave Transit Buses .....99

**Figure 59 |** Real-Time Arrival Information Screen .....99

**Figure 60 |** Expected Annual Operating Revenues and Expenses for SRTP.....103  
Implementation

**Figure 61 |** 5-Year Capital Expenses for SRTP Implementation .....105

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# Executive Summary

## EXECUTIVE SUMMARY

As Wave Transit approaches its 15-year anniversary in 2019, the system is well positioned to continue providing high-quality public transportation in the Cape Fear region. In 2016, Wave Transit provided nearly 1.5 million fixed-route passenger trips in the City of Wilmington, and in other municipalities in New Hanover County and Brunswick County. In addition to fixed-route bus service, Wave Transit operates Dial-a-Ride paratransit services, Wave Pool (commuter van and carpool program), the Free Downtown Trolley, and the Seahawk Shuttle for the University of North Carolina Wilmington (UNCW).

The service area of the Cape Fear Public Transportation Authority (Wave Transit) is challenging to serve with fixed-route transit. Wave Transit's service area is 200 square miles with a population of 216,479. Generally, both population and jobs are uniformly low-density in Wilmington, with few areas that can support frequent transit service and thereby attract riders with other travel options. As a result, the need for public transit for low-income individuals is critical, but providing service efficiently and reliably is more challenging. Nevertheless, Wave Transit uses its limited resources effectively, with fixed-routes existing on the corridors that are most appropriate.

The Wilmington/Cape Fear region is growing, and transit should at least keep pace by serving those who need it, as well as attracting other riders where possible. Rapid population growth has enhanced the need for quality public transit: Wilmington's population increased by 40% from 2000 to 2010, surpassing 100,000 residents for the first time. Since then, the Cape Fear region has experienced continued population growth, with an estimated 263,400 residents living in the Wilmington Metropolitan Area as of 2012. Concurrently, the University of North Carolina Wilmington is expanding, with plans to increase enrollment to 20,000 students by 2020. This influx of students will continue to stress on-campus parking resources, and will amplify the need and importance for the Seahawk Shuttle.

To prepare for future growth and to better serve existing customers, Wave Transit has invested heavily in new facilities. Forden Station, which opened in 2011, is the system's easternmost transfer center and houses Wave Transit's administrative offices. The Wave Transit Operations Center opened in 2015, and serves as a consolidated hub for the system's 73-vehicle fleet, accommodating vehicle storage, maintenance facilities, and fueling stations. The Downtown Wilmington Multimodal Transportation Center is under construction and will serve as the primary transfer facility for all routes serving downtown Wilmington when it opens on Third Street in 2018.

The Cape Fear region is growing, including the UNCW area, and public transit needs to keep pace in order to support this growth.



The SRTP's recommendations incorporate all of these challenges and trends, and designs creative solutions that can integrate emerging travel options with public transit in the Cape Fear Region and make the most efficient use of Wave Transit's resources.

## PUBLIC ENGAGEMENT

In conjunction with the SRTP, Wave Transit directed a comprehensive public engagement effort to help inform the study's recommendations, with coordinated public outreach conducted during four primary periods: July 2017, September 2017, October-December 2017, and February-March 2018. The SRTP team actively worked with prominent community stakeholders, including a focus group with downtown economic business groups to discuss the Free Downtown Trolley, and multiple meetings with UNCW transportation officials and administrative staff. Project staff and consultants also conducted stakeholder interviews with City of Wilmington and New Hanover County jurisdictions and agencies, transportation partners, medical and social services institutions, and business organizations. Interviews were conducted with the following stakeholders: Brunswick County, New Hanover County Department of Social Services, New Hanover County Planning Department, New Hanover County Manager, Pender County, Town of Carolina Beach, Town of Wrightsville Beach, the University of North Carolina Wilmington, Wilmington City Manager, Wilmington Chamber of Commerce, and the Wilmington Housing Authority.

The feedback received from the public and stakeholders ensures that the SRTP recommendations are responsive to the needs of current riders, and representative of Cape Fear's diverse community. Key findings from the public engagement process are summarized below:

- Officials from the City of Wilmington are primarily focused on ensuring that Wave Transit receives adequate local funding to continue providing high-quality public transit.
- Officials and representatives from New Hanover County stressed that transit service should coordinate closely with the three growth nodes identified in the county's Comprehensive Plan: Monkey Junction, Porter's Neck, and N. College Road/Blue Clay Road.
- New Hanover County Department of Social Services and Wilmington Housing Authority request continued service to their existing and planned facilities, as well as travel training support, additional bus shelters, and service to Creekwood.
- Representatives from Brunswick County and Carolina Beach value Wave Transit's fixed-route service and noted that existing routes serve the appropriate alignments. Additional trips on these routes would be helpful.
- Representatives from UNCW indicated that multiple planned on- and off-campus developments, such as additional on-campus housing and several new academic buildings, will increase the need for the Seahawk Shuttle.

- More frequent service is desired, with the most common request being for service every half hour instead of hourly. Increased frequency can be especially helpful if a transfer between routes is required.
- There is a desire for more payment options, including the use of credit and debit cards, a reusable smart card, and mobile phones.
- Requests for earlier service were received, mainly to be able to get to jobs that have an early start. Weekend service was also suggested, particularly for Routes 204 Brunswick Connector and 207 North, which currently have no weekend service.
- New service to areas that have no existing transit service was another common theme. Requests include Porters Neck/Ogden, Creekwood, River Road/Sunset Park, Masonboro Loop and Greenville Loop Roads, and Wrightsville Beach (perhaps seasonally only).
- Feedback supports continuation of the program to upgrade bus stops and make more of them ADA accessible, although it should be noted that cooperation from outside parties is required for sidewalk and bus stop improvements.
- Recommendations for the Free Downtown Trolley included serving the Brooklyn Arts District, providing service to Castle Street and South Front districts near downtown, consideration for charging a small fare, and increasing awareness of the service among the public and tourists.
- Suggestions for UNCW services included later evening hours, adding weekend service, increasing service frequency, and improving driver shift change issues in the afternoon.

## FINANCIAL OUTLOOK

Wave Transit's existing fixed-route service is stretched thin: most routes operate the minimum useful frequency (hourly) at or near the minimum useful span, and service covers a large area with overall marginal density for fixed-route transit. A comprehensive review of existing population and employment densities and educational, medical, and entertainment points of interest confirms that Wave Transit's existing fixed-routes operate in appropriate corridors, serving areas and locations that can support fixed-route transit. Wave Transit's fixed-route system is operating efficiently, but reallocating existing resources is challenging. Few opportunities to reduce coverage, span, or frequency exist to fund service improvements elsewhere in the system.

Several future complications exist, chiefly Wave Transit's current funding arrangement. Wave Transit lacks a dedicated local funding source, and only 18% of the system's operating budget is provided via local sources. As a result, the system's fares exceed those charged by peer systems. Additionally, Federal (42%) and State-level (10%) funding is maximized, limiting opportunities for future growth. North Carolina's General Statutes authorize two potential funding sources at the county level - a vehicle registration fee, and a transit sales tax. The registration

fee would generate an estimated \$1.3 million dollars annually, compared to \$8 million dollars generated by the transit sales tax. These dedicated local funding sources are more dependable, and would ensure that service is maintained and improved annually.

Identifying sustainable funding is critical for Wave to continue providing high-quality service. In the next five years annual operating expenses are projected to outpace annual operating revenues. Even without any service improvements, the operating deficit for FY22 is projected to be over \$300,000 per year. Wave Transit's capital needs also reflect a \$2.8M deficit over the next five years, even with the recent federal grant for new buses during FY18.

## IMPLEMENTATION PLAN

Overall, proposed recommendations based on a systemwide and route-level analysis aligned closely with desired improvements submitted by stakeholders and members of the public. Priority needs identified include increased frequency, earlier weekday and some additional weekend service, new services for unserved areas, more flexible fare payment options, upgrades to real-time information systems (implemented during 2017 with the introduction of the smartphone app), and continued bus stop improvements. Recommendations are suggested in three phases: cost-neutral (short-term) and priority future (most important medium/long term) and other future (long-term, but still within 5 years if resources allow).

### Cost-Neutral Recommendations

Cost-neutral recommendations assume no additional resources and can be implemented in the short-term, pending review of vehicle travel times and systemwide stop-level data (newly available in 2018). These recommendations focus on addressing service gaps and improving coordination of Wave Transit's current fixed-route service. All routes serving downtown Wilmington will originate and terminate at the

new Downtown Transit Center. Proposed cost-neutral recommendations are summarized in **Figure 1 | Proposed Cost-Neutral and Future Recommendations Table**.

### Future Recommendations

Future recommendations could be considered only after cost-neutral recommendations are complete, and would require an additional annual operating cost of \$2.7M to be implemented in full. Recommendations include increased span and frequency on existing routes, and fixed-route and/or on-demand service pilot programs used for covering new areas, with service expanded to Porters Neck, Masonboro Loop Road, Greenville Loop Road, and Wrightsville Beach (if supported by the town). In addition to route-level recommendations in **Figure 1 | Proposed Cost-Neutral and Future Recommendations Table**, the following improvements are proposed:

- **Monkey Junction:** Improved passenger amenities, including benches, shelters, lighting, and ADA accessibility improvements are already underway, to be completed in 2018. New routes will serve the transfer station, and more frequent service will be programmed on existing routes.
- **Earlier Weekday Service:** Adding up to four selected trips between 5-6 a.m. on weekdays will expand service to commuters that work non-traditional hours or shifts. Specific routes will be selected (once data becomes available) based on high ridership on the first existing weekday trip, and will also consider the location of known employers with early shifts. The estimated annual cost for earlier weekday service is \$100,000.
- **Added Rush-Hour Service:** Selected routes would have increased frequency during the morning and afternoon rush hours. Again, the particular routes would be chosen once more data is available. The increased frequency can be of particular benefit to those who need to transfer between two routes. The estimated annual cost for additional rush-hour service is \$300,000.



- **Bus Stop Improvements:** Continue the successful Bus Stop Enhancement Program to upgrade amenities and make more stops ADA-accessible. Some new locations for bus stops were identified during the SRTP process, with helpful feedback from bus operators and others. Much of the cost can be funded by federal and state grants. However, it should be noted that cooperation from outside parties is required for sidewalk and bus stop improvements.
- **Fare Payment:** Increase options for payment, including credit/debit cards, mobile phones, online, and retail outlets as resources allow. Consideration should be given to a transit smartcard, although there are tradeoffs and technology is rapidly evolving.
- **Information Systems:** The new availability of real-time bus arrival information through the smartphone app has been very popular, and efforts should continue to market this capability and increase awareness.
- **Vehicles:** Continue to adopt more efficient and clean fuel options as appropriate. Take full advantage of the recent investments in CNG infrastructure.

The future recommendations are further divided into Priority and Other, based on feedback received from surveys, meetings, and other input submitted.

## Improvements by Others

**Employer Transit Subsidies:** Working with the WMPO TDM Coordinator, employers in the region, especially downtown and near UNCW, should be encouraged to institute or increase subsidies for their employees to use Wave Transit. Employers can also administer programs so that their employees can use pre-tax dollars for transit passes. This can be done by employers ordering passes themselves for distribution to their employees, or by employers issuing special debit cards to be used for transit expenses. There are third-party benefits administrators, such as WageWorks, which can manage the program for the employer. In many cities, these options and subsidies have been proven to increase the proportion of people using transit, and thereby mitigate parking and congestion concerns. Employees often see this as a popular benefit since it reduces their transportation costs and increases their options.

**Fourth Street Bridge Repairs:** The existing weight limits on the 4th Street Bridge just north of the new Multimodal Transportation Center being built at Campbell Street will preclude transit vehicles from using the bridge. Repairing or replacing the bridge should become a priority for the region. Enabling buses to use that segment of 4th Street would allow more routing options, better service for the growing Brooklyn Arts District, and would particularly enhance the efficiency and service reliability of both the Downtown Trolley and the Route 101, which is the busiest in the Wave system.

Recommendations include increased span and frequency on existing routes, and fixed-route and/or on-demand service pilot programs used for covering new areas.

## On-Demand Service

On-demand transit service has emerged as a flexible, responsive, and cost-effective option for serving last-mile issues and other gaps in the transportation system. Multiple on-demand (or microtransit) service models exist. Transit agencies can contract with transportation network companies (such as Lyft, Uber, and Via) to provide service or partner with a software provider (such as TransLoc) to optimize service and efficiency, while maintaining vehicle operations in-house.

Service is tailored to specific urban environments and cities, and is designed to facilitate transfers to fixed-route service. Trips may connect locations within a specified zone, or provide service to a designated pick-up/drop-off point served by fixed-route service. On-demand service is generally recommended for low-density areas that feature transit demand, and may serve as precursors for fixed-route service. On-demand service is generally accessed by smartphones, but can be

customized for passengers that lack personal computers or mobile phones. Payment can be through a phone app, but cash payment options should be provided as well. The service should be available for those who need a wheelchair-accessible vehicle.

Current examples of cities and transit agencies experimenting with on-demand service models includes Sacramento, Kansas City, Tampa, St. Petersburg, Austin, Research Triangle Park (NC), and Arlington (TX).

The exact requirements for on-demand service to be compliant with FTA regulations are not yet known. Any service offering would need to meet FTA requirements.

Adoption of on-demand service is expected to increase within the SRTP's five-year horizon. In Wilmington, potential on-demand zones include Creekwood, Porter's Neck, Market Street (between Eastwood Road and Gordon Road), Masonboro and Greenville Loop Roads, and Wrightsville Beach.

Figure 1 | Proposed Cost-Neutral and Future Recommendations Table

Route/Location	Recommendations		
	Cost Neutral	Priority Future	Other Future
<b>Route 101 Princess Place</b>	<ul style="list-style-type: none"> <li>Alternating trips will serve Creekwood and Walmart during peak period (weekday 6 am – 6 pm); thus providing hourly service to Creekwood and Walmart</li> <li>Possible service on every hourly trip to Creekwood and Walmart nights and weekends, but Wave staff must determine feasibility.</li> </ul>	None.	<ul style="list-style-type: none"> <li>Potential to expand service to 23rd Street and Scientific Park Drive via Creekwood once construction on Scientific Park Drive is complete</li> </ul>

Route/Location	Recommendations		
	Cost Neutral	Priority Future	Other Future
<b>Route 104 Northeast</b>	<ul style="list-style-type: none"> <li>Extend outbound service west on Gordon Road and Kerr Avenue to facilitate a safer transfer with Route 207 North</li> </ul>	None.	None.
<b>Route 107 College Road</b>	None.	<ul style="list-style-type: none"> <li>Improve to hourly frequency, in conjunction with improvements to Route 301</li> </ul>	None.
<b>Route 109 CFCC North (New Route)</b>	None.	None.	<ul style="list-style-type: none"> <li>New route covers eastern half of existing Route 207 North (College Road)</li> <li>Operates between Forden Station and CFCC's North campus</li> <li>Will provide more reliable service to College Road and Laney High School</li> <li>Estimated annual cost is \$400,000</li> </ul>
<b>Route 112 Porters Neck (New Route)</b>	None.	<ul style="list-style-type: none"> <li>Operate service from Forden Station to residential and commercial locations in Middle Sound Loop and/or Porters Neck (Walmart/Publix)</li> <li>Many requests for service to this area</li> <li>Could be operated as on-demand service</li> <li>Estimated annual cost is \$400,000</li> </ul>	None.

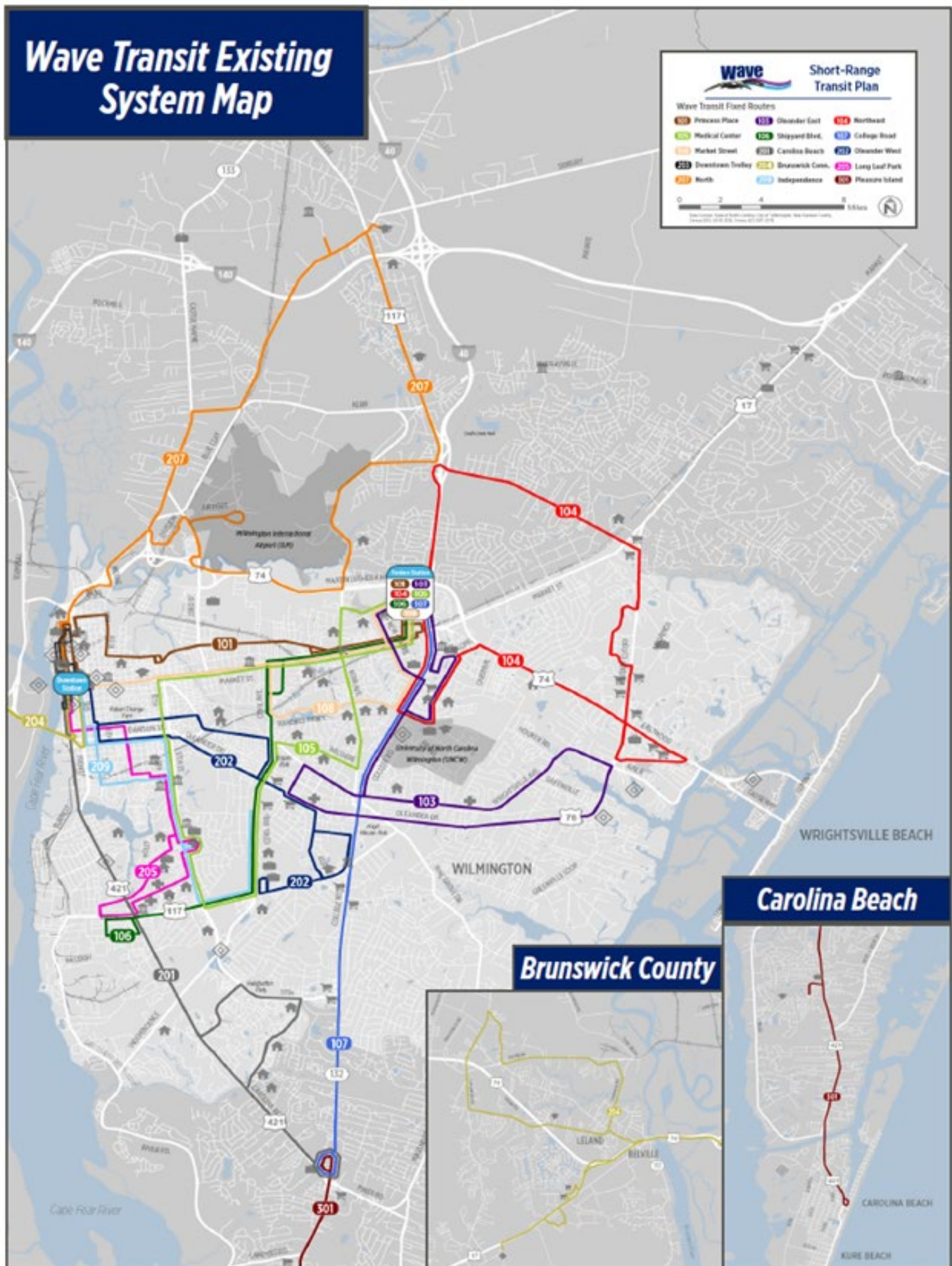


Route/Location	Recommendations		
	Cost Neutral	Priority Future	Other Future
<b>Route 201 Carolina Beach Road</b>	<ul style="list-style-type: none"> <li>• Realignment removes service on George Anderson Drive, 17th Street, and St. Andrews Drive to improve schedule adherence.</li> <li>• This change will require customers traveling to/from George Anderson Drive to access Route 201 via Carolina Beach Road or new Route 210 via 17th Street.</li> <li>• Service on 17th Street and St. Andrews Drive will be covered by proposed Route 210.</li> </ul>	None.	None.
<b>Route 202 Oleander West</b>	<ul style="list-style-type: none"> <li>• Potential changes at Independence Transfer Station site to allow for easier transfers</li> </ul>	None.	None.
<b>Route 204 Brunswick Connector</b>	None.	None.	<ul style="list-style-type: none"> <li>• Extend weekday service until 9PM to expand access for commuters</li> <li>• Add Saturday hourly service</li> <li>• DART service also for new service hours</li> <li>• Estimated annual cost of \$150,000</li> </ul>
<b>Route 205 Long Leaf Park</b>	<ul style="list-style-type: none"> <li>• Route 205 rerouted to 5th St to ensure all current Route 209 area is served.</li> </ul>	None.	<ul style="list-style-type: none"> <li>• Increase frequency to 30 minutes weekdays from 6AM-6PM</li> <li>• Offers north-south frequency similar to east-west of Route 101</li> <li>• Estimated annual cost of \$300,000</li> </ul>

Route/Location	Recommendations		
	Cost Neutral	Priority Future	Other Future
<b>Route 207 North</b>	<ul style="list-style-type: none"> <li>• Provide service on every trip to NHC Jail and Wilmington International Airport.</li> <li>• Service shifted to Farley Drive to provide safer transfer opportunity to Route 104 Northeast.</li> <li>• Serves Front Street in both the inbound and outbound directions, and new Trans Ctr via Red Cross Street.</li> </ul>	None.	<ul style="list-style-type: none"> <li>• Splitting route into two separate routes (see new Route 109 above) eliminates one-way loop (service on College Road) and provides bi-directional service to Wilmington International Airport and NHC Jail.</li> <li>• Will improve route's on-time performance due to shorter path.</li> <li>• Terminates at CFCC's North campus, an area slated for growth.</li> </ul>
<b>Route 209 Independence</b>	<ul style="list-style-type: none"> <li>• Eliminate this route, replaced by new Route 210</li> <li>• Reroute of Route 205 noted above ensures that all existing service area is covered</li> </ul>	None.	None.
<b>Route 210 17th Street (New Route)</b>	<ul style="list-style-type: none"> <li>• Replaces Route 209 Independence and Route 201 service on 17th Street and St. Andrews Drive and provides additional service between new Multimodal Trans Center and Monkey Junction.</li> <li>• Supplements Route 201, which has the highest ridership per vehicle hour.</li> <li>• Provides new service to Cameron Art Museum and Point at Barclay Hills.</li> <li>• One-seat ride between downtown and Independence Transfer Station site can potentially be covered by changes to Route 202 noted above.</li> </ul>	None.	None.

Route/Location	Recommendations		
	Cost Neutral	Priority Future	Other Future
<b>Route 301 Pleasure Island</b>	None.	<ul style="list-style-type: none"> <li>• Improve weekday and Saturday frequency to hourly to better serve employees and visitors</li> <li>• Results in upgraded service for Route 107 (hourly)</li> <li>• Estimated annual cost: \$400,000</li> </ul>	None.
<b>Route 302 Masonboro Loop Road (New Route)</b>	None.	None.	<ul style="list-style-type: none"> <li>• Requested during public meetings/survey</li> <li>• Will include transfer points to Route 103 Oleander East and provide transfer opportunities at Monkey Junction</li> <li>• Could also be provided as on-demand service</li> <li>• Estimated annual cost is \$400,000</li> </ul>
<b>On-Demand Wrightsville Beach</b>	None.	<ul style="list-style-type: none"> <li>• On-demand service with connections to Route 104</li> <li>• Serves employees and visitors</li> <li>• Estimated annual cost of \$200,000</li> </ul>	None.
<b>On-Demand Creekwood</b>	None.	<ul style="list-style-type: none"> <li>• If needed to supplement prior cost-neutral improvements</li> <li>• Off-peak only</li> <li>• Estimated annual cost of \$50,000</li> </ul>	None.

Figure 2 | Map of Existing Wave Transit Service





### Figure 3 | Map with Proposed Cost-Neutral Service Changes

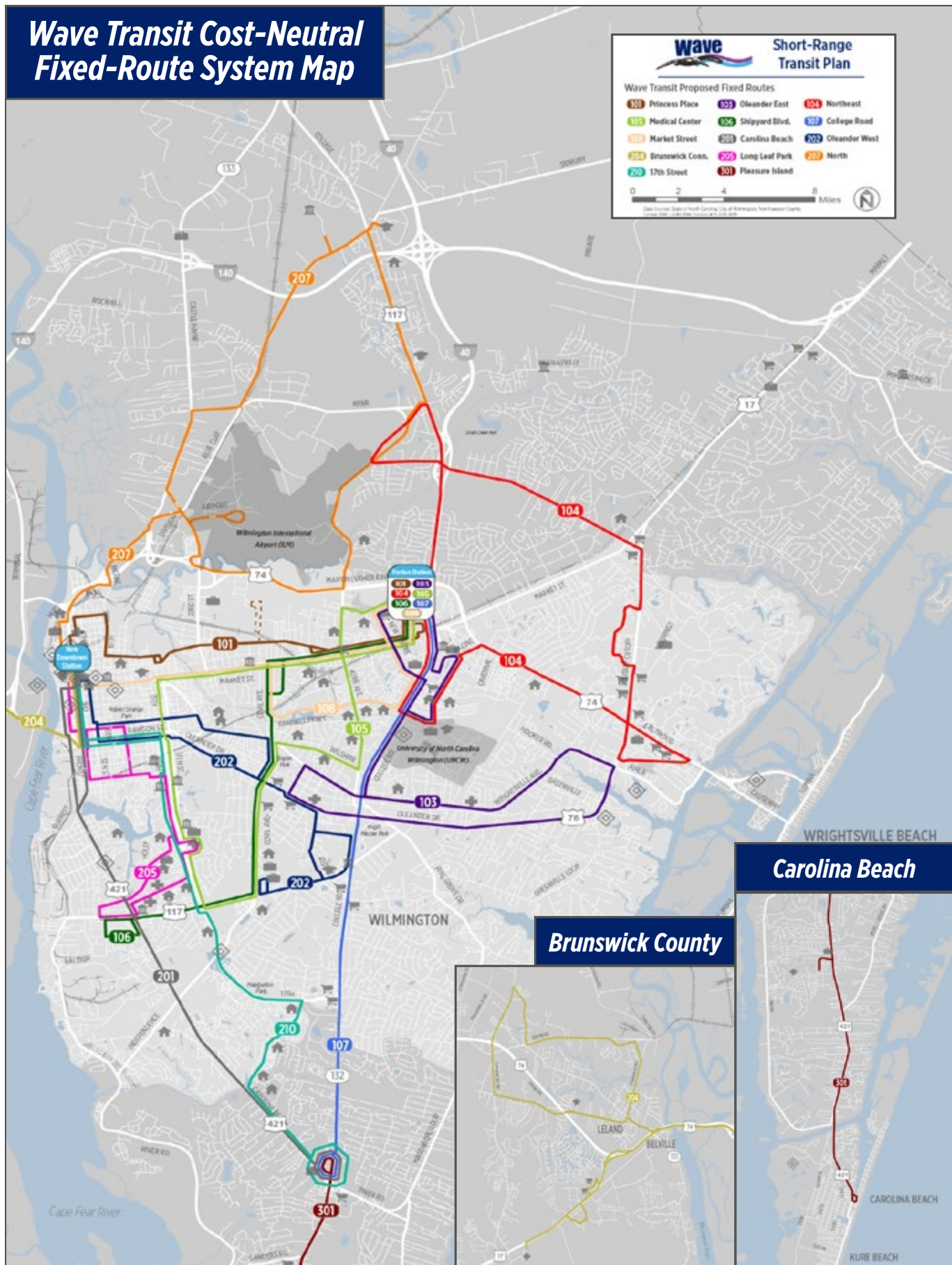
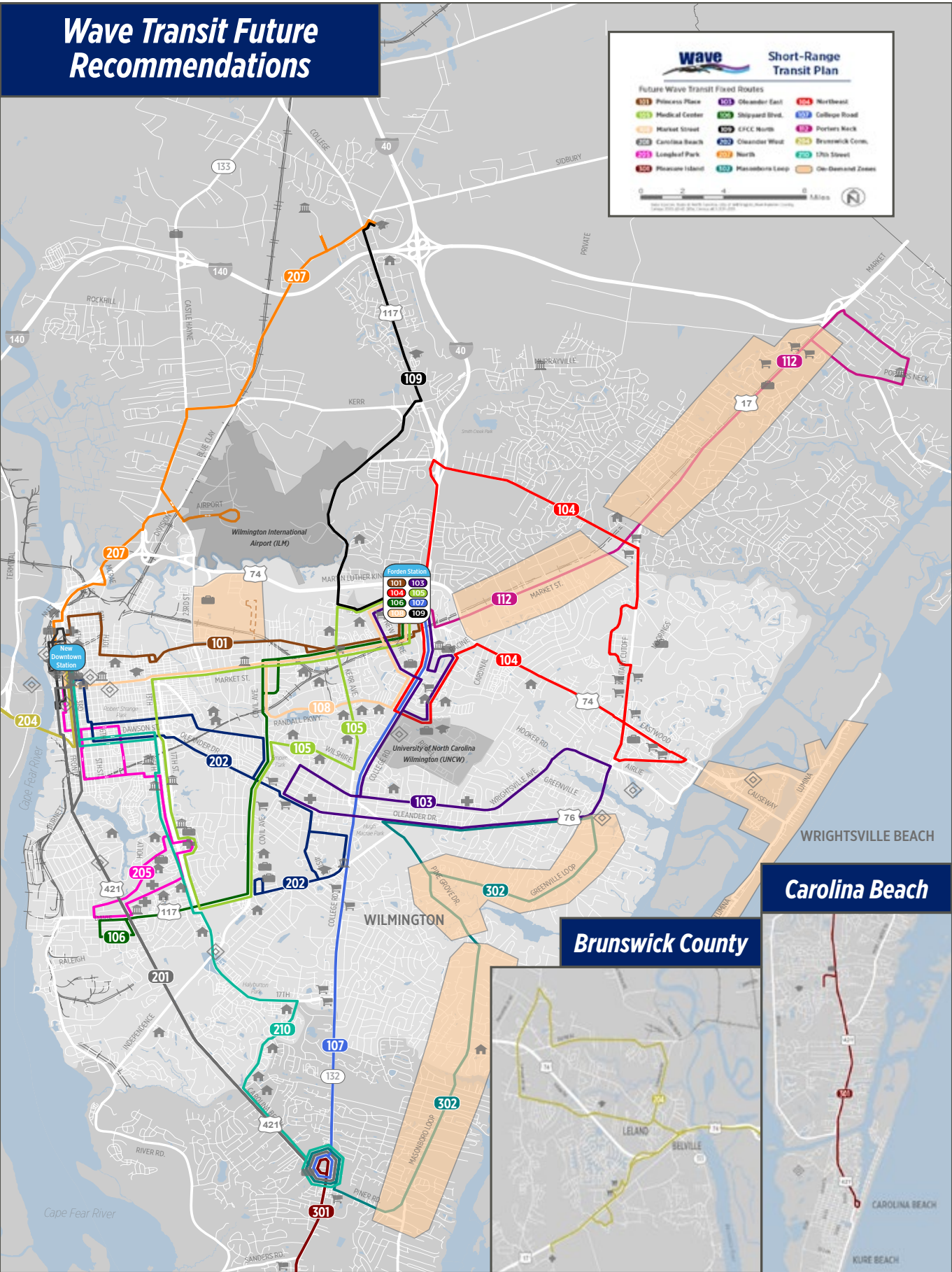




Figure 4 | Map with All Proposed Service Changes



## DOWNTOWN TROLLEY

Redesigning the Free Downtown Trolley is a central focus of the SRTP. The Trolley is currently underutilized, but future commercial, residential, and cultural developments in downtown Wilmington will eliminate several existing parking facilities and increase the need for frequent transit service in the central business district and surrounding districts.

The SRTP involved downtown Wilmington business owners and stakeholders throughout the planning process. A trolley focus group was formed, and these stakeholders helped to develop a proposed alignment that was tested during the Azalea Festival in April 2018, but the exact route has not been finalized. In addition to redesigning the Trolley's alignment, the following improvements are being considered:

- **New Vehicles:** Wave Transit owns three replica trolleys, but only two are currently operational, and there have been many requests for at least one new vehicle. Funding for 1-2 new vehicles could be funded from a FTA grant received in April 2018 through the 5339 Bus and Bus Facilities program.
- **Passenger Amenities:** The majority of Trolley bus stops lack shelters, benches, lighting, and visible signage. Trolley maps and prominent signage should be placed at all stops, parking decks, and popular attractions located on the route. Improving passenger amenities should be a priority once the new Trolley route is established. However, it should be noted that narrow rights-of-way and historic regulations in the CBD make improvements more challenging.
- **Marketing and Branding:** Wave Transit will consider improved branding and marketing opportunities for the Trolley to raise awareness among downtown residents and visitors. This may include adjusting trolley stop names to reflect sights and streets nearby; developing partnerships with local businesses, hotels, and the visitor's bureau to promote the circulator and possibly provide tokens for riders; customer appreciation days; rebranding the service as the Downtown Circulator.
- **Fare Collection:** Wave Transit is also considering charging a nominal fare. Introducing a fare will emphasize the value of the Trolley as a means for seeing the attractions and frequenting downtown businesses. Non-mechanical "drop boxes" are the preferred fare collection option (one unit per trolley, \$1,000 per unit).

## UNC WILMINGTON SEAHAWK SHUTTLE

The Seahawk Shuttle operates efficiently and provides widespread on-campus and off-campus coverage for UNCW students. As UNCW's enrollment has steadily increased in recent years, demand for service has increased among students living along the Randall Pkwy. and Kerr Ave. corridors, as well as on campus. As a result, vehicle capacity is an issue on several routes, especially during the mid-morning and mid-afternoon periods. While additional service is ultimately necessary, reallocating transit resources without reducing coverage, span, or frequency is difficult. Wave Transit is currently unable to absorb additional capacity or contribute additional full-sized transit vehicles without additional resources.

## Cost-Neutral Recommendations

Cost-neutral opportunities exist to improve Seahawk Shuttle service while maintaining a high-quality passenger experience for UNCW students.

- **Combine 706 Orange and 711 Grey Routes:** The Orange and Grey routes currently operate staggered service on the same alignment. Combining the routes will help balance passenger loads, enable 10-minute frequency during peak periods, and simplify the passenger experience.
- **Continue to work with UNCW to review schedule adherence system-wide** each semester to identify service bottlenecks, give buses priority where possible (such as stoplights), increase marketing/coordination with off-campus housing complexes, continue improvements to real-time info, and to plan now for future operating and capital needs.

## Future Recommendations

These recommendations require additional resources:

- **Passenger Amenities:** Improving passenger amenities must remain a priority. Benches, shelters, and lighting should be installed at remote parking lots, on-campus stops, and high-ridership off-campus stops, and stops serving multiple routes. All high-ridership stops should be accessible to pedestrians through sidewalks, curb ramps, and crosswalks at intersections.
- **Frequent Service:** Increase frequency during the morning peak (8-11 a.m.) and afternoon peak (3-5 p.m.) to address capacity concerns and reduce the number of standees. Operating full-size vehicles (35-40 person capacity) should also be considered on the following routes: 704 Yellow, 706 Orange, 707 Red Express, 711 Grey.
- **Evening Hours:** If service is extended into the evening, some daytime shuttle routes can be combined.
- **703 Red Shuttle Extension:** Expanding the Red Shuttle west on Wilshire Boulevard to Larchmont Drive, Winston Boulevard, and Hoggard Street would provide enhanced service to Wilshire Landing and Wimbledon Chase. This extension will not impact or alter the current 707 Red Express Shuttle.
- **708 Pink:** This new service will connect the UNCW campus to Racine Drive and College Acres Drive, extending service to the northeast of campus.

Seahawk Shuttle recommendations include some additional service on existing routes, as well as some new areas to be served.

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# Overview and Study Approach

## OVERVIEW AND STUDY APPROACH

The City of Wilmington and the surrounding Cape Fear region continue to experience growth in population and jobs. The city passed 100,000 people for the first time in the 2010 decennial Census, and its estimated population was 117,525 as of 2016. Downtown has experienced a renaissance, with many new bars and restaurants filling formerly vacant or under-utilized buildings. The UNCW campus also continues to expand rapidly, with the University adding more students overall, and particularly more students hailing from further away who need housing on or near campus. This regional growth has created vibrancy and is helping to attract even more newcomers, but also brings transportation challenges such as lack of parking and increased congestion. In addition, many people want or need to travel without a car, and providing good alternatives to the automobile can mitigate some of the congestion and parking concerns, while allowing everyone to fully participate in critical life activities.

A previous Short Range Transit Plan was completed for Wave Transit in 2012, with recommendations for keeping pace with the region's growth and making transit service as effective as possible. Many of those recommendations were successfully implemented, and this study is designed to make new suggestions for implementation over the next 5 years, as available resources allow.

### STUDY GOALS AND METHODOLOGY

This study identifies the markets for transit services in Wilmington, evaluates the effectiveness of existing transit services, and provides recommendations for the improvement and redesign of services over a five-year time span. The scope of the study includes Wave's fixed-route bus system, the Free Downtown Trolley, and the Seahawk Shuttle system operated by Wave for UNCW. Implementation of the study recommendations is also expected to be coordinated with the opening of the new Wilmington Multimodal Transportation Center in downtown. The study used the following methodology:

1. **Assess existing planning efforts.** The study included a review of recent and current planning efforts, including both plans and studies conducted by Wave Transit and regional planning efforts.
2. **Evaluate the market for transit services.** An essential aspect of designing and developing effective transit services lies in understanding changes in the size, density and distribution of population and employment so that transit services continue to reflect the local and regional operating environment. As part of the SRTP, the study team looked at the existing market for transit services in terms of population, and employment, as well as the size and location of key demographic groups to understand how well Wave's services are matched to the current travel demand and growth

This study identifies the markets for transit services in Wilmington, evaluates the effectiveness of existing transit services, and provides recommendations for the improvement and redesign of services over a five-year time span.

trends. The analysis also identified potential new markets and service opportunities.

3. **Collect feedback from stakeholders and the public.** To understand how regional transit services should develop and grow, the study team collected feedback from Wave riders, members of the public, and key community stakeholders. The study included a survey of riders and non-riders (a copy of which is provided in Appendix C), delivered both on board buses and electronically on the Wave website. Community stakeholders interviewed included representatives of the city of Wilmington; towns of Leland, Wrightsville Beach, and Carolina Beach; counties of New Hanover, Brunswick and Pender; Wilmington Housing Authority; Wilmington Metropolitan Planning Organization (Wilmington MPO); numerous social service agencies; and Wave Transit staff. There were additional meetings with a project Steering Committee, downtown focus groups, and UNCW staff.
4. **Evaluate existing transit services.** The study team analyzed the agency's productivity to broadly gauge system efficiency and effectiveness, and compared Wave against peer agencies. This effort included an analysis of the overall system, including all routes and services, as well as individual analyses of specific Wave routes. This analysis consisted of a detailed review of route productivity and focused on identifying the strengths and weaknesses of existing services, in order to maintain what is working well and improve what is working poorly.
5. **Propose service change options.** To match services to the demand for transit in the region, and to reflect feedback collected on priorities for transit services, service redesign concepts were created. Some of the proposed changes would require additional resources, while others could be achieved in a cost-neutral fashion. These concepts were then presented to the public, and feedback on service design options collected in order to determine community preferences.
6. **Define preferred alternative.** Using a combination of stakeholder and public input, as well as additional staff review, the study team identified a preferred alternative. This preferred alternative includes proposed recommendations that were well received, and its priorities were informed by feedback regarding which recommendations were deemed most important.
7. **Develop a funding and implementation plan.** Once the preferred alternative was finalized, the SRTP broadly lays out a strategic funding and implementation plan to help Wave Transit realize the proposal. The SRTP also includes a series of other recommendations for consideration by Wave Transit. These include discussions on fare payment, vehicle propulsion, information systems, and bus stops.

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**Existing Conditions**



## EXISTING CONDITIONS

### BACKGROUND DOCUMENTS

A number of planning documents were used to inform or refine the outcomes of this transit study, including some specific analyses of roadway changes and corridors, plans from Pender and Brunswick counties, the Create Wilmington Comprehensive Plan, as well as some documents relating to existing or proposed facilities and developments. The documents listed below were the ones most broadly applicable to designing the recommendations in this SRTP.

#### Wave Transit Short-Range Transit Plan (SRTP) – June 2012

This previous SRTP proposed changes to existing services in order to increase efficiency and usefulness, as well as some new service designed to accommodate growth. Most of the recommendations were implemented successfully, with many routes becoming more direct and some span and frequency changes. The Creekwood neighborhood was no longer directly served, and this warrants a fresh look in the current study. New service was piloted to Carolina Beach/Pleasure Island, although only five round trips per day could be funded. This pilot is evaluated in the current SRTP. Finally, there has been progress on some challenges identified in the previous SRTP, but continued perseverance is required due to the long-term nature of correcting the problems, such as improvements to sidewalks and bus stops.

The study team reviewed plans from the City of Wilmington, New Hanover County, and others.

#### Cape Fear Transportation 2040 – November 2015

This long-range plan from WMPO notes that mass transit in the region should increasingly look to serve choice riders as well as those who are transit-dependent. Some potential express bus routes were outlined, and those are considered in this current study. The need for new transit service to the Porters Neck Walmart was noted, which is also evaluated in this SRTP. The plan also describes the planned Wilmington Multimodal Transportation Center, which is currently about to begin construction.

#### Plan NHC – July 2016

The Comprehensive Plan for New Hanover County documents the recent growth and outlines expected future regional development. Growth nodes are identified for three areas – around Monkey Junction, near the Cape Fear Community College North Campus, and the Porters Neck/Kirkland area. These nodes were taken into account when planning future changes to transit service.

## SUMMARY OF ROUTE PROFILES

The SRTP compiled route profiles for each of Wave Transit's fixed routes. The following data was reviewed for each route: major corridors, major activity centers/points of interest, schedule statistics, annual ridership (FY2012 to FY2016), daily ridership, and passengers per vehicle hour. Specific service improvement opportunities were proposed for each route, focusing on alignment modifications, frequency, and span.

Route 101 is Wave Transit's highest-ridership fixed-route, averaging 476 passengers per day. Systemwide, Wave Transit's fixed-routes average 192 passengers per day. Route 201 is the most crowded route, with the most passengers per vehicle hour. Full route profiles are available in Appendix B.

Figure 5 | Average Daily Passengers Per Route (2016, not including Downtown Trolley)

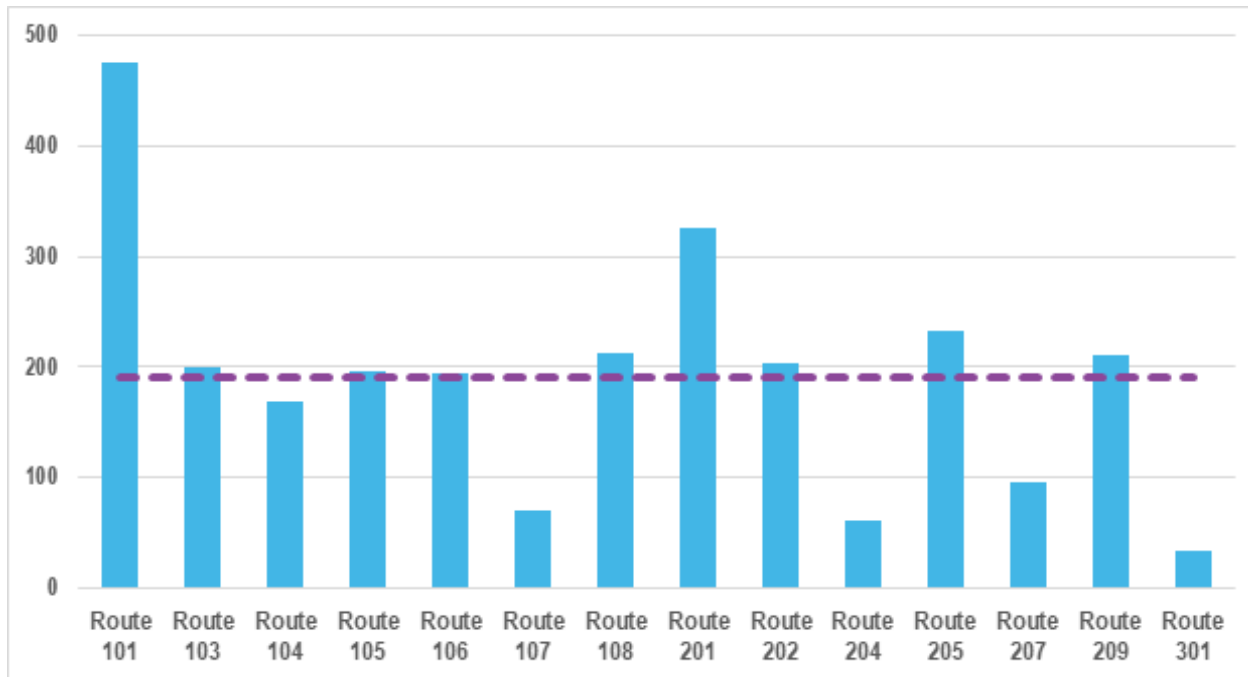
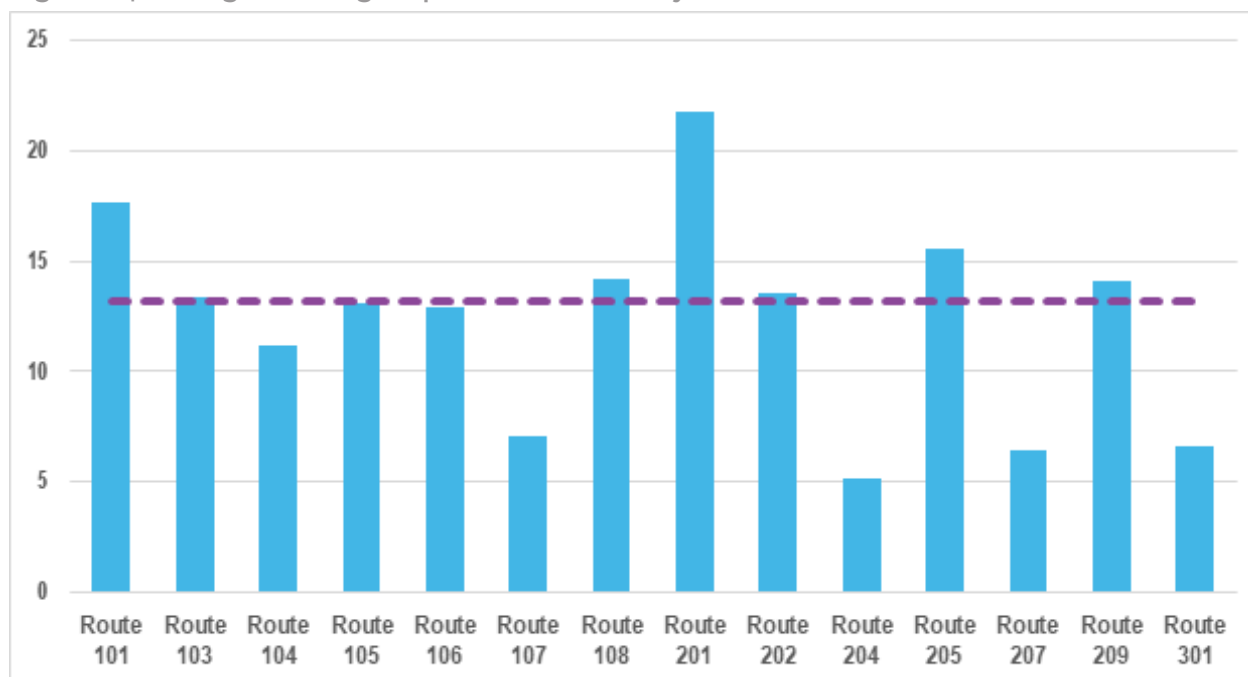


Figure 6 | Average Passengers per Vehicle Hour by Route

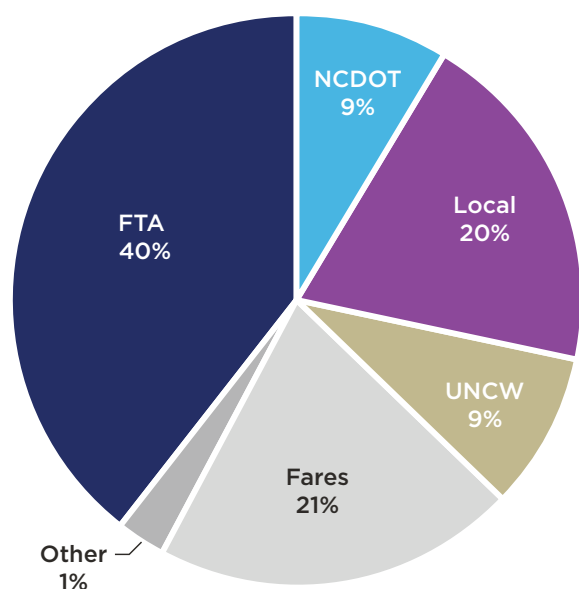


## FARES AND FUNDING

Wave Transit's revenues are divided into six major categories, as summarized below:

- **FTA:** Section 5307 (Urbanized Area Formula Grant) is the predominant federal funding source for Wave Transit (currently about \$2.4M per year); Section 5310 (Enhanced Mobility of Seniors & Individuals with Disabilities) is also used for operating assistance (currently about \$250K per year), as well as other smaller federal programs.
- **NCDOT:** Funding is primarily from the State Maintenance Assistance Program (SMAP), and is unpredictable year to year.
- **Local:** City of Wilmington is the primary provider of local funding. As of 2017, local sources provided 18% of Wave Transit's operating revenues. Wave Transit supports a vehicle registration fee and dedicated transit sales tax, which combined would generate more than \$9 million annually, and significantly improve transit in the Cape Fear region.
- **UNC Wilmington:** Revenue from UNCW is paid by the university in lieu of fares for students; transit service fees from students are remitted directly to UNCW.
- **Fares:** Fares account for over 20% of annual revenues. Fares were raised by \$0.50 in 2013, at the time giving Wave Transit the second-highest fare in North Carolina (behind Charlotte), with a full adult fare 62% higher than the average full fare for the state.
- **Other:** Revenue contracts for advertising and intercity bus service (Greyhound).

Figure 7 | Wave Transit 2018 Adopted Revenue Budget



Among peer transit systems, regular fixed-route fares range from \$1.00 to \$2.25, with Wave Transit operating with a fare of \$2.00. While still somewhat higher than most of the peer group, this fact supports the high farebox recovery of Wave Transit identified above. Like Wave Transit, the peer systems provide free transfers and a federally mandated reduced fare program. Within the industry, fare revenues generally support between 12-20% of operating costs. At 21%, Wave Transit is at the higher end of this range. This indicates Wave Transit is leveraging fares to support service and utilizing other funds to support other needs, such as capital expenses.

Figure 8 | Fare Comparison with Peer Agencies

City, State	Service Provider	Fixed-route Fare*	Reduced Fare
<b>Wilmington, NC</b>	Cape Fear Public Transportation Authority	\$2.00	\$1.00
<b>Asheville, NC</b>	Asheville Redefines Transit	\$1.00	\$0.50
<b>Columbia, SC</b>	Central Midlands Transit	\$1.50	\$0.75
<b>Conover, NC</b>	Western Piedmont Regional Transit Authority	\$1.25	\$0.60
<b>Fayetteville, NC</b>	Fayetteville Area System of Transit	\$1.25	\$0.50
<b>Greensboro, NC</b>	Greensboro Transit Authority	\$1.50	\$1.00

<b>Greenville, SC</b>	Greenville Transit Authority	\$1.50	\$0.75
<b>Lakeland, FL</b>	Lakeland Area Mass Transit District	\$1.50	\$0.75
<b>Research Triangle Park, NC</b>	Research Triangle Regional Public Transportation Authority	\$2.25	\$1.00
<b>Roanoke, VA</b>	Greater Roanoke Transit Company	\$1.50	\$0.75
<b>Savannah, GA</b>	Chatham Area Transit Authority	\$1.50	\$0.75
<b>Winston-Salem, NC</b>	Winston-Salem Transit Authority	\$1.00	\$0.50
<b>Peer Average</b>		\$1.43	\$0.71

Source: National Transit Database (2015); \*All peer systems have free transfers.

Wave Transit's five-year projection shows that despite focused efforts and tight control on cost, operating expenses will grow faster than operating revenues. It is anticipated that while revenues will increase at an average rate of 1.7 percent, expenses will increase at an average rate of 2.4 percent. Over a five-year period, Wave Transit faces a projected \$1.2M operating deficit.

Figure 9 | Wave Transit Five Year Forecast Chart

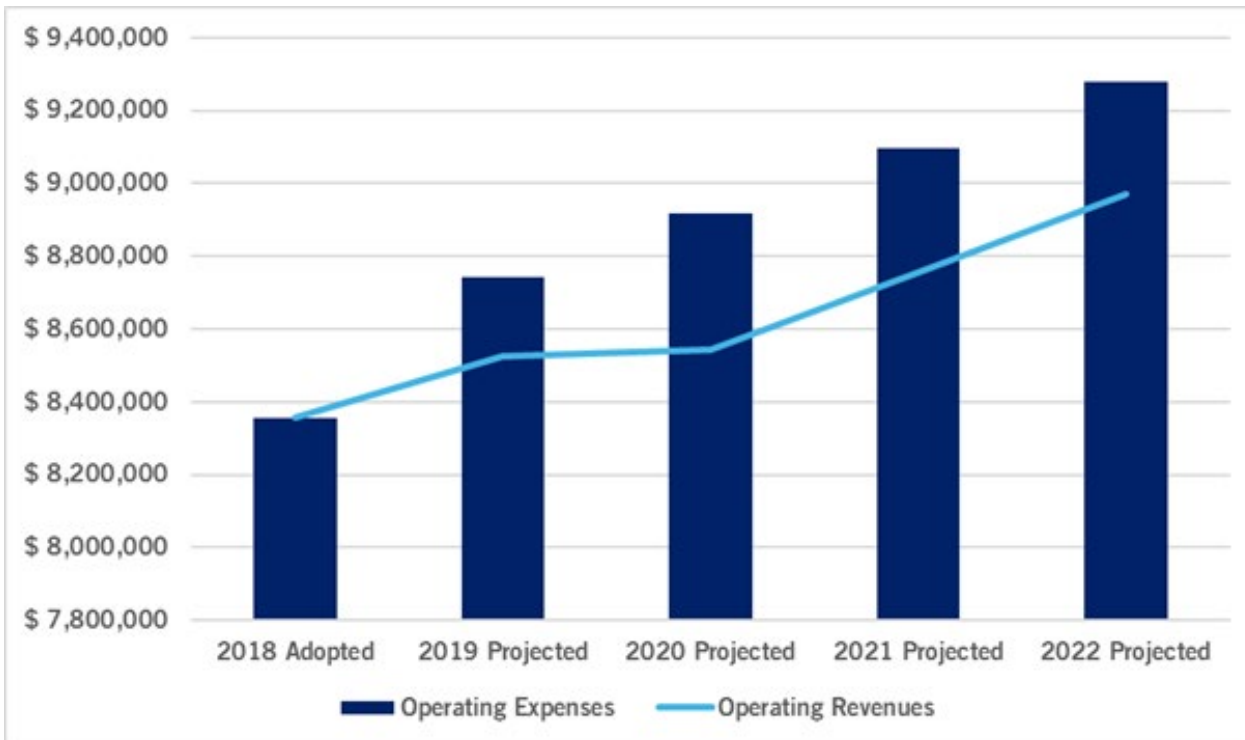




Figure 10 | Peer System Operating Environments

City, State	Service Provider	Service Area Size (sq. mi.)	Urbanized Area Population (2015)	Population Density (per sq. mile)	Annual Operating Cost (millions)	Fixed-Route Vehicles in Peak Service
<b>Wilmington, NC</b>	Cape Fear Public Transportation Authority	200	216,479	1,082	\$7.1	23
<b>Asheville, NC</b>	Asheville Redefines Transit	45	83,393	1,853	\$5.2	16
<b>Columbia, SC</b>	Central Midlands Transit	211	288,700	1,368	\$12.8	38
<b>Conover, NC</b>	Western Piedmont Regional Transit Authority	1,665	342,142	205	\$1.4	6
<b>Fayetteville, NC</b>	Fayetteville Area System of Transit	95	150,131	1,580	\$5.6	22
<b>Greensboro, NC</b>	Greensboro Transit Authority	127	269,666	2,123	\$14.2	41
<b>Greenville, SC</b>	Greenville Transit Authority	227	248,173	1,093	\$4.5	17
<b>Lakeland, FL</b>	Lakeland Area Mass Transit District	77	312,388	4,056	\$6.4	27
<b>Research Triangle Park, NC</b>	Research Triangle Regional Public Transportation Authority	1,519	1,402,824	923	\$19.6	78
<b>Roanoke, VA</b>	Greater Roanoke Transit Company	43	97,032	2,256	\$7.3	34
<b>Savannah, GA</b>	Chatham Area Transit Authority	438	265,128	605	\$17.3	52
<b>Winston-Salem, NC</b>	Winston-Salem Transit Authority	108	199,555	1,847	\$11.0	36
<b>Peer Average</b>		414	332,609	1,628	\$9.6	33

Source: National Transit Database (2015), U.S. Census

## ASSESSMENT OF EXISTING SERVICE

The study team, together with Wave Transit, identified a set of transit systems with similar characteristics and operating environments to Wave Transit. The peers generally have metropolitan areas and transit systems that are close in size to Wilmington and mid-size universities with student and staff populations comparable to the University of North Carolina Wilmington. **Figure 10 | Peer System Operating Environments** lists each peer and the

characteristics that make the transit systems similar to Wave Transit.

Wave Transit's service area is 200 square miles with a population of 216,479. The Cape Fear region generally features low-to-moderate density. As a result, the need for public transit for low-income individuals is critical, but providing service efficiently and reliably is more challenging.

## Performance Metrics Benchmarking

Wave Transit and its peer systems were compared in terms of select financial metrics. Data was collected from the National Transit Database (NTD) based on 2015 reporting data. **Figure 11 | Peer Agency Fixed-Route Performance Metrics (2015)** shows how transit service in Wilmington compares to each selected peer community across a number of key financial benchmarks. Data below is representative of fixed route service only.

Figure 11 | Peer Agency Fixed-Route Performance Metrics (2015)

City, State	Service Provider	Passengers per Revenue Hour	Cost per Passenger Trip	Cost per Revenue Hour	Farebox Recovery %
<b>Wilmington, NC</b>	Cape Fear Public Transportation Authority	16.98	\$4.80	\$81.51	19.17%
<b>Asheville, NC</b>	Asheville Redefines Transit	22.66	\$3.57	\$80.95	12.86%
<b>Columbia, SC</b>	Central Midlands Transit	14.82	\$6.18	\$91.58	14.63%
<b>Conover, NC</b>	Western Piedmont Regional Transit Authority	8.92	\$9.89	\$88.23	6.97%
<b>Fayetteville, NC</b>	Fayetteville Area System of Transit	18.36	\$3.53	\$64.82	22.02%
<b>Greensboro, NC</b>	Greensboro Transit Authority	26.76	\$3.32	\$88.74	23.21%
<b>Greenville, SC</b>	Greenville Transit Authority	16.45	\$4.18	\$68.81	21.44%
<b>Lakeland, FL</b>	Lakeland Area Mass Transit District	17.02	\$4.74	\$80.65	4.42%

<b>Research Triangle Park, NC</b>	Research Triangle Regional Public Transportation Authority	14.35	\$10.47	\$150.20	11.40%
<b>Roanoke, VA</b>	Greater Roanoke Transit Company	20.94	\$3.18	\$66.68	27.67%
<b>Savannah, GA</b>	Chatham Area Transit Authority	20.27	\$4.77	\$96.61	16.45%
<b>Winston-Salem, NC</b>	Winston-Salem Transit Authority	24.56	\$3.39	\$83.17	15.93%
<b>Peer Average</b>		18.65	\$5.20	\$87.31	16.09%

Wave Transit's cost per passenger trip is \$4.80, 7.7 percent below the peer average. When compared to peer systems, Wave Transit has the fourth highest cost per passenger trip. The service recommendations in this study will help to improve the cost per passenger by identifying short-range transit improvements to increase ridership productivity. When compared to peer agencies, Wave Transit's cost per revenue hour is better than half of the peer group. At a cost of \$81.51 per revenue hour, Wave Transit's cost is 6.6 percent lower than the average of peer agencies. It should be noted that many of the peer agencies are city operated and share overhead cost among other city departments, which means that not all of the peer overhead cost is reflected in this analysis. As a transit authority, Wave Transit incurs all overhead cost.

The farebox recovery ratio for Wave Transit is 19.17 percent, which is above the peer average. Wave Transit requires less subsidy per passenger than half of the peer group.

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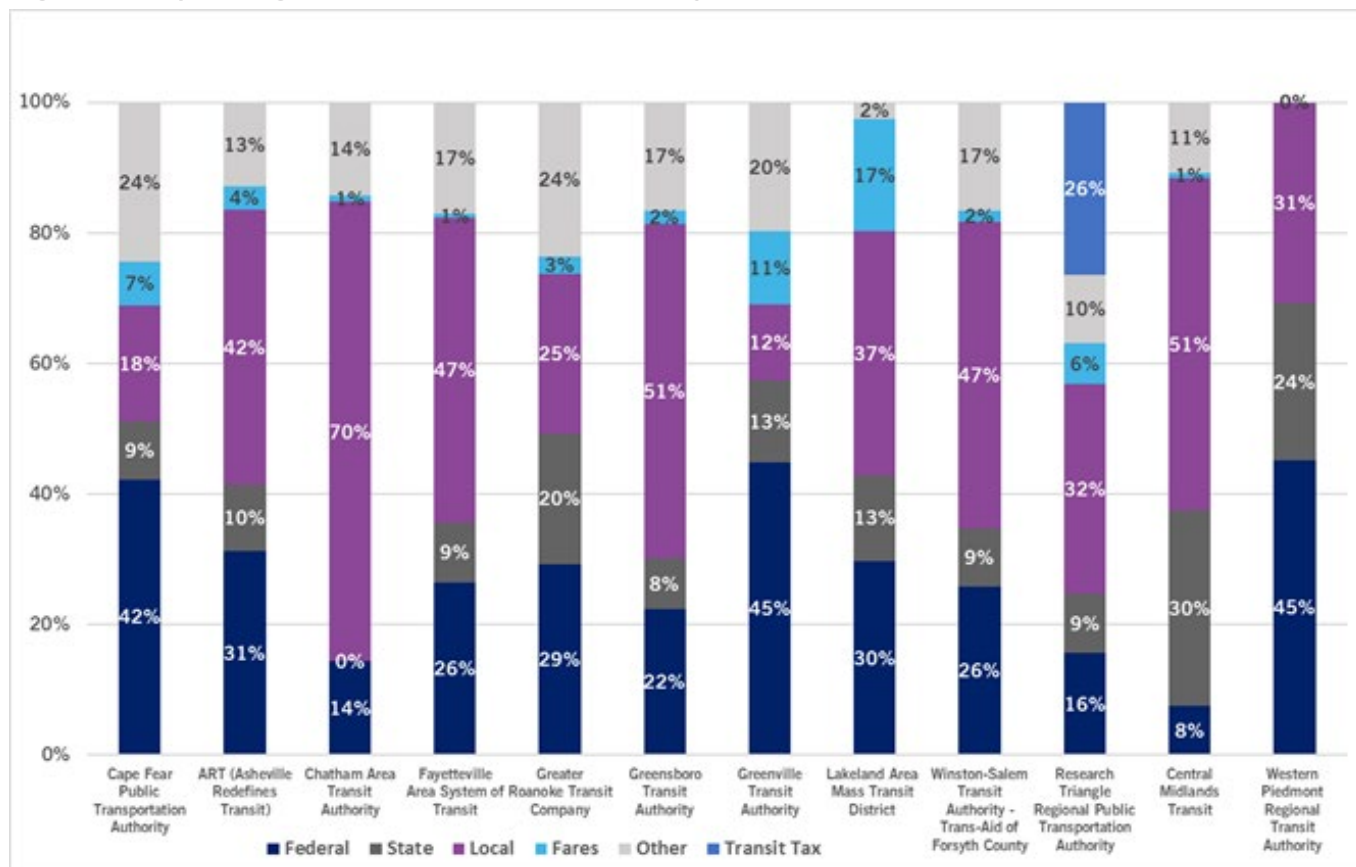
## Operating Revenues

The peer systems utilize federal, state, local, and other funds to support transit operations. As shown in **Figure 12 | Operating Revenue Sources from Peer Systems**, the reliance on various funds differs between providers. Wave Transit receives the majority of its operating funding from the Federal Government, which comprises 42% of the operating revenue, the third highest of all peers. By contrast, 18% of Wave Transit's operating revenues come from local sources, the second lowest percentage of all peers. The largest variance in funding sources among the peer group is local funding. As agencies look for new ways to provide improved services, most turn to various forms of local funding, including sales tax, property tax, fuel tax, and general fund support.

More than other funding sources, the amount of local dollars impacts the level of transit service available to a community.

The two main reasons for this are, 1) federal and state funding is generally trending downward as a percentage of agency revenue, and 2) any discretionary federal funds require a local funding match of at least 20 percent for capital projects and at least 50 percent for operating projects. Dedicated local funding sources, including the tax options identified, provide additional benefits as compared to general fund revenues. Dedicated local funding sources are more dependable and as a result may be used to leverage additional debt financing and support the issuance of bonds. Systemwide dedicated funding sources also help to reduce geographical/political challenges which are often associated with general fund revenues. Transit providers receiving general fund revenues often face challenges to service in which communities may seek more or less services based on the amount of funding provided and not based on the level of demand.

Figure 12 | Operating Revenue Sources from Peer Systems



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# Market Analysis

## MARKET ANALYSIS

The SRTP conducted a comprehensive Market Analysis to understand both the need and potential for transit service in Cape Fear by examining the following market characteristics:

- **Population and employment density**, which are the strongest indicators of transit demand. Larger numbers of people living and working near each other and along corridors leads to a stronger market for transit and indicate transit ridership potential.
- **Socio-economic characteristics**, such as income, auto availability, age, and disability status are characteristics indicative of a higher propensity to use transit, and thus illustrate transit need.
- **The location of major employment centers**, which equates to major daily destinations as well as potential transit partners.

Each of these factors indicates demand for transit, but ridership is also affected by urban form, land use, the pedestrian environment, and the convenience of other transportation alternatives.

### POPULATION

Population density is a key determinant of demand for public transit. The SRTP analyzed population density by Census block in the City of Wilmington, New Hanover County, and Brunswick County. Key findings from this analysis include the following:

- Much of Wilmington features low (one to five people per acre) to moderate population density (six to 15 people per acre).
- Wilmington's highest population density is downtown and on or near UNCW's campus. Downtown Wilmington and the neighborhoods north, south, and east feature transit-supportive population densities and street networks conducive to operating public transit routes.
- Outside of downtown Wilmington, high population density areas are more dispersed.

Pockets of high population density are present southwest of New Hanover Regional Medical Center, on St. Andrews Drive, east of Covil Avenue and south of Market Street, and between Kerr Avenue and College Road west of UNCW.

- The majority of locations that feature transit-supportive population densities are served by at least one Wave Transit route. Exceptions are the residential developments east of Ogden; high-density retail and residential developments on Market Street north of Gordon Road to Porters Neck; development along Causeway Drive, abutting Wrightsville Beach; the Greenville Village mobile home park south of Oleander Drive; and sections of Myrtle Grove.
- On Pleasure Island, the highest population densities are located in downtown Carolina Beach, Harper Avenue, and along Carolina Beach Drive (north and south of Carolina Beach).
- Population density in Brunswick County is mostly low, with moderate population densities in Belville south of Chappell Loop Road, and in Leland at the Brunswick Point apartment complex south of Ocean Highway, along Lanvale Road between Ocean Highway and Old Fayetteville Road, along Old Fayetteville Road in Woodburn, and at the Waterford residential development north of Ocean Highway.

### EMPLOYMENT

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. The SRTP analyzed employment density in the City of Wilmington, New Hanover County, and Brunswick County. Key findings from this analysis includes the following:

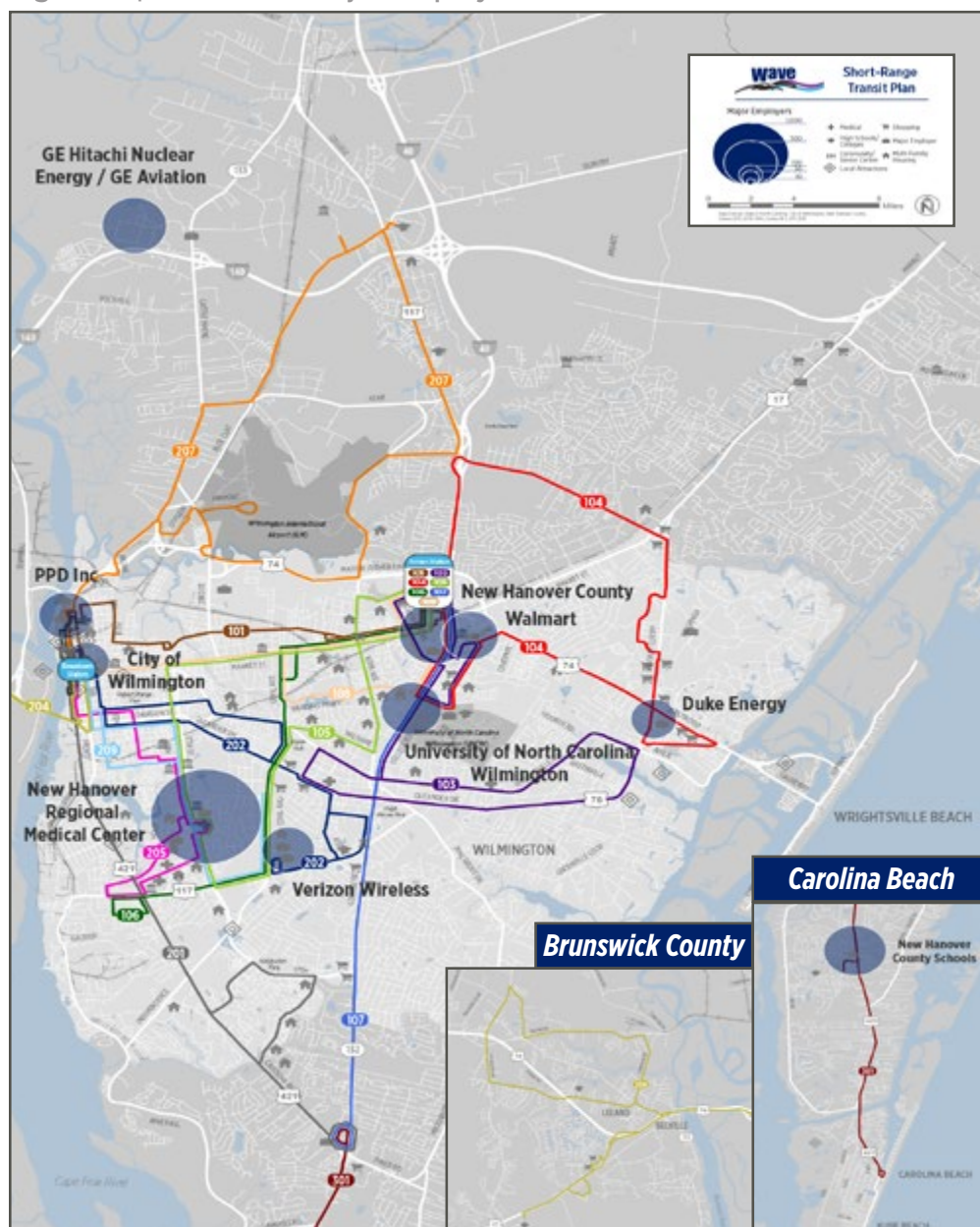
- As would be expected, relatively high employment density (31-60 jobs per acre) is concentrated in a few key pockets of Wave Transit's service area. These locations include downtown Wilmington, at New Hanover County Regional Medical Center on 17th Street, UNCW, Monkey Junction, Independence Mall,

and at the junction of Market Street, College Road, and Eastwood Road.

- Several corridors outside of downtown Wilmington support moderate to high employment densities, including Market Street, 17th Street, College Road, Oleander Drive, and Eastwood Road between Military Cutoff Road and Wrightsville Beach.
- Additional pockets of high employment density exist in the Audubon neighborhood, Porter's Neck, the intersection west of Shipyard Boulevard and Independence Boulevard, and on Military Cutoff Road north of Eastwood Road.

- Employment density in Brunswick County is highest in Leland, along Old Fayetteville Road and on Ocean Highway, west of I-74. However, this is not notated on the map below.
- Employment density on Pleasure Island is minimal, with the highest densities concentrated in downtown Carolina Beach and on Lake Park Boulevard. Carolina Beach's hotels, rental properties, and restaurants support a significant number of service sector jobs, especially in the summer months. Many service sector workers in Wilmington and New Hanover County are transit-dependent, and rely on Wave Transit to travel to and from work.

Figure 13 | Location of Major Employers



Population and employment density are the strongest indicators of transit demand.

## TRAVEL FLOWS

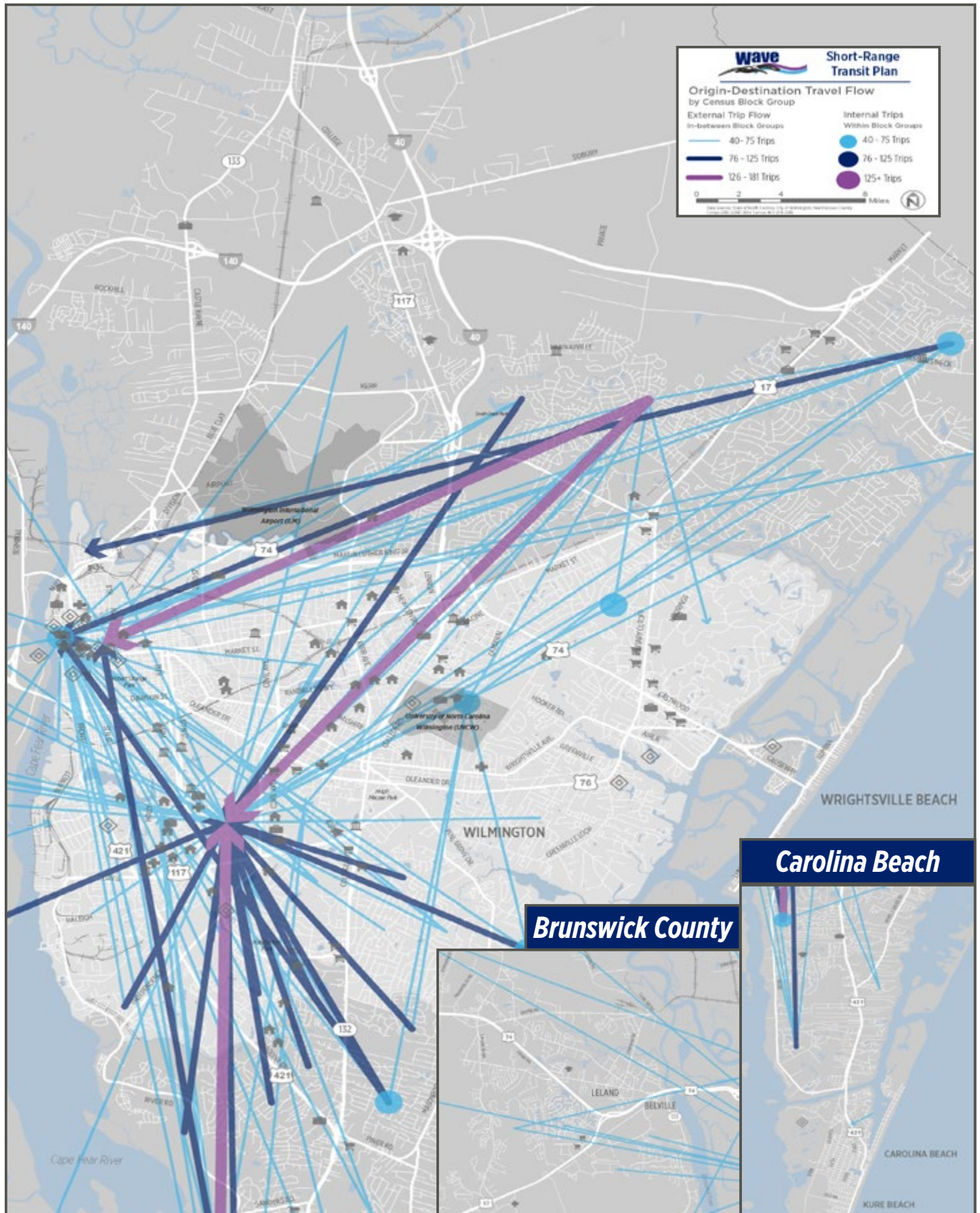
The SRTP analyzed employment origin and destination travel flow data (LODES, 2014) to assess daily origin-destination travel volumes in New Hanover and Brunswick Counties. This data is illustrated below in **Figure 14 | Employment-Based Travel Flows (2014)**. New Hanover County Regional Medical Center is the largest trip generator in the study area, followed by downtown Wilmington. The maximum number of daily trips between any two block groups in the study area is 181. The highest daily travel flows, featuring more than 100 daily employment trips, occur between the following nine locations:

- Kirkwood to New Hanover Regional Medical Center  
(181 daily employment trips)
- Meadowbrook to New Hanover Regional Medical Center  
(158 daily employment trips)
- Meadowbrook to downtown Wilmington  
(126 daily employment trips)
- The Cape to New Hanover Regional Medical Center  
(120 daily employment trips)
- Arrowhead to New Hanover Regional Medical Center  
(111 daily employment trips)
- Carriage Hills to New Hanover Regional Medical Center  
(103 daily employment trips)
- Breezewood to New Hanover Regional Medical Center  
(101 daily employment trips)
- The Lakes to New Hanover Regional Medical Center  
(101 daily employment trips)
- Myrtle Grove to New Hanover Regional Medical Center  
(101 daily employment trips)

Internal trips made within individual Block Groups are designated by proportional circles. Ten block groups in the study area feature between 40 and 75 internal daily trips, while no block groups in the study area feature more than 75 internal trips. The following neighborhoods in the study area record between 40 and 75 daily internal trips: downtown Wilmington, UNC Wilmington, Mayfair Town Center (Wilmington), Windward Oaks (Wilmington), North Myrtle Grove (New Hanover County), Porters Neck (New Hanover County), Kirkwood (New Hanover County), Kure Beach, Compass Pointe (Brunswick County), and Southeast Leland (Brunswick County).



Figure 14 | Employment-Based Travel Flows (2014)



## TRANSIT POTENTIAL INDEX

The Transit Potential Index is a composite of the population and employment densities and is an indicator of the viability of fixed-route service in the study area. A higher Transit Potential Index score for a Census Block points to a higher likelihood of generating substantial transit ridership in that block. A review of the Transit Potential Index for the study area suggests:

- Transit potential is particularly high in downtown Wilmington along Front Street, 2nd Street and 3rd Street. Moderate-to-high transit potential also exists in The Bottom and Carolina Place neighborhoods, in the vicinity of UNCW, near New Hanover County Regional Medical Center, at Monkey Junction, and in the Audubon neighborhood.
- The following corridors also feature high transit potential: Market Street, 17th Street, College Road, and Oleander Drive. Outlying pockets of transit potential exist in Wrightsville Beach, Myrtle Grove, the Seagate neighborhood, and Porter's Neck.
- Moderate transit potential exists at Creekwood South, north of Princess Place Drive. Creekwood South is a low-income housing development owned and operated by the Wilmington Housing Authority.
- Transit potential on Pleasure Island is highest in downtown Carolina Beach, as well as north and southeast of downtown.
- In Brunswick County, transit potential is highest in select locations in Leland, on Old Fayetteville Road and Ocean Highway, and pockets of residential development in Belville.
- The majority of the areas served by Wave Transit feature moderate transit potential, which is reflected in the system's current coverage.

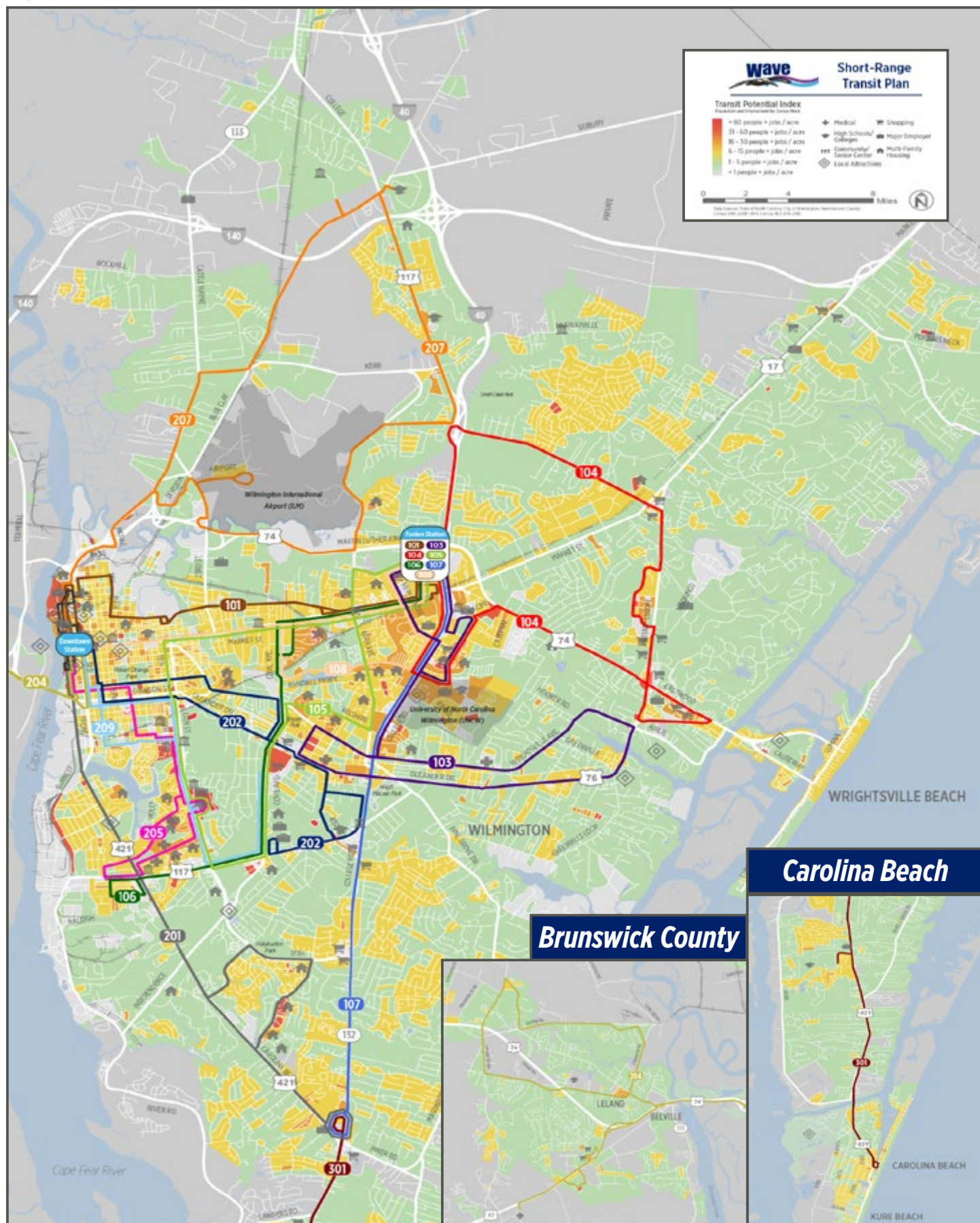
## IMPLICATIONS FOR THE SRTP

In 2015, 1.3% of workers in Wilmington commuted by public transit, 2.8% commuted by walking, and 3.2% commuted by "other means," which includes bicycles. Bicyclists are a growing segment of Wave Transit's ridership, and Wave Transit actively encourages multimodal connectivity. To accommodate bicyclists, two bike racks are mounted on each of Wave Transit's fixed-route vehicles. Where feasible, Wave's bus stop improvements include installation of a bike rack. In FY 2016, 20,730 bicycle trips were made on Wave Transit, a 64% increase from 2015.

While most areas which can support fixed-route transit already have scheduled service, there are opportunities to expand service to places such as Wrightsville Beach, Porters Neck/Ogden, and Myrtle Grove.



Figure 15 | Transit Potential Index



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# **Stakeholder and Public Input**



## STAKEHOLDER AND PUBLIC INPUT

### SURVEYS

The Wave Transit SRTP conducted three separate surveys during the first phase: Wave Transit Fixed-Route Survey, Wave Transit Free Downtown Trolley Survey, and the UNCW Seahawk Shuttle survey. Each survey included an on-board and online component. The on-board surveys for the fixed-route and Seahawk Shuttle were conducted in April 2017; the on-board survey for the Free Downtown Trolley was conducted in June 2017. Online versions of each survey were posted on the Wave Transit website from June through October 2017. Two surveys gauging public feedback on the proposed recommendations were available online in February and March, and these are discussed in Chapter 5.

A comprehensive overview of the survey tools, methodology, results, and comments are included in the Public Engagement Memo (Appendix C.)

### ONLINE PROJECT TOOLS

The SRTP solicited comments and feedback from the general public through an interactive, online tool called Wikimapping, which allows users to leave location-specific comments. New service is requested on Masonboro Loop Road, Greenville Loop Road, Military Cutoff Road (bidirectional service), Pine Grove Drive, at the junction of 17th Street and Independence Boulevard, Oleander Drive (bidirectional service), in Wrightsville Beach, in Sunset Park, and to the North Carolina Aquarium at Fort Fisher.

Figure 16 | SRTP Wikimapping Page

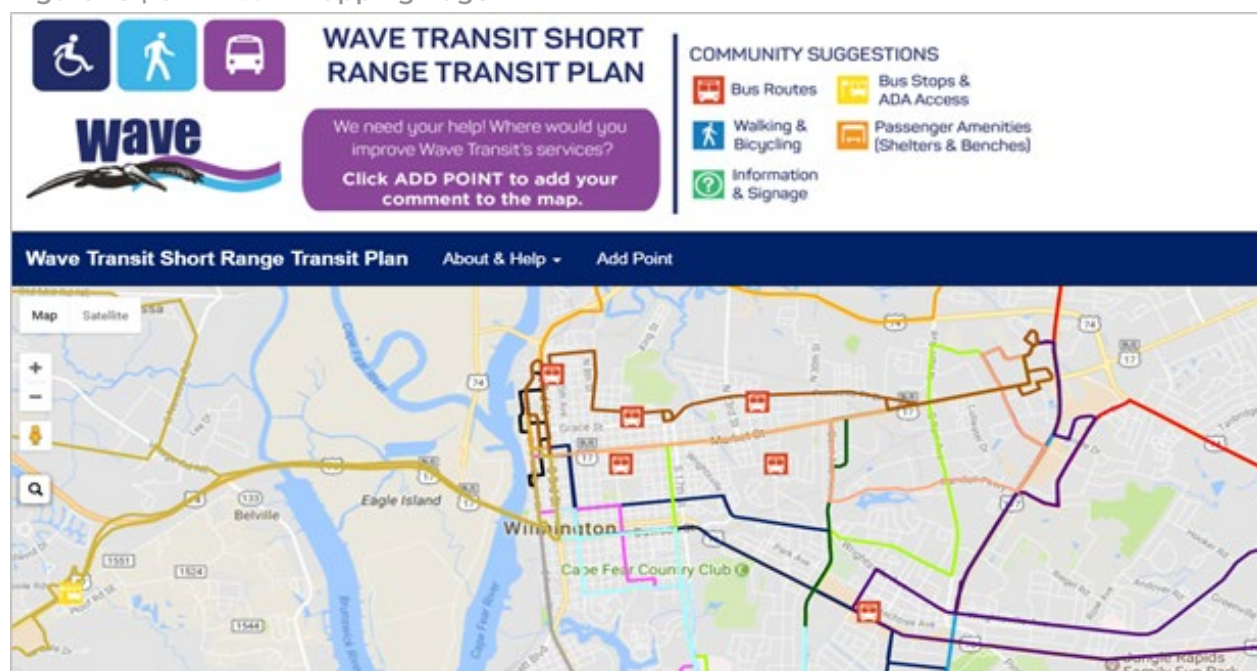




Figure 17 | September Meeting at Forden Station

## MEETINGS AND INTERVIEWS

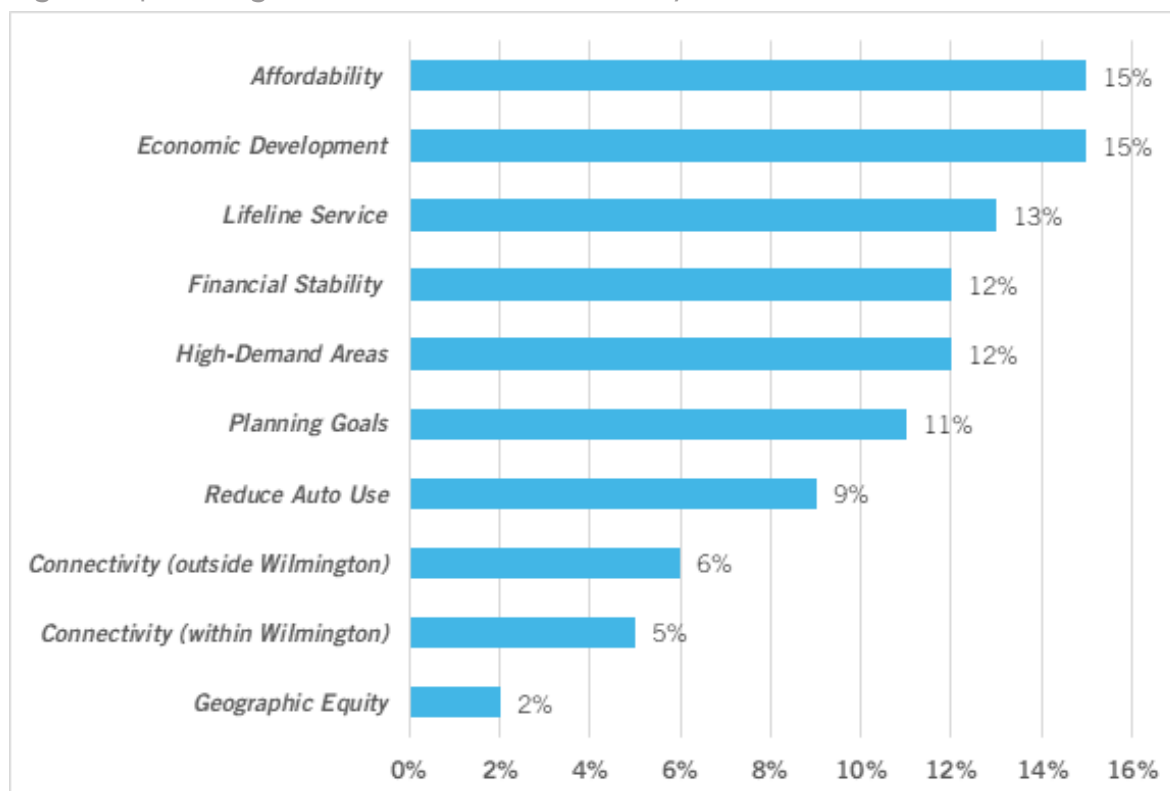
A public meeting was held at Forden Station in September 2017 in order to gather some early feedback about what the SRTP should focus on. This meeting was well attended and helped get the word out regarding the online survey described below.

The SRTP Steering Committee was integral in directing the study's goals and objectives and providing feedback on proposed recommendations as the SRTP progressed. The SRTP Steering Committee was composed of local and regional stakeholders and representatives from the City of Wilmington; New Hanover County; Brunswick County; Pender County; Town of Leland; Town of Carolina Beach; Town of Kure Beach; the regional planning organization (WMPO); educational institutions (UNCW and Cape Fear Community College); medical centers (New Hanover Regional Medical Center); and social service departments, community organizations, and community partners including the Department of Social Services, the NHC Senior Resource Center, the Wilmington Housing Authority, the Disability Resource Center, and Pender Adult Services. Key findings from the Steering Committee were as follows:

- **Ensure Equity:** The Steering Committee recognizes that Wave Transit is a vital mobility lifeline for many Cape Fear residents. However, the tradeoff between expanding transit coverage (serving new areas) and increasing transit frequency (more trips per hour), was acknowledged. While systemwide 15-minute frequency is optimal, the Steering Committee recognizes that existing ridership demand and financial constraints may not warrant this level of service.
- **Support Tourism:** Tourism is a principal industry in the Cape Fear region, and tourists contribute heavily to the region's traffic congestion. As such, the Steering Committee is invested in leveraging Wave Transit's resources to enhance the mobility of tourists while limiting the impact of private vehicles on the region's roads. Limited access to Pleasure Island, as well as the expectation of increased traffic on River Road following the construction of a 2,000+ unit residential development, was also noted.
- **Promote Economic Development:** Improving fixed-route service between downtown Wilmington and Leland was suggested to provide greater flexibility for commuters and to support the development of new business in Leland. Attracting new businesses to the Cape Fear region by leveraging and improving public transit service is also a priority.
- **Expand Service:** Several Steering Committee members recommended that Wave Transit expand its current service area and function more as a regional transit system, as opposed to focusing service in the City of Wilmington and New Hanover County. Shuttle service between Carolina Beach, Kure Beach, Fort Fisher, and the Southport ferry was proposed to support connectivity on Pleasure Island. Gauging Pender County's interest in fixed-route transit services and discussing greater coverage with Brunswick County officials was also recommended.



Figure 18 | Steering Committee's Prioritized Goals/Values



A Downtown Trolley focus group was formed, which included stakeholders from existing economic development groups. This focus group considered changes to the existing Free Downtown Trolley, in order to attract more riders to the service and support growth in the Central Business District and surrounding areas. The group's deliberations especially helped with difficult tradeoffs between having the Trolley serve new areas, while still maximizing service frequency and minimizing ride time.

Members of the consulting team also conducted stakeholder interviews with City of Wilmington and New Hanover County jurisdictions and agencies, transportation partners, medical and social services institutions, and business organizations. Key points from each meeting are briefly summarized below:

- **Brunswick County:** The existing Wave Transit route (204 Brunswick Connector) is well located in Brunswick County and serves the areas where the majority of development is occurring. Brunswick County representatives stressed the importance of pedestrian connections to the three Wave Transit park-and-ride lots, and hope usage of these facilities can be increased.
- **New Hanover County Department of Social Services:** The key priority for the NHC DSS is to ensure that Wave Transit provides service to their new building in coordination with WHA, which is scheduled to open in 2019. Providing service to NHC Government Center on voting day and event transportation for the agency's annual fatherhood conference in the spring were suggested. DSS would also appreciate a greater understanding

of the travel training program, and notice for future service changes associated with the SRTP, so they can be fully prepared for service modifications. Wave Transit has discussed transit needs for the new DSS facility with the project architect, and plans to serve the new facility with improved access and amenities.

- **New Hanover County Manager:** The County Manager stressed that transit service should coordinate closely with zones designated for development by New Hanover County, specifically the three growth nodes identified in the county's Comprehensive Plan: Monkey Junction, Porter's Neck, and N. College Road/Blue Clay Road. Additionally, he noted that the three year Capital Improvement Plan includes funding for bicycle and pedestrian infrastructure improvements, which could help improve access to Wave Transit bus routes.
- **New Hanover County Planning Department:** New Hanover County is expecting its population to reach 130,000 by 2040 and is encouraging more mixed-use developments. The Planning Department is interested in considering express commuter service on Market Street to ease traffic congestion between downtown, midtown, and I-40.
- **Pender County:** Pender County representatives do not feel that fixed-route transit is warranted within the SRTP's five-year planning horizon. However, they are interested in improving the regional transportation network as more than 60% of county residents commute to jobs outside the county. The county is focusing development along NC-210 and locations south, which could eventually support fixed-route transit.
- **Town of Carolina Beach:** Carolina Beach officials value Wave Transit service (Route 301 Pleasure Island) and do not want the service to be discontinued; many service/hospitality employees rely on the route to commute to/from Pleasure Island. Officials are interested in how ridership is affected by festivals and large events (held nearly every weekend during the shoulder season).
- **Town of Wrightsville Beach:** Wrightsville Beach officials are primarily concerned with traffic congestion on roadways leading to/from Wrightsville Beach, managing employee parking, and congestion on N. Lumina Avenue caused by Uber/Lyft pick up and drop offs near bars and restaurants. Officials indicated that parking is sufficient on most days during the summer, but can be difficult on summer weekends; they are concerned that fixed-route transit or a shuttle bus would stress existing municipal services by bringing more people than would otherwise arrive.
- **University of North Carolina Wilmington:** Multiple planned on- and off-campus developments will increase the need for the Seahawk Shuttle, such as additional on-campus housing and the potential extension of Hurst Drive. Short-term goals for the Seahawk Shuttle include better education for incoming students on how to use the shuttle, better coordination with and service to off-campus housing developments, improved amenities (bus shelters), additional remote parking facilities, and operating larger capacity buses to handle expected ridership increases. UNCW is also willing to consider a dedicated transitway through campus (potentially Price Drive).

- **Wilmington City Manager:** The main topic was city funding of Wave Transit. The SRTP includes a look at how peer systems are funded, and the City is also undertaking a study of the topic which will likely include more detail. It was agreed to coordinate the studies as much as possible, in order to more accurately project local funding for Wave Transit in the future. There were no particular service requests from the City. It was also agreed that the consultants would follow up with Wilmington Housing Authority separately.
- **Wilmington Chamber of Commerce:** The Chamber of Commerce expressed the importance of public transit in the Wilmington region and hopes that Wave Transit will continue to offer service for employees working non-traditional hours (shift and hospital workers).
- **Wilmington Housing Authority:** WHA representatives stressed that individuals and families served by WHA are dependent on public transit, and that Wave Transit service is very important to their clients. They expressed concern that Wave Transit does not directly serve the Creekwood housing development (closest stop is on Princess Place). Additionally, a new development is planned west of Creekwood that includes 200 units of workforce housing (expected to be completed by 2019). WHA does not feel that coordinated on-demand service operated by Uber/Lyft would sufficiently serve the Creekwood development. WHA would appreciate bus shelters at the Hillcrest and Houston Moore housing developments.

Additional outreach was conducted at existing community events by Wave Transit staff, in order to raise awareness about the study and gather input.

Figure 19 | Wave Transit Park(ing) Day Outreach



## GOALS AND OBJECTIVES

### Project Goals

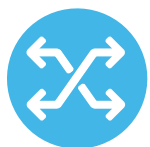
As mentioned above, stakeholder workshops and general public meetings were held to gather feedback on travel needs. Surveys were used to identify regional transit priorities and tradeoffs and to define goals. These goals were then refined during additional discussions with Wave Transit staff. Goals were further refined and clarified using additional data collected from peer reviews.

Based on this process the following goals are used in this study to guide future transit services within the Cape Fear region:



### Enhance

Make transit more convenient than it is today



### Connect

Connect people to more places than they can reach today



### Sustain

Ensure the financial and long-term sustainability of the transit system

Figure 20 | Project Goals

## PROJECT OBJECTIVES

Each of the goals for Wave Transit service will be addressed through a variety of measurable quantitative and qualitative objectives.

### Enhance

- Where applicable, operate longer hours on weekdays and weekends than the services do today
- Have more frequent scheduled service and/or shorter response times for on-demand service than today
- Keep fares affordable over time
- Provide more fare payment options than are available today
- Improve service reliability beyond what it is today, so that all routes average at least 75% on time for all timepoints

## Connect

- Increase or add service so that more major activity centers are served
- Focus on connecting more people to more jobs
- Comprehensive service for transit-dependent people should be a high priority
- Improve connections to nearby destinations in New Hanover and Brunswick counties

## Sustain

- Coordinate transit with future development and infrastructure and encourage the creation of “transit first” development areas
- Continue to provide cost-effective services
- Utilize emerging mobility options and public-private partnerships
- Address lack of dedicated transit funding
- Increase community support for transit above what it is today

The following two charts illustrate responses to survey questions from the first phase of the S RTP (responses are combined from on-board and online surveys).

Figure 21 | Which of the following describe the reasons that you use Wave Transit?

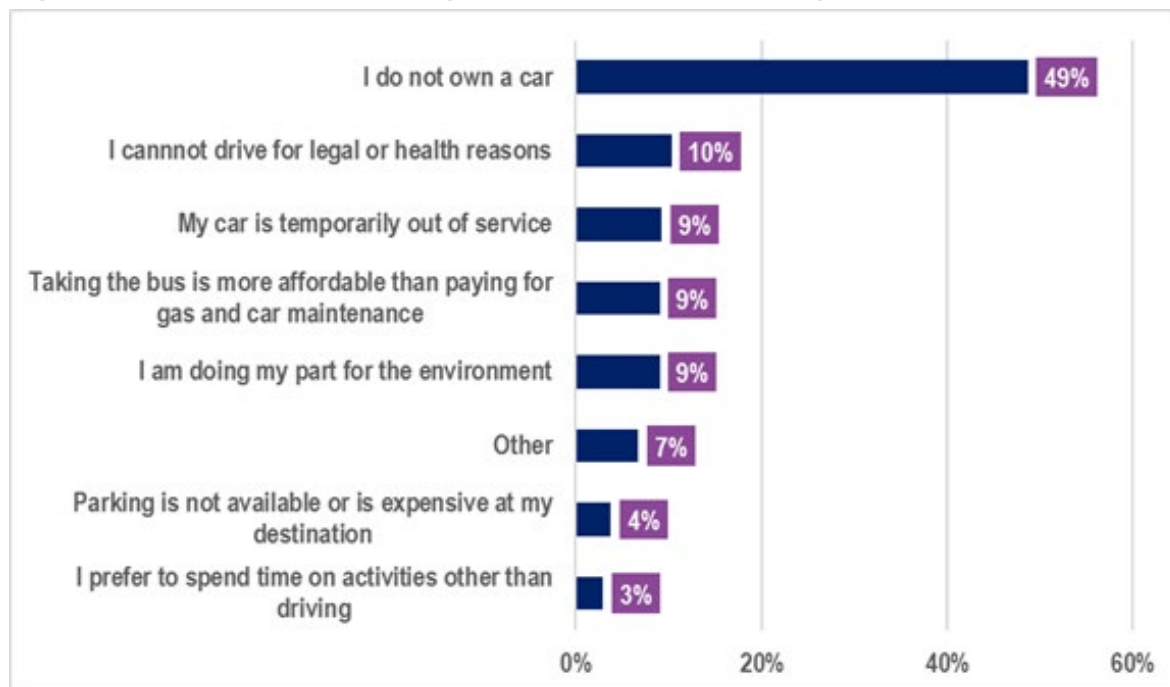
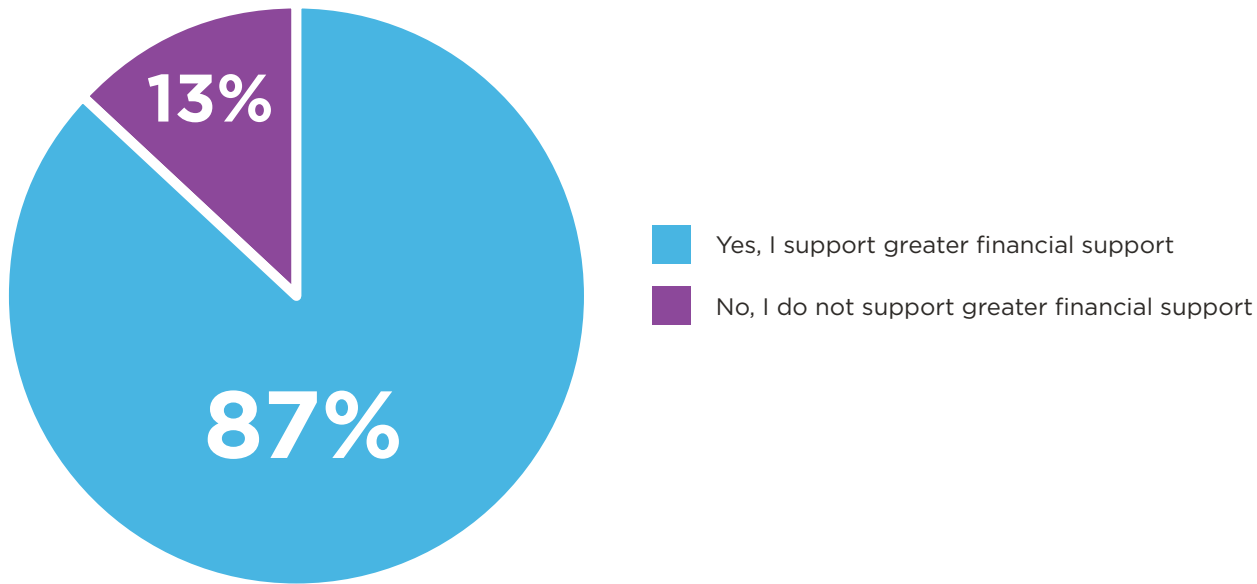


Figure 22 | Do you support greater local and regional financial support for Wave Transit?



## SUMMARY OF INPUT

The feedback received from the public and stakeholders is critical to creating recommendations for improving the Wave Transit system. Since resources are limited, prioritizing the most important and commonly-heard requests can ensure that those resources are used wisely. The breadth and quantity of feedback received during the project, whether communicated through surveys, interviews, or online, also instills confidence that the SRTTP will reflect the desires of the community in the Cape Fear region. Overall, suggestions can be categorized into themes as shown below.

### Frequency

More frequent service is desired, with the most common request being for service every half hour instead of hourly. Increased frequency can be especially helpful if a transfer between routes is required. In addition, more frequent service on Route 301 Pleasure Island, which currently only has a few trips per day, was suggested.

### Span of Service

Requests for earlier service were received, mainly to be able to get to jobs which have an early start. Weekend service was also suggested, particularly for Routes 204 Brunswick Connector and 207 North, which currently have no weekend service.

### Coverage

New service to areas which have no existing transit service was another common theme. Requests include:

- Porters Neck/Ogden
- Creekwood
- River Road/Sunset Park
- Masonboro Loop and Greenville Loop Rds.
- Beach areas, perhaps seasonally only

### Fares/Payment

There is a desire for more payment options, including the use of credit and debit cards, a reusable smart card, and mobile phones.



Figure 23 | How did you pay for your fare today? (On-board) /  
How do you typically pay for your fare on Wave Transit (Online)?

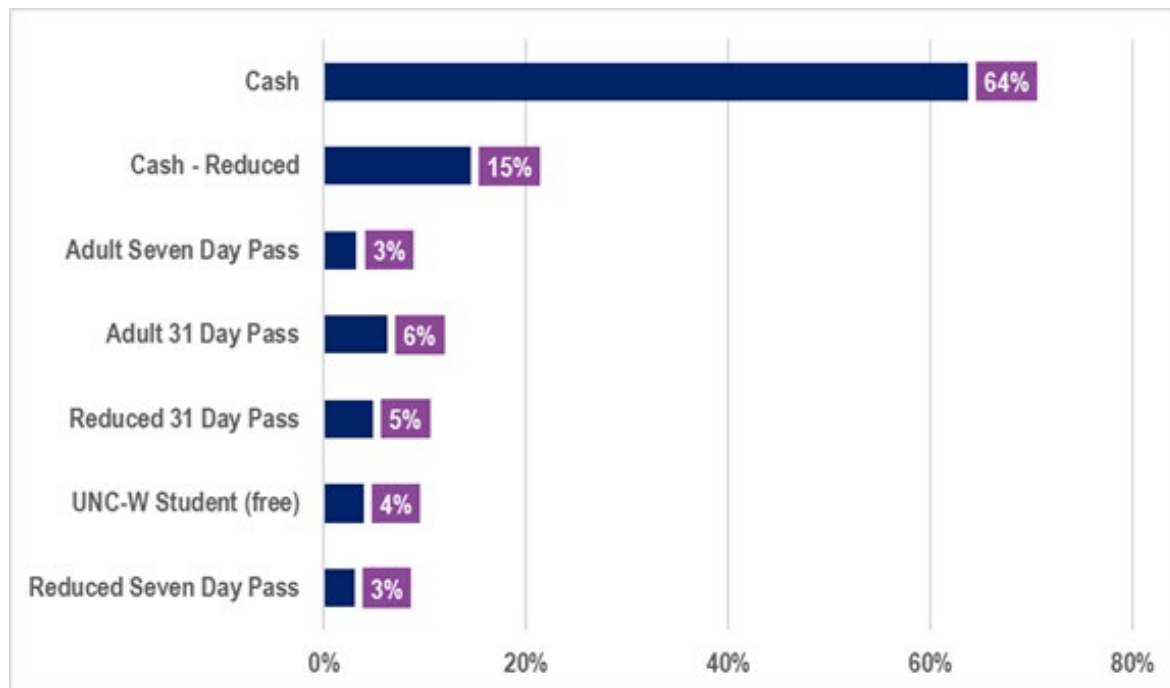
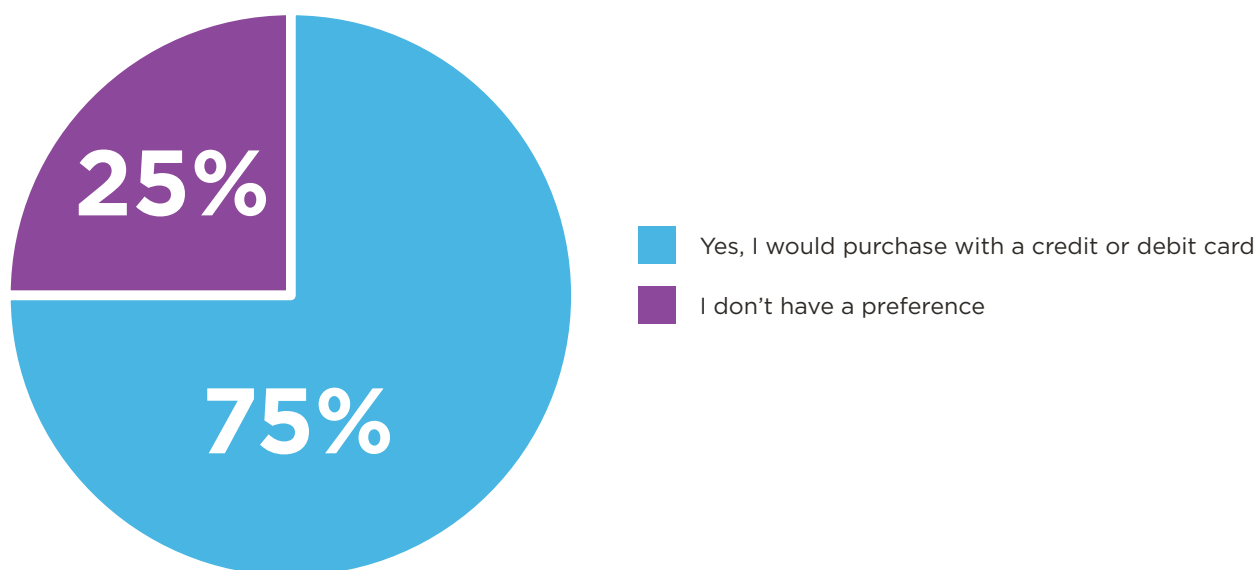


Figure 24 | If possible, would you purchase pass products with a credit or debit card?



## Information/Awareness

The real-time vehicle arrival information was introduced by Wave Transit midway through the public engagement process. This capability responds to customer desires for better information, and it is likely that continued promotion of the new app will increase its usage, and that any remaining kinks from the rollout will be ironed out.

## Customer Service

While it was acknowledged that many Wave Transit staff are professional and courteous, a desire was also expressed that this behavior become more universal among bus operators.

## Bus Stops

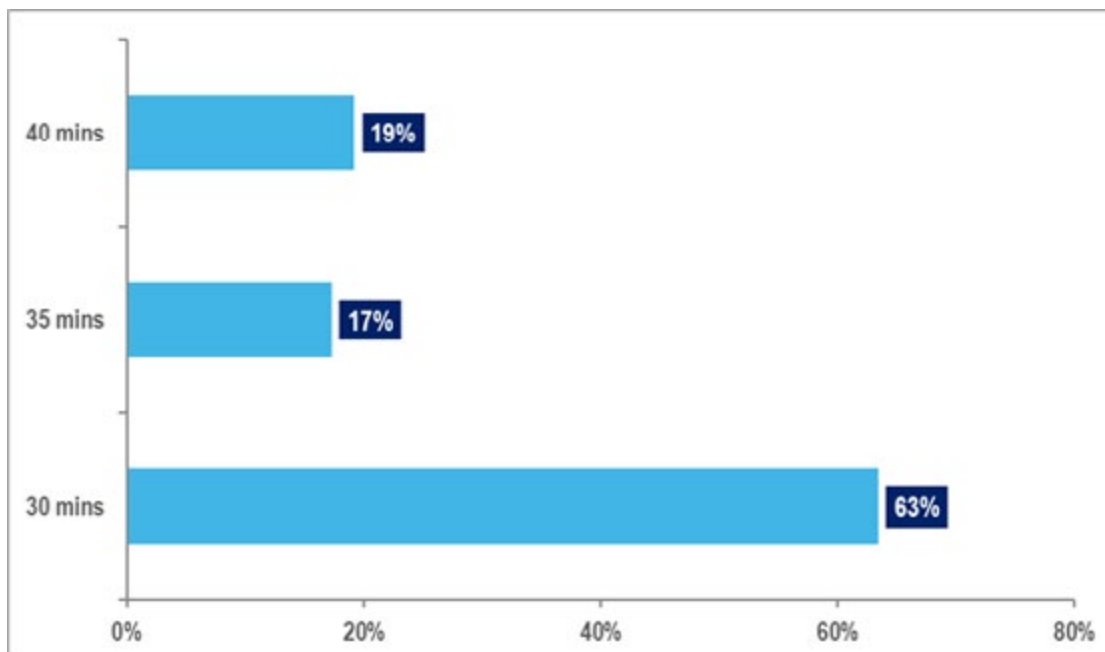
Feedback supports continuation of the program to upgrade bus stops and make more of them ADA accessible. A few locations for additional bus stops were noted as well.

## Free Downtown Trolley

Recommendations for the Free Downtown Trolley included:

- Serve Brooklyn Arts District
- Consider other business districts near downtown, and Sawmill Point apts.
- Consider charging a small fare
- Increase awareness as many people know little about the existing service

Figure 25 | Downtown Trolley – Increased coverage area might require a longer riding time. Would you be willing to ride

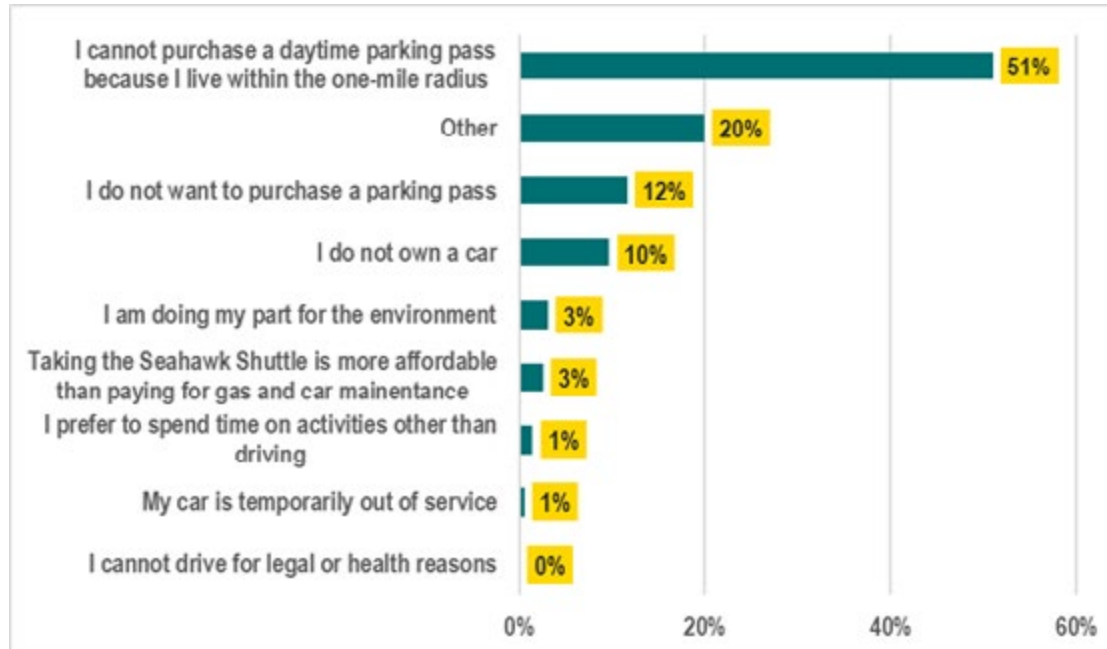


## Seahawk Shuttle

Suggestions for the UNCW services included:

- Later evening hours
- Adding weekend service
- More frequent service
- Improving driver shift change issues in the afternoon

Figure 26 | Which of the following describe the reasons that you use the Seahawk Shuttle?



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**Preferred Alternative**

## PREFERRED ALTERNATIVE

### EVALUATION PROCESS

Wave Transit's existing fixed-route service is stretched thin. The majority of routes operate at the minimum useful frequency (hourly) and at or near the minimum useful span (6 a.m. to 9 p.m.). Wave Transit serves an expansive geographic region, which features marginal density for fixed-route transit. Current routes operate in appropriate corridors, and serve destinations and neighborhoods that support fixed-route transit.

Wave Transit is currently operating efficiently. As such, few opportunities exist to reduce coverage, span or frequency in order to fund service elsewhere. As Wave Transit moves forward with the proposed cost-neutral and future recommendations, it's critical to use resources wisely and prioritize recommendations that will improve service for all users.

Multiple service needs were identified early on in the SRTP, including increased frequency, earlier weekday and some additional weekend service, new service for unserved areas, more fare collection/payment options, and continued bus stop improvements.

As much as possible, all proposed service changes for the SRTP were vetted using specific feedback received about each proposal, as well as a proposal's contribution toward the goals outlined in **Chapter 4 – Enhance, Connect, and Sustain**.

### PUBLIC/STAKEHOLDER RESPONSE TO ALTERNATIVES

Both the cost-neutral and future recommendations received strong support from the public and stakeholders. As summarized in the Public Engagement Memo (Appendix C), 73% of online survey respondents agree with the proposed alignment for new Route 210 17th Street and 76% agree with the proposal to add service to Creekwood on Route 101 and only serve Walmart hourly. Additionally, 72% of online survey respondents agree that \$1 is a reasonable fare for the Downtown Trolley. The most popular requests for additional/improved service are to Creekwood, Wilmington International Airport, Wrightsville Beach, rush-hour service, and expanded service for Route 301 Pleasure Island.



Figure 27 | What type of improvements would make you MORE LIKELY to use Wave Transit?  
(Select all that apply)

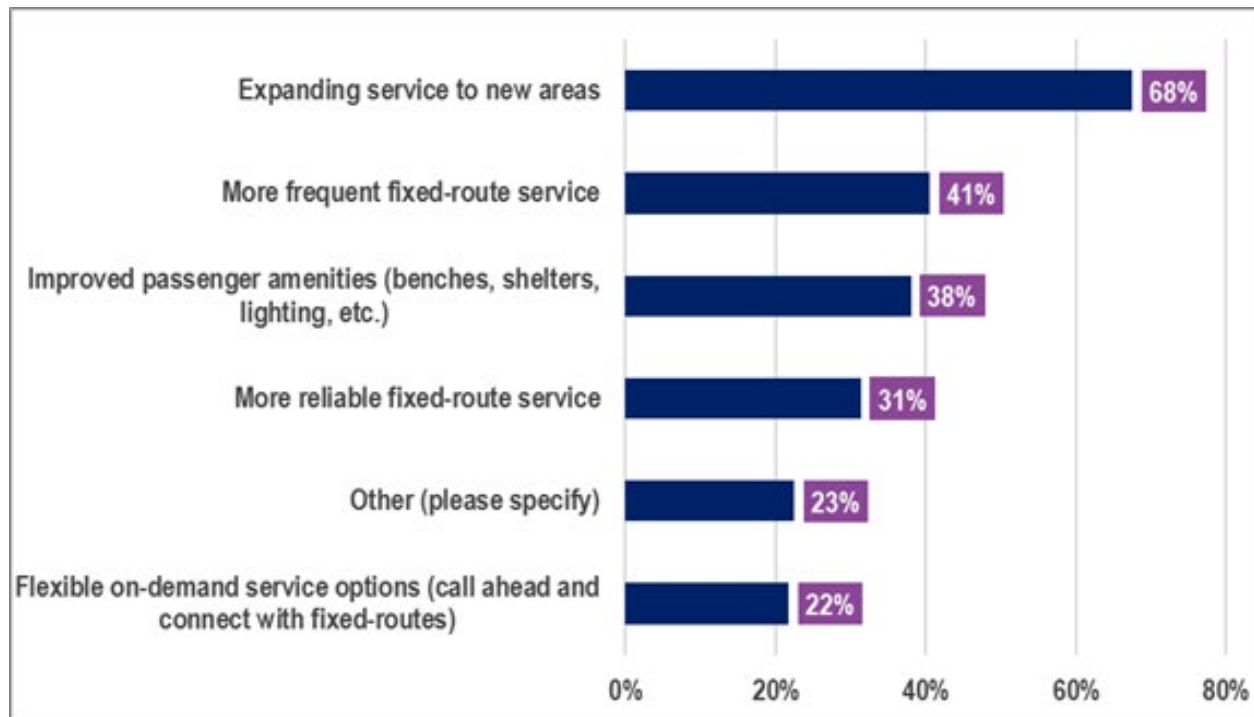


Figure 28 | Route 101 will add service to Creekwood, but will only serve Walmart hourly.

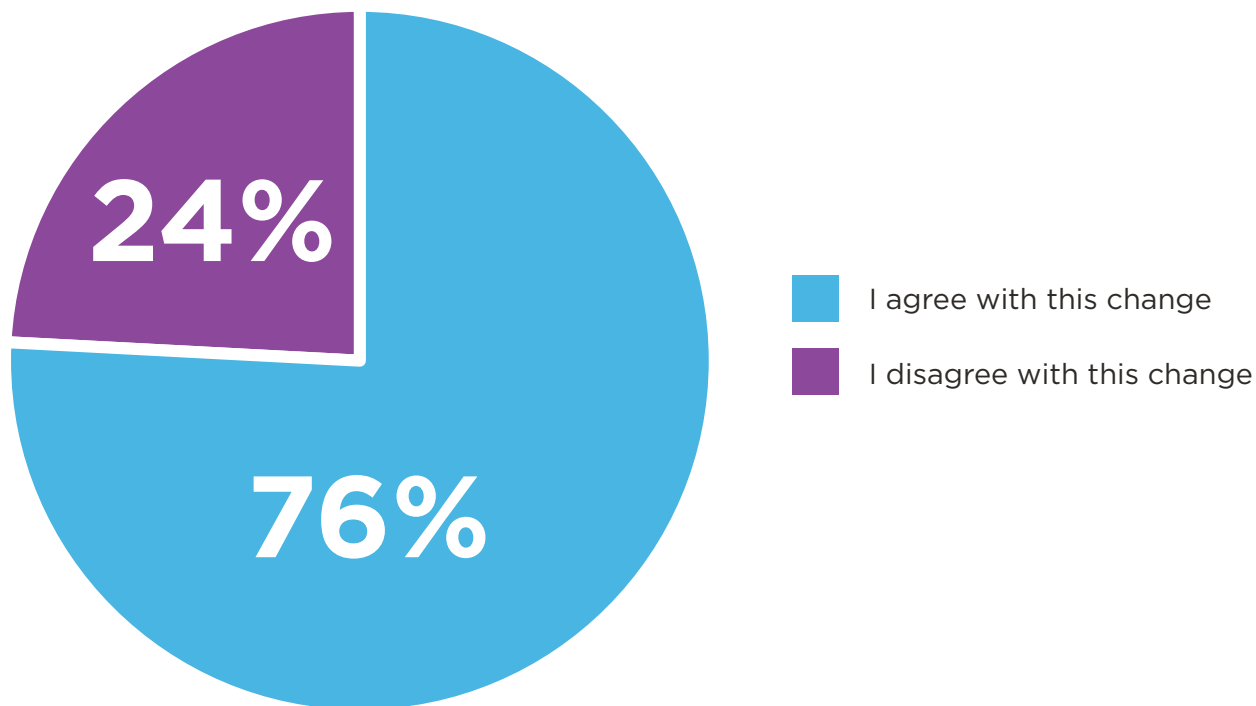
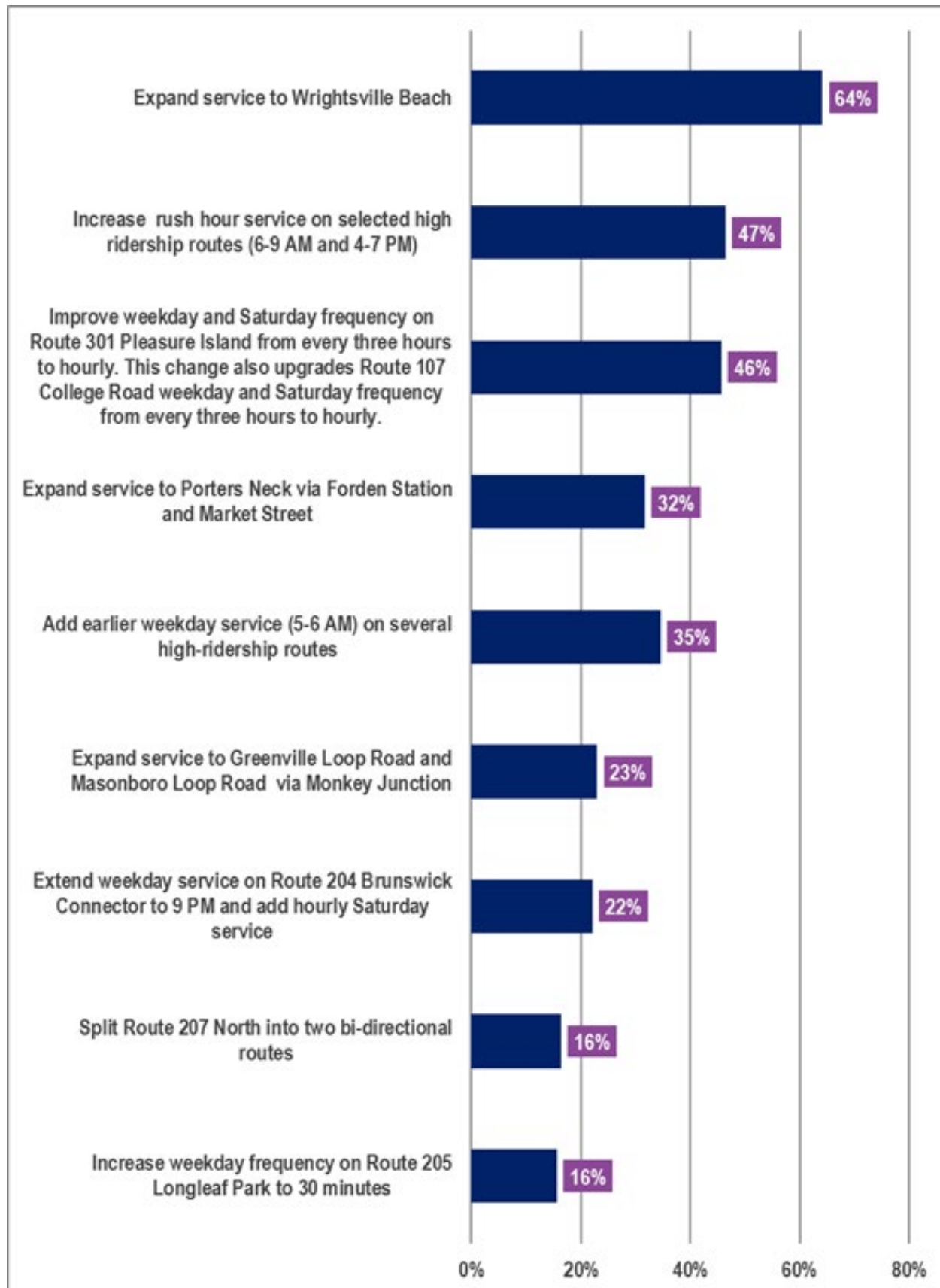


Figure 29 | The following future recommendations could be implemented by Wave Transit with additional funding and jurisdictional support where applicable, at an undetermined date. Please select only three projects that should be prioritized.



## COST-NEUTRAL ALTERNATIVES/RECOMMENDATIONS

Cost-neutral alternatives and recommendations can be implemented in the short-term and require no additional funding or resources. These recommendations focus on addressing service gaps and improving coordination of current service. Wave Transit staff were heavily involved in the recommendations process; all recommendations will be comprehensively reviewed before implementation.

Under the cost-neutral scenario, no significant modifications are proposed for the following Wave Transit fixed routes: Route 103 Oleander East, Route 105 Medical Center, Route 106 Shipyard Boulevard, Route 107 College Road, Route 108 Market Street, Route 202 Oleander West, Route 204 Brunswick Connector, and Route 301 Pleasure Island. Cost-neutral recommendations are summarized below:

- **Downtown Wilmington:** All routes serving downtown Wilmington will originate service at the new Multimodal Transportation Center, expected to open during 2019. This will require minor alignment modifications in downtown Wilmington for the following routes: Route 101, Route 108, Route 201, Route 202, Route 204, Route 205, Route 207, Route 210, and the Downtown Trolley. Service to Solomon Towers will be provided by Route 201 Carolina Beach Road outbound and Route 205 Longleaf Park inbound.
- **Route 101 Princess Place:** Direct service to Creekwood is added on select trips. Weekday peak service alternates between Creekwood and Walmart; evening and weekend service is included under both cost-neutral and future recommendations, depending on further review of vehicle travel times.
- **Route 207 North:** Will serve Wilmington International Airport and NHC Jail on every trip; coordinate transfer opportunity with Route 104 Northeast by rerouting both onto Kerr Avenue.
- **Route 209 Independence:** Replace Route 209 Independence with new Route 210 - 17th Street.

Figure 30 | Proposed Fixed Route Cost-Neutral Recommendations

Route 101 Princess Place	
Proposed Alignment and Service Modifications	<ul style="list-style-type: none"> <li>• Alternating outbound trips from Downtown Wilmington will serve Creekwood and Walmart during peak period (weekday 6 am – 6 pm); thus providing hourly service to Creekwood and Walmart</li> <li>• Possible service on every hourly trip to Creekwood and Walmart nights and weekends, but Wave staff must determine feasibility</li> <li>• Potential to expand service to 23rd Street and Scientific Park Drive via Creekwood once construction on Scientific Park Drive is complete</li> </ul>
Route 104 Northeast	
Proposed Alignment Modifications	<ul style="list-style-type: none"> <li>• Extends outbound service on Gordon Road to provide a safe transfer to Route 207 North at Kerr Avenue. Route continues north on Kerr Avenue, and returns inbound to Forden Station on College Road</li> </ul>
Route 201 Carolina Beach Road	
Proposed Alignment Modifications	<ul style="list-style-type: none"> <li>• Remove service on George Anderson Drive, 17th Street, and St. Andrews Drive to improve schedule adherence</li> <li>• This change will require customers traveling to/from George Anderson Drive to access Route 201 via Carolina Beach Road or Route 210 via 17th Street</li> <li>• Service on 17th Street and St. Andrews Drive will be covered by proposed Route 210</li> </ul>
Route 202 Oleander West	
Proposed Alignment Modifications	<ul style="list-style-type: none"> <li>• Potential changes at Independence Mall site to allow easier transfers</li> </ul>
Route 205 Long Leaf Park	
Proposed Alignment Modifications	<ul style="list-style-type: none"> <li>• Reroute onto 5th Street to ensure that all existing Route 209 area is covered</li> </ul>
Route 207 North	
Proposed Alignment Modifications	<ul style="list-style-type: none"> <li>• Will provide service on every trip to NHC Jail and Wilmington International Airport</li> <li>• Service shifted to Farley Drive to provide safer transfer opportunity to Route 104 Northeast</li> <li>• Will serve Front Street in both the inbound and outbound directions, and new Wilmington Multimodal Transportation Center via Red Cross Street</li> </ul>

## Route 209 Independence

Proposed Elimination

- Service is discontinued (replaced by new Route 210)

## Route 210 - 17th Street (New service)

Proposed New Route

- Replaces Route 201 service on 17th Street and St. Andrews Drive
- Replaces Route 209 Independence
- Provides additional service between new Multimodal Transportation Center and Monkey Junction
- Supplements Route 201, which has the highest ridership per vehicle hour
- New service to Cameron Art Museum and Point at Barclay Hills
- One-seat ride between downtown and Independence Mall could potentially be covered by changes to Route 202 noted above

Figure 31 | Service to New Downtown Transfer Station / Wilmington Multimodal Transportation Center (WMMTC)

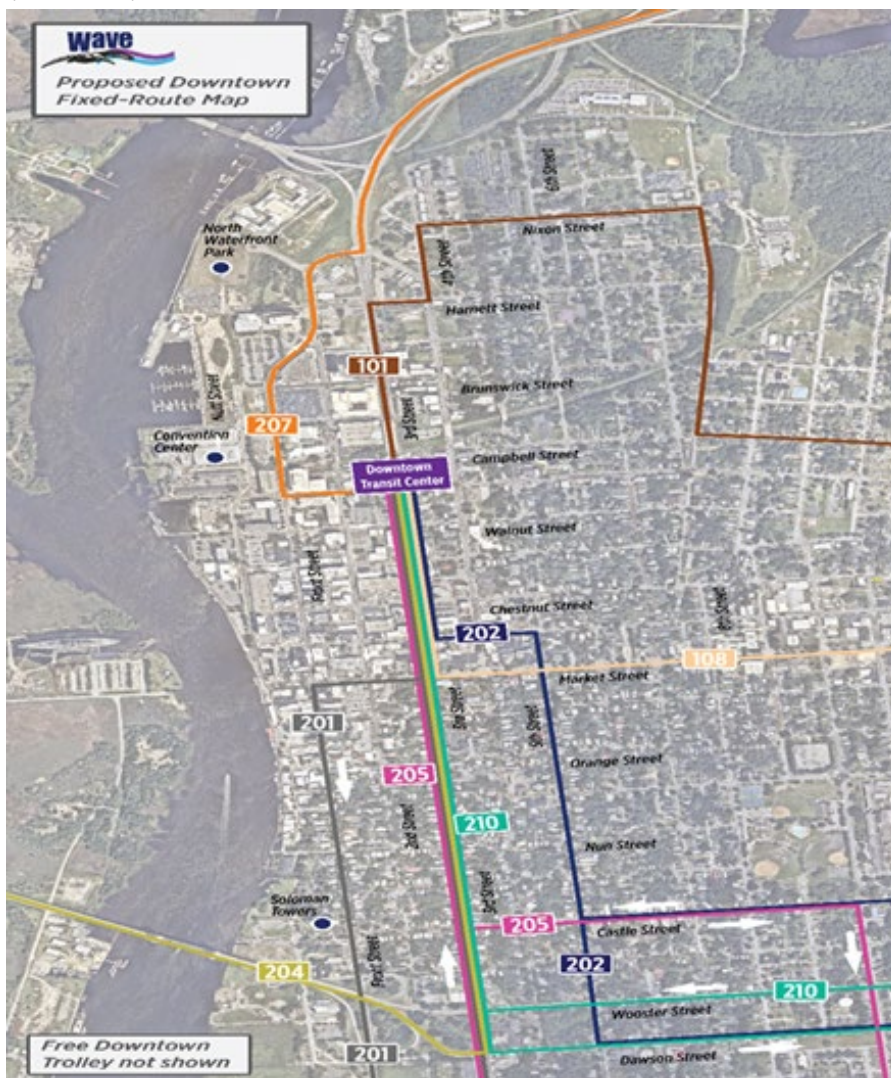




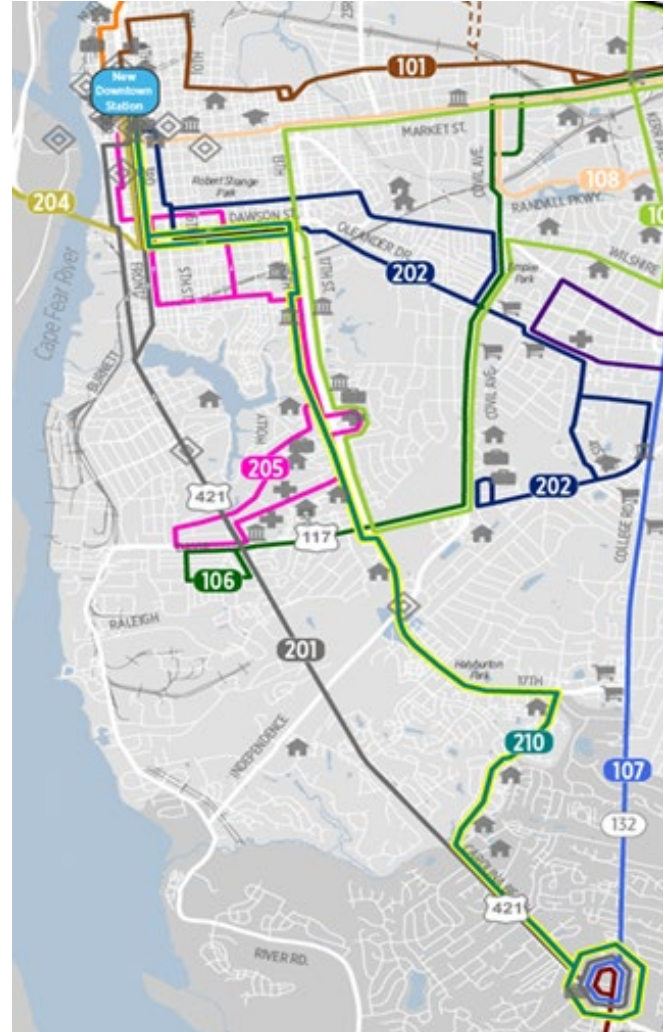
Figure 32 | Proposed Route 101 Alternating Service to Creekwood (and Walmart)



Figure 33 | New Route Alignment for Route 104 (and 207)



Figure 34 | New Proposed Route 210 - 17th Street





## FUTURE ALTERNATIVES/ RECOMMENDATIONS

Future alternatives and recommendations can be implemented in the next one to five years, but require additional funding and resources (approximately \$2.7 million). Future recommendations should be implemented once cost-neutral recommendations are complete. Overall, the recommendations improve span and frequency on some existing routes and expand service to Porters Neck, Masonboro Loop Road, Greenville Loop Road, and Wrightsville Beach. Future recommendations are summarized below:

- Fixed-route and/or on-demand service pilot programs used for covering new areas

- Increase Route 205 Long Leaf Park weekday frequency
- Improve service by splitting Route 207 North
- More weekday and Saturday service for Routes 204 Brunswick Connector and 301 Pleasure Island
- New service (either fixed route or on-demand) for Masonboro Loop Road, Greenville Loop Road, Porters Neck/Ogden, and Wrightsville Beach

**Figure 35 | Proposed Fixed-Route Future Recommendations**

Route 107 College Road	
Proposed Service Modifications	<ul style="list-style-type: none"> <li>• Increase to hourly service in conjunction with Route 301 changes below</li> </ul>
Route 204 Brunswick Connector	
Proposed Service Modifications	<ul style="list-style-type: none"> <li>• Extend weekday service until 9 p.m.</li> <li>• Expands access for commuters</li> <li>• Add Saturday hourly service</li> <li>• Estimated annual cost of \$150,000</li> </ul>
Route 205 Long Leaf Park	
Proposed Service Modifications	<ul style="list-style-type: none"> <li>• Increase to 30-minute weekday peak frequency</li> <li>• Productive route already and will have absorbed some Route 209 ridership</li> <li>• Estimated annual cost of \$300,000</li> </ul>
Route 207 North	
Proposed Alignment Modifications	<ul style="list-style-type: none"> <li>• Operate bidirectional service from the Downtown Multimodal Center to Cape Fear Community College's North Campus (via current outbound alignment).</li> <li>• Provides bi-directional service to Wilmington International Airport and NHC Jail</li> <li>• Will improve route's on-time performance due to shorter path</li> <li>• Terminates at CFCC's North campus, an area slated for growth</li> </ul>

**Route 301 Pleasure Island**

## Proposed Service Modifications

- Improve weekday and Saturday frequency to hourly
- Serves employees and visitors
- Hourly service is the minimum frequency that is useful for most people
- Also upgrades Route 107 to hourly
- Consider allowing free transfers, possibly with funding from Carolina Beach
- Estimated annual cost of \$400,000

**Route 109 CFCC North (New service)**

## Proposed New Route

- New route covers eastern half of existing Route 207 North
- Operates between Forden Station and CFCC's North campus on New Centre Drive, Kerr Avenue, College Road, and Blue Clay Road
- Will provide more reliable service to North College Road and Laney High School
- Estimated annual cost of \$400,000

**Route 112 Porters Neck (New service)**

## Proposed New Route

- Operate service from Forden Station to residential and commercial locations in Middle Sound Loop and/or Porters Neck (Walmart/Publix)
- Many requests for service to this area
- Might be on-demand service instead
- Estimated annual cost of \$400,000

**Route 302 Masonboro Loop Road (New service)**

## Proposed New Route

- Requested during public meetings and survey
- Operates from Monkey Junction to Oleander Drive, via Piner Road, Masonboro Loop Road, Greenville Loop Road, Oleander Drive, and Pine Grove Drive
- Will include transfer points to Route 103 Oleander East
- Might be on-demand service instead
- Estimated annual cost of \$400,000

In addition to specific alignment modifications to individual routes, the following recommendations are also proposed.

#### Earlier Weekday Service

- Add up to four selected trips between 5-6 a.m. on weekdays
- Once detailed trip data becomes available, select routes with highest ridership on first existing trip
- Also consider location of known employers with early shift
- Estimated annual cost of \$100,000

#### Increased Rush Hour Service

- Increase rush hour frequency on selected routes by adding up to 12 round trips between 6-9 a.m. and 4-7 p.m.
- Once detailed trip data is available, select routes with highest rush hour ridership
- Routes 201 Carolina Beach Road and/or Route 108 Market Street may be good candidates
- Fleet will need to increase, but maintenance capacity exists
- Estimated annual operating cost of \$300,000

#### Additional Improvements (1-5 Years)

- Bus Stops
  - Add 5 stops at selected locations on Routes 204 and 301, based on customer/operator feedback
  - Continue accessibility and amenity upgrades
- Fare Payment
  - Allow payment on mobile phones
  - Accept credit and debit cards
  - Consider transit smartcard
  - Increase online and retail outlet options if possible
- Information Systems
  - Continue improvements to real-time info
- Vehicles
  - Continue to adopt more efficient and clean fuel options as appropriate

#### Long Term Recommendations (5+ Years)

The following suggestions were considered, but are more appropriate for post-SRTP implementation period:

- Service to Kure Beach/Fort Fisher/Aquarium
- Service to River Road
- Weekend service on Route 207 North
- Commuter/Express service

Service to these areas will be reevaluated in future planning studies

Figure 36 | Proposed New Route 109  
CFCC North



Figure 38 | Proposed New Route 302 Masonboro  
Loop Road

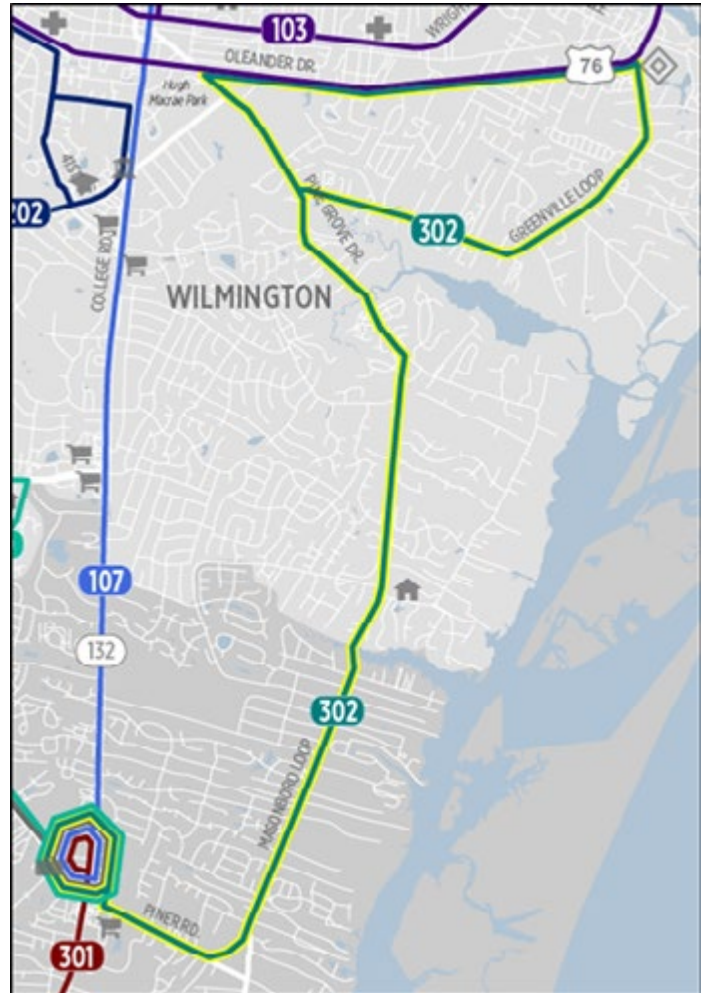
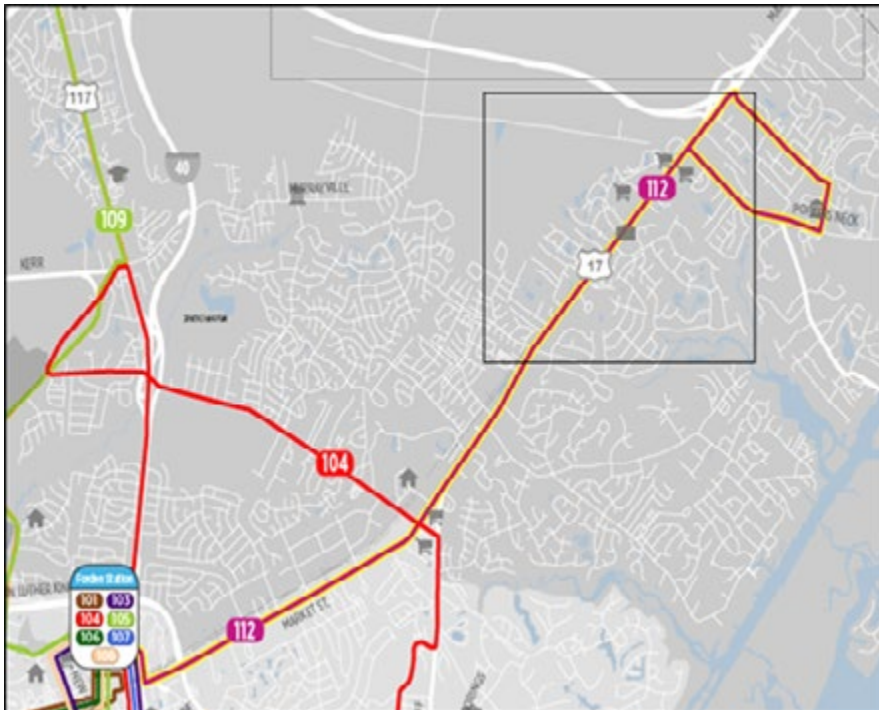


Figure 37 | Proposed New Route 112 Porters Neck/Ogden



## DOWNTOWN TROLLEY

Improving the Downtown Trolley was a central focus of the SRTP. Wave Transit staff worked with consultants and downtown Wilmington stakeholders and economic development organizations to design an alignment that serves all interests. The alignment was piloted during the Azalea Festival in April 2018, and will be finalized later this year. Additional opportunities to improve the Downtown Trolley operations and passenger experience are summarized below.

**Figure 39 | Proposed Downtown Trolley Recommendations**

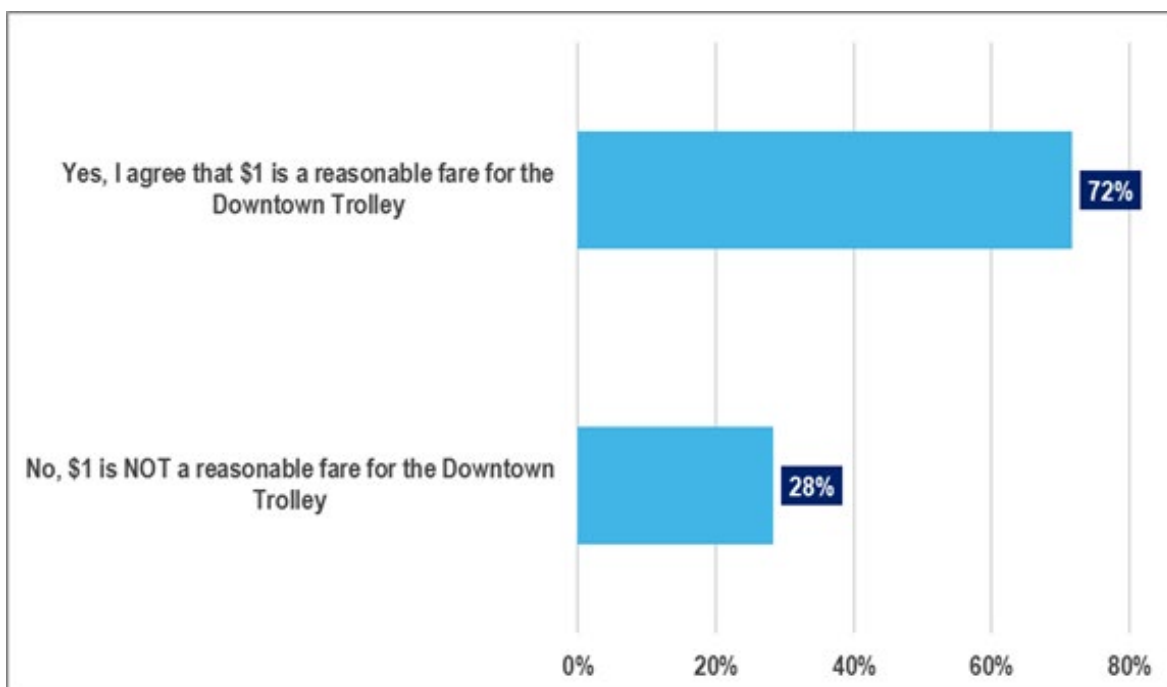
New Trolley Route
<ul style="list-style-type: none"> <li>• Start and end service at new Downtown Multimodal Transportation Center</li> <li>• Reasonable consensus on alignment has been achieved, but timing is still being tested</li> <li>• Serves tourists and locals, growth areas</li> <li>• Possibility of using new FTA funding to purchase new vehicles</li> </ul>
New Vehicles
<ul style="list-style-type: none"> <li>• Use recent FTA 5339 grant to purchase 1-2 new vehicles</li> <li>• Can be replica antique trolley or other vehicle branded separately from other fixed-route service</li> </ul>
Fare Collection Options
<ul style="list-style-type: none"> <li>• Begin charging nominal fare</li> <li>• Non Mechanical “drop boxes”, 1 per Trolley</li> <li>• Accepts only cash</li> <li>• Capital Cost Est: \$1,000 per Trolley</li> <li>• Annual Operating Cost Est: minimal, include with fixed route nightly fare emptying</li> <li>• Raising or lowering fare requires no adjusting to hardware</li> </ul>



## Marketing

- Adjust trolley stop names to reflect the sights and streets nearby
- Develop partnerships with local businesses, hotels, and visitor's bureau
- Schedule lunch and learns to educate locals
- Provide website and newsletter copy with information for customers about how to get to their destination using the Trolley
- Provide maps, signage, tokens, window stickers (Downtown Trolley Supporter)
- Place route map and signage at gathering areas, parking decks, and major pedestrian thoroughfares downtown
- Advocate for more prominent placement on the City of Wilmington website
- Rebranding efforts
- Rename as Downtown Circulator, or
- Develop a vehicle naming contest with local businesses and schools to give the Trolley an identity
- Host on-board rider appreciation days
- Offer stickers reading, "I rode the trolley" to riders when they depart the vehicle
- Hold a ribbon cutting event for new trolley route
- Replace existing trolley stop signage with more prominent signage
- Sponsor riding events and consider sponsorship of stops

Figure 40 | The SRTP is considering introducing a nominal fare to ride the Downtown Trolley to emphasize the trolley's value, and to help cover operating costs. Do you feel \$1 is a reasonable fare for riding the Downtown Trolley?



## UNCW SEAHAWK SHUTTLE

The SRTP team worked closely with UNCW's transportation and administrative staff to create realistic and effective recommendations for the Seahawk Shuttle. Demand for off-campus service has increased in recent years, and capacity is a concern on multiple routes. The Seahawk Shuttle operates service within a one-mile radius of UNCW's central campus, but multiple private apartment complexes beyond the one-mile radius have requested service. Additional funding is necessary before expanding the Seahawk Shuttle service area,

and at this time, Wave Transit cannot absorb more capacity or contribute additional full-sized vehicles without additional resources.

One modified route (703 Red Shuttle Express) and one new route (708 Pink) are proposed to better service existing demand off-campus. In addition to modifying service and proposing future routes, passenger facilities such as bus shelters, benches, lighting, and signage should be prioritized. UNCW also expressed interest in a campus transitway, and the SRTP recommends this proposal be studied independently.

Figure 41 | Proposed UNCW Seahawk Shuttle Recommendations

### Combine Orange and Grey Routes (Cost-Neutral Recommendation)

- Allows better marketing as a service with 10-minute frequency
  - Display frequency on maps instead of scheduled departure times
- Balances passenger loads
- Only if growth has stabilized, and the combined route is not likely to be split again soon
- Capacity concerns may exist even with 10-minute frequency

### Service Improvements (Future Recommendations)

- Improve passenger amenities (benches, shelters, lighting) and access at remote parking lots (curb ramps and pedestrian crosswalks), on-campus stops, and on highest ridership routes
- Increase frequency during morning peak (8-11 a.m.) and afternoon peak (3-5 p.m.) to address capacity concerns and reduce number of standees and/or operate full-size buses (35-40 person capacity) on routes 704 Yellow, 706 Orange, 707 Red Express, 711 Grey
- Considering operating evening hours
  - Shuttle routes could be combined if service is extended later into the evening

### Route 703 Red Shuttle (Future Recommendation)

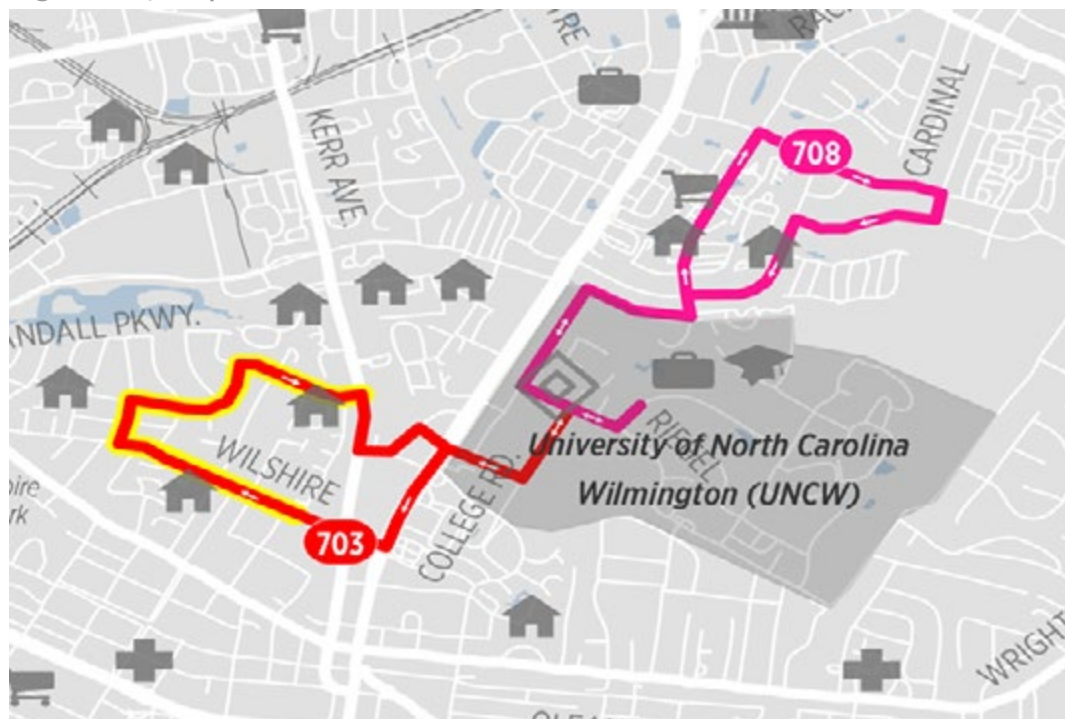
- Expand service west on Wilshire Boulevard to Larchmont Drive, Winston Boulevard, and Hoggard Street
- Provides better service to Wilshire Landing and Wimbledon Chase apartments
- Will NOT impact or alter 707 Red Express Shuttle

**Route 708 Pink Shuttle (Future Recommendation)**

- Add new service connecting UNCW campus to off-campus housing north of campus
  - 26 students at College Acres currently have on-campus parking permits
- Consider expanding shuttle service beyond the one-mile radius to serve Autumn Hall off Eastwood Road (if demand exists)
- Consider serving northeast section of campus on inbound service

**Campus Transitway**

- Study the potential for a campus transitway, which is limited to transit, bicycles and pedestrians
  - Creates a sustainable and user-friendly environment that encourages alternative modes of transportation
- Increases transit reliability and provides transit riders with direct access to the core of campus (classrooms, student union, etc.)
- Bicycle lanes can complement transit and pedestrian network
- Connecting transitway to multimodal hub or remote parking facilitates greater use of transit
- Price Drive could serve as a campus transitway
  - Modification required to allow thru-traffic to Walton Drive
- Further study and review of bike/pedestrian volumes, vehicle throughput, and future development is suggested before establishing an on-campus transitway

**Figure 42 | Proposed New and Extended Seahawk Shuttle Routes**

Generally, the relationship between Wave Transit and UNCW is a good one, from which both sides benefit. Ongoing dialogue should continue in order to plan for the significant campus growth expected over the next few years.

## IMPROVEMENTS BY OTHERS

### Employer Transit Subsidies

Working with the WMPO TDM Coordinator, employers in the region, especially downtown and near UNCW, should be encouraged to institute or increase subsidies for their employees to use Wave Transit. Employers can also administer programs so that their employees can use pre-tax dollars for transit passes. This can be done by employers ordering passes themselves for distribution to their employees, or by employers issuing special debit cards to be used for transit expenses. There are third-party benefits administrators, such as WageWorks, which can manage the program for the employer. In many cities, these options and subsidies have been proven to increase the proportion of people using transit, and thereby mitigate parking and congestion concerns. Employees often see this as a popular benefit since it reduces their transportation costs and increases their options.

### Fourth Street Bridge Repairs

The existing weight limits on the 4th Street Bridge just north of the new Downtown Transfer Station / Wilmington Multimodal Transportation Center (WMMTC) being built at Campbell Street will preclude transit vehicles from using the bridge. Repairing or replacing the bridge should become a priority for the region. Enabling buses and Trolley vehicles to use that segment of 4th Street would allow more routing options, better service for the growing Brooklyn Arts District, and would particularly enhance the efficiency and service reliability of both the Downtown Trolley and the Route 101, which is the busiest in the Wave system.

## POTENTIAL ON-DEMAND SERVICE

New on-demand services are increasingly becoming part of public transit networks, particularly for serving times and places with lower demand. Where demand would not

ordinarily justify a fixed-route service, modern on-demand services can serve these areas and connect people with the fixed-route network, in a somewhat more optimized manner than was available before recent technology innovations. While areas of lower density will always be challenging and expensive to serve, recent software innovations can make on-demand service somewhat more efficient. Additionally, better customer information technology allows people to take advantage of the inherent flexibility of on-demand service.

These on-demand services are designed to be fully part of the transit system and have the following characteristics:

- Agency-operated or contracted
- Also called Microtransit
- Can be door-to-door or have designated pickup and dropoff locations
- Shared rides and fairly immediate response times (typically 15-30 minutes or less)
- Trips within a zone or to connect with fixed-route service
- Can be combined with scheduled trips at certain times of day if needed

Such services are often introduced as a pilot program and can be a good way to test demand. If the pilot service has trouble keeping up with demand at certain times, then scheduled trips can be added at those times (perhaps with a larger vehicle if needed).

For areas where a fixed route would be low-performing due to lower demand, modern on-demand service can be somewhat cheaper to operate and more flexible for both the agency and customers. As travel patterns become apparent, the program parameters can be more easily changed (service area, program rules, response time, fares/subsidy, etc.), as compared to a fixed route.

During the pilot period, caps on subsidies or number of trips offered can be instituted in order to minimize the risk of costs exceeding the budget.

Wherever the on-demand service would be used as a feeder to fixed routes, every effort should be made to minimize customer waiting times, and provide a comfortable, accessible place for pickups and dropoffs.

Besides potential contracts with providers like Uber and Lyft, there are also many software vendors who can support transit agencies offering on-demand service with in-house vehicles and operators. If the service is provided by the agency itself, it may or may not be combined with ADA paratransit services. Two examples of software platforms are Via (used in Austin, TX among other places) and TransLoc (a North Carolina company recently acquired by Ford).

When negotiating with software vendors, Wave Transit should use as much open-source material as possible, and own as much of the service and customer information generated as possible. This is especially important in the technology sector, since vendors turn over rapidly due to bankruptcy and other challenges. However, the innovations remain, and this trend toward increasing use of on-demand services is expected to continue, even if the specific providers change.

While on-demand service can offer significant benefits due to its flexibility, it is important to make sure that all potential customers are able to use it. This means that service for those who need a wheelchair-accessible vehicle must be provided. And even if most payments are made via a phone app, some option for paying cash must be provided.

Many of the places where these modernized on-demand services are being tried have instituted the pilot programs only recently, and so it is difficult to draw definitive conclusions at this time. The following places are only some examples of those integrating on-demand services into the transit network:

- Sacramento
- Kansas City
- Tampa
- St. Petersburg
- Austin
- Research Triangle Park
- Arlington (TX)

Exact requirements for on-demand service to meet FTA regulations is not yet known. Any service offering would need to meet all FTA requirements.



Figure 43 | Fixed Route Converted to On-Demand Service in 2018 (Research Triangle Park)

**What is Go OnDemand?**

Go OnDemand allows riders to request a ride Monday through Friday through the TransLoc Rider app by selecting pickup and dropoff locations within RTP and surrounding areas.

Riders can request rides anytime between 6 a.m. and 6 p.m. with final dropoff at 6:30 p.m. Download TransLoc Rider in the **Apple Store** or on **Google Play**. You can also book a trip from your desktop at [ondemand.transloc.com](http://ondemand.transloc.com). If you don't have an internet connection, just call GoTriangle at (919) 314-8777 to request services.

Currently, there is no charge to ride the Go OnDemand Shuttles.

**Frequently Asked Questions**

- Why are you changing from fixed route to OnDemand?
- How can I hail a ride?
- How will I know the ride is on the way? Can I track it?
- Can I schedule a future trip?
- Where will the shuttle go?
- Will the shuttles be wheelchair accessible?
- What is the average wait time?

**Why are you changing from fixed route to OnDemand?**

On-demand transit services offer greater flexibility. Instead of being held to a fixed route at fixed times, riders will be able to request rides as needed. This creates streamlined routing and scheduling, allowing GoTriangle to manage a larger service area during longer hours during the workday.

**RTP Shuttle Service Area - Public Outreach**

Existing stops in area  
+ All areas

Connecting routes  
• Route 100/104  
• Route 201  
• Route 750  
• Route 800/805  
• Route 13/138  
• Route 14  
• Route 15

Points of Interest  
• Regional Transit On  
• Park  
• Train  
• Bus  
• West Triangle  
• RTP  
• North Triangle  
• Triangle Square

Service area  
• Service area

Within the 5-year S RTP horizon, on-demand service seems likely to be the preferred option for serving some areas in or near Wilmington that have no transit service today. The following are some possibilities:

### On-Demand Service for Porters Neck and Market Street East

- Connection points to Route 104 at Market Street and Gordon Road
- Connection point at Forden Station
- In place of proposed new fixed route 112 Porters Neck/Ogden, at some or all times of day
- Estimated annual cost of \$300K

Figure 44 | Proposed On-Demand Zones for Market East and Porters Neck



### On-Demand Service for Greenville Loop and Masonboro Loop Roads

- Connection point to Route 103 on Oleander Drive
- Connection point to Route 107, Route 201, Route 210, and Route 301 at Monkey Junction
- In place of new proposed fixed route 302 Masonboro Loop Rd, at some or all times of day
- Estimated annual cost of \$300K

Figure 45 | Proposed On-Demand Zones for Masonboro Loop and Greenville Loop Roads



### On-Demand Service for Creekwood

- Evenings and weekends
- Bounded by 23rd, 30th, MLK and Princess Place
- Connection points to fixed route on Princess Place and Market Street
- Potential to expand service to 23rd Street and Scientific Park Drive via Creekwood once construction on Scientific Park Drive is complete
- Estimated \$50K annual cost

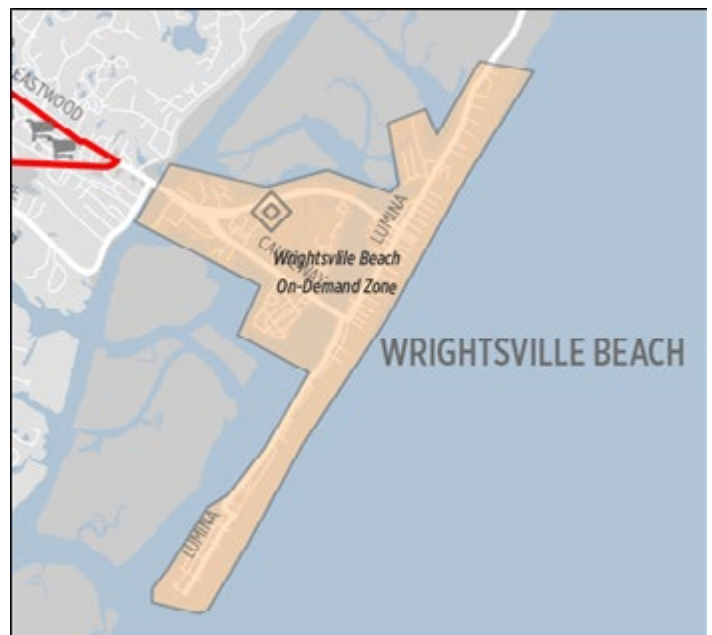
### On-Demand Service to Wrightsville Beach

- Connection points to Route 104 on Military Cutoff or Mayfair Road (Park and Ride)
- Serves employees and visitors
- Estimated annual cost of \$200K

Figure 46 | Proposed On-Demand Zone for Creekwood



Figure 47 | Proposed On-Demand Zone for Wrightsville Beach



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# Implementation Plan



# IMPLEMENTATION PLAN

## PHASED OPERATING PLAN

The SRTP recommendations are largely independent of one another, and therefore can be phased in as resources allow. Based on feedback from stakeholders and customers, the following is recommended as a broad outline of three potential phases for implementation.

### Cost-Neutral Recommendations

All of these proposals need to be further reviewed by Wave Transit staff for feasibility and refinement, including further testing of vehicle running times. In addition, more detailed passenger counts are just becoming available, and agency staff will consider these before implementing any changes. However, it is possible that most or all of the cost-neutral changes would be ready to begin in conjunction with the opening of the new Downtown Transfer Station / Wilmington Multimodal Transportation Center (WMMTC) in 2019. The new transit center would require some downtown rerouting and schedule changes anyway, so this may be an opportune time to also implement the cost-neutral recommendations, which include:

- New Route 210 – 17th Street
- Elimination of Route 209 Independence
- Realignment of Route 205 Long Leaf
- Realignment of Route 201 Carolina Beach Blvd
- Realignment of Routes 207 North and 104 Northeast
- Alternating Route 101 weekday trips to Creekwood and Walmart
- Realignment of Free Downtown Trolley, begin charging \$1 fare

### Priority Future Recommendations

Based on feedback from surveys, stakeholders, and meetings, the following items from the future recommendations could be implemented first (estimated annual operating cost of \$1.45M):

- New on-demand service to Wrightsville Beach, assuming jurisdictional approval
- Additional rush hour service on selected routes
- Increasing Route 301 Pleasure Island service to hourly
- Add early-morning service on selected routes
- New on-demand or fixed-route service to Porters Neck



- Night/weekend service for Creekwood, either on-demand or fixed-route
- Accept credit/debit cards for fare payment
- Continue bus stop improvements
- Continue clean vehicle purchases

## Other Future Recommendations

The remaining recommendations should be implemented as resources become available, and in some cases will also benefit from more time for local development, data collection, and discussion with stakeholders (estimated annual operating cost of \$1.25M excluding Downtown Trolley and Seahawk Shuttle):

- New fixed-route or on-demand service to Masonboro Loop and Greenville Loop Rds
- Extended hours and Saturday service for Route 204 Brunswick Connector
- Split Route 207 North, create new Route 109 CFCC North
- Increase frequency on Route 205 Long Leaf
- Additional service on Downtown Trolley
- Seahawk Shuttle changes
- Additional fare payment options

## SERVICE STANDARDS AND ONGOING EVALUATION

There are no national transit service guidelines; however, FTA does have mandates for the service guidelines and policies to be included in the Title VI Program required of all transit agencies operating fixed-route service. Wave Transit currently has established service guidelines as part of their 2017 Title VI Program. The guidelines are in compliance with Title VI requirements and include:

- **Vehicle Load:** The acceptable level of crowding at peak and off-peak times
- **Minimum Frequency:** For peak and off-peak, and may be varied according to population density in the area being served

- **On-Time Performance:** May be by route or system-wide, and details can be defined by the agency
- **Regional and Geographic Coverage:** Areas served, as well as distance between stops; may be related to population density. Stop placement may vary depending on the nature of an individual route (e.g. local urban or regional connector).

These guidelines are reviewed annually, with input from planning and operations, and possibly other departments. Some consultation with the public is helpful, even though it is more difficult to engage people in the relatively abstract discussion of guidelines (as compared to specific service change proposals). Finally, the refined guidelines should be approved by management and/or the board of directors as appropriate.

In addition to the mandated guidelines, it may be desirable to set a guideline for span of service, which could vary by type of route. For typical local bus service, a minimum span of 12 hours per weekday might be considered, as this span of service usually allows the service to be useful to a relatively large proportion of potential users. However, it is important to note that run cutting and union contracts (CBA) impact hours of service. Wave Transit's runs are usually divisible by four hours to minimize overtime. Moreover, it is often useful to balance the guidelines for coverage, frequency, and span with one or more guidelines related to efficiency/productivity, such as passengers per revenue hour and/or farebox recovery as described in the Performance Measures section.

**Figure 48 | Proposed Wave Transit Service Guidelines** includes a set of proposed service guidelines for Wave Transit. These guidelines are primarily based on the productivity and design of existing Wave Transit services and guidelines, as well as industry guidelines. These guidelines should be used to support Wave Transit's more detailed guidelines already being used as part of the Title VI Program.

Generally, service guidelines should be realistically achievable but somewhat aspirational. Therefore, it is appropriate to set guidelines that could not be met with existing resources, but could be reasonably achieved within a few years if appropriate resources were made available. As service changes are implemented or new funding becomes available, Wave Transit should reevaluate the guidelines proposed here. The agency could for example, establish tiered performance guidelines based on a route hierarchy. Routes comprising the Core Network, which serve corridors with greater ridership demand, could have higher service productivity guidelines than Neighborhood Network routes, which provide coverage service in lower demand neighborhoods. Wave Transit could then use this tiered standard to justify increasing service frequency and span on routes that exceed the guidelines for its tier, as well as to justify reducing service on routes that are underperforming. This practice would allow Wave Transit to easily identify when service modifications are needed and provide a unified and clear message to the public.

Figure 48 | Proposed Additional Wave Transit Service Guidelines

Metric	Proposed Standard	Justification
<b>Passengers per Revenue Hour</b>	20.0	Close to peer average
<b>Operating Cost per Passenger</b>	\$4.00	Close to peer average
<b>Operating Cost per Revenue Hour</b>	\$80.00	Close to peer average
<b>Farebox Recovery</b>	20%	Close to current farebox recovery rate
<b>On-Time Performance</b>	Existing standards appear to be appropriate	
<b>Vehicle Load (Passenger-to-seat ratio)</b>	<ul style="list-style-type: none"> <li>• Peak: 1.5</li> <li>• Off Peak/Weekend: 1.0</li> </ul>	Industry standard, similar to existing
<b>Minimum Frequency</b>	<ul style="list-style-type: none"> <li>• Peak: 60 minutes</li> <li>• Off Peak/Weekend: 60 minutes</li> </ul>	Close to existing guideline
<b>Geographic Coverage</b>	At least 4 households per acre or 5 jobs per acre, contiguous with existing service area, to justify hourly fixed-route service	Industry best practice
<b>Minimum Stop Spacing</b>	1/4Mile (1320 feet)	Industry standard; ensures that most passengers will be within a 2-5 minute walk of a stop without degrading service quality; close to existing guideline

## Title VI and Environmental Justice Review

Wave Transit's 2017 Title VI Program and service guidelines establishes a strong base for the agency's Title VI obligations. The Title VI plan is compliant with all FTA requirements. Aside from regular review and updates, no other action is required. The proposed changes to service standards outlined above are optional.

## OTHER RECOMMENDATIONS TO SUPPORT SERVICE

### Fare Payment and Collection Technologies

Today, advancements in mobile phone technology, banking, and payment systems have made methods for paying a fare more numerous than they have ever been before.

Allowing more choices for purchasing and paying fares can attract riders (especially younger people who are more accustomed to innovative payment options for other goods and services) and can reduce dwell times and, therefore, speed up service. Adding new payment options can be appropriate when fare equipment needs to be replaced or when an opportunity is presented for new partnerships with retail establishments, institutions, other transit agencies, or vendors like mobile payment providers. However, competing technologies present some challenges for determining strategy.

A growing number of options for transit fare collection have emerged over the past decade.

### Technology's Role in Fare Alternatives

While technology has changed rapidly, new approaches to fare payment should follow and support the fare policies and products of a transit agency. Implementation of new approaches must have the following considerations:

**Operations:** How will the new technology impact dwell time, driver enforcement, and fare evasion?

**Planning:** Are there new opportunities for ridership and revenue data as a result of the technology?

**Distribution:** How will the fare media be distributed? What are the options for fare card outlets, ticket vending machines, online portals, etc?

**Maintenance:** What is the cost to maintain fareboxes and supportive networks?

**Costs/Revenues:** What is the cost of fare collection? Are there opportunities to increase revenue?

**Customer Experience:** What's the quality of the customer experience in terms of ease of payment, convenience, and customer support?

The following section surveys fare collection technologies that are in use at select transit agencies along with the trade-offs associated with each technology.

## Magnetic Stripe Media

This is the current technology used at Wave Transit for passes. Experience from LA Metro indicated that magnetic stripes have a much higher failure rate than “contactless” smartcards—200 times per day compared to 6.7 for smartcards. The publicly known failure rate of magnetic stripe cards has opened the door for fare evasion for passengers who claim that a card is malfunctioning when it is actually out of value. In addition, magnetic stripes on farecards are susceptible to demagnetization or damage.

Despite these drawbacks, magnetic media also carry many advantages. Since they are printed on paper, they are easy to manufacture and can be pre-printed and distributed to vendors or partner agencies without requiring special card-encoding equipment at the vendor sites. Magnetic stripe media can also be dispensed easily at the farebox.

**Figure 49 | Benefits and Drawbacks of Magnetic Stripe Technology**

Benefits	Drawbacks
Collection of basic fare data	Fare media can be damaged/deactivated
Reduces operator interactions/fare enforcement	Limited uses of fare media (cannot combine passes and stored value on same card)
Reduces cash in system	Reloading can only occur at designated locations (cannot be done automatically)
Accommodates cash (stored value), passes, and transfers (cannot necessarily do all at once on the same card)	
Can be purchased pre-loaded (encoded)	

## Smartcards

Electronic contactless smartcards—a more durable, hard plastic card—have become common at many transit agencies. For customers, smartcards have advantages over magnetic cards, but successful implementation can be challenging. The most significant customer advantage of smartcards compared to magnetic cards is their durability; they can last for several years without replacement. Smartcards can be reloaded with stored cash value or passes and offer the opportunity to provide balance protection, increasing security. In addition, the use of smartcards allows more flexible pricing options since transfer costs can be automatically calculated.

**Figure 50 | Smartcard Used in Atlanta**



From an operational perspective, payment with smartcards is faster than both magnetic stripe payment and cash payment. In addition, since the validation and encoding of a smartcard do not require any mechanical action at the farebox, smartcard systems are frequently more reliable (fewer breakdowns) compared with magnetic stripe fare collection systems.

Despite these benefits, smartcards also present challenges. One significant challenge is the need for elaborate back-end systems to manage accounts and balances. For example, smartcards typically do not come “pre-loaded” and must have value added to them. As a result, smartcards require a network of opportunities to load smartcards including in-person, online, and telephone options. In-person reloading could occur at a fixed-location, an automatic fare reloading station (ticket vending machine), or even at the farebox. Each location requires special hardware to read the smartcard and real-time communications to ensure that the customer’s account can be updated with new balance information. The use of smartcards also necessitates capabilities for potential retail vendors to be able to add value or new fare products to cards.

**Figure 51 | Benefits and Drawbacks of Smartcards**

Benefits	Drawbacks
<p>Enhanced data collection capabilities</p> <p>User features like “autoload” and “balance protection”</p> <p>Loading value online or over the telephone</p> <p>Lower on-board transaction times (reduced dwell times)</p> <p>Permanence of cards (single card can be used for months/years)</p>	<p>Higher cost of implementation (back-end systems, value-loading terminals, new equipment, need for on-board vehicle communications equipment)</p> <p>Greater range of fare options may lead to greater levels of confusion for customers and complexity for agency staff</p>



## Smartphone Payment

Smartphone payment offers an increase in customer convenience over paper or smartcard payment as well as potential operational savings. Smartphone payments eliminate the need for customers to buy and carry a separate card, may reduce delay in fare payment by reducing the use of cash, and may lower maintenance costs by reducing the volume of passes that must be processed. Unlike other fare technology options, smartphone payments require a person to have a linked credit card or banking account, which means that smartphone payment is not an option for customers who rely on cash. Smartphone payment options can serve as a supplement to an existing fare collection system until smartphone ownership is standard. In bus environments, smartphone payments can be accepted in one of three ways, described below.

1. **Flash Pass:** The simplest implementation of smartphone payment is to allow riders to use their phone as a “flash pass” that is validated by the bus operator when they board the bus. This strategy does not require any additional hardware to be installed and can be implemented with few hurdles. The primary drawback is that this method requires additional attention of the operator to visually validate fare media. TriMet in Portland has launched a mobile payment app that uses this system (see **Figure 52 | Phone Used as Flash Pass in Portland, OR**; similar to the flashing of paper passes/tickets). As part of their fare products, transfer media have been eliminated and all cash one-way payments (\$2.50) provide a “2.5 hour” ticket upon fare payment, which can be used for transfers during that time window.
2. **Barcode/Optical Scanners:** A smartphone’s large screen provides an opportunity to use barcodes or QR codes to validate fare payment. This approach requires the farebox to use a barcode scanning device (similar to a grocery store checkout counter or an airport scanner reading a boarding pass) to read a smartphone’s screen. Barcode readers can read barcodes beyond those on smartphones, including those issued by ticket machines or barcodes printed at home. A fare system using 2-D barcodes can allow both print and mobile payment validation. Optical barcodes also can be scanned by mobile devices for enforcement, and systems can be put in place to update valid barcodes regularly. Currently, Nassau Inter-County Express (NICE) is using in-vehicle optical scanners to validate payments via mobile phone (see **Figure 53 | Bar Code Scanner in Nassau County, NY**).

Figure 52 | Phone Used as Flash Pass in Portland, OR



Figure 53 | Bar Code Scanner in Nassau County, NY



3. **Proximity Validation:** Using a smartphone as a farecard in the U.S. is very rare due to a variety of factors. The Utah Transportation Authority in Salt Lake City is one of the country's leaders in fare technology and began to accept Apple Pay and Google Wallet in late 2014. Chicago Transit Authority also accepts Apple Pay as of 2015. For many years, different technologies created by smartphone manufacturers have not produced a clear solution that could be included as part of universal fare collection equipment. As a result, many agencies have opted to use simpler ways of validating mobile phone-based fare payment in the interim. Future technologies that support proximity validation include Near-Field Communication (NFC) and Bluetooth Low Energy (BLE).

Figure 54 | Benefits and Drawbacks of Smartphone-Enabled Fare Payment

Benefits	Drawbacks
Fare products can be accessed through one's smartphone; there is no need for separate fare distribution outlets	Visual validation of fare products could add dwell time; however, some studies suggest that flash passes may be faster than processing individual magnetic cards or smartcards
Various means to validate media (visual, scan, proximity)	Access issue for those who do not have a smartphone with data plan or a linked credit card/bank account
Customers can purchase fare products at any time and at any location	Need to supplement existing fare payment options (smartcard or magnetic stripe)

## Off-Board Fare Payment

In addition to the specific technology used for fare collection, another important consideration is whether to move payment off of the vehicle and have fare payment take place at machines in bus stops or stations (see **Figure 55 | Off-board Fare Payment in Manhattan**). Off-board payment can significantly reduce dwell times and speed service. Typically, riders are allowed to board through all doors of the vehicle, which also helps to better distribute passengers within the vehicle. Fare enforcement is conducted either at stations or on board the vehicle. Fare enforcers ask for “proof-of-payment” from customers, which can be inspected visually or by use of equipment that reads smartcards, barcodes, etc. Fare enforcement officials are increasingly using smartphone-based equipment for their work.



Figure 55 | Off-board Fare Payment in Manhattan

## Connected Vehicles

Another capability that can be very powerful is to have vehicles that are online all the time. In combination with account-based fare systems (discussed below), this real-time communication allows customers to purchase and pay fares through various channels with instantaneous updating of their account balance. Having connected vehicles can facilitate more partnerships with retail vendors and better online account management, since customer payments are immediately available for use on the vehicle. These improved options can speed up transit service by reducing onboard cash transactions and/or card refills.

Connected vehicles can also be used for real-time communications by other onboard systems, including video surveillance, passenger counting, and maintenance sensors. Typically, the vehicles communicate through the cellular network. There are both upfront capital costs and ongoing charges for access to the cell network, but the benefits can make these costs worthwhile. Besides the customer service advantages, the collection and transmission of real-time data can improve transit planning and operations.

## Account-based System

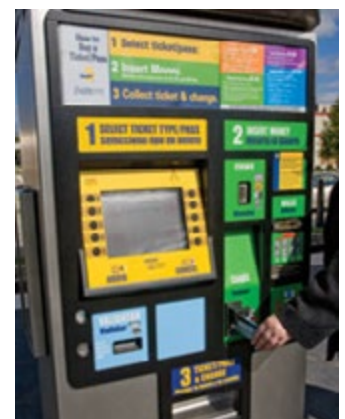
In an account-based system, the customer's account balance is not stored on the fare media itself but in a back-office account. This is a prerequisite for some other features listed below, including regional fare payment processing, full online account management, auto-loading, open payments, and many innovative fare options.

### Open Payment Acceptance

Most U.S. transit systems still require payment through fare media issued by the transit agency (usually tickets or cards). However, in addition to the rise in smartphone payments, there has been interest in allowing direct payment by credit card. Pilot programs have been conducted, and the Chicago Transit Authority (CTA) now allows credit card payment for contactless cards only. The main advantage is that customers do not have to carry a separate form of transit payment and can simply use a card or phone that they already carry. These “open payment” systems can also facilitate partnership programs between transit agencies and other merchants.

## Ticket Vending Machines

Vending machines (see **Figure 56 | Ticket Vending Machine in Dallas** for an example) are commonly used to provide another means of purchasing fares. They are most often placed on the transit agency's property, such as at transfer centers. However, many agencies have agreements to place ticket vending machines on other public property, including sidewalks. Some vending machines are found in private institutions, especially



**Figure 56 |**  
**Ticket Vending**  
**Machine in Dallas**

stadiums, museums, or other places with many visitors. The machines require power and communications as well as some weather protection, but nevertheless can be installed in diverse environments.

### **Retail Partners**

Many cities have retailers that sell transit agency fare products. Sometimes the retailer receives a commission, although many merchants are willing to participate for reduced commissions since transit customers can bring new walk-up business. Typically, these retail partners already handle cash and have longer hours and can include check cashers, grocery stores, and pharmacies. As mentioned above, having an account-based system and connected vehicles can enhance the value of retail partners, since payments will be instantaneously available for use on any vehicle.

### **Online Account Management**

Allowing customers to make payments online, register their accounts for balance protection, review their account and usage history, and print their own transaction receipts are some of the features that transit riders appreciate. These features can attract new riders, since they alleviate the need for many transactions during the transit journey and also make reimbursement of business expenses easier. Many existing and potential transit riders are accustomed to managing their accounts online for other goods and services.

### **Auto-loading**

An account-based system also enables the possibility of auto-loading. Customers can automatically renew their time-based passes or automatically refill their stored-value account balance. This requires a person to link the transit account to a credit or debit card, but many people appreciate the convenience. Auto-loading often reduces onboard transactions, and therefore improves service as well.

### **Bus Stops**

Wave Transit has a successful program (Five Year Bus Stop Enhancement Plan, 2015-2019) for making bus stops ADA-accessible, and adding shelters and other amenities. There are always challenges, since Wave Transit does not own or control the site of most bus stops, and must work with public and private owners. Some sites may lack sufficient space for both a shelter and an accessible path of travel, in which case the accessibility needs must take precedence. Overall, the upgrades to existing stops should continue as resources allow, and with the cooperation of third parties as needed. Listed below are items raised during the SRTP.

### **New Bus Stops**

Bus operators were especially helpful with suggestions for where additional bus stops and shelters could be most effective. If resources allow and suitable sites can be found, consider the following (both directions where applicable or unless noted):

- Route 202 – Dawson St between 16th and 17th (Eastbound, Rite Aid)
- Route 202 – Wrightsville Ave at Kent St
- Route 204 – Lincoln Rd at Eastbrook Dr
- Route 204 – Old Fayetteville Rd at John Sneed Lane
- Route 301 – Carolina Beach Rd at S Ridge Blvd
- Route 301 – Carolina Beach Rd at Myrtle Grove Rd
- Route 301 – Carolina Beach Rd at Bonaire Rd
- Route 301 – Carolina Beach Blvd at The Cape Blvd
- Route 301 – North Lake Park Blvd at Spencer Farlow





Figure 57 | Wave Transit Bus Stop with Shelter

## New Shelters

- Monkey Junction (already underway)
- 4th Street NB at NHC Health (SB has shelter)
- 16th Street SB at Willard
- Princess Place Dr at 30th Street
- 17th Street at Food Lion

## Vehicles

Wave Transit has successfully transitioned to CNG-powered vehicles for an increasing portion of the fleet, and this has lowered operating costs as well as pollution from transit vehicles. Since CNG costs are generally expected to be less than diesel for many years to come, and since CNG fueling and maintenance infrastructure is in place, increasing the proportion of CNG vehicles during the 5-year horizon of this SRTP is appropriate. This strategy has been further assisted by the recent federal grant to Wave Transit for \$3.6M for clean vehicles, from FTA under the 5339 Bus and Bus Facilities program.

Buses that are completely propelled by batteries have made a lot of progress over the last few years, although it's hard to say when they will be fully ready to replace more traditional fuel sources. The relatively moderate climate in the Wilmington area may mean that a pilot program using a battery-powered vehicle(s) would be warranted within the next few years. Services that have a shorter route and/or use a smaller vehicle might be more conducive to such a pilot program, and include:

- Downtown Trolley
- New on-demand service to Wrightsville Beach
- Seahawk Shuttles





Figure 58 | CNG-Powered Wave Transit Buses

## Information Systems

The real-time bus arrival information provided to the system from Clever Devices is a significant advancement and clearly appreciated by Wave customers. Efforts to raise awareness about this new capability should continue, including marketing at events, online, and through community groups.

Other systems are important but not customer-facing. The recent installation of an automated passenger counting system should yield important data to be used in future service planning, including refinement of the SRTP recommendations.

Figure 59 | Real-Time Arrival Information Screen



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# Financial Plan

# FINANCIAL PLAN

## OPERATING

As noted in previous sections, Wave will face a growing operating deficit in coming years, even without any expansion of service. Meanwhile, new revenues will likely need to be primarily from local sources, since Wave already maximizes their use of federal, state, and private funding. Fortunately, the state of North Carolina has authorized ways for localities to raise funds for transit if the communities wish to do so.

Operating funding is typically the greatest challenge for transit agencies, since costs often escalate faster than revenues, and there is less support from federal and state partners as compared to capital funding. The following chart illustrates the overall operating funds needed, if the SRTTP recommendations are implemented in phases as described in Chapter 6. Wave Transit will also continue to maximize funding from advertising and concessions, which can offset some operating costs marginally.

The annual operating revenues and expenses needed are shown below. Notes as follows:

- All figures are in 2018 dollars.
- Phases
  - Cost-Neutral assumes only those changes outlined in Chapter 6 under the Cost-Neutral phase are implemented
  - Priority Future assumes that the Cost-Neutral and Priority Future recommendations are implemented (17% increase in service from existing)
  - All Future assumes that all proposed changes are implemented except Downtown Trolley and Seahawk Shuttle, which may be funded separately (32% increase in service from existing)
- Fares
  - Includes fees collected for trips brokered to social service agencies
  - No net change from existing for cost-neutral phase
  - New fare revenue in future phases equal to 21% of expense (same % as existing)
- UNCW - no change projected
- Local
  - From counties and municipalities
  - Projected increase in future phases to cover expenses not funded by other sources

- NCDOT
  - Includes SMAP but not CTP program which is being discontinued
  - \$50K increase in Priority Future phase due to increased service
  - \$100K increase in All Future Phase due to increased service
- Federal
  - Includes 5303, 5307, 5310, 5339, 5340
  - \$100K increase in Priority Future phase due to increased service
  - \$200K increase in All Future phase due to increased service
- Totals
  - Cost-Neutral phase equals the same as existing 2018 service
  - Priority Future phase increases cost by \$1.45M, includes in-house cost of administering any new on-demand and/or fixed-route service
  - All Future phase increases cost by \$2.7M, also including admin costs
  - Any operating costs associated with credit card fees are not shown, and assumed to be offset by higher fare revenue from new riders

**Figure 60 | Expected Annual Operating Revenues and Expenses for SRTP Implementation**

Revenues / Expenses	Cost-Neutral Phase	Priority Future	All Future
Fares	\$1.75M	\$2.05M	\$2.30M
UNCW	\$0.75M	\$0.75M	\$0.75M
Local	\$1.70M	\$2.70M	\$3.55M
NCDOT	\$0.70M	\$0.75M	\$0.80M
Federal	\$3.30M	\$3.40M	\$3.50M
<b>Total Revenue / Expense:</b>	<b>\$8.20M</b>	<b>\$9.65M</b>	<b>\$10.90M</b>

## CAPITAL

Wave has generally carried out a very successful capital investment program in recent years, with the new facilities at Forden Station, the Operations Center, and the Downtown Multimodal Transportation Center (soon to be in construction) contributing to overall good asset condition. The operations/maintenance facility has room for some expanded service, so implementation of the SRTP recommendations will not require any facility expansion. The agency's fleet plan was given a big boost recently with a \$3.6M grant in 2018 from the FTA 5339 program for Buses and Bus Facilities.



However, some planned capital expenditures for replacement vehicles and other investments remain unfunded at this time, and implementing the SRTTP recommendations will require some expansion of the vehicle fleet. The following chart illustrates expected capital funding needs if the SRTTP is implemented in the same phases as shown above. The amounts shown are for all capital spending over the next 5 years, so All Future includes items from Priority Future, which in turn includes items from the Cost Neutral Scenario. Capital funding may primarily come from federal and state sources, but some local match will likely be required.

Notes as follows:

- All figures in 2018 dollars
- New Vehicles
  - Assumes each additional full-size 35-40' bus/trolley is \$550K
  - New additional smaller vehicles for paratransit or on-demand service are estimated at \$65K/ea
  - No Downtown Trolley or Seahawk Shuttle in any scenario - these are assumed to be included in existing Capital Program or funded by others
  - No additional vehicles in Cost-Neutral Scenario
  - Priority Future has 1 small vehicle (Wrightsville), and 5 large vehicles (2 for rush-hour service, 1 for Route 301, 1 for Porters Neck, 1 spare)
  - All Future has Priority Future plus 4 additional large vehicles (1 for Masonboro, 1 for new Route 109, 1 for increased frequency on Route 205, 1 spare)
- Software/Tech
  - \$200K in Priority Future scenario for credit/debit card payment
  - \$500K in All Future scenario for credit/debit and other payment options (retail, online, smart card, mobile)
  - \$100K in Priority Future for upgrades to information systems (real-time arrival, passenger counting, possibly others)
  - \$300K in All Future for upgrades to information systems
- Bus Stops
  - Assumed \$20K/ea with shelter
  - \$500K for 25 new stops in Cost-Neutral scenario, likely not included in Existing Capital Program (Downtown Trolley, Creekwood, Routes 104, 207, new Route 210; also other new stops requested)
  - \$1M for 50 new stops in Priority Future scenario (Cost Neutral plus new Wrightsville Beach and Porters Neck)
  - \$1.6M for 80 new stops in All Future scenario (Priority Future plus Masonboro Loop/Greenville Loop)

Figure 61 | 5-Year Capital Expenses for SRTP Implementation

5-Year Capital Expenses	Cost-Neutral Scenario	Priority Future	All Future
Existing Capital Improvement Program	\$8.5M	\$8.5M	\$8.5M
New Capital from SRTP - Vehicles	\$0	\$2.8M	\$5.0M
New Capital from SRTP - Software/Tech	\$0	\$0.3M	\$0.8M
New Capital from SRTP - Bus Stops	\$0.5M	\$1.0M	\$1.6M
<b>Total:</b>	<b>\$9.0M</b>	<b>\$12.6M</b>	<b>\$15.9M</b>

# Acknowledgements

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# Appendix A

## Market Analysis, Existing Conditions, Peer Review

See attached documents



# **Wave Transit Short Range Transit Plan**

## **Market Analysis and Existing Conditions Memo**

**September 2017**

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## Table of Contents

	Page
<b>Overview .....</b>	<b>iii</b>
<b>1 Introduction .....</b>	<b>1</b>
<b>2 Existing Services.....</b>	<b>3</b>
Wave Transit Fixed-Route.....	3
Wave Transit Dial-a-Ride.....	7
UNCW Seahawk Shuttle.....	8
Regional Transportation Services.....	10
<b>3 Transit Market Analysis.....</b>	<b>11</b>
Transit Potential.....	11
Transit Need .....	20
Origin-Destination Travel Flow Analysis.....	29
<b>4 Financial Plan .....</b>	<b>31</b>
Expenses.....	31
Revenue .....	33
Five Year Outlook.....	36
Peer Financial Analysis.....	38
Key Findings.....	44
<b>5 Service Guidelines .....</b>	<b>45</b>
Performance Measures.....	45
Peer Review.....	46
Ridership Comparison.....	49
Service Guidelines.....	51
Title VI and Environmental Justice Review.....	52

## Table of Figures

	Page
Figure 1   Wave Transit Fixed-Route Services.....	3
Figure 2   Wave Transit Fixed-Route System Map.....	4
Figure 3   Wave Transit Fares.....	5
Figure 4   Wave Transit Service Characteristics by Route.....	5
Figure 5   Wave Transit Fixed-Route Passenger Trips 2012-2016.....	7
Figure 6   Wave Transit DART Passenger Trips 2012-2016.....	7
Figure 7   Seahawk Shuttle Passenger Trips 2012-2016 .....	8
Figure 8   Seahawk Shuttle On-Campus Map 2017-2018.....	9
Figure 9   Seahawk Shuttle Off-Campus Map 2017-2018.....	10
Figure 10   Population Density.....	14
Figure 11   Employment Density.....	15
Figure 12   Wilmington's Largest Employers.....	16
Figure 13   Wilmington's Major Employers.....	17
Figure 14   Transit Potential Index.....	19
Figure 15   Density of Older Adults.....	24

Figure 16   Density of People with Disabilities.....	25
Figure 17   Density of Low Income Households.....	26
Figure 18   Density of Youth and Young Adults.....	27
Figure 19   Density of Zero Vehicle Households.....	28
Figure 20   Employment Origin-Destination Travel Flow (2014).....	30
Figure 21   Wave Transit Operating Expenses.....	32
Figure 22   Cape Fear Public Transportation Authority Capital Improvement Plan.....	33
Figure 23   Wave Transit 2018 Adopted Revenue Budget.....	34
Figure 24   Wave Transit Revenues.....	36
Figure 25   Wave Transit Five Year Forecast.....	37
Figure 26   Wave Transit Five Year Forecast Chart.....	37
Figure 27   Peer Transit Service Financial Benchmarking – Fixed Route Service Only.....	38
Figure 28   Fare Comparison of Peer Systems.....	39
Figure 29   Operating Revenue Comparison of Peer Systems.....	41
Figure 30   Local Operating Revenue Peer Comparison.....	43
Figure 31   Peer System Operating Environments - Fixed Route Service Only.....	47
Figure 32   Peer System Performance Measures from 2015 NTD – Fixed Route Service Only.....	48
Figure 33   Peer System Passengers Per Capita (2016 NTD) - Fixed Route Service Only.....	50
Figure 34   Proposed Wave Transit Service Guidelines.....	52

# OVERVIEW

The service area of the Cape Fear Public Transportation Authority (Wave Transit) is challenging to serve with fixed-route transit. Even compared to peers such as GoTriangle in the Raleigh-Durham area, which has a large regional service area, the Wilmington metro area features much lower population density. Generally, both population and jobs are uniformly low-density in Wilmington, with few areas that can support frequent transit service and thereby attract riders with other travel options. Meanwhile, there is a significant low-income population which is more likely to be dependent on public transit for access to jobs, health care, education, and other critical activities. The UNCW campus does provide significant transit ridership and creates an activity center that supports frequent transit. But overall, serving travel patterns which are spread out geographically makes it difficult for Wave Transit to exceed its peers in traditional measures of productivity, such as passengers per hour or cost per passenger trip. Nevertheless, Wave Transit appears to be using its limited resources effectively, with fixed routes existing on the corridors which are most appropriate.

The recent trend of declining transit ridership appears not only in the Wilmington area but across the state and the country. In North Carolina, total passenger trips provided from FY2016 to FY2017 decreased in several peer cities and systems, including: Charlotte (-5%), Fayetteville (-4%), Greensboro (-5%), Greenville (-21%), Raleigh (-14%), and Winston-Salem (-17%). By comparison, total passenger trips provided by Wave Transit only declined by 2% during this period.

While there's no single cause for decreasing transit ridership, it appears likely that emerging mobility options such as Uber and Lyft are contributing factors. The Wilmington/Cape Fear region is growing, and transit should at least keep pace by serving those who need it, as well as attracting other riders where possible. The SRTP's recommendations will incorporate all of these challenges and trends, and design creative solutions that can integrate these emerging travel options with public transit, and make the most efficient use of Wave Transit's resources.



# 1 INTRODUCTION

As Wave Transit approaches the system's 15-year anniversary in 2019, the system is well-positioned to continue providing high-quality public transportation in the Cape Fear region. In 2016, Wave Transit provided nearly 1.5 million fixed-route passenger trips in the City of Wilmington, New Hanover County, and Brunswick County. In addition to fixed-route bus service, Wave Transit operates Dial-a-Ride paratransit services, Wave Pool (commuter van and carpool program), and the Seahawk Shuttle for the University of North Carolina Wilmington (UNCW). The Seahawk Shuttle operates 10 fixed routes, providing service to UNCW's campus, off-campus student housing developments, and park and ride lots.

Public transit service has operated continuously in Wilmington and New Hanover County since 1974. From 1974 to 2004, the Wilmington Transit Authority (WTA) operated fixed-route bus service in the Cape Fear region. In 2003, WTA consolidated with New Hanover Transit Services, and in 2004, the City of Wilmington and New Hanover County established the Cape Fear Public Transportation Authority (CFPTA). The CFPTA is jointly financed by the City of Wilmington and New Hanover County, and has operated fixed-route bus service as Wave Transit since 2004.

Wave Transit's most recent Short Range Transit Plan (SRTP) was completed in 2012. The CFPTA implemented the SRTP's recommended route restructuring in February 2013, resulting in expanded service coverage, three new routes, and modified service spans. The following service improvements from the 2012 SRTP were successfully implemented:

- Created Route 301 Pleasure Island to expand service to Carolina Beach
- Created Route 209 Independence to increase service between downtown Wilmington, 16th Street, and New Hanover Regional Medical Center
- Created Route 108 Market Street to increase service frequency on Market Street
- Extended Route 107 College Road to connect route to Monkey Junction
- Restructured service on Route 207 North to improve schedule adherence and provide targeted transit improvements to Laney High School and the VA Clinic
- Restructured service on Route 101 Princess Place removed service to Creekwood South, a low-income housing development owned and operated by the Wilmington Housing Authority
- Restructured Route 103 Oleander East to provide service on Wrightsville Avenue
- Modified service hours to operate from 6:00 a.m. to 9:00 p.m.

Outcomes from the route restructuring were largely positive. Route 301 Pleasure Island has recorded strong ridership, validating the recommended service expansion. Schedule adherence has improved, specifically on Route 104 Northeast and Route 202 Oleander West. To fund Sunday service and lower subsidies, Wave Transit increased fares by 33% following the 2012 SRTP—from \$1.50 to \$2.00. In the first 10 months following the fare change Wave Transit's farebox revenue increased by 3.34%. Additionally, both passengers per revenue mile and passengers per revenue hour remained relatively static in the first 10 months following the 2013 route restructuring.

Rapid population growth has enhanced the need for quality public transit in the Wilmington region. Wilmington's population increased by 40% from 2000 to 2010, surpassing 100,000



residents for the first time. Since then, the Cape Fear region has experienced continued population growth, with an estimated 263,400 residents living in the Wilmington Metropolitan Area as of 2012. Concurrently, the University of North Carolina Wilmington is expanding, with plans to increase enrollment to 20,000 students by 2020. This influx of students will continue to stress on-campus parking resources, and will amplify the need and importance for the Seahawk Shuttle.

To prepare for future growth and to better serve existing customers, Wave Transit has invested heavily in new facilities. Forden Station, which opened in 2011, is the system's easternmost transfer center and houses Wave Transit's administrative offices. The Wave Transit Operations Center opened in 2015, and serves as a consolidated hub for the system's 73-vehicle fleet, accommodating vehicle storage, maintenance facilities, and fueling stations. The Downtown Transfer Station/Wilmington Multimodal Transportation Center (WMMTC) is under construction and is scheduled to open on Third Street in 2019. When completed, the WMMTC will serve as the primary transfer facility for all routes serving downtown Wilmington and could eventually support Amtrak passenger rail service. Lastly, Wave Transit is actively investing in passenger amenities. In 2015, the CFPTA released a five-year Bus Stop Enhancement Plan, which inventoried existing bus stop amenities and identified high priority bus stop locations to install passenger amenities, including shelters, signage, lighting, and trash receptacles, in addition to making accessibility improvements.

This Short Range Transit Plan will identify Wave Transit's near-term priorities and create an implementation plan to refine the existing fixed-route bus network.





## 2 EXISTING SERVICES

The study area for the Wave Transit Short Range Transit Plan (S RTP) is the City of Wilmington, New Hanover County, and northern portions of Brunswick County. This section reviews the existing local and regional public transit operators to provide a complete picture of transportation services and options in the City of Wilmington and the surrounding region.

### WAVE TRANSIT FIXED-ROUTE

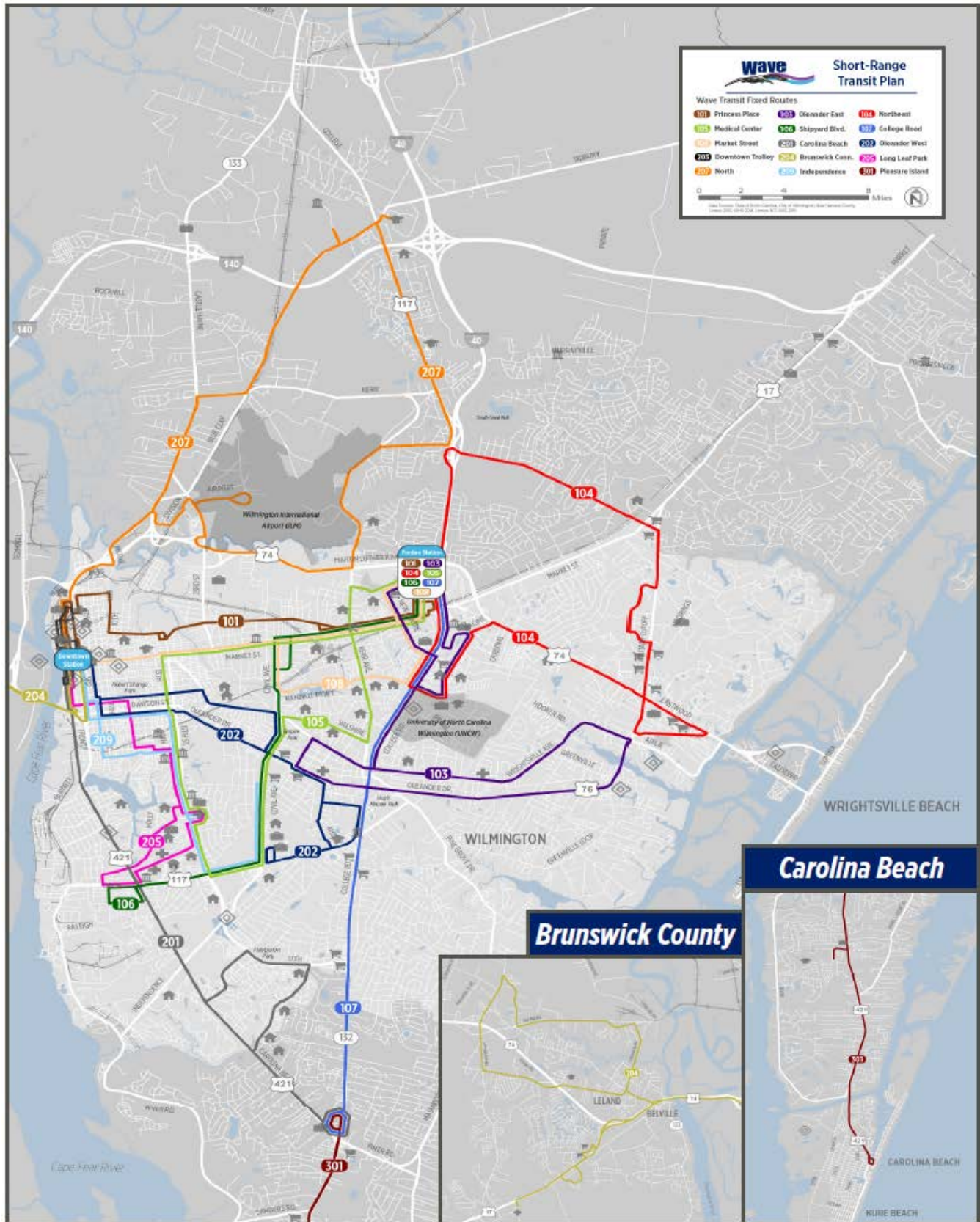
Wave Transit operates 15 fixed-routes in Wilmington, New Hanover County, and northern Brunswick County. Radial and cross-town service is provided from three primary transfer stations: Downtown Station, Forden Station, and Monkey Junction. Seven routes originate at the Downtown Station, seven begin service at Forden Station, and one route departs from Monkey Junction. Service descriptions of each fixed-route are listed in Figure 1.

Figure 1 | Wave Transit Fixed-Route Services

Route Number	Route Name	Service Description
101	Princess Place	Connects Forden Station to Northside and Cape Fear Community College
103	Oleander East	Connects Forden Station to UNCW, the New Hanover County Government Center, and Cape Fear Memorial Hospital
104	Northeast	Connects Forden Station to Mayfaire and Wrightsville Beach
105	Medical Center	Connects Forden Station, the Department of Social Services, New Hanover County Regional Medical Center, and Independence Mall
106	Shipyard Boulevard	Connects Forden Station to Independence Mall
107	College Road	Connects Forden Station to Monkey Junction
108	Market Street	Connects downtown Wilmington to UNCW and Forden Station
201	Carolina Beach Road	Connects downtown Wilmington to Monkey Junction
202	Oleander West	Connects downtown Wilmington to Independence Mall
203	Downtown Trolley	Circulator service in downtown Wilmington between Chandler's Wharf and PPD
204	Brunswick Connector	Connects downtown Wilmington to Leland, Navassa, and New Hanover Medical Center
205	Long Leaf Park	Connects downtown Wilmington to the Department of Social Services and New Hanover County Regional Medical Center
207	North	Connects downtown Wilmington to Cape Fear Community College North Campus, Wilmington International Airport, and the VA Clinic
209	Independence	Connects downtown Wilmington to New Hanover County Regional Medical Center and Independence Station
301	Pleasure Island	Connects Monkey Junction to Carolina Beach



Figure 2 | Wave Transit Fixed-Route System Map





Wave Transit fixed-route and Dial-a-Ride fares are detailed in Figure 3. A regular one-way fare is \$2.00 and a reduced one-way fare is \$1.00. Seniors (passengers 65 years and older), students, and people with disabilities are eligible for reduced fares. Passes are available at regular and reduced rates in the following increments: seven days, 31 days, and ten rides. UNCW students may ride all Wave Transit fixed-routes at no charge by displaying a valid student ID. Transfers between fixed-routes are free, but no transfers are allowed to Route 301 Pleasure Island.

Figure 3 | Wave Transit Fares

Fare Type	Regular Fare	Reduced Fare (Senior, student, disabled)
Adult One Way Pass	\$2.00	\$1.00
UNCW Students	Free (with ID)	Free (with ID)
Adult One Day Pass	\$5.00	\$2.50
Adult Seven Day Pass	\$20.00	\$10.00
Adult Thirty-One Day Pass	\$80.00	\$40.00
Adult Ten Ride Pass	\$20.00	\$10.00
Accessible Van Service Dial-a-Ride-Transportation One Way	--	\$4.00
Accessible Van Service Dial-A-Ride-Transportation 10 Tickets	--	\$40.00
<i>Transfers: Passengers can transfer for free between all routes except for Route 301 Pleasure Island</i>		

The majority of Wave Transit's fixed-routes operate at frequencies of 60 minutes. All routes run Monday through Friday, with most routes operating from 6:00 a.m. to 9:00 p.m. (Figure 4). Thirteen routes provide weekend service, with most routes operating from 6:00 a.m. to 9:00 p.m. on Saturday and from 9:00 a.m. to 6:00 p.m. on Sunday. Route 204 Brunswick Connector and Route 207 North do not operate Saturday or Sunday service. Route 203 Downtown Trolley operates a distinct service schedule: 7:10 a.m. to 8:50 p.m. Monday through Friday, 10:30 a.m. to 8:50 p.m. on Saturday, and 10:30 a.m. to 5:30 p.m. on Sunday.

Figure 4 | Wave Transit Service Characteristics by Route

Route	Service Span	Service Frequency
101 Princess Place	Monday – Friday: 6:00 a.m. – 9:00 p.m. (Peak period service from 6:00 a.m. – 6:00 p.m.) Saturday: 6:00 a.m. – 9:00 p.m. Sunday: 9:00 a.m. – 6:00 p.m.	Peak: 30 minutes Off-Peak: 60 minutes
103 Oleander East	Monday – Friday: 6:00 a.m. – 9:00 p.m. Saturday: 6:00 a.m. – 9:00 p.m. Sunday: 9:00 a.m. – 6:00 p.m.	60 minutes
104 Northeast	Monday – Friday: 6:00 a.m. – 9:00 p.m. Saturday: 6:00 a.m. – 9:00 p.m. Sunday: 9:00 a.m. – 6:00 p.m.	60 minutes
105 Medical Center	Monday – Friday: 6:00 a.m. – 9:00 p.m. Saturday: 6:00 a.m. – 9:00 p.m. Sunday: 9:00 a.m. – 6:00 p.m.	60 minutes



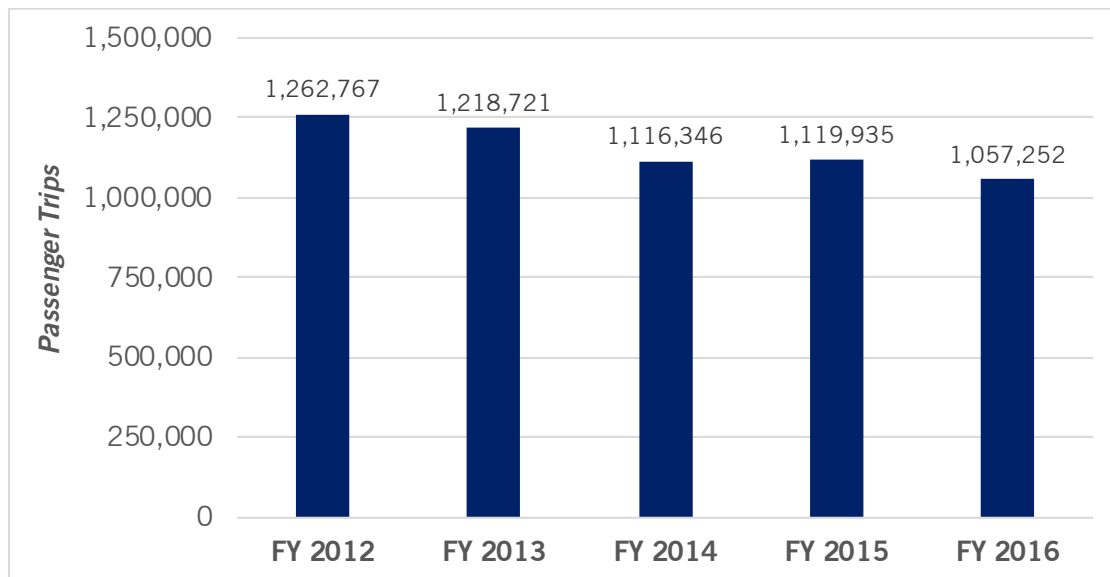
106 Shipyard Boulevard	Monday – Friday: 6:00 a.m. – 9:00 p.m. Saturday: 6:00 a.m. – 9:00 p.m. Sunday: 9:00 a.m. – 6:00 p.m.	60 minutes
107 College Road	Monday – Friday: 6:00 a.m. – 9:00 p.m. Saturday: 6:00 a.m. – 9:00 p.m. Sunday: 9:00 a.m. – 6:00 p.m.	60 minutes
108 Market Street	Monday – Friday: 6:00 a.m. – 9:00 p.m. Saturday: 6:00 a.m. – 9:00 p.m. Sunday: 9:00 a.m. – 6:00 p.m.	60 minutes
201 Carolina Beach Road	Monday – Friday: 6:00 a.m. – 9:00 p.m. Saturday: 6:00 a.m. – 9:00 p.m. Sunday: 9:00 a.m. – 6:00 p.m.	60 minutes
202 Oleander West	Monday – Friday: 6:00 a.m. – 9:00 p.m. Saturday: 6:00 a.m. – 9:00 p.m. Sunday: 9:00 a.m. – 6:00 p.m.	60 minutes
203 Downtown Trolley	Monday – Friday: 7:10 a.m. – 8:50 p.m. Saturday: 10:30 a.m. – 8:50 p.m. Sunday: 10:30 a.m. – 5:30 p.m.	20 minutes
204 Brunswick Connector	Monday – Friday: 6:00 a.m. – 6:00 p.m. Saturday and Sunday: No service	60 minutes
205 Long Leaf Park	Monday – Friday: 6:00 a.m. – 9:00 p.m. Saturday: 6:00 a.m. – 9:00 p.m. Sunday: 9:00 a.m. – 6:00 p.m.	60 minutes
207 North	Monday – Friday: 6:00 a.m. – 9:00 p.m. Saturday and Sunday: No service	60 minutes
209 Independence	Monday – Friday: 6:00 a.m. – 9:00 p.m. Saturday: 6:00 a.m. – 9:00 p.m. Sunday: 9:00 a.m. – 6:00 p.m.	60 minutes
301 Pleasure Island	Monday – Friday: 7:30 a.m. – 7:30 p.m. Saturday: 7:30 a.m. – 7:30 p.m. Sunday: 10:30 a.m. – 4:30 p.m.	180 minutes (3 hours)

## Fixed-Route Ridership

Wave Transit's fixed-route bus service provided 1,057,252 passenger trips in FY 2016. From 2012 to 2016, ridership on Wave Transit's fixed-route bus service decreased by 16% (Figure 5). Overall, passenger trips on Wave Transit fixed-route service and the Seahawk Shuttle declined by 10% in the five-year period from 2012 to 2016. This is part of a nationwide trend of declining transit ridership, likely driven by easier access to automobile financing, the rise of on-demand services like Uber and Lyft, increased telecommuting, and other factors. Also, it should be noted that Seahawk Shuttle ridership has increased during the five-year period, as described in more detail below.



Figure 5 | Wave Transit Fixed-Route Passenger Trips 2012-2016

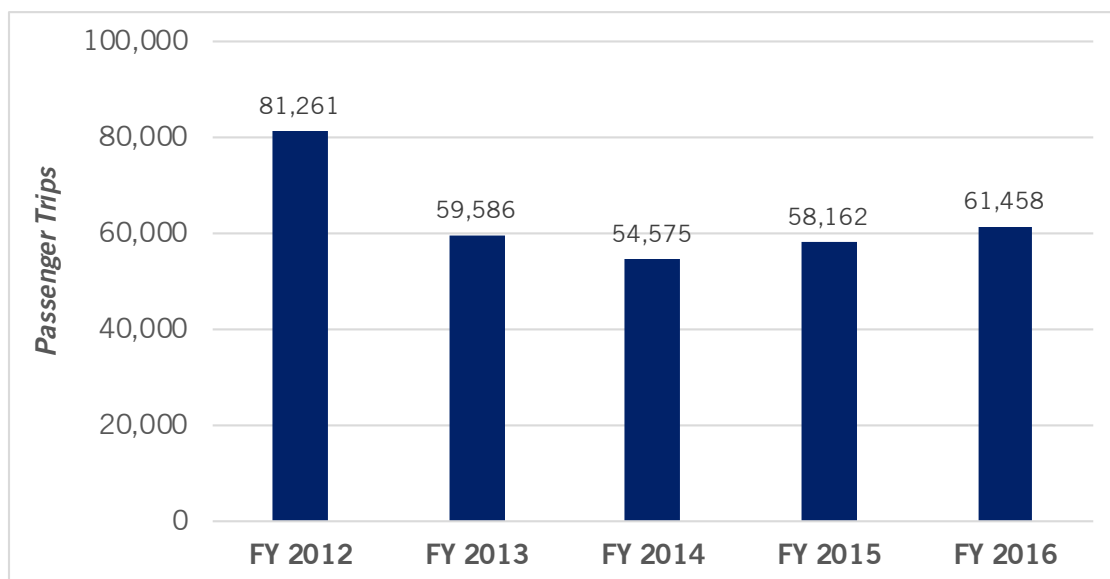


## WAVE TRANSIT DIAL-A-RIDE

Wave Transit's Dial-a-Ride (DART) service provides curb-to-curb ADA paratransit transportation for wheelchair and semi-ambulatory passengers who are unable to use fixed-route service. DART service operates Monday through Saturday from 6:00 a.m. to 9:00 p.m. and on Sunday from 9:00 a.m. to 6:00 p.m. DART trips must be scheduled in advance by calling the DART reservation line, and one-way fares are \$4.00.

DART ridership decreased 27% from FY2012 to FY2013, following the implementation of Wave Transit's fixed-route restructuring. Ridership has remained relatively stable since FY2013. DART provided 61,458 passenger trips in FY2016, an increase of 3% since FY2013 (Figure 6).

Figure 6 | Wave Transit DART Passenger Trips 2012-2016







## UNCW SEAHAWK SHUTTLE

Transit demand on UNCW Wilmington’s campus is currently increasing as the university’s student population increases. Likewise, providing frequent service between UNCW and off-campus student housing developments will remain a priority. The Seahawk Shuttle is a fixed-route bus system serving the UNCW students, faculty, and staff members. During UNCW’s fall and spring academic semesters the shuttle runs Monday through Friday from 7:00 a.m. to 5:30 p.m.; the shuttle does not operate on Saturday or Sunday. The Seahawk Shuttle is fare-free for UNCW students and employees, and a \$2 per trip fare is charged for non-UNCW students/employees.

Two routes provide loop service on UNCW’s campus, and eight routes provide service between UNCW’s campus, off-campus student housing, park and ride lots, and off-campus research facilities (Figure 8 and Figure 9). Route 712 (Teal Shuttle) provides service between UNCW’s campus and Forden Station, enabling transfers to Wave Transit’s fixed-route system, Greyhound intercity bus, and Amtrak Thruway bus service. The CREST Shuttle provides hourly service to UNCW CREST Research Park on the Intracoastal Waterway, eight miles south of UNCW’s main campus.

From 2012 to 2016, ridership on the Seahawk Shuttle increased by 17%, from 286,597 passenger trips in 2012 to 336,321 trips in 2016 (Figure 7).

Figure 7 | Seahawk Shuttle Passenger Trips 2012-2016

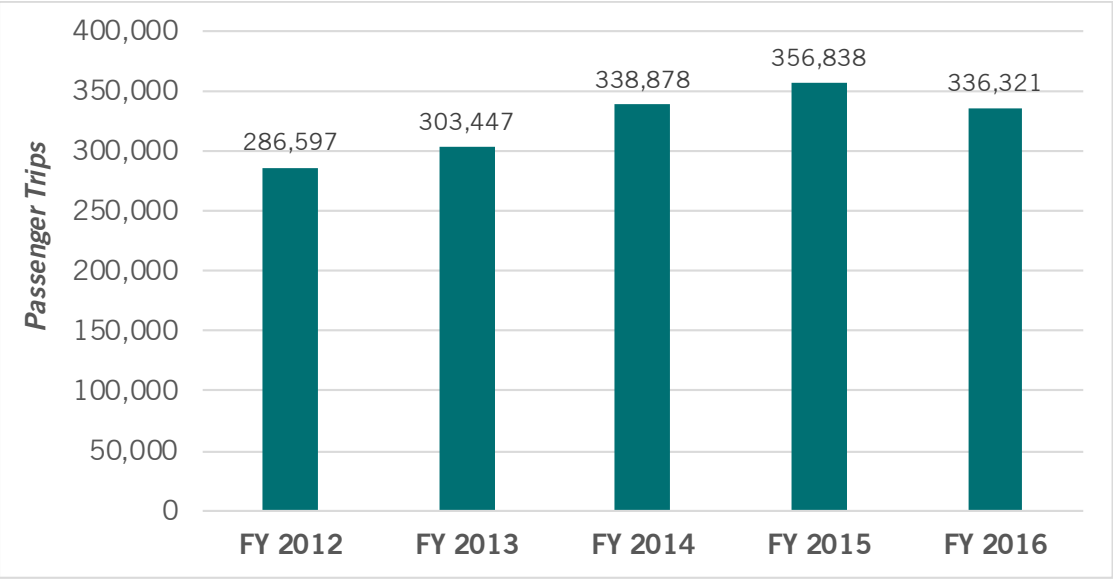
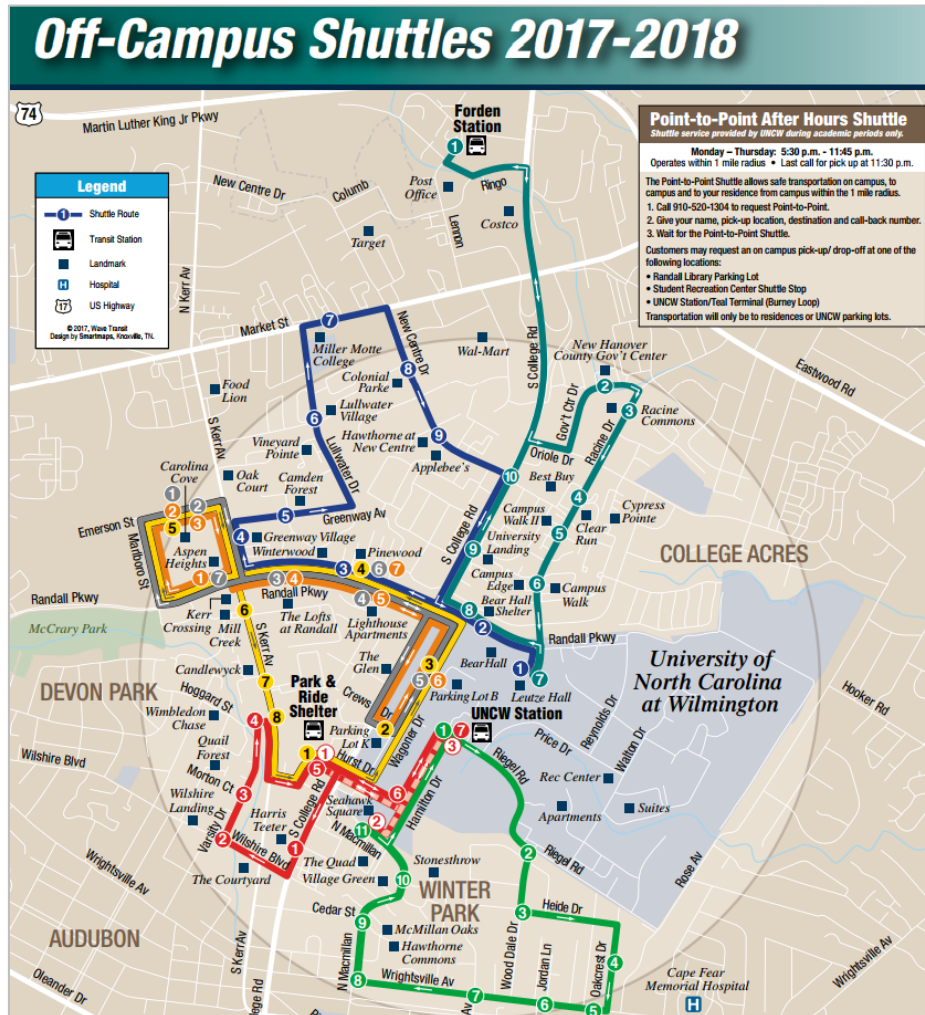








Figure 9 | Seahawk Shuttle Off-Campus Map 2017-2018



## REGIONAL TRANSPORTATION SERVICES

Intercity service in Wilmington is operated by Greyhound and Amtrak Thruway from Forden Station. Greyhound intercity bus service operates multiple routes connecting to cities in North Carolina and throughout the United States. Although Wilmington is not directly served by Amtrak's passenger rail service, Amtrak Thruway connects passengers to the Wilson Amtrak Station by bus, with one daily trip; the Wilson Amtrak Station is served by two north-south passenger train routes—the Palmetto and the Carolinian. Additionally, the North Carolina Ferry System operates daily ferry service between Fort Fisher and Southport.



### 3 TRANSIT MARKET ANALYSIS

Successful public transportation serves densities of population and employment and also fulfills a public service for those who have no other means of transportation. Although Wilmington is an affluent community, one of Wave Transit's core objectives is to provide service to transit-dependent individuals, people that do not have access to a personal vehicle. As Wave Transit looks toward the future, the agency works diligently to understand where potential customers live and work to align routes and service levels. The purpose of the Market Analysis is to understand both the need and potential for transit service in Cape Fear by examining the following market characteristics:

- **Population and employment density**, which are the strongest indicators of transit demand. Larger numbers of people living and working near each other and along corridors leads to a stronger market for transit and indicate transit ridership potential.
- **Socio-economic characteristics**, such as income, auto availability, age, and disability status are characteristics indicative of a higher propensity to use transit, and thus indicate transit need.
- **The location of major employment centers**, which equates to major daily destinations as well as potential transit partners.

Each of these factors indicates demand for transit, but ridership is also affected by urban form, land use, the pedestrian environment, and the convenience of other alternatives. For example, nearly all transit riders are also pedestrians on at least one end of their trip. Thus, the safety and comfort of the walking environment strongly affects ridership. Likewise, areas with minimal traffic congestion and ample (and affordable) parking will have a more difficult time attracting transit riders than areas with heavy congestion and limited parking.

In 2015, 1.3% of workers in Wilmington commuted by public transit, 2.8% commuted by walking, and 3.2% commuted by "other means," which includes bicycles.<sup>1</sup> Bicyclists are a growing segment of Wave Transit's ridership, and Wave Transit actively encourages multimodal connectivity. To accommodate bicyclists, two bike racks are mounted on each of Wave Transit's fixed-route vehicles. In FY 2016, 20,730 bicycle trips were made on Wave Transit, a 64% increase from 2015.

The Market Analysis presented in this chapter is a starting point that broadly identifies regions, neighborhoods, and activity centers that may be supportive of transit service. Data sources include the U.S. Census, the 2010-2014 American Community Survey, and online research.

#### TRANSIT POTENTIAL

Public transportation is generally most efficient in areas with high concentrations of people and businesses. Combining both residential and employment densities yields a transit potential index. This index shows where the conditions are most suitable for transit service based on the number of jobs and people per acre.

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<sup>1</sup> American Community Survey, 2015



## 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 transit is generally limited to within  $\frac{1}{4}$  to  $\frac{1}{2}$  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 3-6 households, or 7-15 people, per acre is needed to support base-level fixed-route transit service (service every 60 minutes). Lower-density communities support different types of transit services, including lower frequency or demand response modes. Figure 10 below shows the population density by Census block in the City of Wilmington, New Hanover County, and Brunswick County. The yellow color matches with the densities that can support at least hourly service; areas with darker colors can support more frequent service.

Key findings from the Population Density map include the following:

- Much of Wilmington features low (one to five people per acre) to moderate population density (six to 15 people per acre).
- Wilmington's highest population density is downtown and on or near UNCW's campus. Downtown Wilmington and the neighborhoods north, south, and east feature transit-supportive population densities and street networks conducive to operating public transit routes.
- Outside of downtown Wilmington, high population density areas are more dispersed. Pockets of high population density are present southwest of New Hanover Regional Medical Center, on St. Andrews Drive, east of Covil Avenue and south of Market Street, and between Kerr Avenue and College Road west of UNCW.
- The majority of locations that feature transit-supportive population densities are served by at least one Wave Transit route. Exceptions are the residential developments west of Ogden; high-density retail and residential developments on Market Street north of Gordon Road to Porters Neck; development along Causeway Drive, abutting Wrightsville Beach; the Greenville Village mobile home park south of Oleander Drive; and sections of Myrtle Grove.
- On Pleasure Island, the highest population densities are located in downtown Carolina Beach, Harper Avenue, and along Carolina Beach Drive (north and south of Carolina Beach).
- Population density in Brunswick County is mostly low, with moderate population densities in Belville south of Chappell Loop Road, and in Leland at the Brunswick Point apartment complex south of Ocean Highway, along Lanvale Road between Ocean Highway and Old Fayetteville Road, along Old Fayetteville Road in Woodburn, and at the Waterford residential development north of Ocean Highway.



## Employment Density

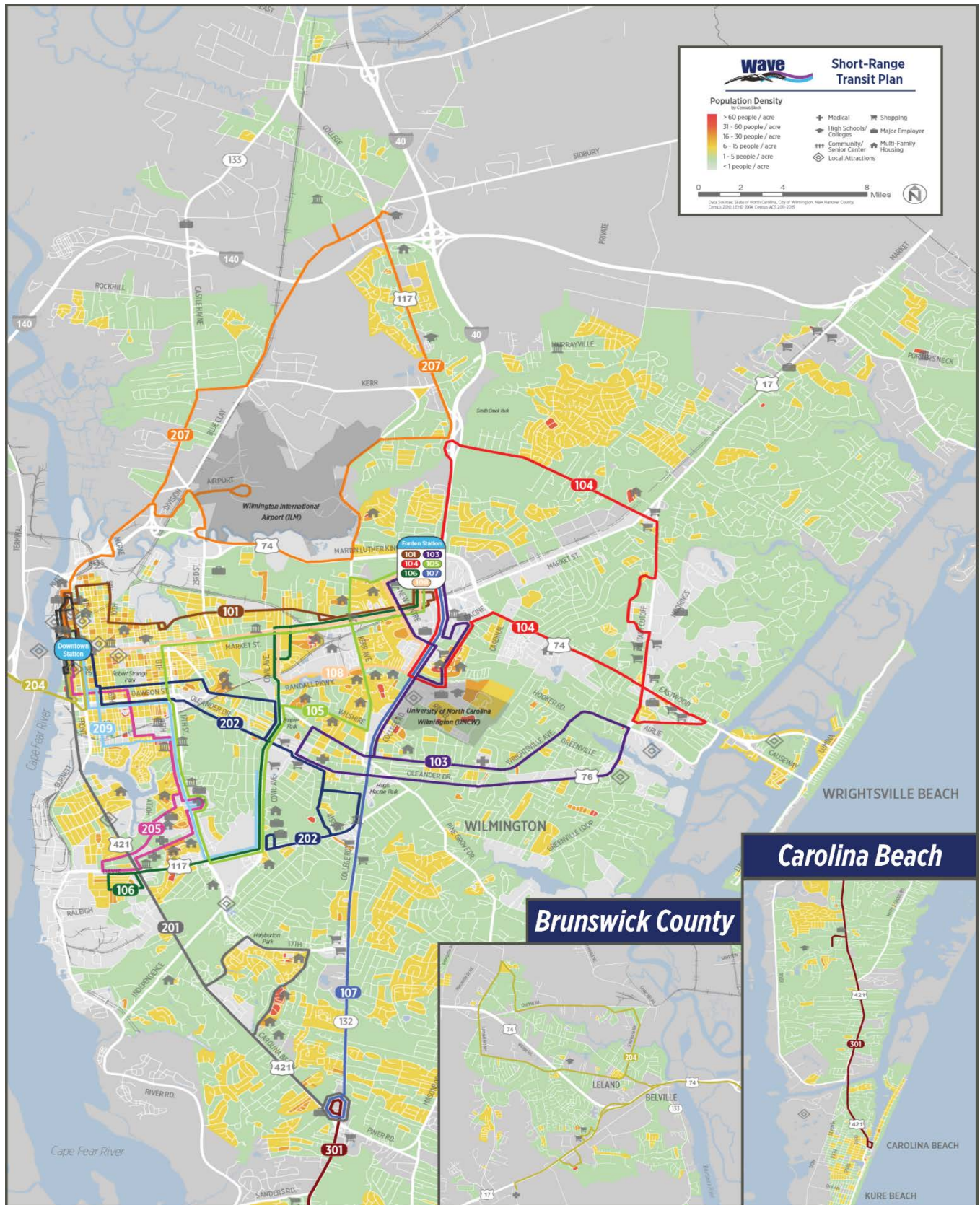
The location and number of jobs is a second strong indicator of transit demand, as traveling to and from work accounts for the largest single segment of transit trips in most markets. Additionally, transit that serves areas of high employment density provides key connections to job opportunities. The minimum level of employment density that is typically needed to support hourly transit service is five jobs per acre. This corresponds to the yellow color in Figure 11. Higher densities can support greater frequency. The employment density presented in Figure 11 reveals several findings:

- As would be expected, relatively high employment density (31-60 jobs per acre) is concentrated in a few key pockets of Wave Transit's service area. These locations include downtown Wilmington, at New Hanover County Regional Medical Center on 17<sup>th</sup> Street, UNCW, Monkey Junction, Independence Mall, and at the junction of Market Street, College Road, and Eastwood Road.
- Several corridors outside of downtown Wilmington support moderate to high employment densities, including Market Street, 17<sup>th</sup> Street, College Road, Oleander Drive, and Eastwood Road between Military Cutoff Road and Wrightsville Beach.
- Additional pockets of high employment density exist in the Audubon neighborhood, Porter's Neck, the intersection west of Shipyard Boulevard and Independence Boulevard, and on Military Cutoff Road north of Eastwood Road,
- Employment density in Brunswick County is highest in Leland, along Old Fayetteville Road and on Ocean Highway, west of I-74.
- Employment density on Pleasure Island is minimal, with the highest densities concentrated in downtown Carolina Beach and on Lake Park Boulevard. Carolina Beach's hotels, rental properties, and restaurants support a significant number of service sector jobs, especially in the summer months. Many service sector workers in Wilmington and New Hanover County are transit-dependent, and rely on Wave Transit to travel to and from work.





Figure 10 | Population Density









## Major Employers

Wilmington's economy is well-balanced, with a focus on education, health care, and industrial manufacturing. With more than 6,000 employees, New Hanover County Regional Medical Center (NHCRMC) is the largest employer in the Cape Fear region. NHCRMC is a healthcare network based on 17<sup>th</sup> Street in Wilmington and also features 70 offices throughout southeast North Carolina. Multiple private sector companies have offices in Wilmington that support more than 1,000 employees, including GE Hitachi Nuclear Energy, PPD, and Verizon Wireless. In addition, corporate headquarters for Alcam, CastleBranch, and Live Oak Bank are based in Wilmington. Tourism and hospitality are also significant economic drivers for the Cape Fear region, especially the beach communities south and east of Wilmington.

Identifying the largest employers in the Wilmington region is useful to map the highest concentration of jobs, illustrate potential commuter travel patterns, and can help Wave Transit explore marketing and partnership opportunities. Partnerships such as employer-supported transit passes, vanpool programs, and on-site transit coordinators can attract choice riders to a transit system and translate into higher overall system ridership.

The 10 largest employers in the Wilmington region, as reported by the Wilmington Chamber of Commerce, are shown in Figure 12. It is important to note that some of the city's top employers have more than one office. For example, employees of the New Hanover Regional Medical Center and New Hanover County Schools work at numerous medical offices and schools located throughout Wilmington and New Hanover County.

Nine of Wilmington's largest employers are currently served by Wave Transit fixed-route bus service (Figure 13). New Hanover County Regional Medical Center is served by three fixed-routes: 105 Medical Center, 205 Long Leaf Park, and 209 Independence. GE Hitachi Nuclear Energy/GE Aviation, the region's fourth largest employer, is not served by fixed-route service. Route 207 North provides service east of the facility on Castle Hayne Road and Blue Clay Road.

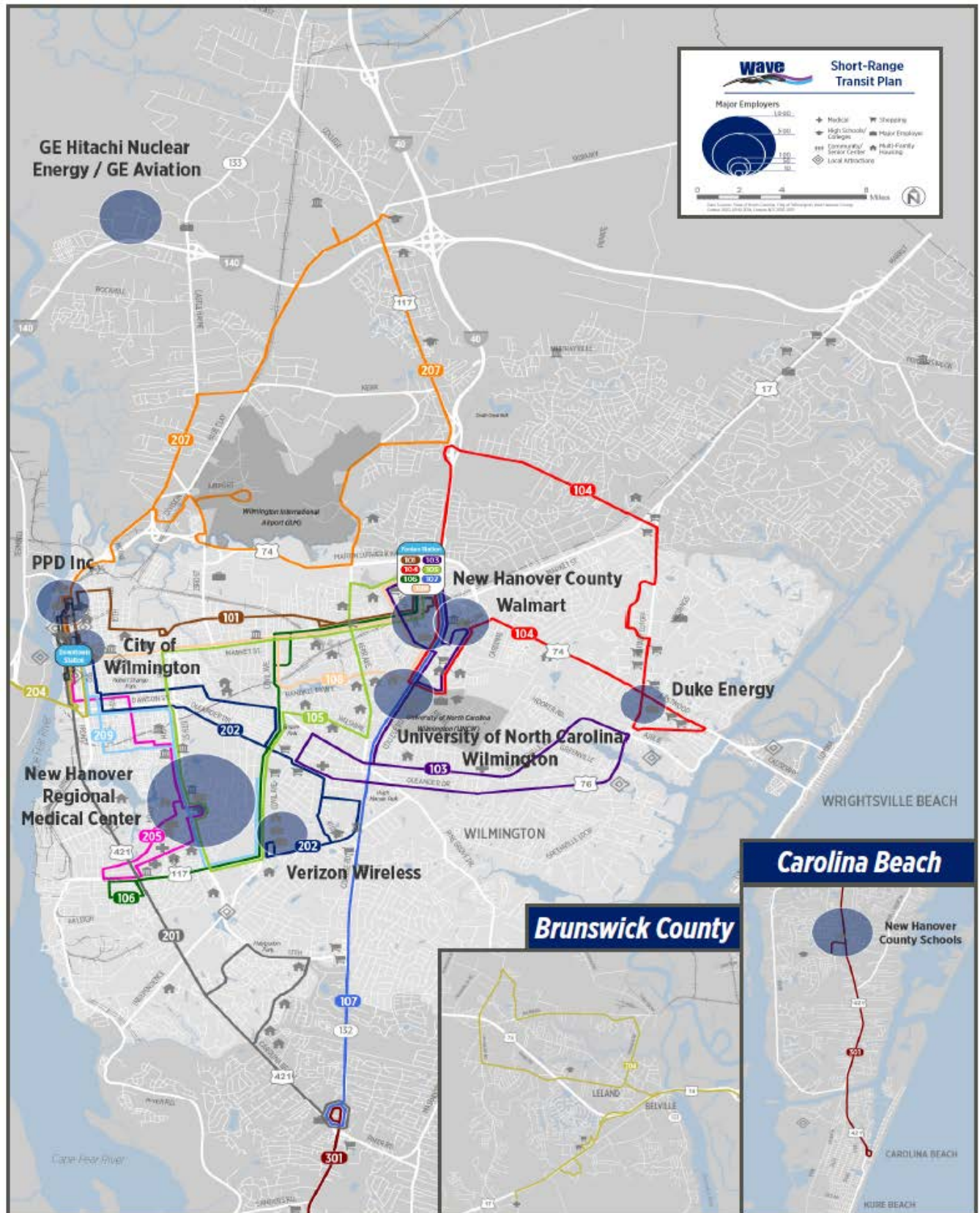
Figure 12 | Wilmington's Largest Employers

Employer	Sector	Employees
New Hanover Regional Medical Center/Cape Fear Hospital	Medical/Health Care	6,123
New Hanover County Schools	Education	4,443
Walmart	Retail	2,592
GE Hitachi Nuclear Energy/GE Aviation	Manufacturing	2,175
University of North Carolina Wilmington	Education	1,860
New Hanover County	Government Services	1,611
PPD, Inc.	Biotech	1,500
Verizon Wireless	Telecommunications	1,411
Duke Energy	Utility Services	1,109
City of Wilmington	Government Services	1,000
Source: Wilmington Chamber of Commerce		





Figure 13 | Wilmington's Major Employers





## Transit Potential Index

The Transit Potential Index, shown in Figure 14, is a composite of the population and employment densities and is an indicator of the viability of fixed-route service in the study area. A higher Transit Potential Index score for a Census Block points to a higher likelihood of generating substantial transit ridership in that block. For the transit potential of an area to be fully realized, however, the area must also have transit-supportive infrastructure such as sidewalks and crosswalks. Actual ridership is also highly dependent on service characteristics such as schedule and routing.

A review of the Transit Potential Index for the study area suggests:

- Transit potential is particularly high in downtown Wilmington along Front Street, 2<sup>nd</sup> Street and 3<sup>rd</sup> Street. Moderate-to-high transit potential also exists in The Bottom and Carolina Place neighborhoods, in the vicinity of UNCW, near New Hanover County Regional Medical Center, at Monkey Junction, and in the Audubon neighborhood.
- The following corridors also feature high transit potential: Market Street, 17<sup>th</sup> Street, College Road, and Oleander Drive. Outlying pockets of transit potential exist in Wrightsville Beach, Myrtle Grove, the Seagate neighborhood, and Porter's Neck.
- Moderate transit potential exists at Creekwood South, north of Princess Place Drive. Creekwood South is a low-income housing development owned and operated by the Wilmington Housing Authority.
- Transit potential on Pleasure Island is highest in downtown Carolina Beach, as well as north and southeast of downtown.
- In Brunswick County, transit potential is highest in select locations in Leland, on Old Fayetteville Road and Ocean Highway, and pockets of residential development in Belville.
- The majority of the areas served by Wave Transit feature moderate transit potential, which is reflected in the system's current coverage.









## TRANSIT NEED

Above all else, public transportation is a mobility tool. Certain population subgroups are more likely to use transit than other modes as their primary means of local and regional transportation. These groups include:

- **Older Adults**, who as they age, often become less comfortable or less able to operate a vehicle.
- **Individuals in Poverty**, typically because transit is less expensive than owning and operating a car.
- **Persons with Disabilities**, many of whom can't drive and or have difficulty driving.
- **Young adults**, who in general have a significantly higher interest in using many transportation options such as transit, walking, and biking and a lower interest in driving.
- **People without Access to a Vehicle**, whether it be by choice or due to financial or legal reasons, often have no other transportation options besides using transit.

Identifying areas in Cape Fear with relatively high concentrations of these groups can help determine where the need for transit service is greatest. It should be noted, however, that high transit need does not necessarily mean that traditional fixed-route transit is ideal for an area. In some locations, the density of transit-dependent population is high, but the total population is still quite low, meaning that the transit potential of the area is also low. The maps in this section utilize the same scale as maps in the Transit Potential section to provide an equal understanding of potential and need.

### Older Adults

Older adults (65 and older) are more likely to use public transit than the general population. Many seniors are retirees, and as a result, take fewer daily trips. Some choose or are forced to stop driving due to health issues, while others simply prefer a car-free lifestyle. Transit provides an important means for this population demographic to remain as active and independent as possible, and to age in place. As of 2015, 14.6% of Wilmington's population was 65 years of age or older.

In general, the density of older adults in Wilmington is low, and well-dispersed throughout the city and parts of New Hanover County (Figure 15). As Wilmington is a popular retirement destination, the densest tracts of older adults are typically related to the presence of retirement and senior assisted living facilities. For example, tracts demonstrating higher densities of older adults are located east of Greenfield Lake, which includes Lake Shore Commons, a retirement community, and Sherwood Manor Rest Home. Additional blocks containing low densities of older adults include the following residential neighborhoods and locations:

- Carolina Place, west and east of 17<sup>th</sup> Street.
- The Bottom, northeast of Robert Strange Park.
- Brooklyn, north of New Hanover High School and south of Oakdale Cemetery.
- Audubon, east of Empie Park.
- Blocks east of College Road, between Holly Tree Road and Pine Valley Drive. These blocks include The Woods at Holly Tree, a senior living facility, and The Cottages at Holly Glen,



north of Holly Tree Road. These neighborhoods are served by Route 107 College Road to the east, but the area is largely underserved by Wave Transit's fixed-route bus network.

- Sunset South, which includes the Glenmeade Village Apartments (reserved for older adults), Silver Stream Health and Rehabilitation Center, and Wilmington Health and Rehabilitation Center.

No blocks in Carolina Beach, Kure Beach, or Brunswick County feature notable densities of older adults.

## People with Disabilities

Residents with disabilities are another group with a high propensity for transit use. While many disabled individuals are eligible for Wave Transit's Dial-a-Ride paratransit service (destination to origin service), there has been a strong national trend toward "mainstreaming" in recent years.

Mainstreaming encourages people with disabilities to use fixed-route transit service instead of paratransit service whenever possible. For the user, this means a greater level of flexibility, as fixed-route service does not require advanced reservations, but less convenience since the passenger must walk or be dropped off at transit stops. For the transit operator, mainstreaming can result in cost reductions and greater service productivity by shifting trips from costly paratransit service to fixed-route service. For those with disabilities to reasonably be expected to rely on fixed route service, however, the service must be physically and geographically accessible. More than 15,000 residents—13.5% of Wilmington's adult population—have a disability, marginally higher than the national average (11%). As Figure 16 demonstrates, disabled residents reside in multiple residential neighborhoods near downtown Wilmington and UNCW, including the following neighborhoods: Audubon, Dry Pond, Devon Park, and Carolina Place. Additional Census Blocks containing concentrations of people with disabilities include the neighborhood surrounding New Hanover High School, multifamily buildings east of University Common, multifamily developments east of Kerr Avenue and west of College Road, and in the Seagate neighborhood north of Greenville Avenue.

## Low Income

Poverty status is a strong indicator of a higher-than-average propensity to use transit because as income falls, the cost of owning and using a private vehicle becomes more burdensome, which makes transit a more attractive option. This analysis used the Census classification of poverty status to identify those living in poverty. Since disposable income is largely a factor of household size and household income, the Census considers household income and the number of members in the household in classifying a household as in poverty or not.

Twenty-three percent of Wilmington residents live below the poverty level. The highest densities of poverty-status individuals in the study area are located east of University Commons, north of UNCW, with densities of 6 to 15 people below poverty per acre (Figure 17). Concentrations of low-income households are also present in the following neighborhoods: Brooklyn, Creekwood, Hillcrest, The Bottom, East Wilmington, Dry Pond, Hanover Heights, Devon Park, Audubon, College Acres, and Seagate.

The density of people in poverty in several neighborhoods is partially due to the location of public housing developments managed by the Wilmington Housing Authority (WHA). The WHA manages



approximately 1,100 units in the City of Wilmington, housing 2,300 residents.<sup>2</sup> In East Wilmington this includes the Eastbrook and Woodbridge public housing developments; Houston Moore Terrace and Hillcrest public housing developments are located in Lake Forest; Robert Taylor Senior Homes is in Northside.

Two additional developments—unaffiliated with the WHA—provide low-income housing: Robert S Jervay Place, a 100-unit affordable housing community in Dry Pond, and the Village at Greenfield Apartments in Lake Forest, which features 425 low-income units. East of Independence Boulevard, Route 201 Carolina Beach serves two areas featuring densities of low-income households, along Saint Andrew Drive and the Silva Terra neighborhood.

No significant densities of low-income individuals are present in Carolina Beach, Kure Beach, or Brunswick County.

## Youth and Young Adult Population

In the same way that older adults are more likely to ride transit than the general population, so are young adults and youth aged 15 to 21 who either cannot drive or do not own a vehicle. This demographic is also increasingly seeking alternative transportation options beyond the automobile. A recent survey of Millennials by Transportation for America and the Rockefeller Foundation reported that more than half of Millennials would prefer to live in a place where they do not have to rely on cars to get around, and two-thirds say access to high quality transportation will be one of their top three criteria when deciding where to live.<sup>3</sup>

Youth and young adults (15-21) make up 13% of Wilmington's population. As shown in Figure 18, the highest concentrations of this population are located on UNCW's campus or in the immediate vicinity. Densities of youth and younger adults also exist where multiple off-campus apartment complexes cater to UNCW students south of Market Street, along Randall Parkway, north of Wilshire Boulevard, and along Racine Drive and MacMillan Avenue. Nearly all of the areas with youth and young adult densities above six people per acre are served by a Wave Transit Route. No significant densities of youth or young adults are present in Brunswick County.

## Households without a Vehicle

For self-evident reasons, individuals without access to a vehicle represent a particularly strong market for transit. In some cases, individuals do not have access to an automobile for health, financial, or legal reasons, while others simply choose to live car-free. Currently, 9.3% of households in Wilmington do not have access to a vehicle. Renter occupied households are four times more likely (14.1%) to lack access to a vehicle than owner-occupied households (3.1%).<sup>4</sup>

As shown in Figure 19 the highest densities of zero-vehicle households in Wilmington are concentrated in The Bottoms, Carolina Place, Dry Pond, and Lake Shore residential neighborhoods east and south of downtown Wilmington. Additional Census Blocks featuring concentrations of zero-vehicle households are located north of Market Street near New Hanover High School, and north of UNCW, near University Commons. Most densities of zero-vehicle households are well-

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<sup>2</sup> Wilmington Housing Authority: [http://www.wha.net/Housing\\_Programs/Public\\_Housing/Public\\_Housing.htm](http://www.wha.net/Housing_Programs/Public_Housing/Public_Housing.htm)

<sup>3</sup> "Access to Public Transportation a Top Criterion for Millennials When Deciding Where to Live, New Survey Shows": <https://www.rockefellerfoundation.org/about-us/news-media/access-public-transportation-top/>

<sup>4</sup> 2011-2015 American Community Survey 5-Year Estimates, "Tenure by Vehicles Available"



served by Wave Transit. Multifamily residential buildings on Lake Branch Parkway, south of the Village at Greenfield, are underserved by Wave Transit, but are geographically isolated on a peninsula jutting into Greenfield Lake.







Figure 16 | Density of People with Disabilities

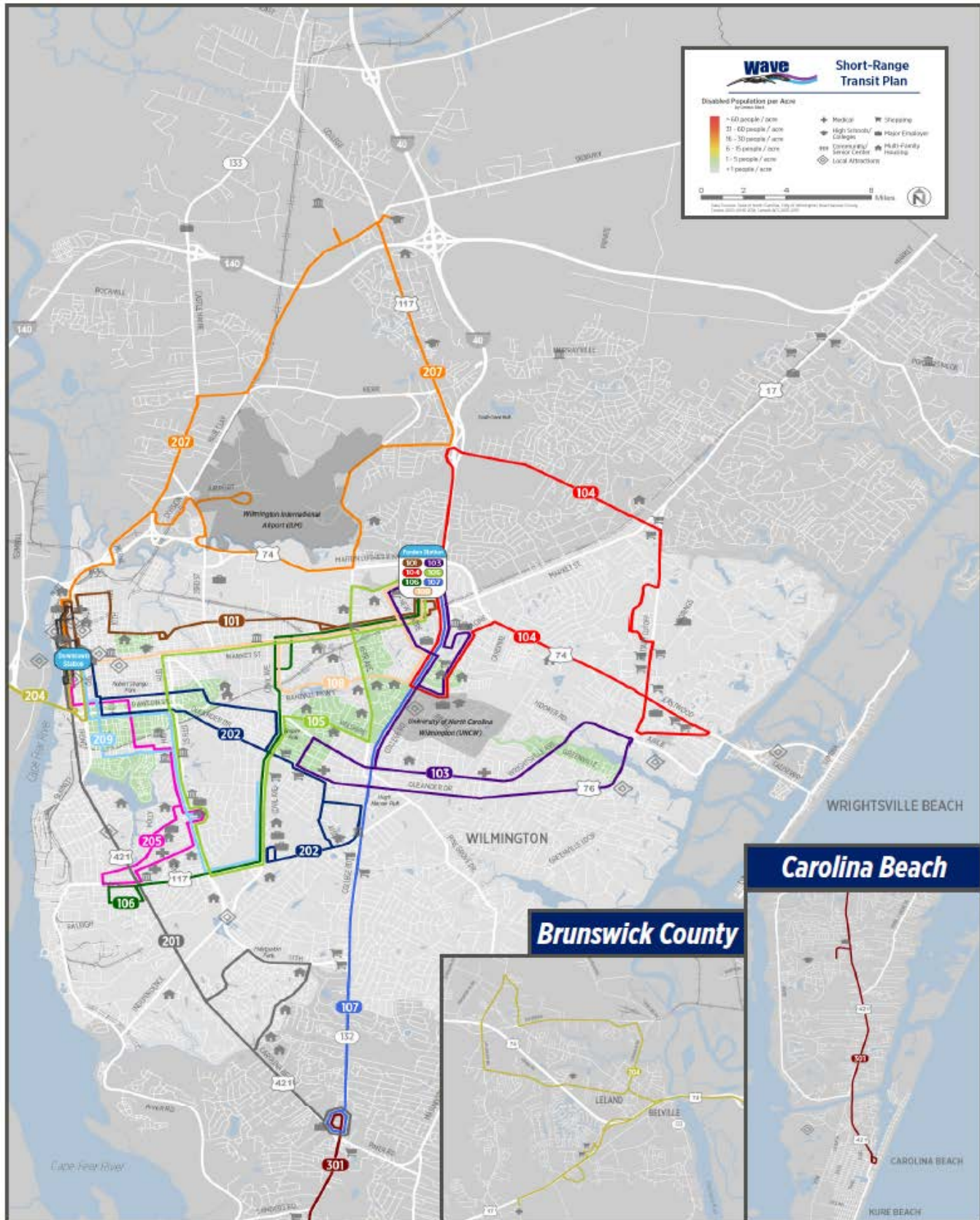




Figure 17 | Density of Low Income Households

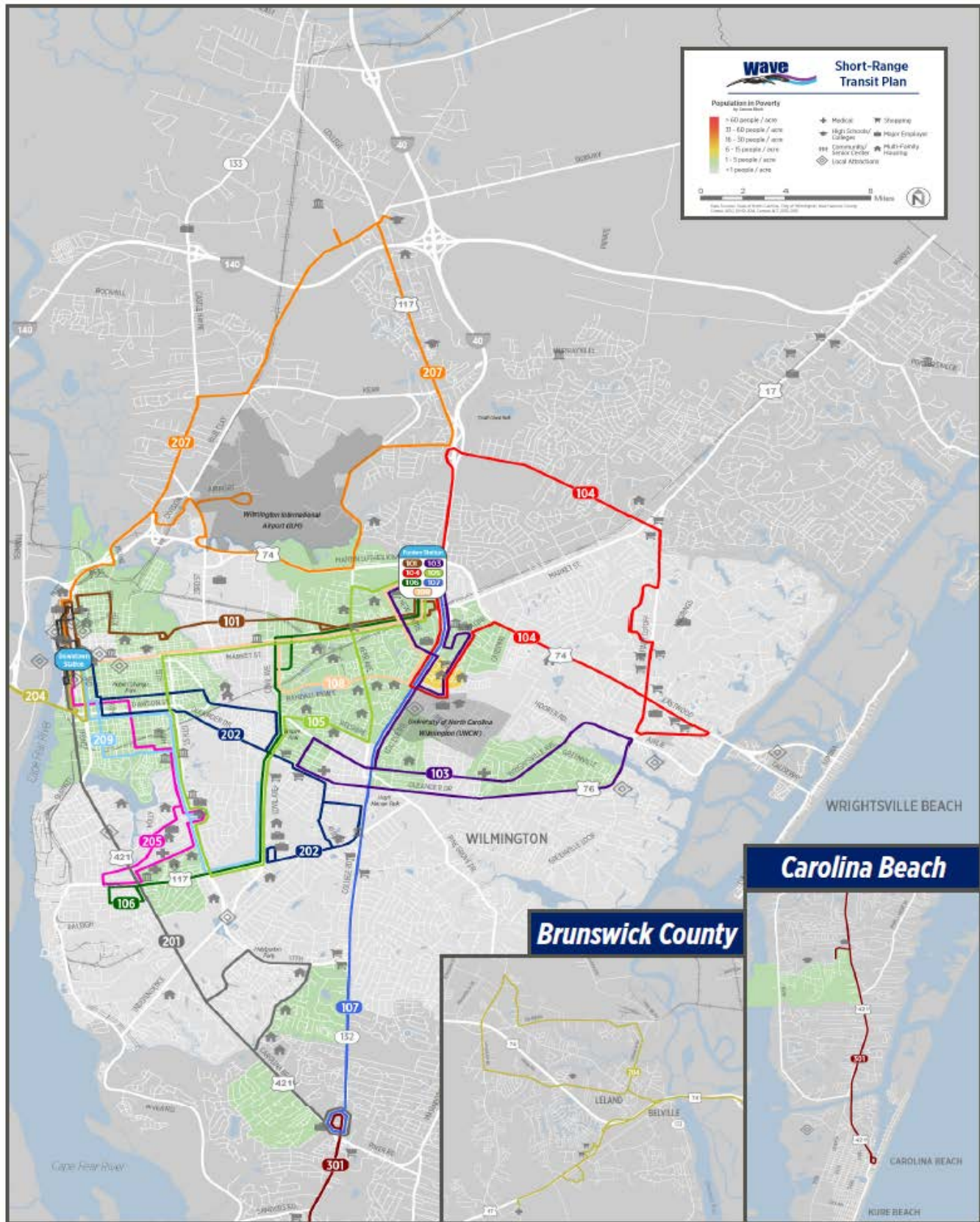
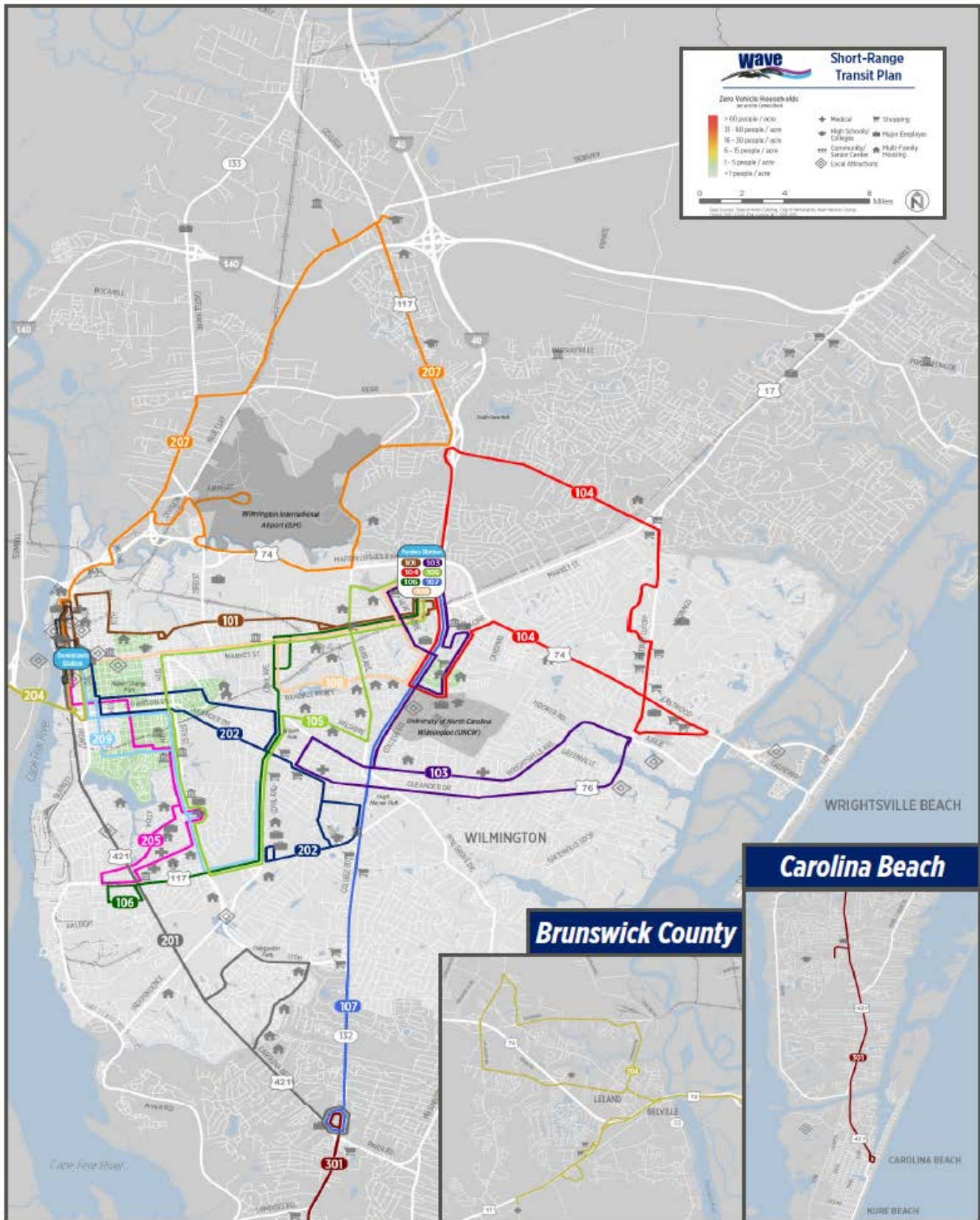








Figure 19 | Density of Zero Vehicle Households







## ORIGIN-DESTINATION TRAVEL FLOW ANALYSIS

Employment origin and destination travel flow data is derived from the LEHD Origin-Destination Employment Statistics dataset (LODES, 2014). LODES data measures employment travel flow between and within individual Census Block Groups (BGs). Individual BGs typically contain populations between 600 and 3,000 people.

Travel flow lines illustrate daily origin-destination travel volumes between Block Groups containing residences to Block Groups containing jobs in New Hanover and Brunswick Counties. Aqua travel flow lines represent 40-75 daily employment trips between BGs; navy lines represent 75-125 daily employment trips between BGs; purple lines represent more than 125 daily employment trips between BGs.

New Hanover County Regional Medical Center is the largest trip generator in the study area, followed by downtown Wilmington. The maximum number of daily trips between any two BGs in the study area is 181. The highest daily travel flows, featuring more than 100 daily employment trips, occur between the following nine locations:

- Kirkwood to New Hanover Regional Medical Center (181 daily employment trips)
- Meadowbrook to New Hanover Regional Medical Center (158 daily employment trips)
- Meadowbrook to downtown Wilmington (126 daily employment trips)
- The Cape to New Hanover Regional Medical Center (120 daily employment trips)
- Arrowhead to New Hanover Regional Medical Center (111 daily employment trips)
- Carriage Hills to New Hanover Regional Medical Center (103 daily employment trips)
- Breezewood to New Hanover Regional Medical Center (101 daily employment trips)
- The Lakes to New Hanover Regional Medical Center (101 daily employment trips)
- Myrtle Grove to New Hanover Regional Medical Center (101 daily employment trips)

Internal trips made within individual Block Groups are designated by proportional circles. Ten BGs in the study area feature between 40 and 75 internal daily trips, while no BGs in the study area feature more than 75 internal trips. The following neighborhoods in the study area record between 40 and 75 daily internal trips:

- Downtown Wilmington
- UNC Wilmington
- Mayfair Town Center (Wilmington)
- Windward Oaks (Wilmington)
- North Myrtle Grove (New Hanover County)
- Porters Neck (New Hanover County)
- Kirkwood (New Hanover County)
- Kure Beach
- Compass Pointe (Brunswick County)
- Southeast Leland (Brunswick County)







## 4 FINANCIAL PLAN

The objective of the financial assessment is to review Wave Transit's financial condition. This information will be used to identify financial options to support the final service improvement plan at the end of this study. This chapter includes an overview of Wave Transit's overall expenses and revenues from the period of FY2015 (actual) to FY2018 (budget) and an overview of capital needs from 2016 to 2021.

The data for this plan came from the following sources:

- Short Range Financial Plan (2017)
- Capital Improvement Plan 2016-2021
- Fiscal Year 2018 Budget

### EXPENSES

Wave Transit provides fixed route and paratransit service at the cost of operating and capital expenses. Operating expenses are comprised of expenditures related to the operation of the transit system, and the goods and services purchased for operations. This includes salaries, benefits, parts, fuel, utilities, and other similar costs. Capital costs are expenditures related to the purchase of equipment. These are costs associated with the infrastructure of a transit system and include rolling stock, shelters, facilities, and other similar costs.

### Operating Expenses

It is budgeted that Wave Transit will spend \$8.4 million in operating expenses in 2018. This is an overall increase in spending from 2017. With the exclusion of 2017, Wave Transit has experienced a moderate increase in total operating expenditures since 2014. Figure 21 provides an overview of operating expense by account. Of interest, operating costs for the Wilmington Multimodal Transportation Center (opening in 2018) are expected to be \$150,000 annually; identifying funding to support the operating costs for the Multimodal Transportation Center is imperative. Additionally, Wave Transit continues to receive requests for new and additional service in areas such as Brunswick County, Northern Market Street corridor, and Pleasure Island. Based on Wave Transit's current expenses these improvements cannot be supported without changes to the existing system or additional revenue.



Figure 21 | Wave Transit Operating Expenses

Operating Expenses	Actual 2014
Salaries and wages	3,580,426
Taxes and benefits	
Taxes	261,243
Benefits	870,454
Fuels and lubricants	1,126,155
Maintenance	449,473
Tires	82,901
Communications & Utilities	109,704
Professional services	393,402
Other services	79,332
Insurance	
Liability	699,273
Worker Comp	248,351
Office supplies and expenses	36,429
Marketing	43,175
Other expenses	99,870
<b>Total</b>	<b>8,080,188</b>

Source: Cape Fear Public Transportation Authority Fiscal Year 2018 Budget

## Capital Expense

Wave Transit maintains a five year Capital Improvement Program, shown in Figure 22. The focus of the program is the replacement of transit vehicles that have exceeded their useful life and capital enhancements, like the Wilmington Multimodal Transportation Center. As of the 2018 Capital Improvement Program, Wave Transit had identified funding for \$5.3 million, or 45 percent of its capital needs. This does not include a \$3.6M federal grant for nine new buses, which was awarded to Wave in 2018, after the completion of the Capital Improvement Program.

The replacement of these identified vehicles is key to maintaining an efficient system. While buses beyond their useful life may still be used for operation there are additional operating costs associated with the maintenance and upkeep of older fleets. Wave Transit currently operates 26 vehicles that have exceeded their useful life as defined by FTA. This includes heavy duty buses and trolleys, which are a priority for Wave Transit. Regarding paratransit, Wave Transit currently does not have any additional needs, and may potentially reduce the fleet size by four, if recent changes to the Medicaid program reduce demand.

In addition to vehicles, Wave Transit has budgeted \$3 million for the Wilmington Multimodal Transportation Center (WMMTC) anticipated to be completed in 2019. In conjunction with the WMMTC, two CNG buses and three CNG shuttles will arrive in 2018.



Figure 22 | Cape Fear Public Transportation Authority Capital Improvement Plan

Fiscal Year	Project	Quantity	Total Cost
<b>FY 2018</b>	HHD Bus	2	\$950,000
	LTV	3	\$390,000
	PT LTV	7	\$450,000
	Trolley	1	\$550,000
	WMMTC	1	\$2,400,000
<b>FY 2019</b>	HHD Bus	4	\$1,900,000
	LTV	2	\$260,000
	PT LTV	8	\$515,000
<b>FY 2020</b>	HHD Bus	3	\$1,500,000
	LTV	2	\$280,000
<b>FY 2021</b>	Trolley	1	\$ 575,000
<b>FY 2022</b>	HHD Bus	3	\$1,600,000
	LTV	2	\$275,000
	Vanpool	2	\$60,000
<b>Total</b>			<b>\$11,705,000</b>
Funding identified			<b>\$5,305,000</b>
Funding not identified			<b>\$6,400,000</b>

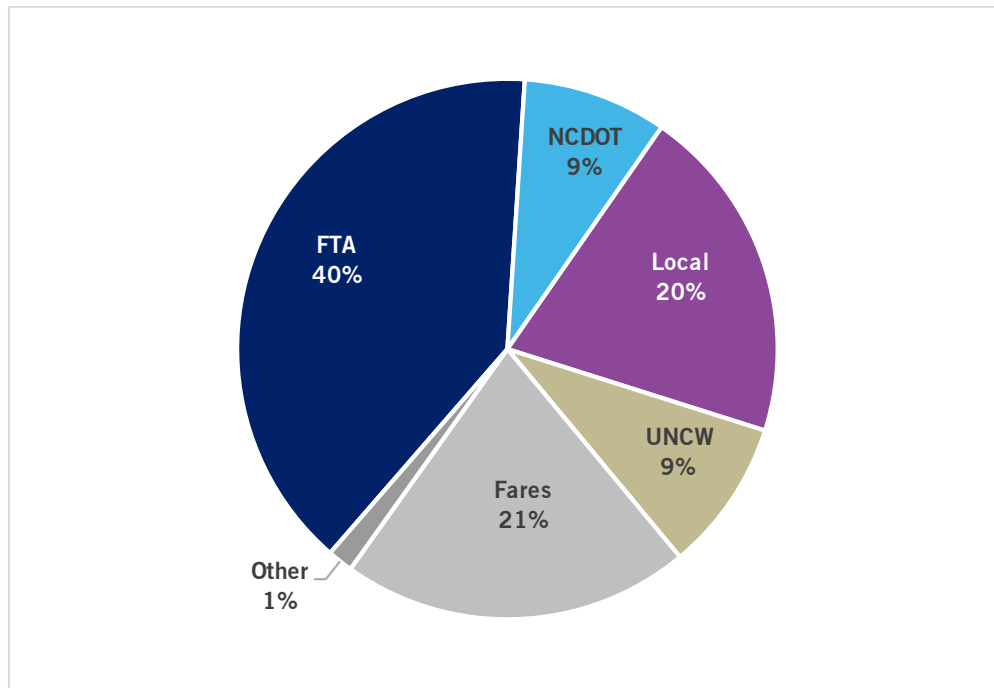
Source: Cape Fear Public Transportation Authority Short Range Financial Plan (2017)

## REVENUE

Revenues are divided into six major categories, fares, UNCW, local, state, federal, and other. Fare revenue is all income received directly from passengers, paid either in cash or through pre-paid tickets, or passes. Local, state, and federal revenues are incomes collected at each respective jurisdictional level. This includes funds collected by transit authorities, counties, cities, states, and the federal government. Revenue from UNCW is paid by the university in lieu of fares for students; transit service fees are remitted directly to UNCW. Other revenues are any other incomes collected outside of fares and jurisdictional revenues. This includes income such as advertising or contract revenues. The 2018 adopted revenue budget is shown in Figure 23.



Figure 23 | Wave Transit 2018 Adopted Revenue Budget



Source: Cape Fear Public Transportation Authority Fiscal Year 2017 Budget

## Revenues

To cover operating and capital expenses Wave Transit relies on six revenue sources noted above. More specific information on each as follows:

- **FTA:** Section 5307 (Urbanized Area Formula Grant) is the predominant federal funding source for Wave Transit; Section 5310 (Enhanced Mobility of Seniors & Individuals with Disabilities) is also used for operating assistance. In 2010 the Wilmington region surpassed 200,000 people. This resulted in a loss of \$250,000 of Section 5311 (Rural Area Formula Grant). Additionally, the federal programs of Section 5317 (New Freedom) and Section 5316 (JARC) have been eliminated, cutting funding for Routes 205 and 108.
- **NCDOT:** Funding is primarily from State Maintenance Assistance Program (SMAP), and is unpredictable year to year.
- **Local:** City of Wilmington is the primary provider of local funding. Wave Transit supports a vehicle registration fee which would raise an estimated \$1.3 million per year and maintain the current service for the next five years. Wave Transit supports a dedicated transit sales tax, which would result in significant improvement in transit in the region. The sales tax is authorized by resolution of the NHC Commissioners placing the question as a voter referendum. This would generate approximately \$8 million per year and allow for systemwide service improvements.
- **UNCW Wilmington:** UNCW is expected to grow by 33% by 2020, and the authority is working with UNCW to ensure that services provided meet the needs of the growing university while balancing the need for transit services in other areas of the region.
- **Fares:** Fares and fees typically account for over 20% of annual revenues and cover 9.35% of operating expenses. Fares were raised by \$0.50 in 2013 giving Wave Transit the





second-highest fare in North Carolina (behind Charlotte) with a full adult fare 62% higher than the average full fare for the state.

- **Other:** Revenue contracts for advertising and intercity bus service (Greyhound).

The approved 2018 budget anticipates Wave Transit will generate \$8.4 million. This is 3.1% more than the 2017 revenue of \$8.1 million. Excluding 2017, Wave Transit has experienced moderate growth in revenues as shown in Figure 24. Significant reductions in funding from New Hanover – Department of Aging, New Hanover DSS (workfirst), and ROAP contributed to the 2017 decrease.



Figure 24 | Wave Transit Revenues

	Actual 2014	Actual 2015	Actual 2016	Actual 2017	Budget 2018
Passenger Fares	1,041,221	1,075,572	1,039,002	967,958	1,017,000
NHC – Dept. of Aging	25,215	31,012	4,906	4,822	5,000
NHC - DSS	542,987	581,894	637,335	599,251	635,000
NHC - Workfirst	17,340	13,937	2,286	5,861	6,000
UNCW	789,224	776,925	713,322	736,868	760,000
Other agencies	21,882	37,995	31,548	28,662	83,450
FTA 5307/5340/5339	2,549,045	2,815,923	2,808,196	2,625,130	2,825,551
FTA 5310	300,643	367,510	315,951	322,356	252,083
FTA 5303	45,988	64,441	56,140	56,000	60,000
NCDOT SMAP	653,722	564,864	666,297	710,832	711,000
NCDOT CTP	143,159	163,538	160,054	168,869	186,150
City of Wilmington	1,285,000	1,285,000	1,442,295	1,323,550	1,363,257
New Hanover County	273,000	275,000	432,822	311,873	311,873
ROAP	229,461	130,214	114,114	41,040	-
Brunswick County	29,350	33,663	29,350	29,350	30,230
Leland	50,000	57,347	50,000	50,000	51,500
Navassa	12,525	14,365	12,525	12,525	12,900
Carolina Beach	--	8,500	8,500	9,375	9,565
Other income	91,838	174,165	168,565	163,028	127,002
Less: Capital Match	7,389	70,120	24,756	63,596	90,400
<b>Total Revenues</b>	<b>\$8,094,211</b>	<b>\$8,401,745</b>	<b>\$8,668,452</b>	<b>\$8,103,754</b>	<b>\$8,357,161</b>

Source: Cape Fear Public Transportation Authority Fiscal Year 2018 Budget

## FIVE YEAR OUTLOOK

Wave Transit's five year projection shows that despite focused efforts and tight control on cost, operating expenses will grow faster than operating revenues. It is anticipated that while revenues will increase at an average rate of 1.7 percent, expenses will increase at an average rate of 2.4 percent. Over a five year period, Wave Transit faces a \$1.2 million dollar operating deficit, shown annually in Figure 25. This projected deficit increases to \$5.9 million when unfunded capital expenses are considered. While it is possible to defer capital expenses for a short time these expenses will compound over time, creating additional challenges and additional operating expenses. Since the projected operating costs exceed the current operating revenue (Figure 26) any deferment of capital expenses will likely require adjustments to operations.

The projected deficits represent the cost to maintain the existing level of service and do not factor in the cost necessary to expand or improve service. Any additional service would only further increase the identified deficits. This should be considered as Wave Transit evaluates the possible new funding from sources like vehicle registration fees and sales tax.

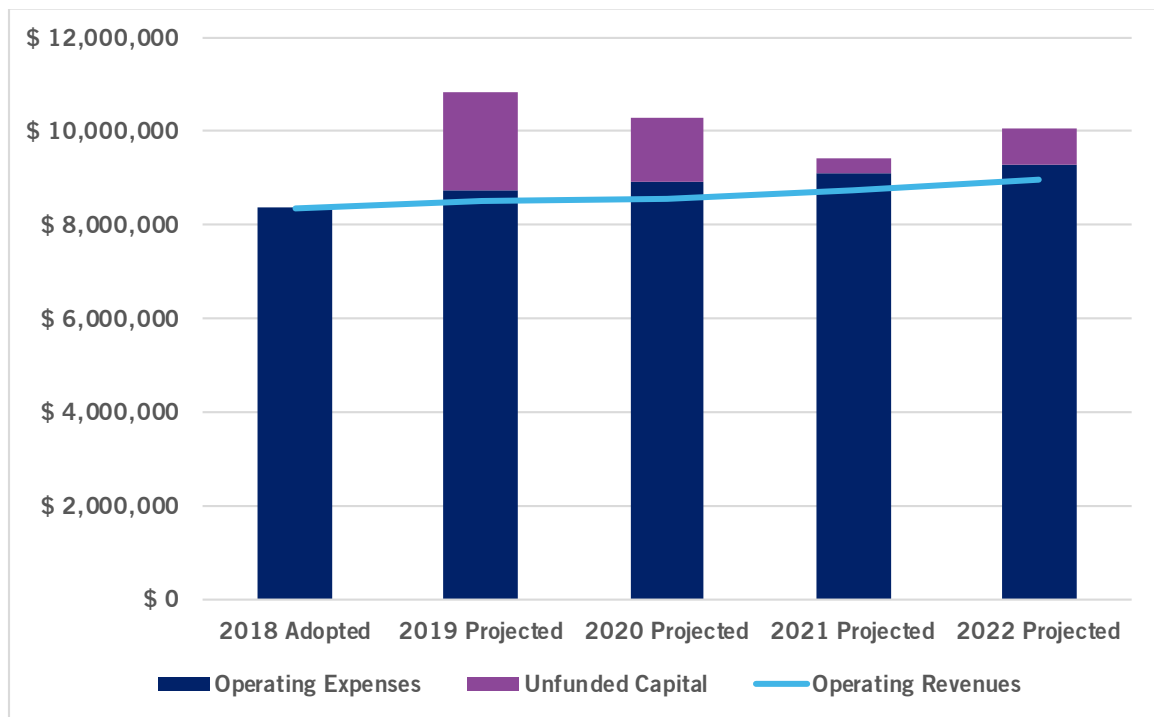


Figure 25 | Wave Transit Five Year Forecast

FY 2017	2018 Adopted	2019 Projected	2020 Projected	2021 Projected	2022 Projected
FTA	\$ 3,312,834	\$ 3,121,200	\$ 3,183,624	\$ 3,247,296	\$ 3,312,242
NCDOT	\$ 721,949	\$ 868,305	\$ 682,155	\$ 682,155	\$ 682,155
Local	\$ 1,689,018	\$ 1,842,436	\$ 1,897,709	\$ 1,954,641	\$ 2,013,280
UNCW	\$ 760,000	\$ 826,875	\$ 868,219	\$ 911,630	\$ 957,211
Fares	\$ 1,746,450	\$ 1,821,522	\$ 1,867,060	\$ 1,913,737	\$ 1,961,580
Other	\$ 127,002	\$ 45,000	\$ 45,000	\$ 45,000	\$ 45,000
Operating Revenues	\$ 8,357,253	\$ 8,525,339	\$ 8,543,768	\$ 8,754,458	\$ 8,971,469
Operating Expenses	\$ 8,357,253	\$ 8,744,115	\$ 8,918,997	\$ 9,097,377	\$ 9,279,324
Unfunded Capital	\$ -	\$ 2,110,000	\$ 1,395,000	\$ 350,000	\$ 786,023
Annual Surplus/(Deficit)	\$ -	(\$ 2,328,776)	(\$ 1,770,229)	(\$ 692,919)	(\$ 1,093,879)

Source: Cape Fear Public Transportation Authority Short Range Financial Plan (2018)

Figure 26 | Wave Transit Five Year Forecast Chart



Source: National Transit Database (2015)



## PEER FINANCIAL ANALYSIS

The study team, together with Wave Transit, identified a set of transit systems with similar characteristics and operating environments to Wave Transit. The peers generally have metropolitan areas and transit systems that are close in size to Wilmington and mid-size universities with student and staff populations comparable to the University of North Carolina Wilmington. Figure 27 lists each peer and the characteristics that make the transit systems similar to Wave Transit.

### Performance Metrics Benchmarking

Wave Transit and its peer systems were compared in terms of select financial metrics. Data was collected from the National Transit Database (NTD) based on 2015 reporting data. Figure 27 shows how transit service in Wilmington compares to each selected peer community across a number of key financial benchmarks. Data below is representative of fixed route service only.

Figure 27 | Peer Transit Service Financial Benchmarking – Fixed Route Service Only

City, State	Service Provider	Passengers per Revenue Hour	Cost per Passenger Trip	Cost per Revenue Hour	Farebox Recovery %
Wilmington, NC	Cape Fear Public Transportation Authority	16.98	\$4.80	\$81.51	19.17%
Asheville, NC	Asheville Redefines Transit	22.66	\$3.57	\$80.95	12.86%
Columbia, SC	Central Midlands Transit	14.82	\$6.18	\$91.58	14.63%
Conover, NC	Western Piedmont Regional Transit Authority	8.92	\$9.89	\$88.23	6.97%
Fayetteville, NC	Fayetteville Area System of Transit	18.36	\$3.53	\$64.82	22.02%
Greensboro, NC	Greensboro Transit Authority	26.76	\$3.32	\$88.74	23.21%
Greenville, SC	Greenville Transit Authority	16.45	\$4.18	\$68.81	21.44%
Lakeland, FL	Lakeland Area Mass Transit District	17.02	\$4.74	\$80.65	4.42%
Research Triangle Park, NC	Research Triangle Regional Public Transportation Authority	14.35	\$10.47	\$150.20	11.40%
Roanoke, VA	Greater Roanoke Transit Company	20.94	\$3.18	\$66.68	27.67%
Savannah, GA	Chatham Area Transit Authority	20.27	\$4.77	\$96.61	16.45%
Winston-Salem, NC	Winston-Salem Transit Authority	24.56	\$3.39	\$83.17	15.93%
<b>Peer Average</b>		<b>18.65</b>	<b>\$5.20</b>	<b>\$87.31</b>	<b>16.09%</b>

Source: National Transit Database (2015); fees paid by universities are counted as fares



## Productivity and Expenses

Wave Transit's cost per passenger trip is \$4.80, 7.7 percent below the peer average. When compared to peer systems, Wave Transit has the fourth highest cost per passenger trip. The service recommendations in this study will help to improve the cost per passenger by identifying short-range transit improvements to increase ridership productivity. When compared to peer agencies, Wave Transit's cost per revenue hours is better than half of the peer group. At a cost of \$81.51 per revenue hours, Wave Transit's cost is 6.6 percent lower than the average of peer agencies. It should be noted that many of the peer agencies are city operated and share overhead cost among other city departments. As a transit authority, Wave Transit incurs all overhead cost. In conjunction with ridership improvements the short-range plan will look for additional opportunities to ensure service is providing the maximum return on investment.

The farebox recovery ratio for Wave Transit is 19.17 percent above the peer average. Wave Transit requires less subsidy per passenger than half of the peers group.

Figure 28 page shows current fares for the peer systems identified above. The regular fixed-route fare ranges from \$1.00 to \$2.25, with Wave Transit operating with a fare of \$2.00. While slightly higher than most of the peer group, this fact supports the high farebox recovery of Wave Transit identified above. Like Wave Transit, the peer systems provide free transfers and a federally-mandated reduced fare program. Within the industry fare revenues generally support between 12 and 20% of operating cost. At 19% Wave Transit is at the higher end of this range. This indicates Wave transit is leveraging fares to support service and utilizing other funds to support other needs, such as capital expenses.

Figure 28 | Fare Comparison of Peer Systems

City, State	Service Provider	Fixed-route Fare*	Reduced Fare
Wilmington, NC	Cape Fear Public Transportation Authority	\$2.00	\$1.00
Asheville, NC	Asheville Redefines Transit	\$1.00	\$0.50
Columbia, SC	Central Midlands Transit	\$1.50	\$0.75
Conover, NC	Western Piedmont Regional Transit Authority	\$1.25	\$0.60
Fayetteville, NC	Fayetteville Area System of Transit	\$1.25	\$0.50
Greensboro, NC	Greensboro Transit Authority	\$1.50	\$1.00
Greenville, SC	Greenville Transit Authority	\$1.50	\$0.75
Lakeland, FL	Lakeland Area Mass Transit District	\$1.50	\$0.75
Research Triangle Park, NC	Research Triangle Regional Public Transportation Authority	\$2.25	\$1.00
Roanoke, VA	Greater Roanoke Transit Company	\$1.50	\$0.75
Savannah, GA	Chatham Area Transit Authority	\$1.50	\$0.75
Winston-Salem, NC	Winston-Salem Transit Authority	\$1.00	\$0.50
Peer Average		\$1.43	\$0.71

Source: National Transit Database (2015); \*All peer systems have free transfers.





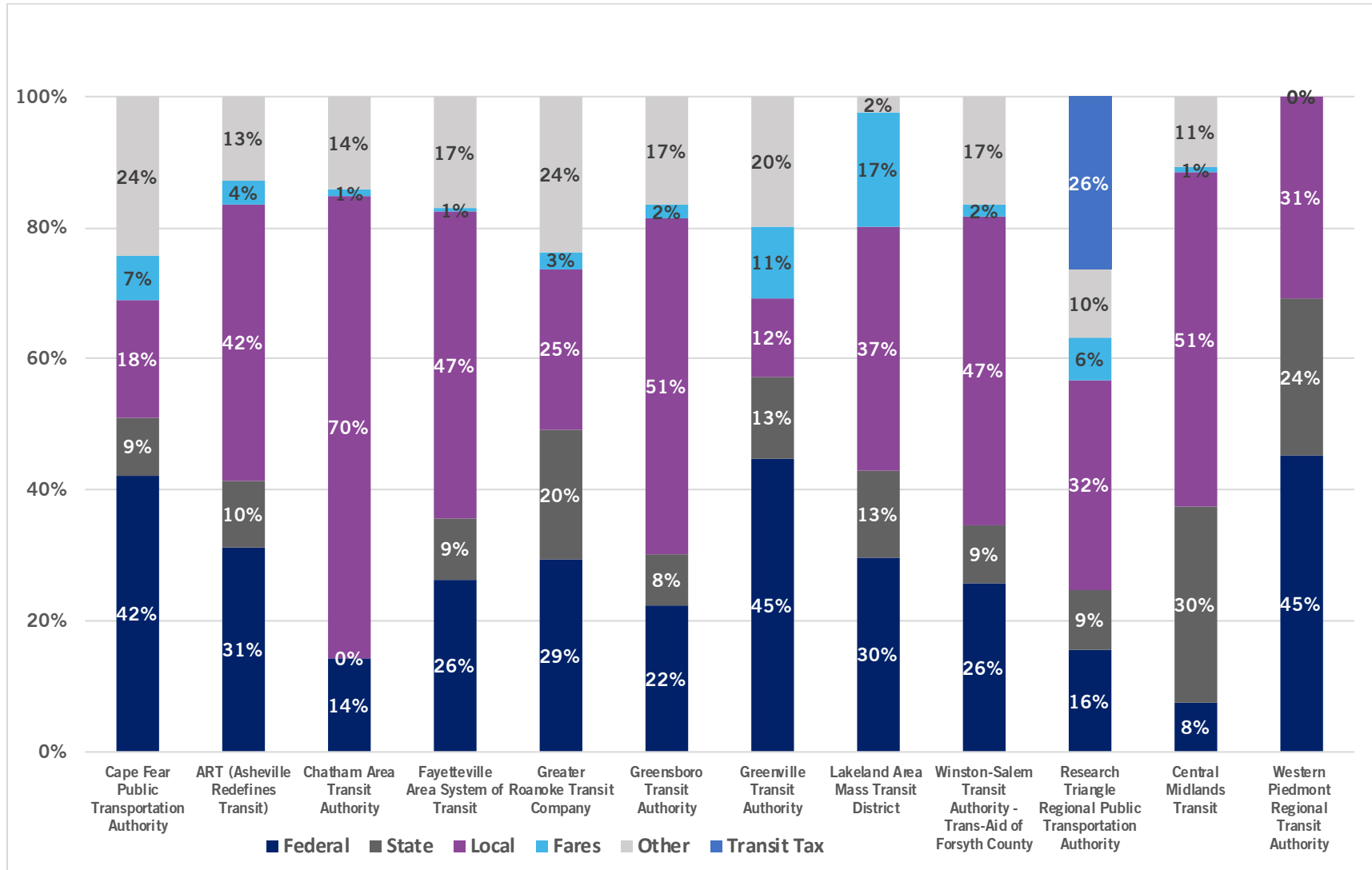
## Operating Revenues

The peer systems utilize federal, state, local, and other funds to support transit operations. As shown in Figure 29, the reliance on various funds differs between providers. Wave Transit receives the majority of its operating funding from the Federal Government, which comprises 42% of the operating revenue, the third highest of all peers. By contrast, 18% of Wave Transit's operating revenues come from local sources, the second lowest percentage of all peers. The largest variance in funding sources among the peer group is local funding. As agencies look for new ways to provide improved services most turn to various forms of local funding, including sales tax, property tax, fuel tax, and general fund support.

More than any other funding source the amount of local dollars impacts the level of transit service available to a community. The two main reasons for are, 1) federal and state funding is becoming scarce, and 2) any discretionary federal funds require a local funding match of at least 20 percent for capital projects and at least 50 percent for operating projects. Within local funding sources options there are distinct benefits worth noting. Dedicated local funding sources, including the tax options identified provide additional benefits for general fund revenues. Dedicated local funding sources are more dependable and as a result may be used to leverage additional debt financing and support the issuance of bonds. Systemwide dedicated funding sources also help to reduce geographical challenges which are often associated with general fund revenues. Transit providers receiving general fund revenues often face challenges to service in which communities may seek more or less services based on the amount of funding provided and not based on the level of demand.



Figure 29 | Operating Revenue Comparison of Peer Systems





## Local Operating Revenue

As described above local operating revenues are very important in determining the level and location of transit services within a community. Figure 30 provides an overview of local funding sources among peer agencies and the percentage of operating revenue they comprise. Of the peers, four receive only one type of funding. The majority, six systems receive money from a city or county general fund. Two peer systems, Chatham Area Transit Authority and Greater Roanoke Transit Company receive funding from multiple jurisdictions, while the remaining six peers receive money only from one jurisdiction. The sources of funding were obtained through a summary of online research and telephone interviews, merged with revenue data from NTD.



Figure 30 | Local Operating Revenue Peer Comparison

City, State	Service Provider	General Funding Partners	Property Tax	Other
<b>Wilmington, NC</b>	<b>Cape Fear Public Transportation Authority</b>	City of Wilmington, New Hanover County, UNCW, Town of Carolina Beach, Town of Leland, Town of Navassa, Brunswick County		
Asheville, NC	Asheville Redefines Transit	City of Asheville 85%		Fee-in-lieu 15%
Columbia, SC	Central Midlands Transit	100% City of Columbia		
Conover, NC	Western Piedmont Regional Transit Authority	100%		
Fayetteville, NC	Fayetteville Area System of Transit	City of Fayetteville 83%		Vehicle tag fee is 17% of local budget
Greensboro, NC	Greensboro Transit Authority		City of Greensboro 100%	
Greenville, SC	Greenville Transit Authority	Greenville County 100%		
Lakeland, FL	Lakeland Area Mass Transit District	Polk County 100%		
Research Triangle Park, NC	Research Triangle Regional Public Transportation Authority			Vehicle registration fee, rental car tax, local sales tax
Roanoke, VA	Greater Roanoke Transit Company	City of Salem, Town of Vinton 100%		
Savannah, GA	Chatham Area Transit Authority	City of Savannah 21%	Special district (Savannah, unincorporated Chatham County, and a portion of Garden City) 69%	
Winston-Salem, NC	Winston-Salem Transit Authority		City of Winston-Salem 93%	Motor vehicle privilege license fee 7%

Source: National Transit Database (2015); percentages only; transit agency websites and documents, some telephone interviews



## KEY FINDINGS

Based on the review of available documents and data the following key findings exist:

- Wave Transit will need to adjust to meet these funding challenges due to 1) declining federal funding to support the replacement of rolling stock, and 2) rising labor, fringe, vehicle and facility maintenance, and commodity costs.
- Over the next five years annual operating expenses are projected to outpace annual operating revenues by 0.9 percent. While Wave Transit has a balanced budget for the year 2018, there is a projected operating deficit of \$219,000 in 2019. This operating deficit increase to over \$300,000 per year in subsequent years, resulting in a projected \$1.2million dollar deficit over the next five years.
- Wave Transit's capital needs reflect a \$4.6 million dollar deficit over the next five years.
- Wave Transit is operating several vehicles beyond their useful life. As a result Wave Transit is maintaining a fleet with more spares than industry standards, and is using additional operating dollars to cover additional maintenance cost.
- Nationwide applications for grants such as the FTA's Bus and Bus Facilities has shown that discretionary dollars are becoming scarcer and more competitive. This combined with recent discussions at the federal level of reducing transit funding will increase the need for additional sustained local funding.
- NC General Statutes authorize two potential local funding sources - a vehicle registration fee, and a transit sales tax. The registration fee would generate an estimated \$1.3 million dollars annually, compared to \$8 million dollars generated by the transit sales tax. Both sources should be evaluated to determine the long-term impact on service and growing expenses.
- Wave Transit has a strong farebox recovery ratio when compared to peer systems. This shows Wave Transit is utilizing fares and university subsidies to a greater degree for support of the cost of transit service.
- Local funding among peers varies. Most receive operating dollars from one city or county general fund, however two peers receive funding from multiple jurisdictions.





## 5 SERVICE GUIDELINES

Service guidelines are the foundation of transit service planning, and provide an objective and consistent basis upon which to track service performance and make service decisions. Service guidelines are used to measure and evaluate operational performance, and to support decisions about where and when service should be added, maintained, or reduced. Since resources are always limited, having quantitative criteria can help with prioritizing the most effective use of those resources.

Without an established set of guidelines, service changes can appear arbitrary, regardless of how justifiable they may be. Ideally, service guidelines help to establish a network that best meets travel needs, while maintaining reasonable productivity and efficiency. Recognizing that transit service planning requires flexibility, these guidelines indicate general rules to support the expertise of local planning staff and not a rigid prescription or strict minimum standard.

### PERFORMANCE MEASURES

For transit systems that wish to develop robust performance measures and service guidelines, it is often useful to initially set a baseline that reflects current performance, while also establishing a set of goals by which to judge future service. For example, a goal may be to match the average service performance of a set of peer systems for one or more performance metrics. Typical metrics used for evaluating service performance include:

- **Passengers per Revenue Hour:** Calculated by dividing the total number of passengers by the total number of vehicle revenue hours. The number of passengers per hour is a good measure of service productivity.
- **Operating Cost per Passenger:** Calculated by dividing all operating and administrative costs by total passengers. The subsidy per passenger is a further refinement of this measure and is calculated by subtracting farebox revenue from gross operating and administrative costs and dividing by total passengers. This measure is useful when service cuts or enhancements are being considered and justified.
- **Operating Cost per Revenue Hour:** Calculated by dividing all operating and administrative costs by total in-service vehicle hours. This metric provides a good measure of cost efficiency, and indicates how much it costs the agency to provide an hour of service.
- **Farebox Recovery:** Calculated by dividing fare revenues by total operating cost. Farebox recovery indicates how much of an agency's operating expenses are covered by passenger fare revenue.
- **On-Time Performance:** Measured by recording bus departure and arrival times on a regular schedule to monitor schedule adherence.
- **Preventable Accidents/Revenue Mile:** Calculated by dividing the number of preventable accidents by revenue miles, this is a key safety metric.
- **Passenger Complaints:** Records the number of passenger complaints that are submitted in writing or verbally conveyed to the transit agency. This is typically measured as the number of valid complaints divided by 500 or 1,000 passengers.

Most agencies utilize just a subset of these measures, depending on agency goals and objectives, data availability and the desired service evaluation process. As in many areas, the use of a limited,



focused set of measures is usually more effective than the use of a more extensive list of measures.

In addition, different sets of thresholds are typically applied to different types of services. At the transit system level, distinctions are usually made among services (regular fixed-routes, express routes, etc.). Where services are classified differently, the same basic measures are typically used, but different thresholds are set. For example, where the major productivity measure is passengers per revenue hour, the acceptable level of performance may be set at 15 passengers per hour for regular fixed-route university shuttles. At the route level, service performance measures can help identify how well routes are performing, and determine when it is appropriate to improve or reduce a route's service category.

## **PEER REVIEW**

The study team, together with Wave Transit staff, identified a set of transit systems with similar characteristics and operating environments to Wave Transit (Figure 31). The peers generally have metro areas and transit systems that are close in size to Wave Transit and the Wilmington region. However, Wilmington features a higher percentage of low-income individuals (19.2%) than all but one the peer systems (Winston-Salem Transit Authority: 19.9%); the average representation of low-income populations among peer systems is 18.1%. All of the peers have mid-size universities comparable to the University of North Carolina at Wilmington, but also have other significant trip generators in their communities.



Figure 31 | Peer System Operating Environments

City, State	Service Provider	Service Area Size (sq. mi.)	Urbanized Area Population (2015)	Population Density (per sq. mile)	Annual Operating Costs (millions)	Fixed-Route Vehicles in Peak Service
Wilmington, NC	Cape Fear Public Transportation Authority	200	216,479	1,082	\$7.1	23
Asheville, NC	Asheville Redefines Transit	45	83,393	1,853	\$5.2	16
Columbia, SC	Central Midlands Transit	211	288,700	1,368	\$12.8	38
Conover, NC	Western Piedmont Regional Transit Authority	1,665	342,142	205	\$1.4	6
Fayetteville, NC	Fayetteville Area System of Transit	95	150,131	1,580	\$5.6	22
Greensboro, NC	Greensboro Transit Authority	127	269,666	2,123	\$14.2	41
Greenville, SC	Greenville Transit Authority	227	248,173	1,093	\$4.5	17
Lakeland, FL	Lakeland Area Mass Transit District	77	312,388	4,056	\$6.4	27
Research Triangle Park, NC	Research Triangle Regional Public Transportation Authority	1,519	1,402,824	923	\$19.6	78
Roanoke, VA	Greater Roanoke Transit Company	43	97,032	2,256	\$7.3	34
Savannah, GA	Chatham Area Transit Authority	438	265,128	605	\$17.3	52
Winston-Salem, NC	Winston-Salem Transit Authority	108	199,555	1,847	\$11.0	36
<b>Peer Average</b>		<b>414</b>	<b>332,609</b>	<b>1,628</b>	<b>\$9.57</b>	<b>33</b>

Source: National Transit Database (2015), U.S. Census

Wave Transit and its peer systems were compared in terms of select performance metrics. Data was collected from the National Transit Database (NTD) based on 2015 reporting data. Figure 32 shows how Wave Transit compares to each of the selected peers on a number of measures of service performance and efficiency.



Wave Transit is somewhat below the peer average regarding passengers per hour and mile, and this is likely due at least in part to the lower population density of the Wilmington area compared to peers.

With a farebox recovery of 19.17%, Wave Transit does exceed the average of its peers (16.09%). However, Wave Transit's adult one-way fare is \$2.00, among the highest in North Carolina. Wave Transit's fare is 25% to 50% higher than peer North Carolina systems: adult fare on Asheville Redefines Transit and Winston-Salem Transit Authority is \$1.00, Fayetteville Area System of Transit charges \$1.25, and Greensboro Transit Authority charges \$1.50.

Figure 32 | Peer System Performance Measures from 2015 NTD – Fixed Route Service Only

City	Service Provider	Passengers per Revenue Hour	Passengers per Revenue Mile	Cost per Passenger Trip	Cost per Revenue Hour	Farebox Recovery (%)
Wilmington, NC	Cape Fear Public Transportation Authority	16.98	1.20	\$4.80	\$81.51	19.17%
Asheville, NC	Asheville Redefines Transit	22.66	1.54	\$3.57	\$80.95	12.86%
Columbia, SC	Central Midlands Transit	14.82	1.29	\$6.18	\$91.58	14.63%
Conover, NC	Western Piedmont Regional Transit Authority	8.92	0.49	\$9.89	\$88.23	6.97%
Fayetteville, NC	Fayetteville Area System of Transit	18.36	1.44	\$3.53	\$64.82	22.02%
Greensboro, NC	Greensboro Transit Authority	26.76	2.06	\$3.32	\$88.74	23.21%
Greenville, SC	Greenville Transit Authority	16.45	0.95	\$4.18	\$68.81	21.44%
Lakeland, FL	Lakeland Area Mass Transit District	17.02	1.17	\$4.74	\$80.65	4.42%
Research Triangle Park, NC	Research Triangle Regional Public Transportation Authority	14.35	0.70	\$10.47	\$150.20	11.40%
Roanoke, VA	Greater Roanoke Transit Company	20.94	1.46	\$3.18	\$66.68	27.67%
Savannah, GA	Chatham Area Transit Authority	20.27	1.54	\$4.77	\$96.61	16.45%
Winston-Salem, NC	Winston-Salem Transit Authority	24.56	2.11	\$3.39	\$83.17	15.93%
<b>Peer Average</b>		<b>18.65</b>	<b>1.34</b>	<b>\$5.20</b>	<b>\$87.31</b>	<b>16.09%</b>

Source: National Transit Database (2015)



## RIDERSHIP COMPARISON

Wave Transit's service area is 200 square miles with a population of 216,479—seventh highest among the 11 peer systems, and 34% below the peer average (327,734) (Figure 33). The Cape Fear region also features a lower population density than its peers—1,082 people per square mile. As a result, the need for public transit for low-income individuals is critical, but providing service efficiently and reliably is more challenging.

In 2016, Wave Transit provided 1,393,573 passenger trips, ninth highest among the 11 peers and 28% below the peer average of 1,935,226 annual passenger trips. At a finer level, Wave Transit provided 6.44 passenger trips per capita in 2016, 41% fewer boardings per capita than peer systems (peer average of 10.86). Wave Transit's lower number of passenger trips and trips served per capita is explained by the region's smaller population base, lower-density development (outside of downtown Wilmington and near UNCW), and high rates of vehicle ownership (96% of all households in Wilmington own at least one personal vehicle).





Figure 33 | Peer System Passengers Per Capita (2016 NTD) – Fixed Route Service Only

City, State	Service Provider	Fixed-Route Passenger Trips (2016)	Service Area Population	Passenger Trips Per Capita
Wilmington, NC	Cape Fear Public Transportation Authority	1,393,573	216,479	6.44
Asheville, NC	Asheville Redefines Transit	2,135,879	88,512	24.13
Columbia, SC	Central Midlands Transit	2,356,278	288,700	8.16
Conover, NC	Western Piedmont Regional Transit Authority	126,053	342,142	0.36
Fayetteville, NC	Fayetteville Area System of Transit	1,526,632	150,131	10.16
Greensboro, NC	Greensboro Transit Authority	3,913,676	269,666	14.51
Greenville, SC	Greenville Transit Authority	1,053,595	188,991	5.57
Lakeland, FL	Lakeland Area Mass Transit District	1,304,808	312,388	4.17
Research Triangle Park, NC	Research Triangle Regional Public Transportation Authority	1,599,910	1,402,824	1.14
Roanoke, VA	Greater Roanoke Transit Company	2,211,393	97,032	22.79
Savannah, GA	Chatham Area Transit Authority	3,532,628	265,128	13.32
Winston-Salem, NC	Winston-Salem Transit Authority	1,526,632	199,555	15.06
Peer Average		1,935,226	327,734	10.85



## SERVICE GUIDELINES

There are no national transit service guidelines; however, FTA does have mandates for the service guidelines and policies to be included in the Title VI Program required of all transit agencies operating fixed-route service. Wave Transit currently has established service guidelines as part of their 2014 Title VI Program. The guidelines are in compliance with Title VI requirements and include:

- **Vehicle Load:** The acceptable level of crowding at peak and off-peak times
- **Minimum Frequency:** For peak and off-peak, and may be varied according to population density in the area being served
- **On-Time Performance:** May be by route or system-wide, and details can be defined by the agency
- **Regional and Geographic Coverage:** Areas served, as well as distance between stops; may be related to population density. Stop placement may vary depending on the nature of an individual route (e.g. local urban or regional connector).

These guidelines are reviewed annually, with input from planning and operations, and possibly other departments. Some consultation with the public is helpful, even though it is more difficult to engage people in the relatively abstract discussion of guidelines (as compared to specific service change proposals). Finally, the refined guidelines should be approved by management and/or the board of directors as appropriate.

In addition to the mandated guidelines, it may be desirable to set a guideline for span of service, which could vary by type of route. For typical local bus service, a minimum span of 12 hours per weekday might be considered, as this span of service usually allows the service to be useful to a relatively large proportion of potential users. However, it is important to note that run cutting and union contracts (CBA) impact hours of service. Wave Transit's runs are usually divisible by four hours to minimize overtime. Moreover, it is often useful to balance the guidelines for coverage, frequency, and span with one or more guidelines related to efficiency/productivity, such as passengers per revenue hour and/or farebox recovery as described in the Performance Measures section above.

Figure 34 includes a set of proposed service guidelines for Wave Transit. These guidelines are primarily based on the productivity and design of existing Wave Transit services and guidelines, as well as industry guidelines. These guidelines should be used to support Wave Transit's more detailed guidelines already being used as part of the Title VI Program.

Generally, service guidelines should be realistically achievable but somewhat aspirational. Therefore, it is appropriate to set guidelines which could not be met with existing resources, but could be reasonably achieved within a few years if appropriate resources were made available. As service changes are implemented or new funding becomes available, Wave Transit should reevaluate the guidelines proposed above. The agency could for example, establish tiered performance guidelines based on a route hierarchy. Routes comprising the Core Network, which serve corridors with greater ridership demand, could have higher service productivity guidelines than Neighborhood Network routes, which provide coverage service in lower demand neighborhoods. Wave Transit could then use this tiered standard to justify increasing service frequency and span on routes that exceed the guidelines for its tier, as well as to justify reducing service on routes that are underperforming. This practice would allow Wave Transit to easily



identify when service modifications are needed and provide a unified and clear message to the public.

Figure 34 | Proposed Wave Transit Service Guidelines

Metric	Proposed Standard	Justification
<b>Passengers per Revenue Hour</b>	▪ 20.0	▪ Close to peer average
<b>Operating Cost per Passenger</b>	▪ \$4.00	▪ Close to peer average
<b>Operating Cost per Revenue Hour</b>	▪ \$80.00	▪ Close to peer average
<b>Farebox Recovery</b>	▪ 20%	▪ Slightly higher than current farebox recovery rate
<b>On-Time Performance</b>	▪ Existing standards appear to be appropriate	
<b>Vehicle Load (Passenger-to-seat ratio)</b>	▪ Peak: 1.5 ▪ Off Peak/Weekend: 1.0	▪ Industry standard
<b>Minimum Frequency</b>	▪ Peak: 60 minutes ▪ Off Peak/Weekend: 60 minutes	▪ Close to existing guideline
<b>Geographic Coverage</b>	▪ At least 4 households per acre or 5 jobs per acre, contiguous with existing service area, to justify hourly fixed-route service	▪ Industry best practice
<b>Minimum Stop Spacing</b>	▪ ¼ Mile (1320 feet)	▪ Industry standard; ensures that most passengers will be within a 2-5 minute walk of a stop without degrading service quality; close to existing guideline

## TITLE VI AND ENVIRONMENTAL JUSTICE REVIEW

Wave Transit's 2017 Title VI Program and service guidelines establishes a strong base for the agency's Title VI obligations. The Title VI plan is compliant with all FTA requirements. Aside from regular review and updates, no other action is required. The proposed changes to service standards outlined above are optional.

# Appendix B

## Route Profiles

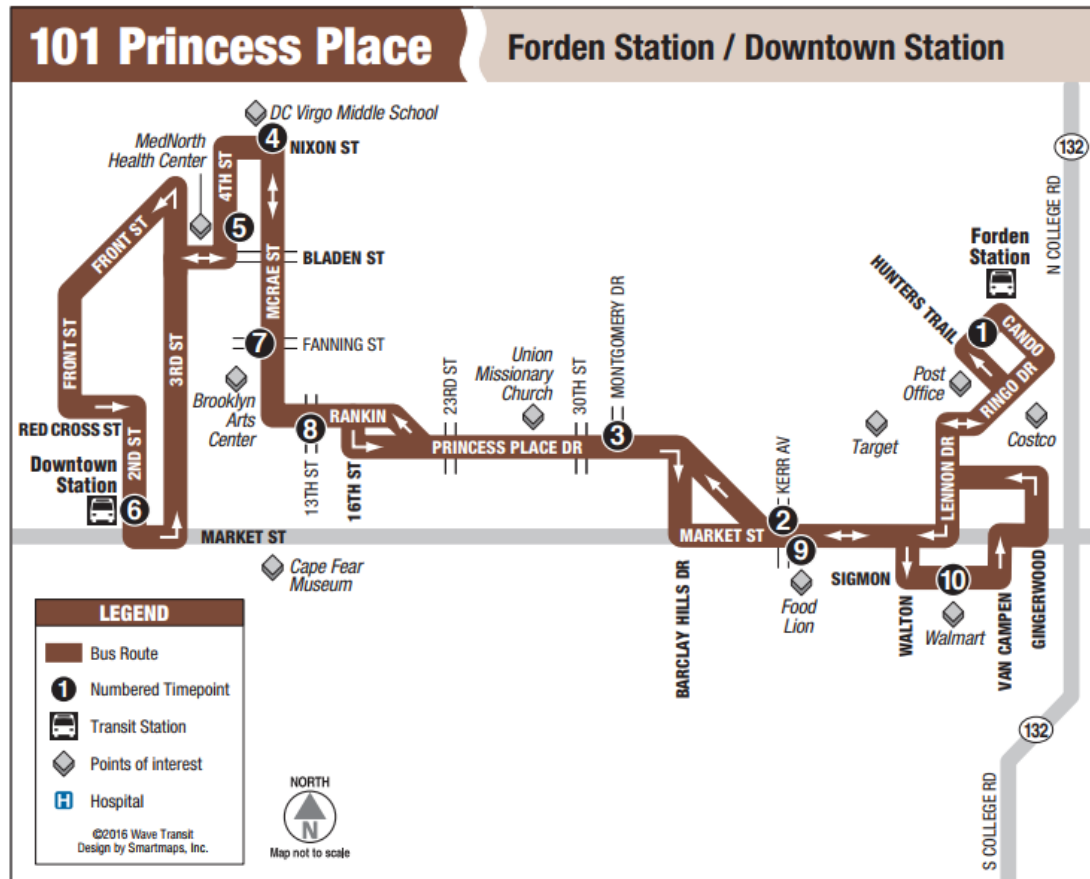
See attached documents



WAVE TRANSIT

# ROUTE 101

Princess Place



## Route Overview

### Major Corridors

Route 101 provides crosstown service between Downtown Transfer Station and Forden Station, including the northern portion of the Brooklyn Arts District. Along the way, the route provides service to dense residential neighborhoods along Princess Place Drive, Market Street, and several big box retailers, including Costco, Target, and Walmart.

### Major Activity Centers / Points of Interest

- Downtown Wilmington
- Creekwood
- MedNorth Health Center
- Brooklyn Arts Center
- Forden Station





- Walmart
- Costco

### Schedule Statistics

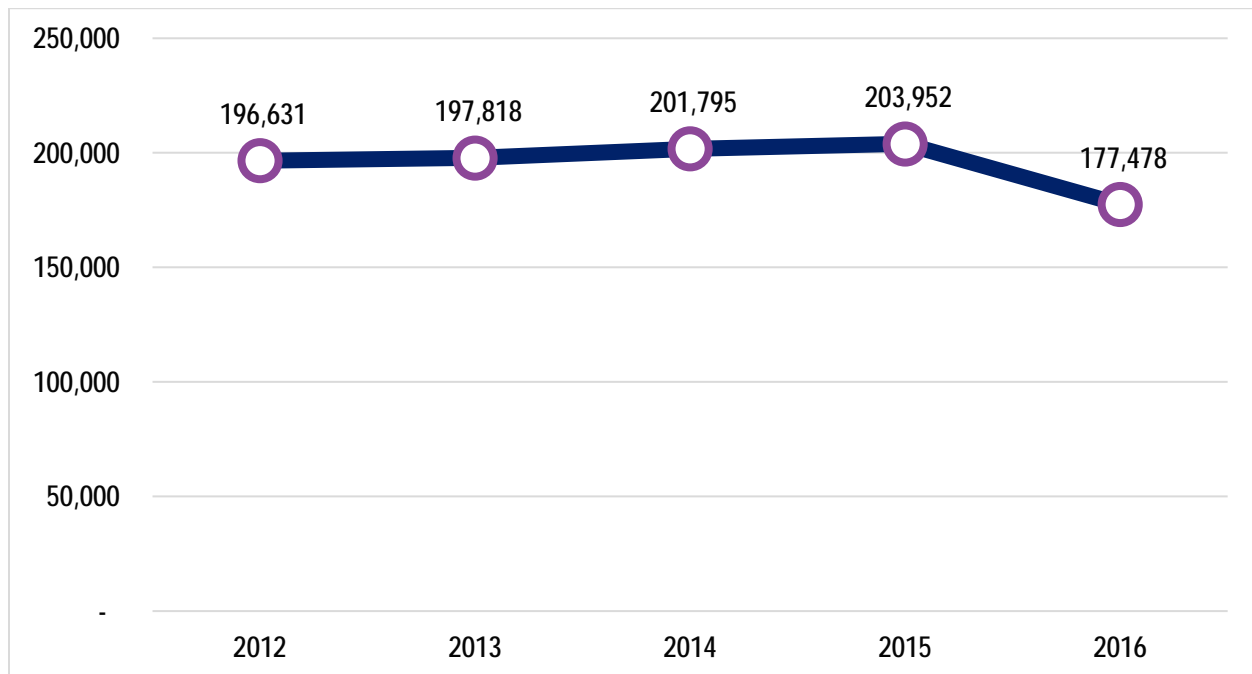
SERVICE DAY	SPAN OF SERVICE	FREQUENCY (MIN)	DAILY TRIPS (INBOUND/OUTBOUND)
Monday-Friday	6:00 AM to 9:00 PM	Peak: 30 / Off-Peak: 60	27 / 27
Saturday	6:00 AM to 9:00 PM	60	15 / 15
Sunday	9:00 AM to 6:00 PM	60	9 / 9

*Peak frequencies are calculated for service that operates 6 AM – 6 PM. Off-peak weekday service is 6 PM – 9 PM. Weekend service is considered off-peak service.*

### Ridership Overview

Route 101 averaged 195,535 annual passengers across the five year period from FY2012 to FY2016. Ridership during this period peaked in 2015, with 203,952 passengers; overall passenger trips declined by 10% from 2012 to 2016.

**Figure 1 | Route 101 Ridership: FY2012 - FY2016**

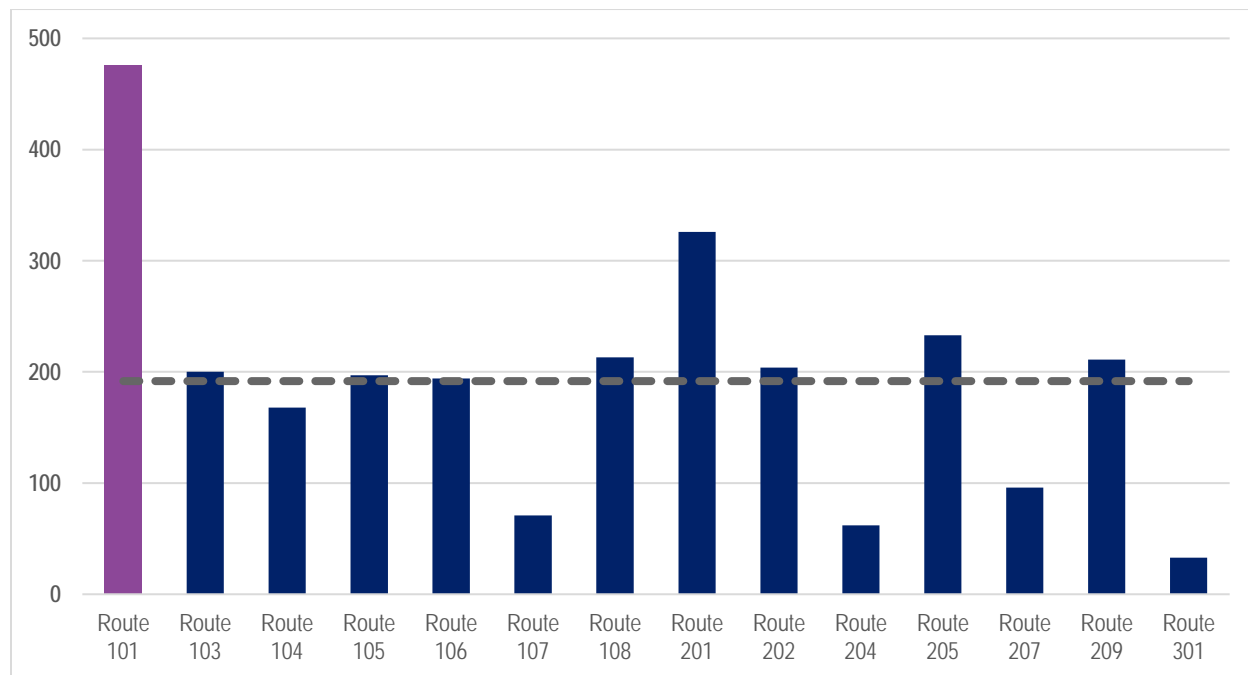




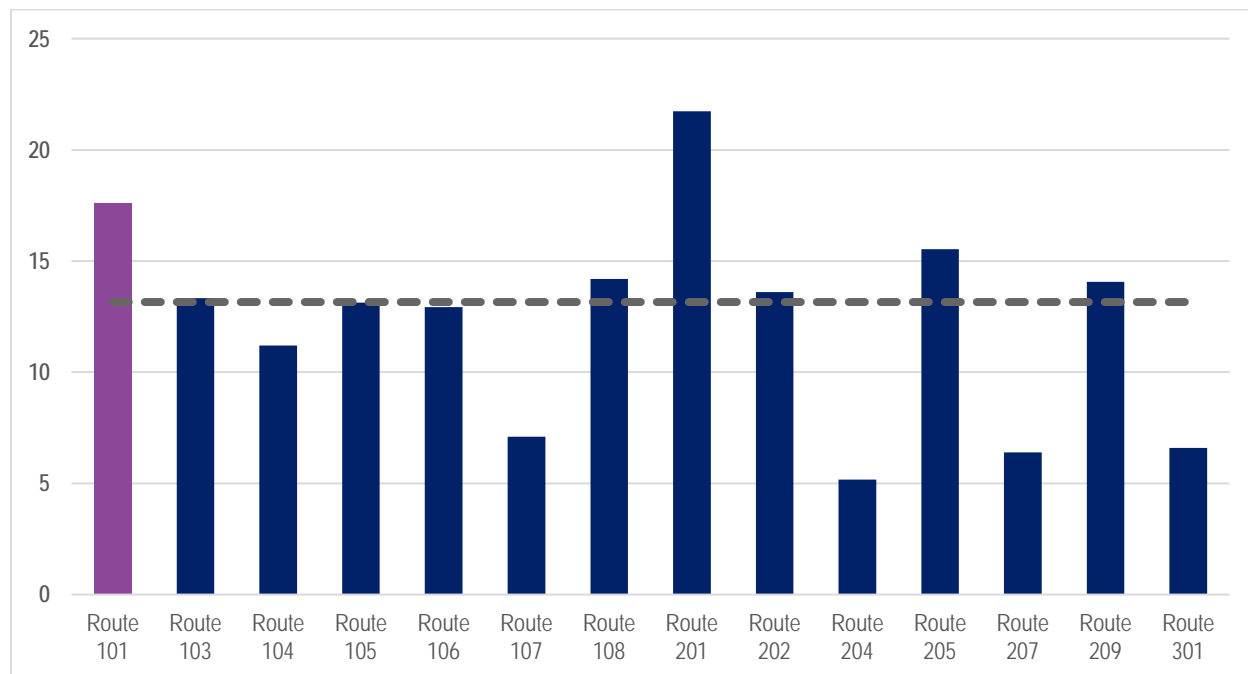
## Service Performance and Productivity

Route 101 is Wave Transit's highest-ridership fixed-route. The route averages 476 passengers per day, 148% greater than system average (192) (Figure 2). The route serves 17.6 passengers per vehicle hour, which ranks second among fixed-routes and is 43% greater than the system average (12.3 PPH) (Figure 3).

**Figure 2 | Average Daily Passengers per Route**



**Figure 3 | Average Passengers per Vehicle Hour**





## Service Improvement Opportunities

Opportunities to strengthen Route 101 are listed below. Maintaining Route 101's relatively high ridership and productivity is paramount, so major improvements may not be necessary. Some suggestions may be contradictory, as there is usually more than one approach to improving a route.

- **Cost-Neutral Service Improvements**

- Route 101 will serve the new Downtown Transit Center. For outbound and inbound service, the route will travel on 3<sup>rd</sup> Street, Harnett Street, and 4<sup>th</sup> Street.
- To improve service to Creekwood, Route 101 is proposed to alternate outbound trips from Downtown Wilmington, serving either Creekwood or Walmart during the peak period (weekdays from 6 a.m. – 6 p.m.). This recommendation will provide hourly service into Creekwood and to Walmart, while maintaining 30-minute frequency along Princess Place Drive and the remainder of the route.

- **Future Service Improvements:**

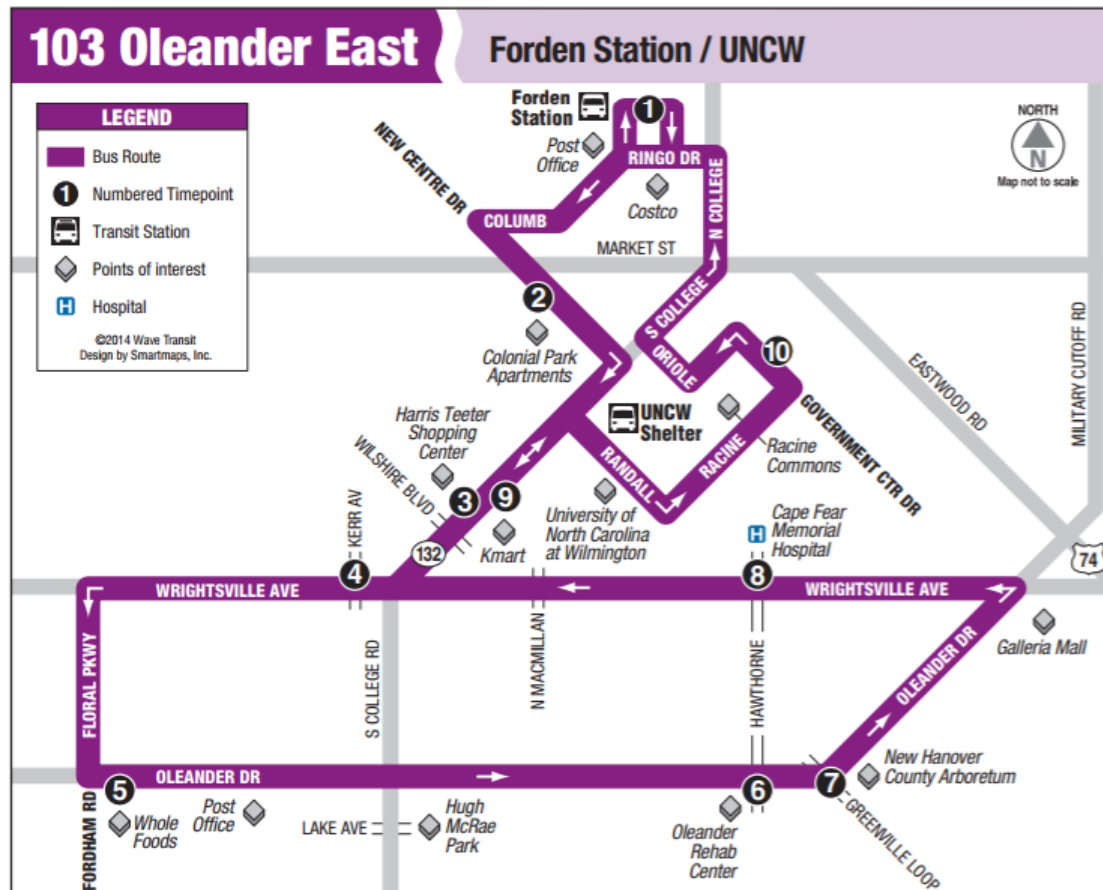
- Evening and weekend service to Creekwood will be considered, depending on operating and ridership statistics. On-demand service could also be considered to serve Creekwood during these periods.
- Operating thru service on Scientific Park Drive to 23<sup>rd</sup> Street is recommended, once the road extension is completed and following a full review of the route's operating statistics.



WAVE TRANSIT

# ROUTE 103

Oleander East



## Route Overview

### Major Corridors

Route 103 provides service between Forden Station and Cape Fear Memorial Hospital. Along the way, the route provides service to the University of North Carolina Wilmington campus, Government Center Drive, New Hanover County Arboretum and several retailers, including Whole Foods, Harris Teeter, Kmart, Costco and the Galleria Mall.

### Major Activity Centers / Points of Interest

- University of North Carolina at Wilmington
- Cape Fear Memorial Hospital
- New Hanover County Arboretum
- Oleander Rehab Center
- Whole Foods



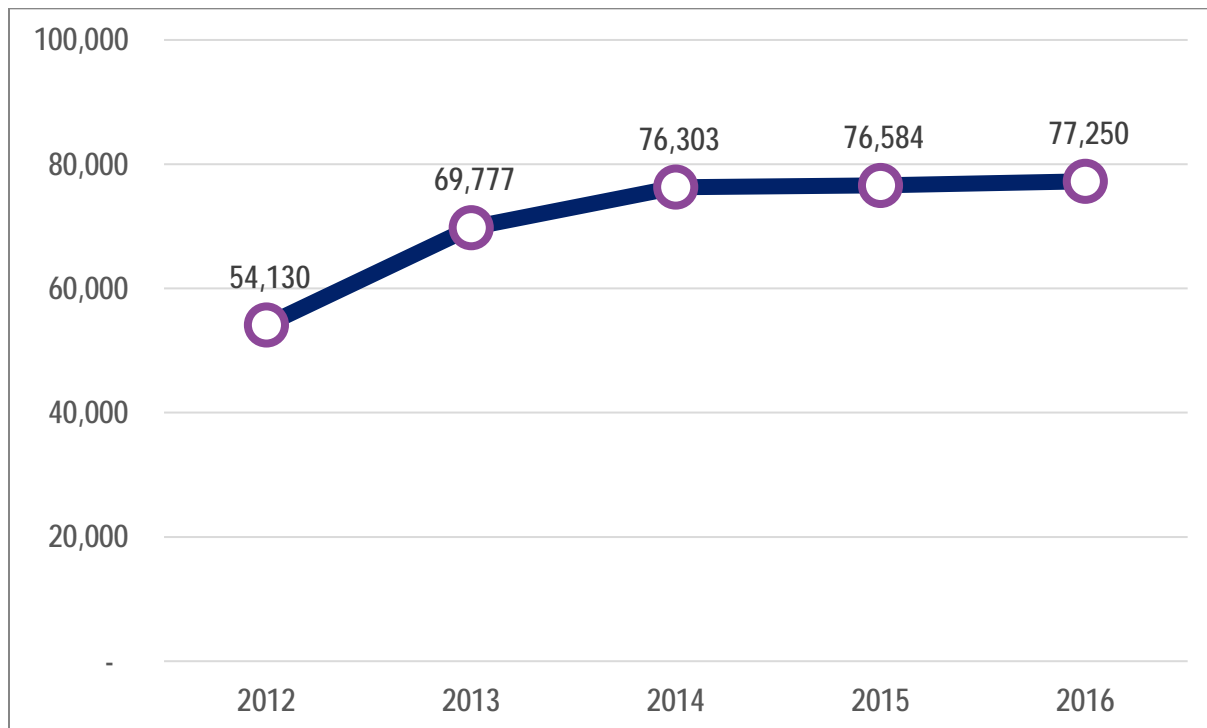
## Schedule Statistics

SERVICE DAY	SPAN OF SERVICE	FREQUENCY (MIN)	DAILY TRIPS (INBOUND/OUTBOUND)
Monday-Friday	6:00 AM to 9:00 PM	60	15/15
Saturday	6:00 AM to 9:00 PM	60	15/15
Sunday	9:00 AM to 6:00 PM	60	12/12

## Ridership Overview

Route 103 averaged 70,809 annual passengers across the five year period from FY2012 to FY2016. Ridership during this period peaked in 2016, with 77,250 passengers; overall passenger trips have increased by 43% from 2012 to 2016.

**Figure 1 | Route 103 Ridership FY2012 - FY2016**



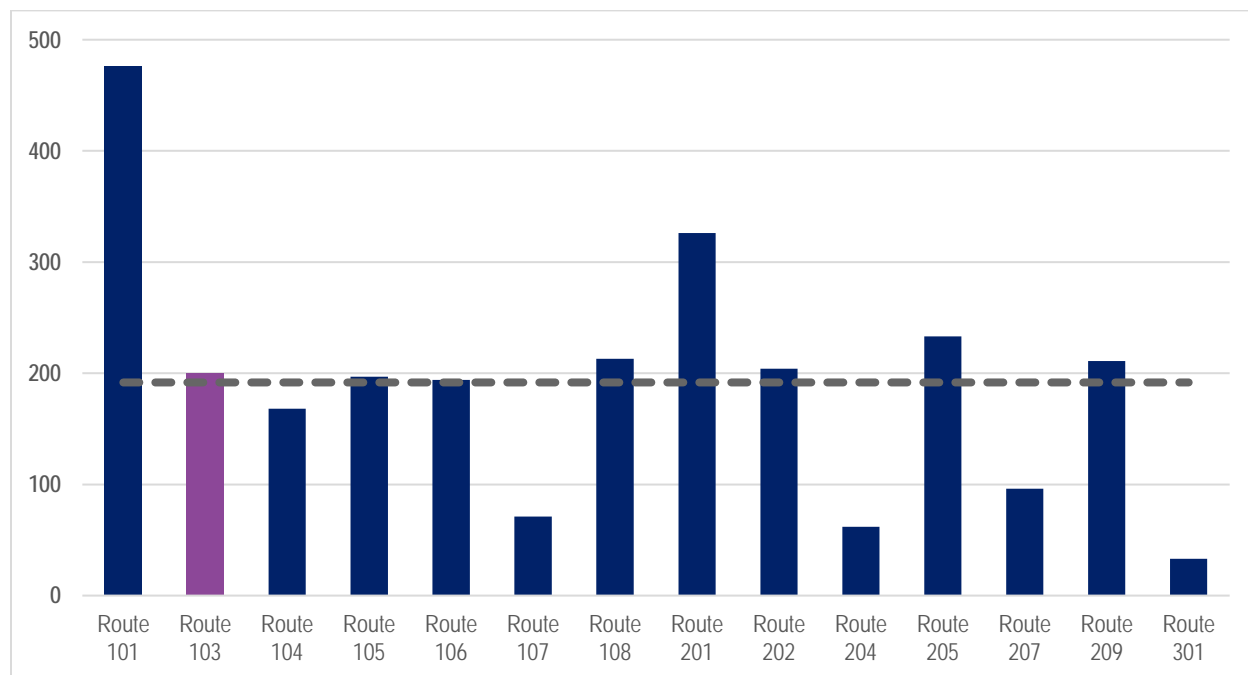




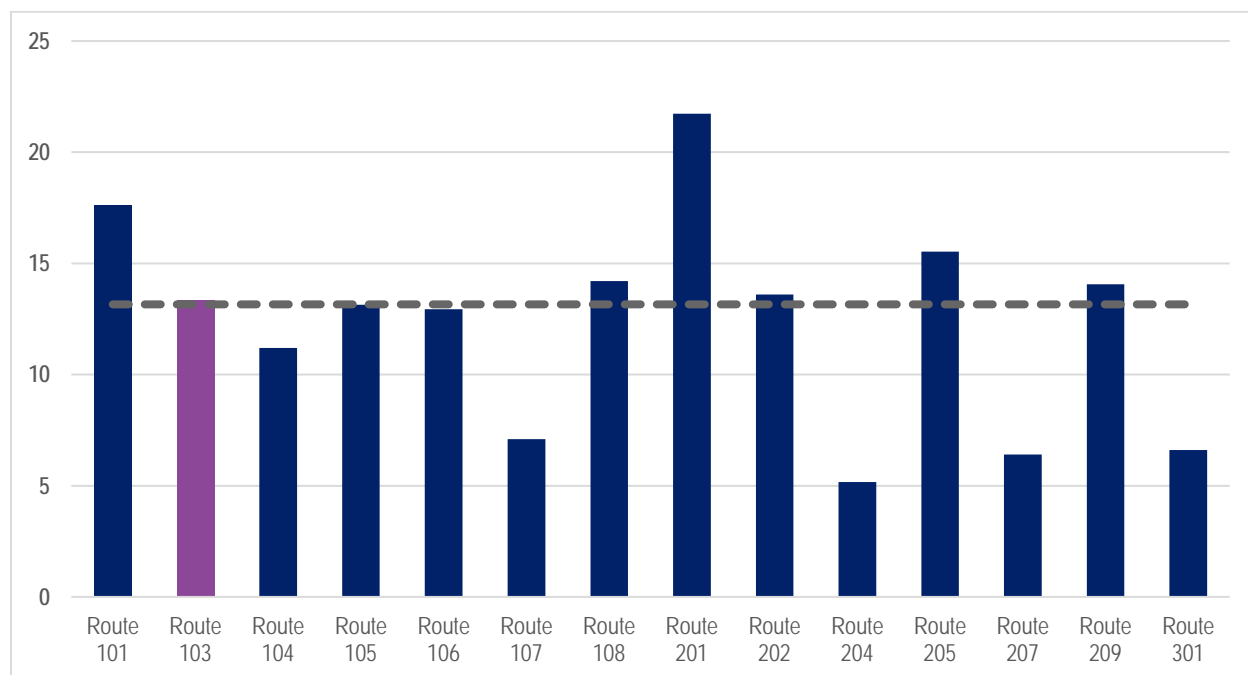
## Service Performance and Productivity

Route 103 is the 7<sup>th</sup> most productive Wave Transit fixed-route. It averages 200 passengers per day, 4% greater than system average (192) (Figure 2). The route serves 13.3 passengers per vehicle hour, which ranks 7th among fixed-routes and is 8% greater than the system average (12.3 PPH) (Figure 3).

**Figure 2 | Average Daily Passengers per Route**



**Figure 3 | Average Passengers per Vehicle Hour**





## Service Improvement Opportunities

Opportunities to strengthen Route 103 are listed below. Some suggestions may be contradictory, as there is usually more than one approach to improving a route.

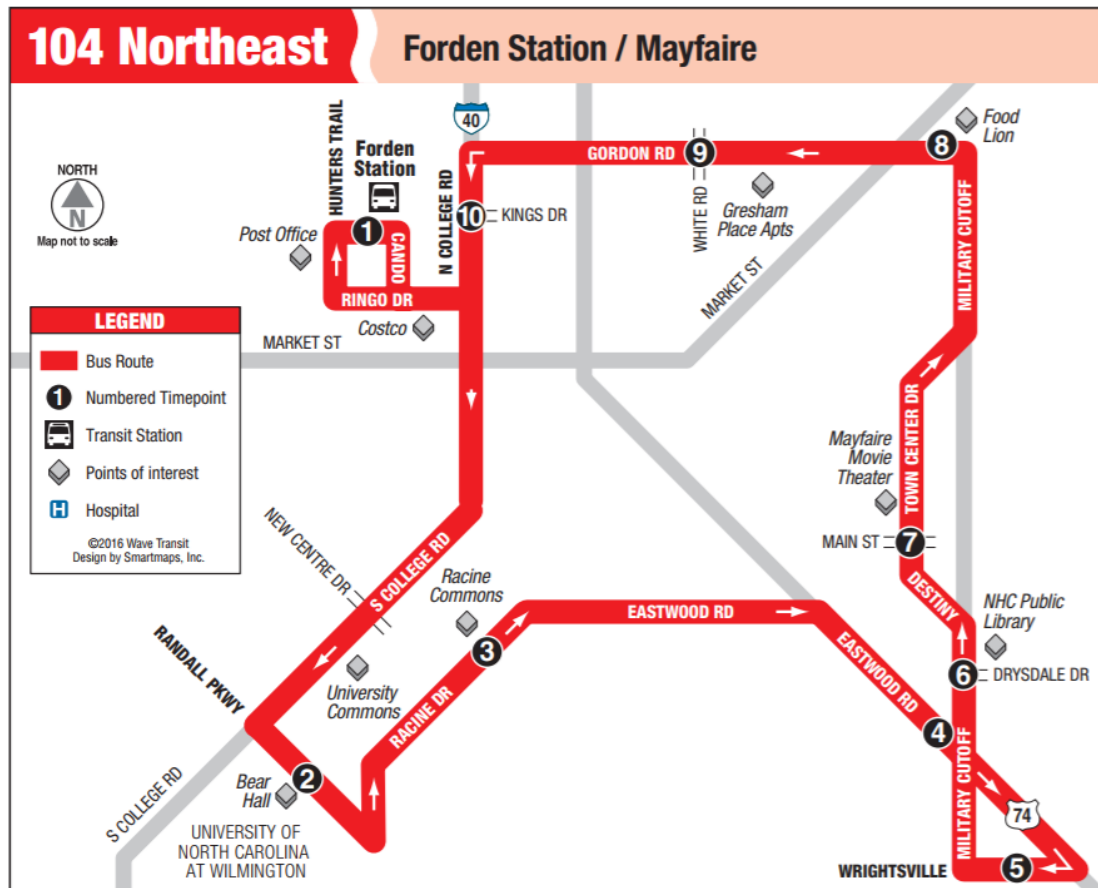
- No service improvements are suggested for Route 103 at this time. The ridership from year-to-year is stable, which is a more positive trend than the overall fixed-route system.



WAVE TRANSIT

# ROUTE 104

Northeast



## Route Overview

### Major Corridors

Route 104 provides service between Forden Station and the NHC Public Library. Along the way, the route provides service to the University of North Carolina Wilmington campus, residential neighborhoods along Eastwood Road, Gordon Road and several retailers, including Costco and Food Lion.

### Major Activity Centers / Points of Interest

- University of North Carolina Wilmington
- NHC Public Library
- Mayfaire Shopping Center
- Hunters Trail
- Costco



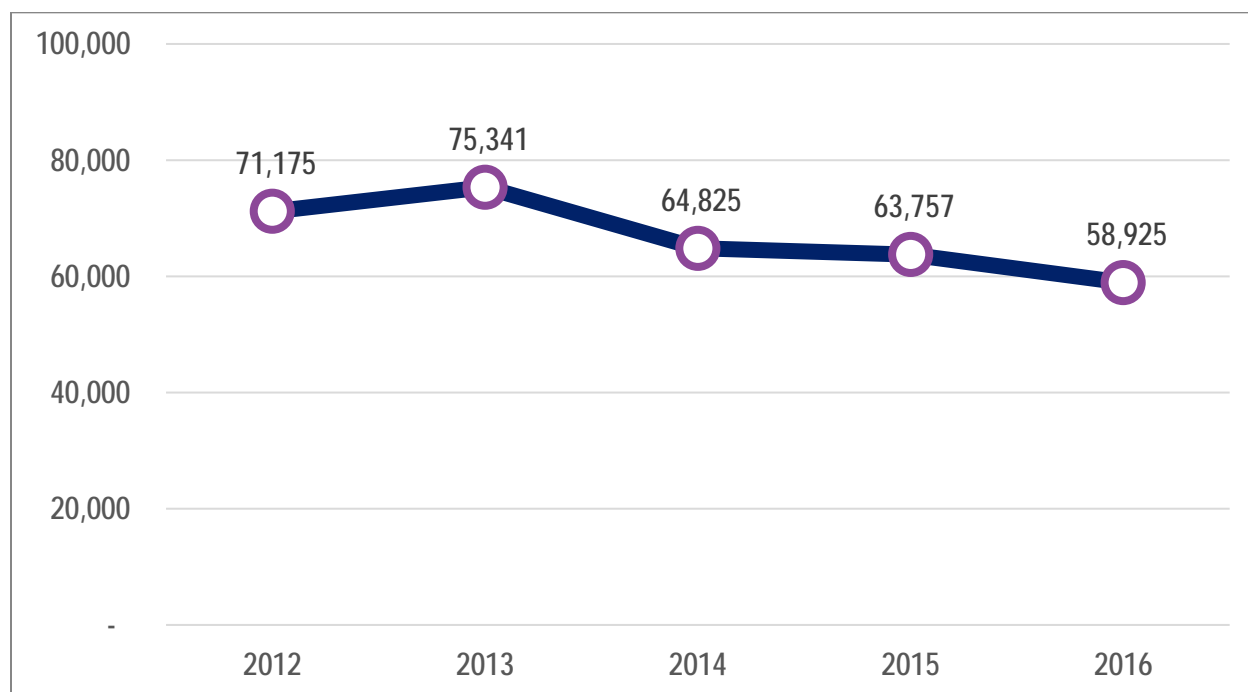
### Schedule Statistics

SERVICE DAY	SPAN OF SERVICE	FREQUENCY (MIN)	DAILY TRIPS (INBOUND/OUTBOUND)
Monday-Friday	6:00 AM to 9:00 PM	60	15/15
Saturday	6:00 AM to 9:00 PM	60	15/15
Sunday	9:00 AM to 6:00 PM	60	12/12

### Ridership Overview

Route 104 averaged 66,805 annual passengers across the five year period from FY2012 to FY2016. Ridership during this period peaked in 2013, with 75,341 passengers; overall passenger trips have decreased by 17% from 2012 to 2016.

**Figure 1 Route 104 Ridership FY2012 - FY2016**





## Service Performance and Productivity

Route 104 is the 10<sup>th</sup> most productive Wave Transit fixed-route. It averages 168 passengers per day, 12% less than system average (192) (Figure 2). The route serves 11.2 passengers per vehicle hour, which ranks 10th among fixed-routes and is 9% less than the system average (12.3 PPH) (Figure 3).

Figure 2 | Average Daily Passengers per Route

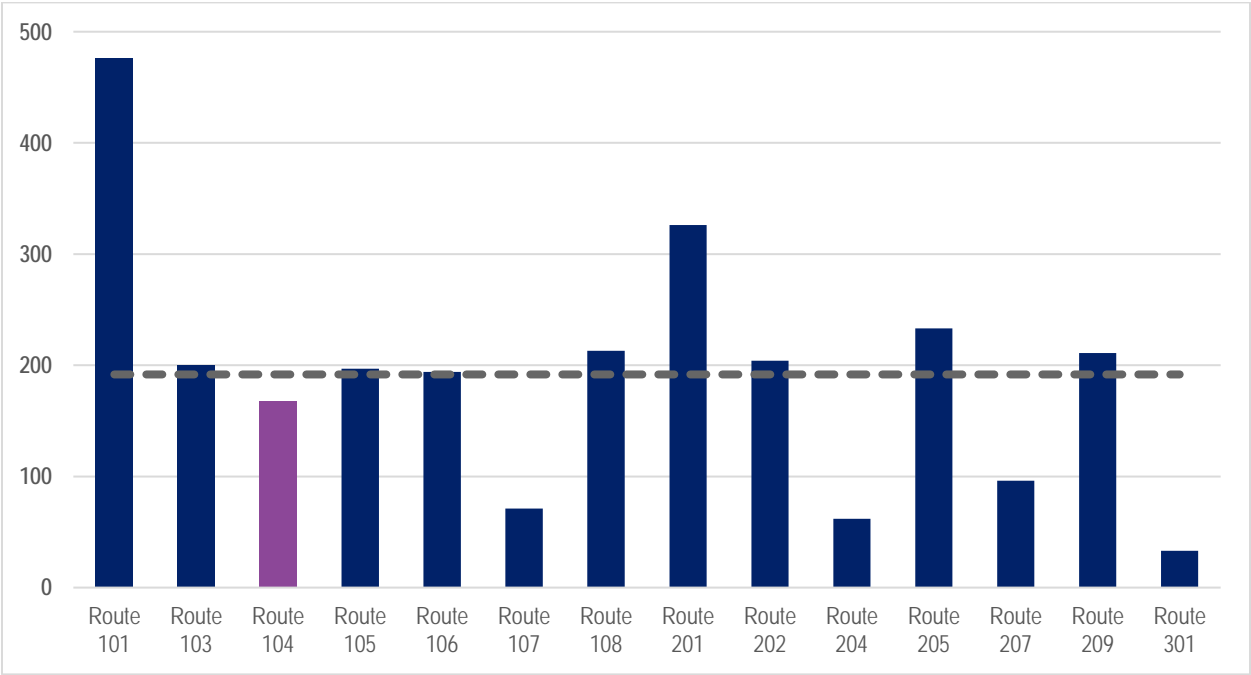
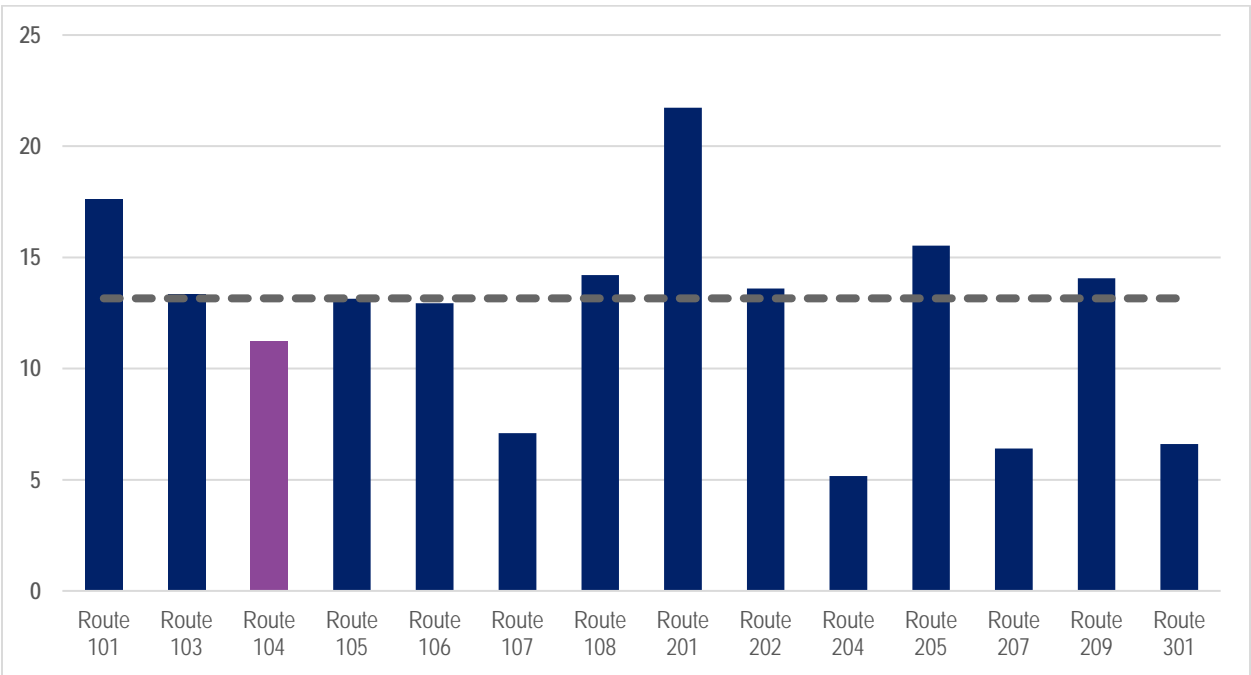


Figure 3 | Average Passengers per Vehicle Hour







## Service Improvement Opportunities

Opportunities to strengthen Route 104 are listed below. Some suggestions may be contradictory, as there is usually more than one approach to improving a route.

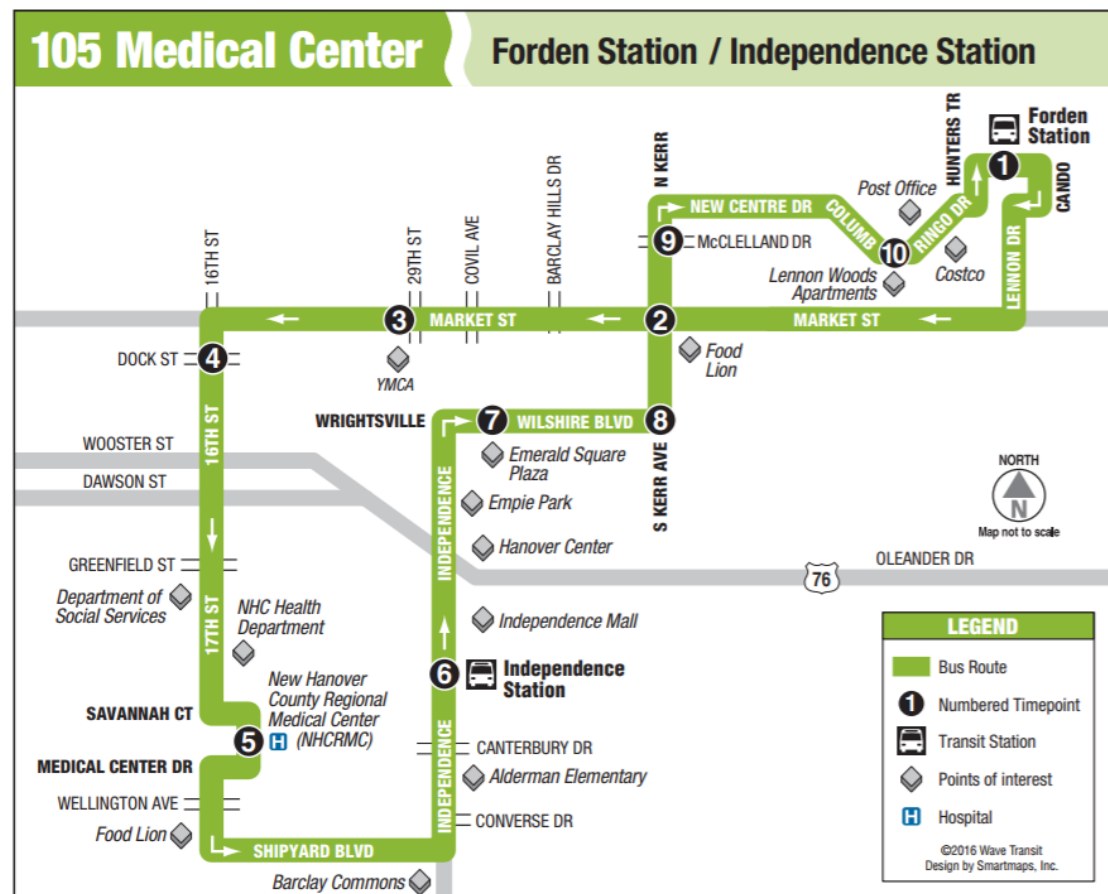
- **Cost-Neutral Service Improvements:** Service on Route 104 is proposed to extend westbound on Gordon Road, turn right on Farley Drive, and turn right on College Road, completing the route at Forden Station. This modification will provide a safer transfer opportunity with Route 207 North at the intersection of Farley Drive and Kerr Avenue.
- **Future Service Improvements:** No future service improvements are recommended at this time.



WAVE TRANSIT

# ROUTE 105

Medical Center



## Route Overview

### Major Corridors

Route 105 provides service between Forden Station and Independence Station. Along the way, the route provides service to the New Hanover County Regional Medical Center, NHC Health Department, Department of Social Services, Emerald Square Plaza, Alderman Elementary, and several big box retailers, including Costco and Food Lion.

### Major Activity Centers / Points of Interest

- NHC Regional Medical Center
- NHC Health Department
- Department of Social Services
- YMCA
- Emerald Square Plaza



- Hanover Center
- Alderman Elementary
- Costco

#### Schedule Statistics

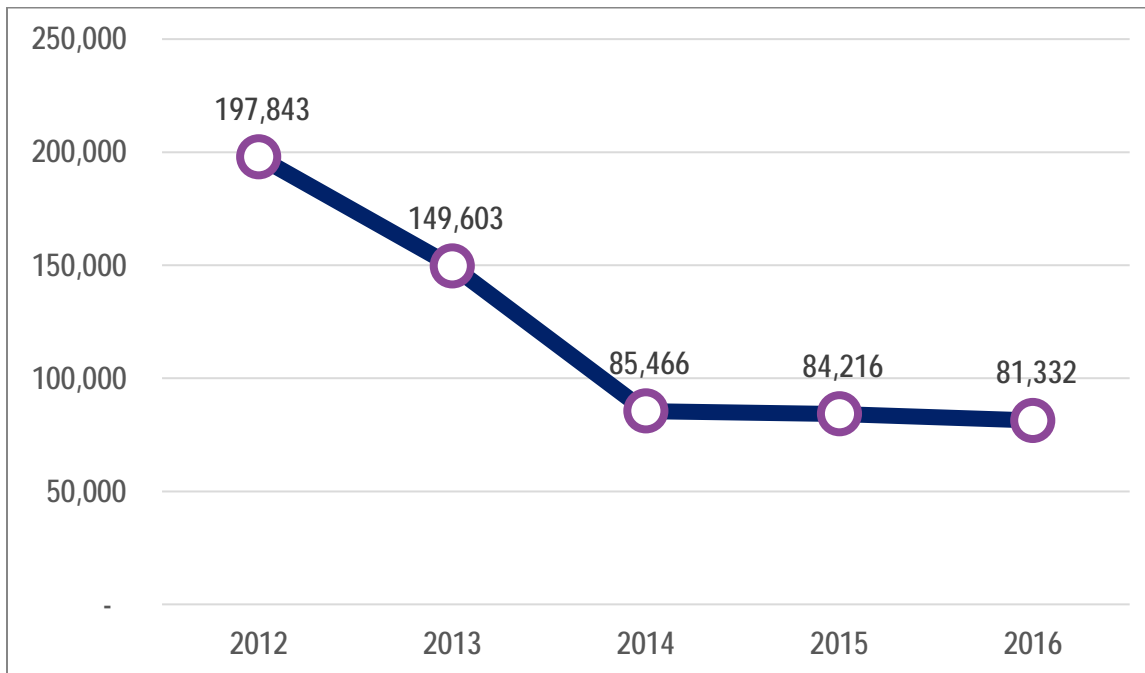
SERVICE DAY	SPAN OF SERVICE	FREQUENCY (MIN)	DAILY TRIPS (INBOUND/OUTBOUND)*
Monday-Friday	6:00 AM to 9:00 PM	60	15
Saturday	6:00 AM to 9:00 PM	60	15
Sunday	9:00 AM to 6:00 PM	60	12

*\*All bus routes return to their starting point (bus stop #1) after leaving bus stop #10.*

## Ridership Overview

Route 105 averaged 119,692 annual passengers across the five year period from FY2012 to FY2016. Ridership during this period peaked in 2012, with 197,843 passengers; overall passenger trips have decreased by 59% from 2012 to 2016.

**Figure 1 Route 105 Ridership FY2012 - FY 2016**

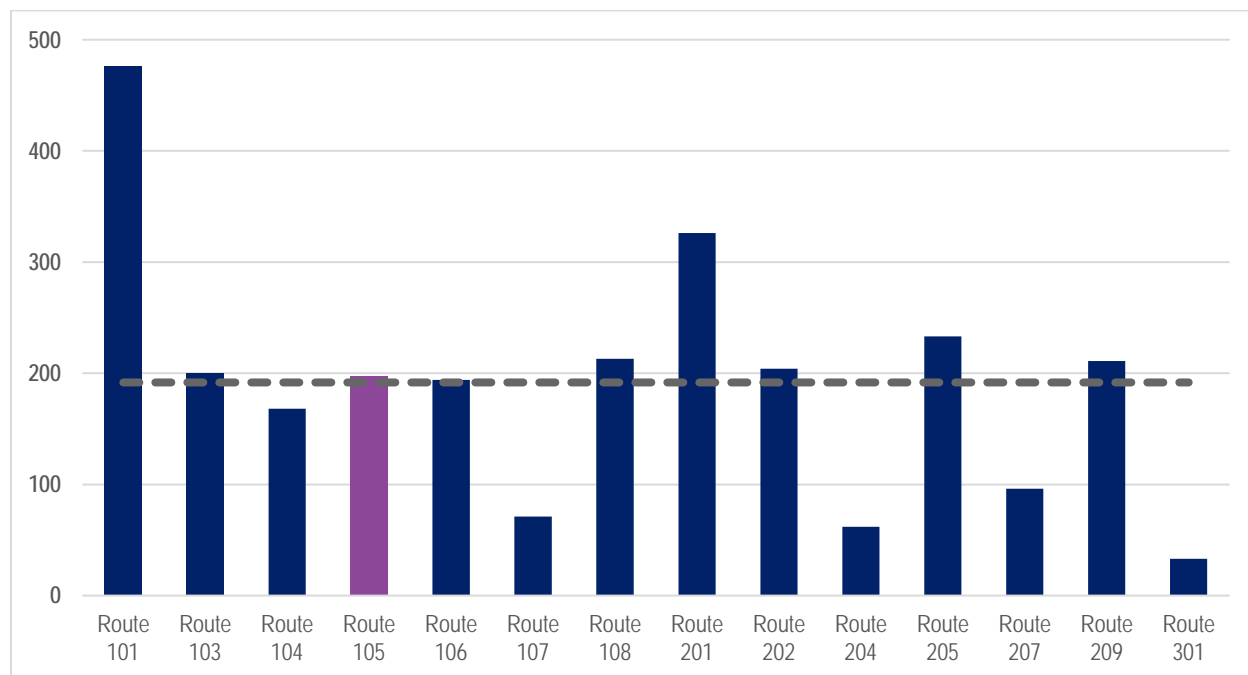




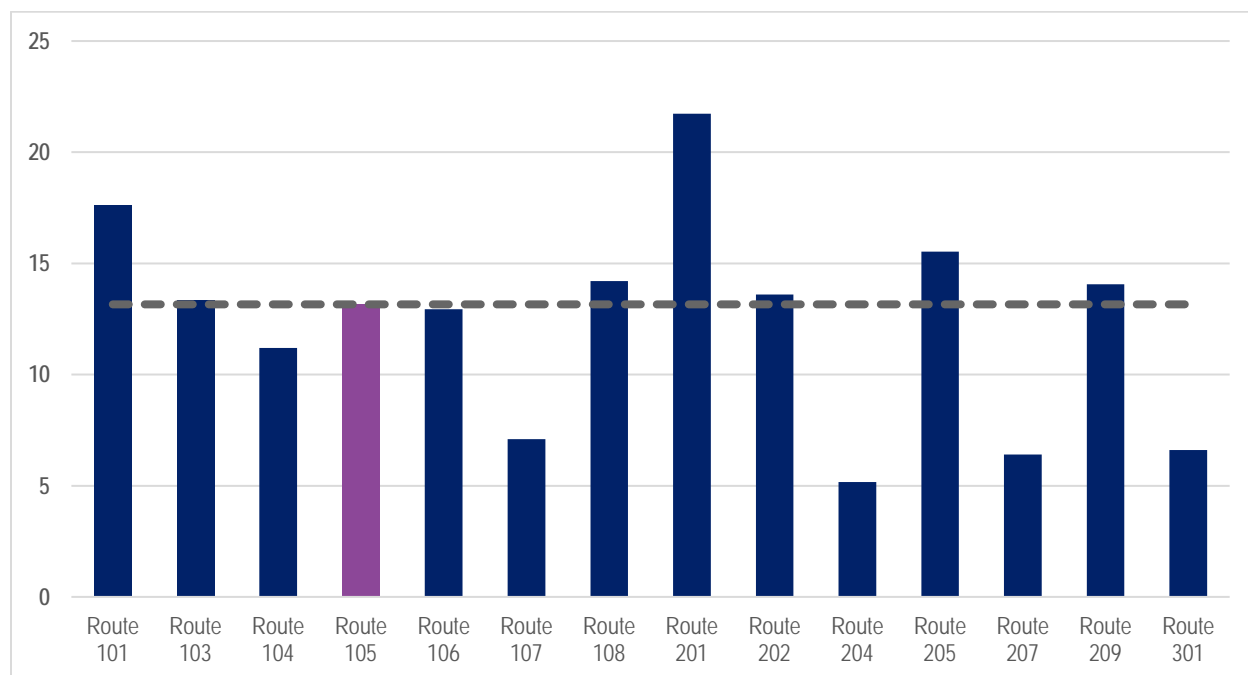
## Service Performance and Productivity

Route 105 averages 197 passengers per day, which is 3% greater than system average (192) (Figure 2). The route serves 13.1 passengers per vehicle hour, which ranks 8th among fixed-routes and is 7% greater than the system average (12.3 PPH) (Figure 3).

**Figure 2 | Average Daily Passengers per Route**



**Figure 3 | Average Passengers per Vehicle Hour**





## Service Improvement Opportunities

Opportunities to strengthen Route 105 are listed below. Some suggestions may be contradictory, as there is usually more than one approach to improving a route.

- **Cost-Neutral Service Improvements:** No cost-neutral service improvement opportunities are recommended for Route 105.
- **Future Service Improvements:** No future service improvement opportunities are recommended for Route 105.

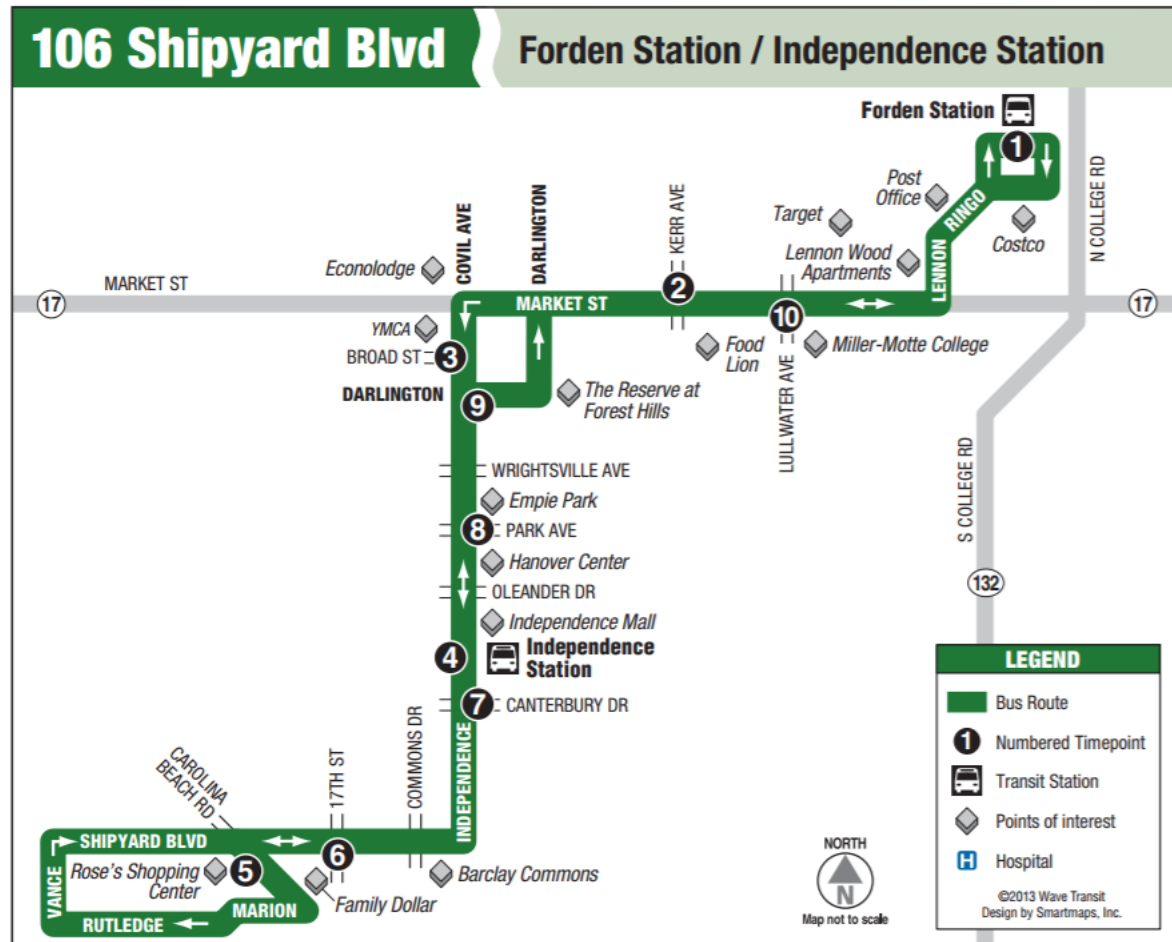




WAVE TRANSIT

# ROUTE 106

Shipyard Blvd



## Route Overview

### Major Corridors

Route 106 provides service between Independence Station and Forden Station. Along the way, the route provides service to the Empie Park, Hanover Center, Independence Mall, Rose's Shopping Center, Barclay Commons, Mille Motte College and several retailers, including Costco, Target, Family Dollar, and Food Lion.

### Major Activity Centers / Points of Interest

- Empie Park
- Hanover Center
- Independence Mall
- Rose's Shopping Center



- The Reserve at Forest Hills

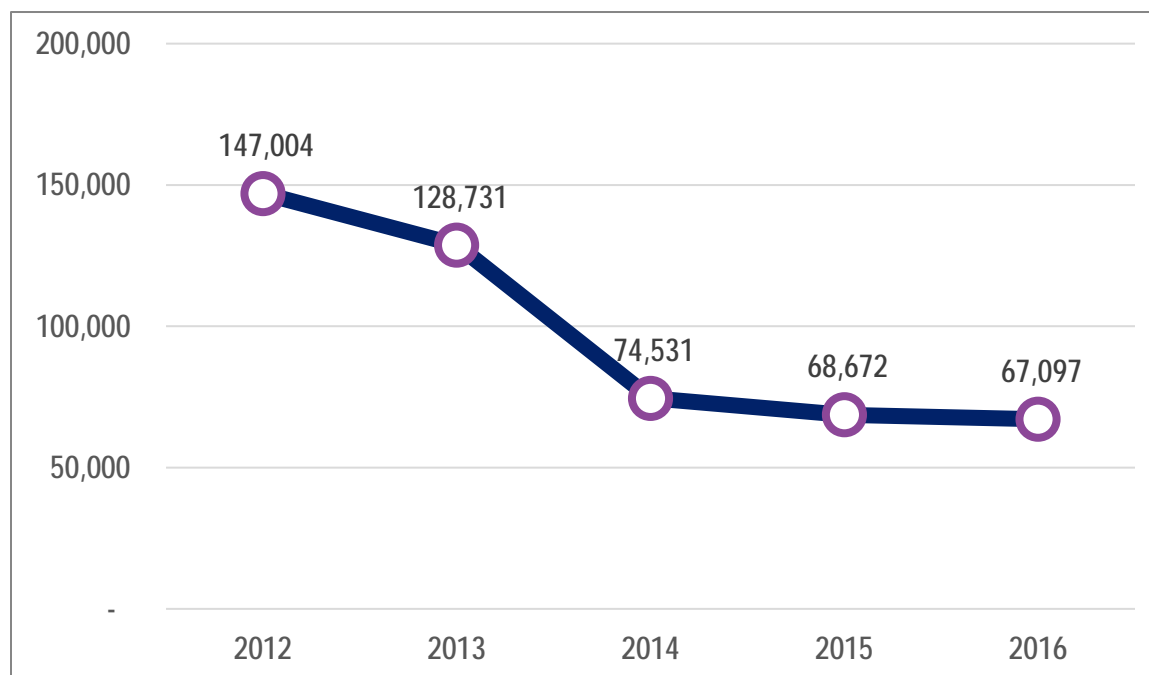
#### Schedule Statistics

SERVICE DAY	SPAN OF SERVICE	FREQUENCY (MIN)	DAILY TRIPS (INBOUND/OUTBOUND)
Monday-Friday	6:00 AM to 9:00 PM	60	15/15
Saturday	6:00 AM to 9:00 PM	60	15/15
Sunday	9:00 AM to 6:00 PM	60	12/12

#### Ridership Overview

Route 106 averaged 97,207 annual passengers across the five year period from FY2012 to FY2016. Ridership during this period peaked in 2012, with 147,004 passengers; overall passenger trips have decreased by 54% from 2012 to 2016.

**Figure 1 Route 106 Ridership FY2012 - FY2016**

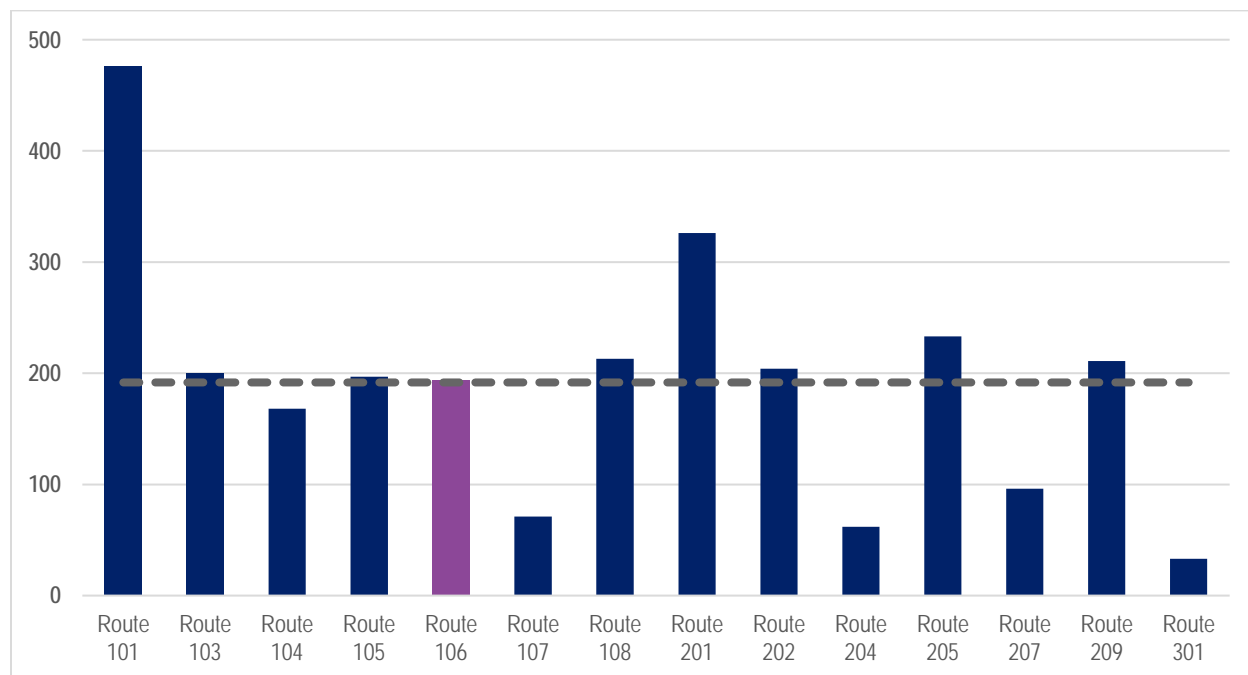




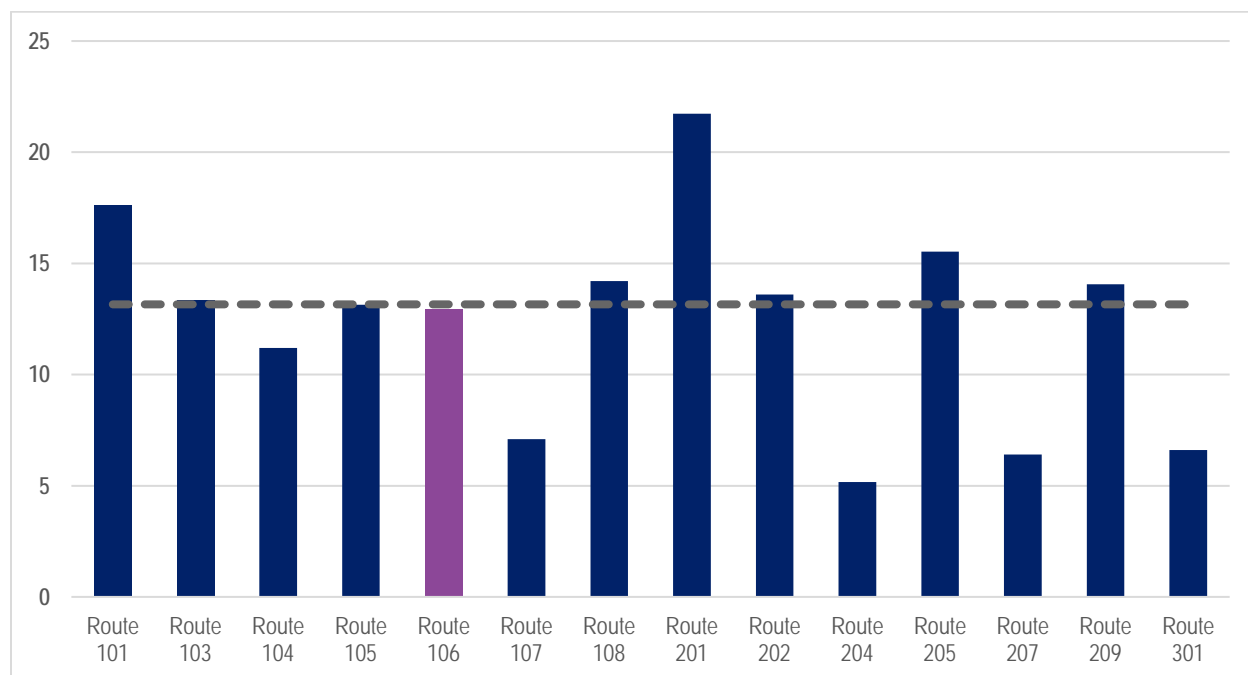
## Service Performance and Productivity

Route 106 averages 194 passengers per day, 2% greater than system average (192) (Figure 2). The route serves 12.9 passengers per vehicle hour, which ranks 9th among fixed-routes and is 5% greater than the system average (12.3 PPH) (Figure 3).

**Figure 2 | Average Daily Passengers per Route**



**Figure 3 | Average Passengers per Vehicle Hour**





## Service Improvement Opportunities

Opportunities to strengthen Route 106 are listed below. Some suggestions may be contradictory, as there is usually more than one approach to improving a route.

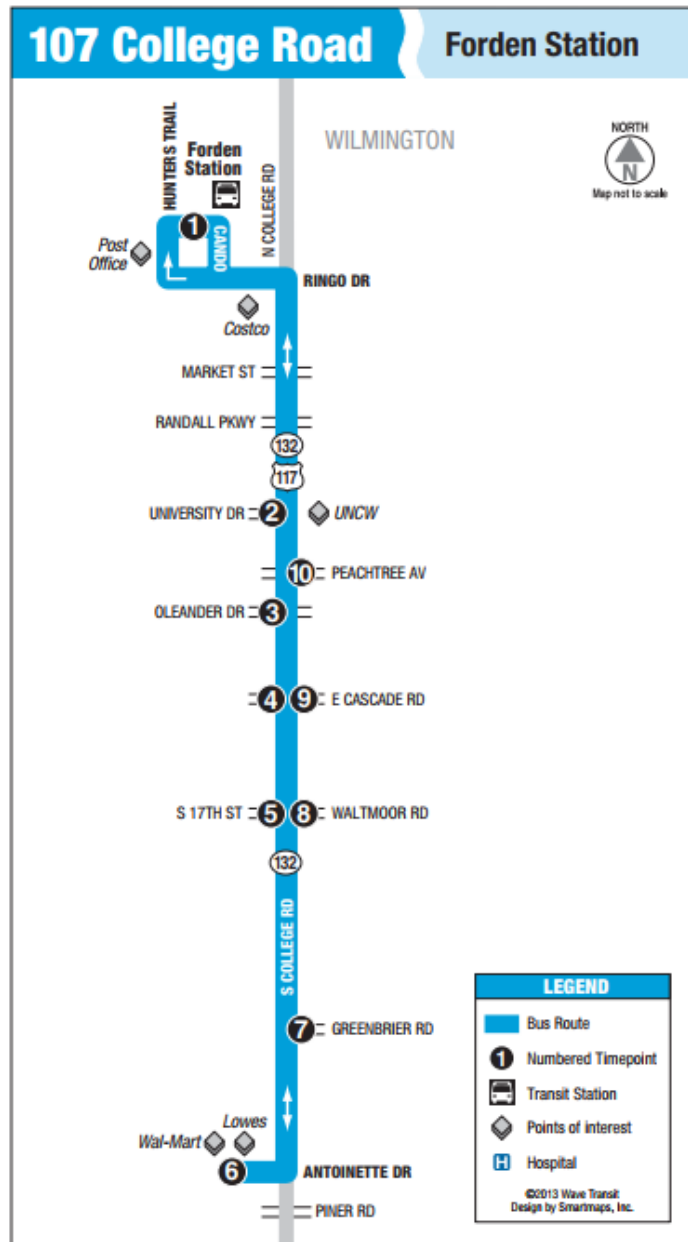
- **Cost-Neutral Service Improvements:** No cost-neutral service improvement opportunities are recommended for Route 106.
- **Future Service Improvements:** No future service improvement opportunities are recommended for Route 106.



WAVE TRANSIT

# ROUTE 107

College Road



## Route Overview

### Major Corridors

Route 107 provides service between the University of North Carolina Wilmington, Forden Station, and Monkey Junction. Along the way, the route provides service to the Hunters Trail, residential neighborhoods along College Road, and several big box retailers, including Costco and Walmart.



### Major Activity Centers / Points of Interest

- Hunters Trail
- University of North Carolina Wilmington
- Post Office
- Walmart
- Costco

### Schedule Statistics

SERVICE DAY	SPAN OF SERVICE	FREQUENCY (MIN)	DAILY TRIPS (INBOUND/OUTBOUND)*
Monday-Friday	6:00 AM to 9:00 PM	60	10/10
Saturday	6:00 AM to 9:00 PM	60	10/10
Sunday	9:00 AM to 6:00 PM	60	6/6

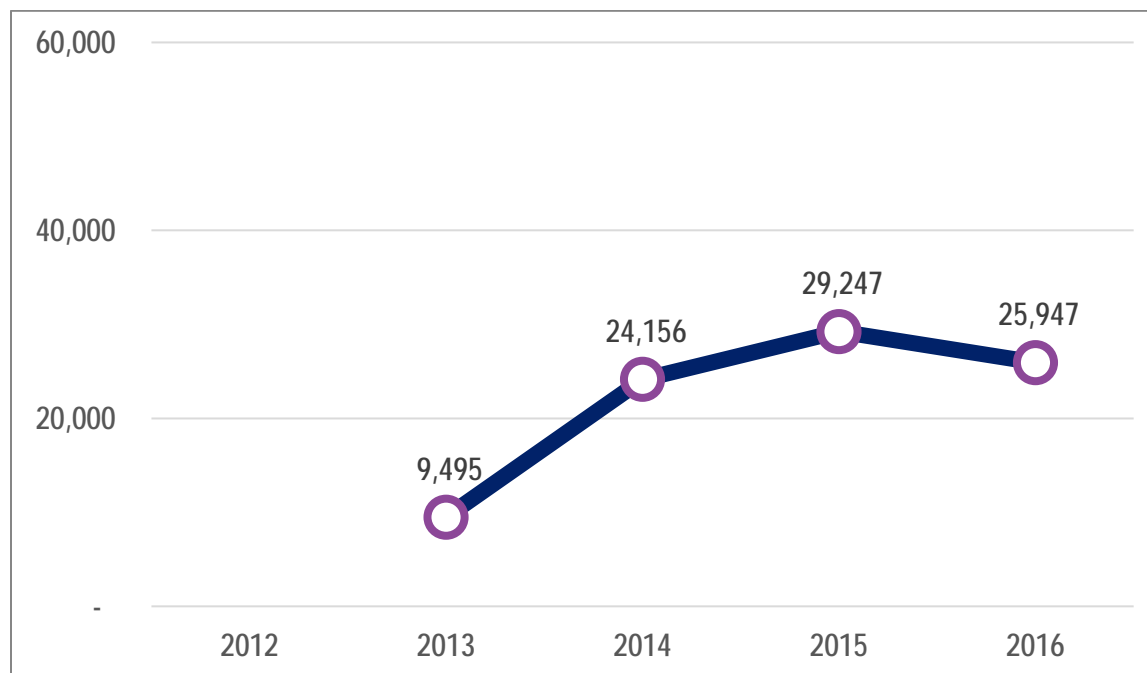
\*All bus routes return to their starting point (bus stop #1) after leaving bus stop #10.

\* Route deviates to 301 Pleasure Island every 120 minutes during the hours of 7:00am, 10:00am, 1:00pm, 4:00pm and 7:00pm Monday-Saturday. (Every 120 minutes during the hours of 7:00am, 10:00am, 1:00pm and 4:00pm Sunday.

### Ridership Overview

Route 107 averaged 22,211 annual passengers across the four year period from FY2013 to FY2016. Ridership during this period peaked in 2015, with 29,247 passengers; overall passenger trips have increased by 7% from 2013 to 2016.

**Figure 1 | Route 107 Ridership FY2013 - FY2016**







## Service Performance and Productivity

Route 107 averages 71 passengers per day, 126% less than system average (192) (Figure 2). The route serves 7.1 passengers per vehicle hour, which ranks 11th among fixed-routes and is 42% less than the system average (12.3 PPH) (Figure 3).

Figure 2 | Average Daily Passengers per Route

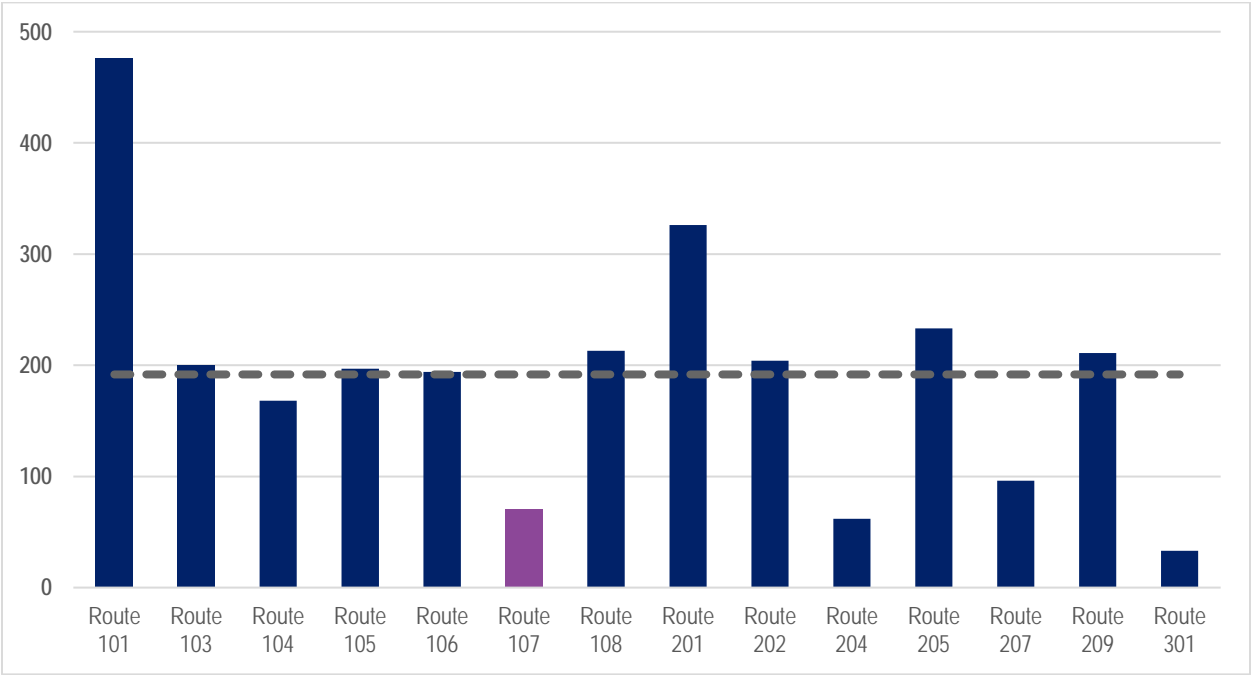
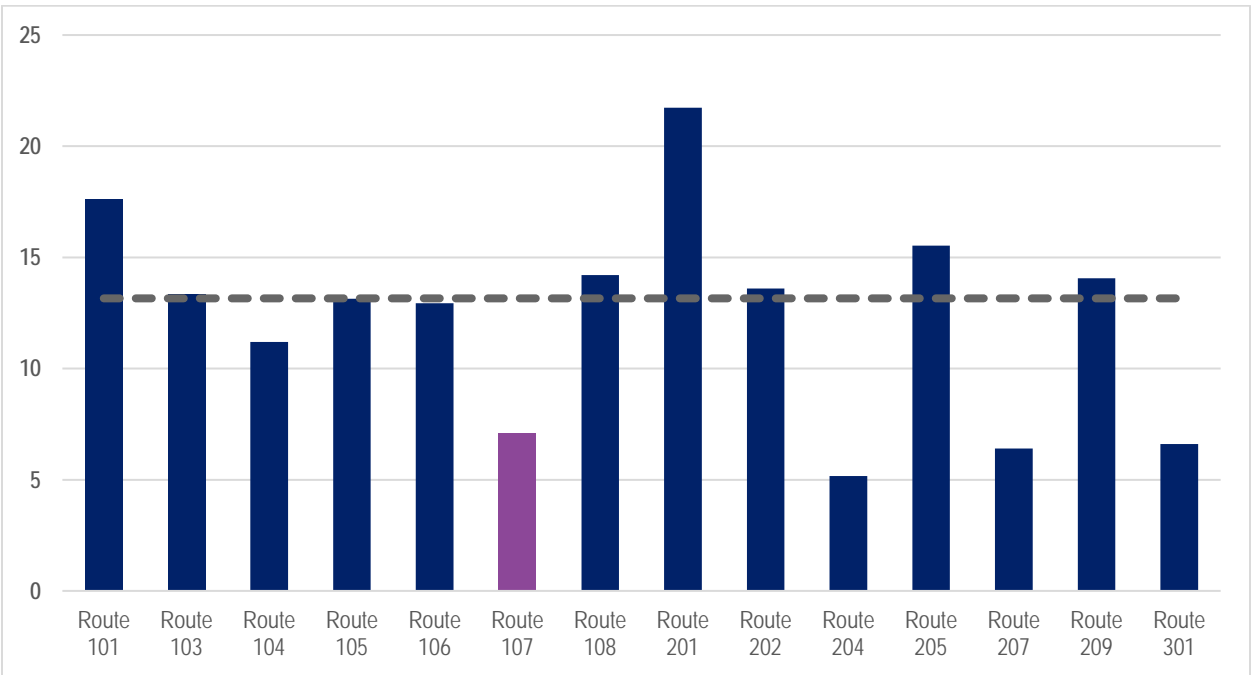


Figure 3 | Average Passengers per Vehicle Hour





## Service Improvement Opportunities

Opportunities to strengthen Route 107 are listed below. Some suggestions may be contradictory, as there is usually more than one approach to improving a route.

- **Cost-Neutral Service Improvements:** No cost-neutral service improvement opportunities are recommended for Route 107.
- **Future Service Improvements:** Upgrading Route 107 to hourly service is recommended as a future service improvement. As Route 107 is interlined with Route 301, this recommendation will be implemented as service frequency is improved on Route 301 Pleasure Island.



WAVE TRANSIT

# ROUTE 108

Market Street



## Route Overview

### Major Corridors

Route 108 provides service between Downtown Wilmington Station and Forden Station. Along the way, the route provides service to the Cape Fear Museum of History and Science, University Plaza, YMCA, and several retailers, including Costco and Food Lion.

### Major Activity Centers / Points of Interest

- Colonial Park Apartments
- Cape Fear Museum of History and Science
- Hunters Trail
- University Plaza
- YMCA
- Costco



## Schedule Statistics

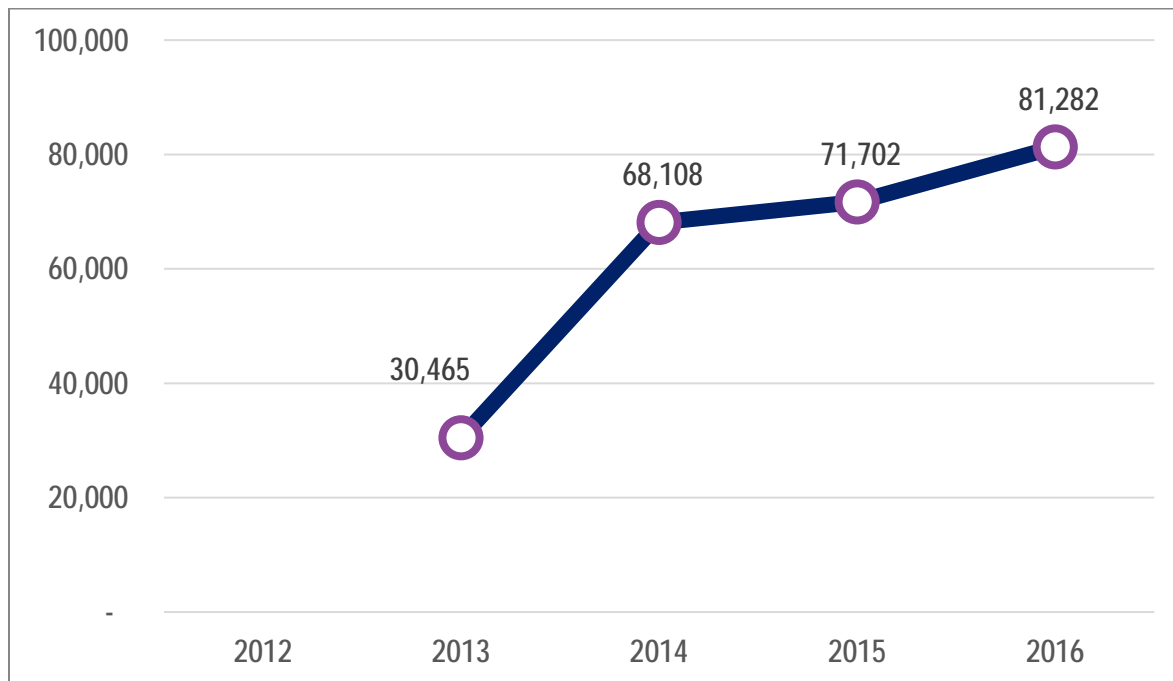
SERVICE DAY	SPAN OF SERVICE	FREQUENCY (MIN)	DAILY TRIPS (INBOUND/OUTBOUND)*
Monday-Friday	6:00 AM to 9:00 PM	60	15
Saturday	6:00 AM to 9:00 PM	60	15
Sunday	9:00 AM to 6:00 PM	60	12

\*All bus routes return to their starting point (bus stop #1) after leaving bus stop #10.

## Ridership Overview

Route 108 averaged 62,889 annual passengers across the five year period from FY2012 to FY2016. Ridership during this period peaked in 2016, with 81,282 passengers; overall passenger trips have increased by 167% from 2012 to 2016.

**Figure 1 Route 108 Ridership FY2012 - FY2016**





## Service Performance and Productivity

Route 108 averages 213 passengers per day, 11% greater than system average (192) (Figure 2). The route serves 14.2 passengers per vehicle hour, which ranks 4th among fixed-routes and is 15% greater than the system average (12.3 PPH) (Figure 3).

Figure 2 | Average Daily Passengers per Route

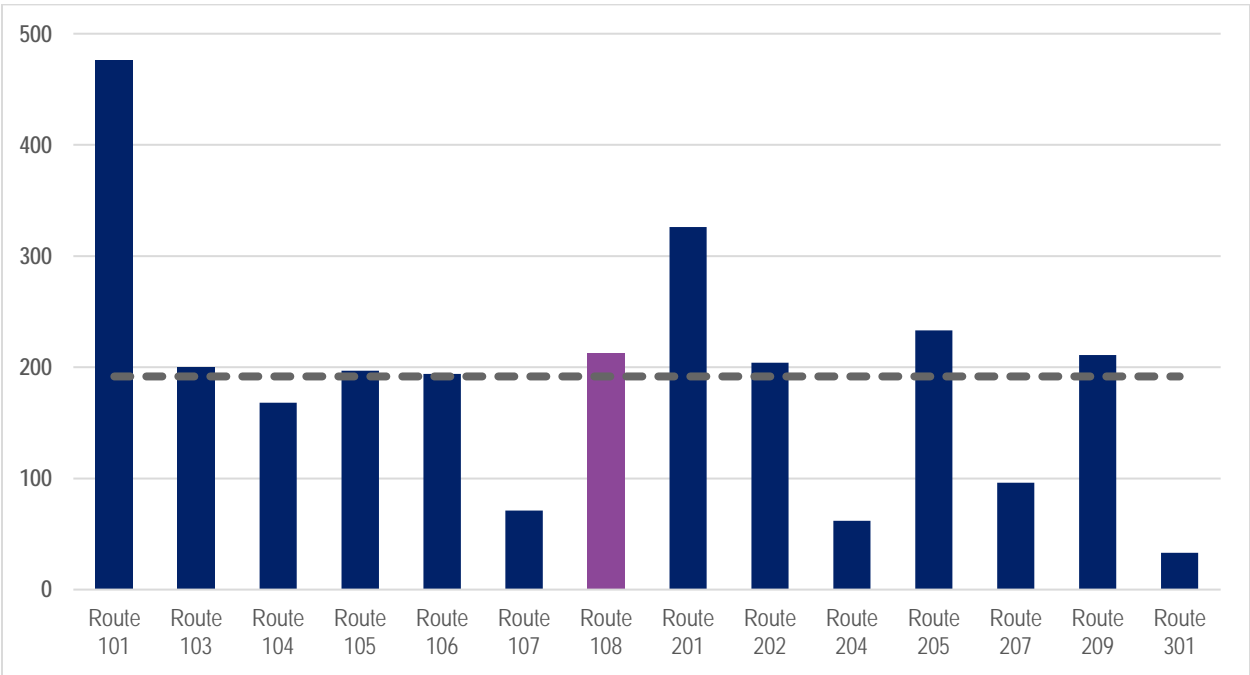
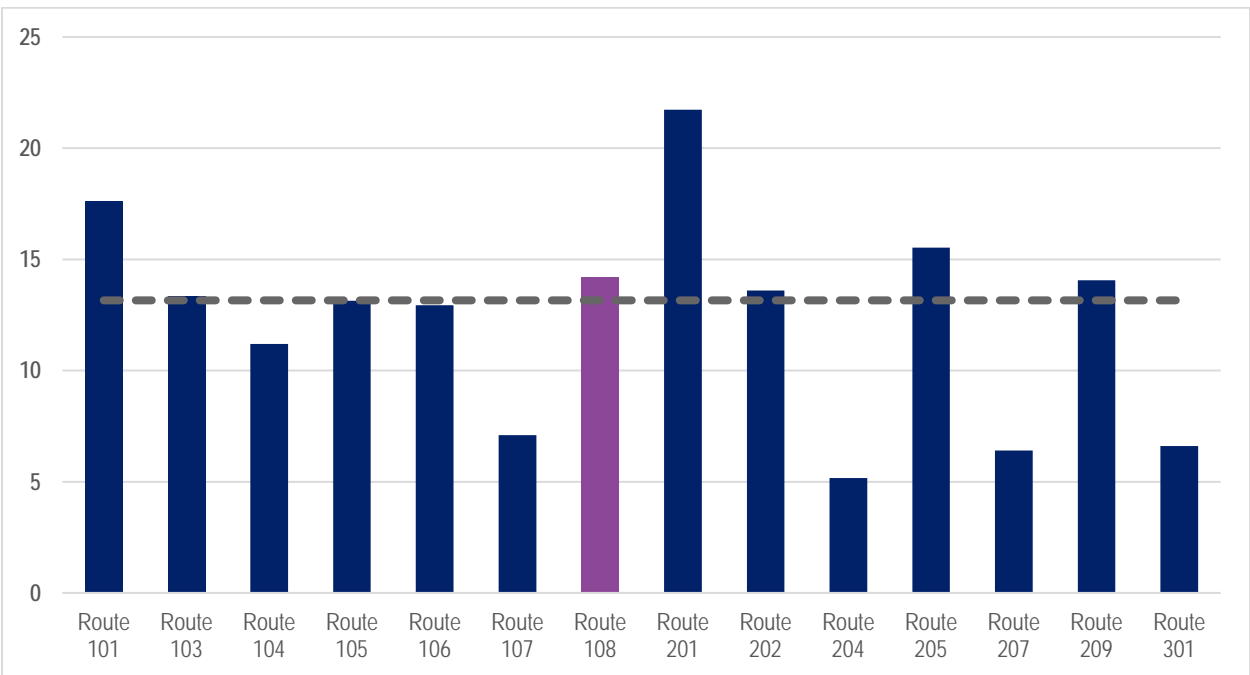


Figure 3 | Average Passengers per Vehicle Hour





## Service Improvement Opportunities

Opportunities to strengthen Route 108 are listed below. Some suggestions may be contradictory, as there is usually more than one approach to improving a route.

- **Cost-Neutral Service Improvements:** Route 108 Market Street is recommended to serve the new Downtown Transit Center via 3<sup>rd</sup> Street (from Market Street) on both outbound and inbound trips.
- **Future Service Improvements:** Increasing to 30-minute frequency during rush hours should be considered, pending review of trip-by-trip data when available.

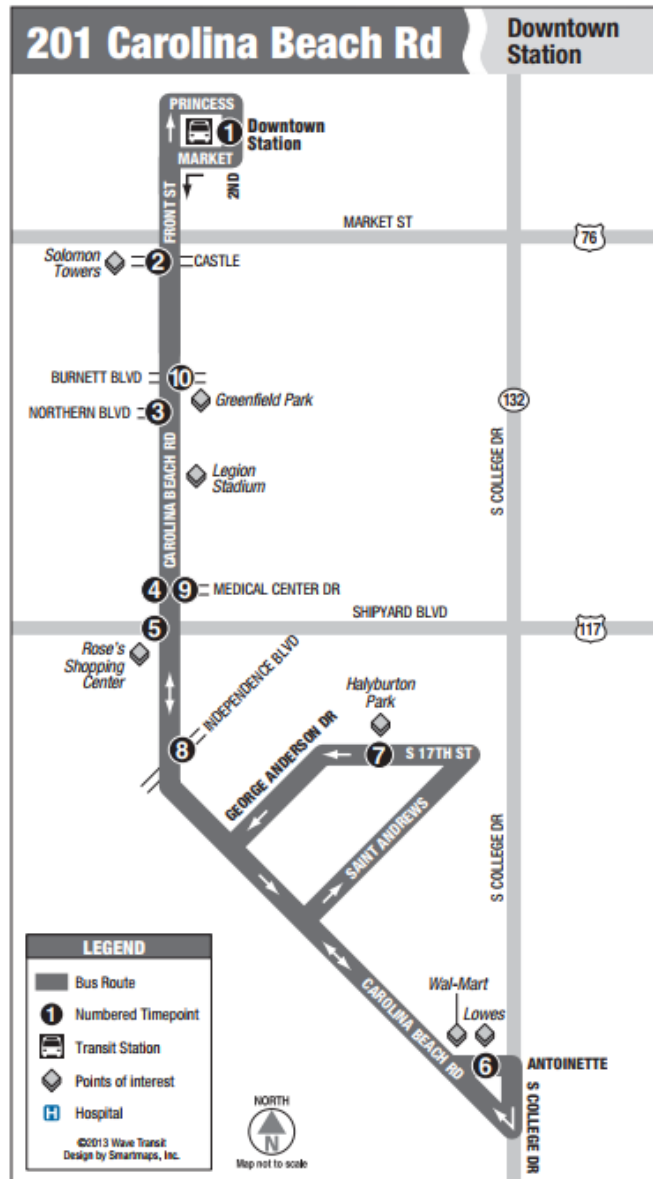




WAVE TRANSIT

# ROUTE 201

Carolina Beach Road



## Route Overview

### Major Corridors

Route 201 provides service between Downtown Wilmington Station and Monkey Junction. Along the way, the route provides service to the Legion Stadium, Greenfield Park, Halyburton Park, Rose's Shopping Center and Walmart.



### Major Activity Centers / Points of Interest

- Solomon Towers
- Greenfield Park
- Legion Stadium
- Rose's Shopping Center
- Halyburton Park
- Walmart

### Schedule Statistics

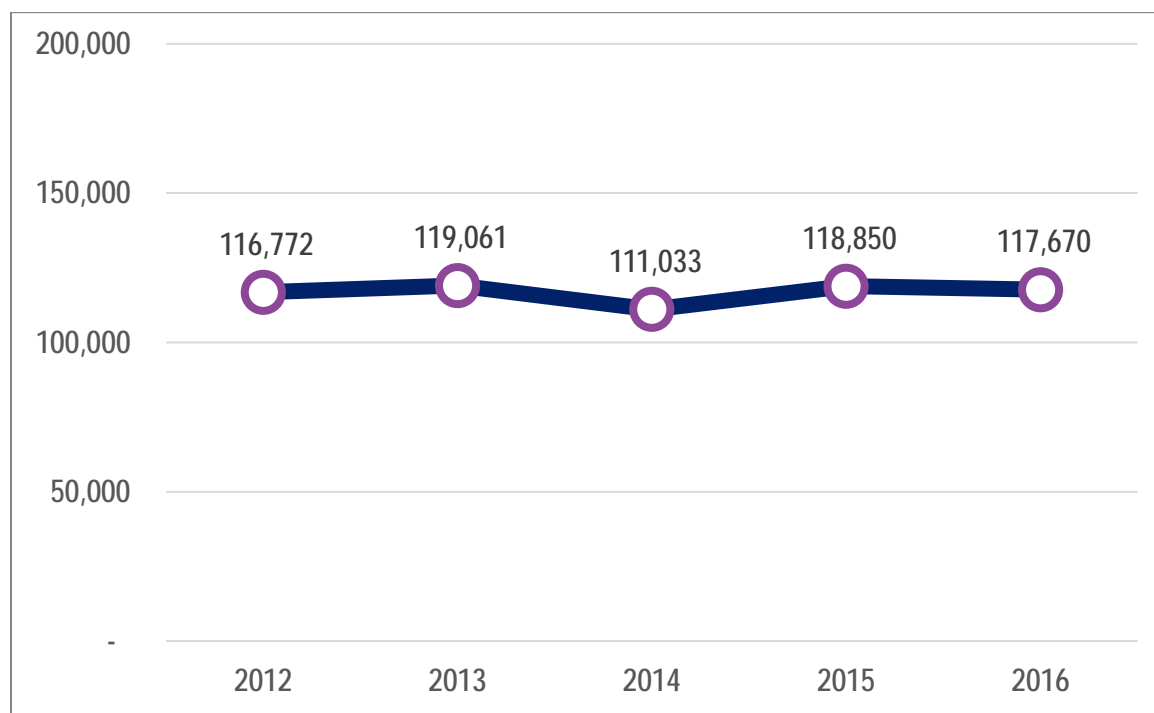
SERVICE DAY	SPAN OF SERVICE	FREQUENCY (MIN)	DAILY TRIPS (INBOUND/OUTBOUND)*
Monday-Friday	6:00 AM to 9:00 PM	60	15
Saturday	6:00 AM to 9:00 PM	60	15
Sunday	9:00 AM to 6:00 PM	60	12

\*All bus routes return to their starting point (bus stop #1) after leaving bus stop #10.

### Ridership Overview

Route 201 averaged 116,677 annual passengers across the five year period from FY2012 to FY2016. Ridership during this period peaked in 2013, with 119,061 passengers; overall passenger trips have increased by 1% from 2012 to 2016.

**Figure 1 Route 201 Ridership FY 2012 - FY2016**

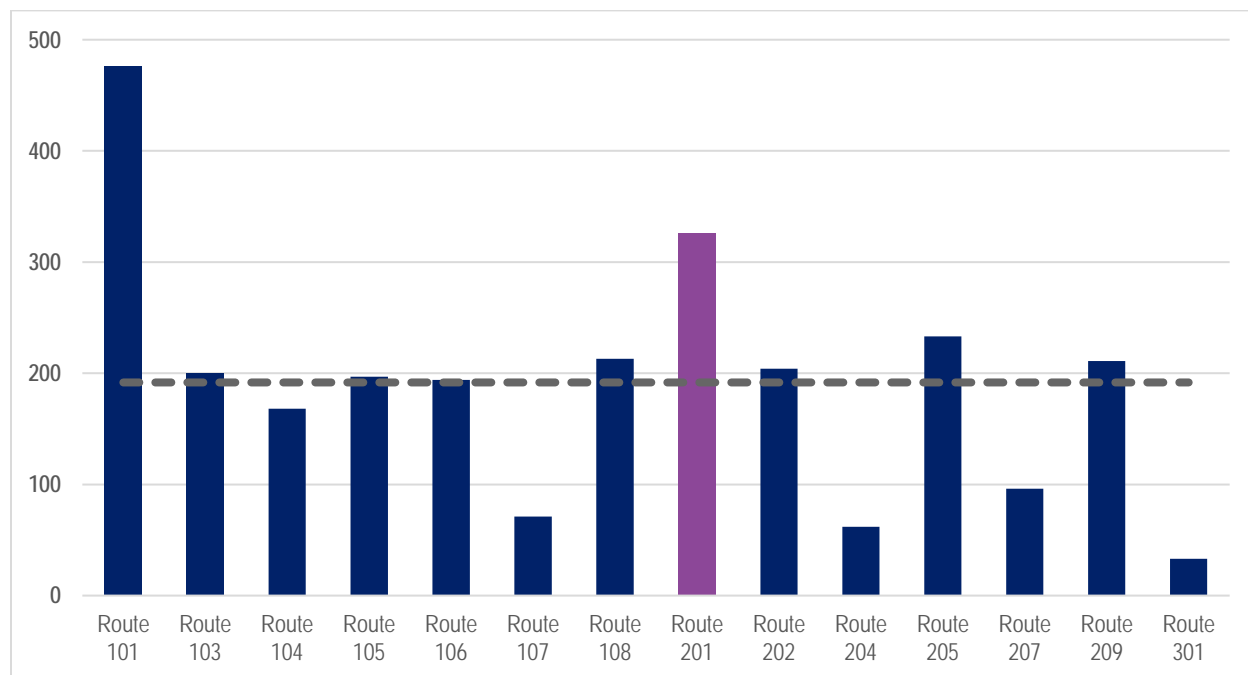




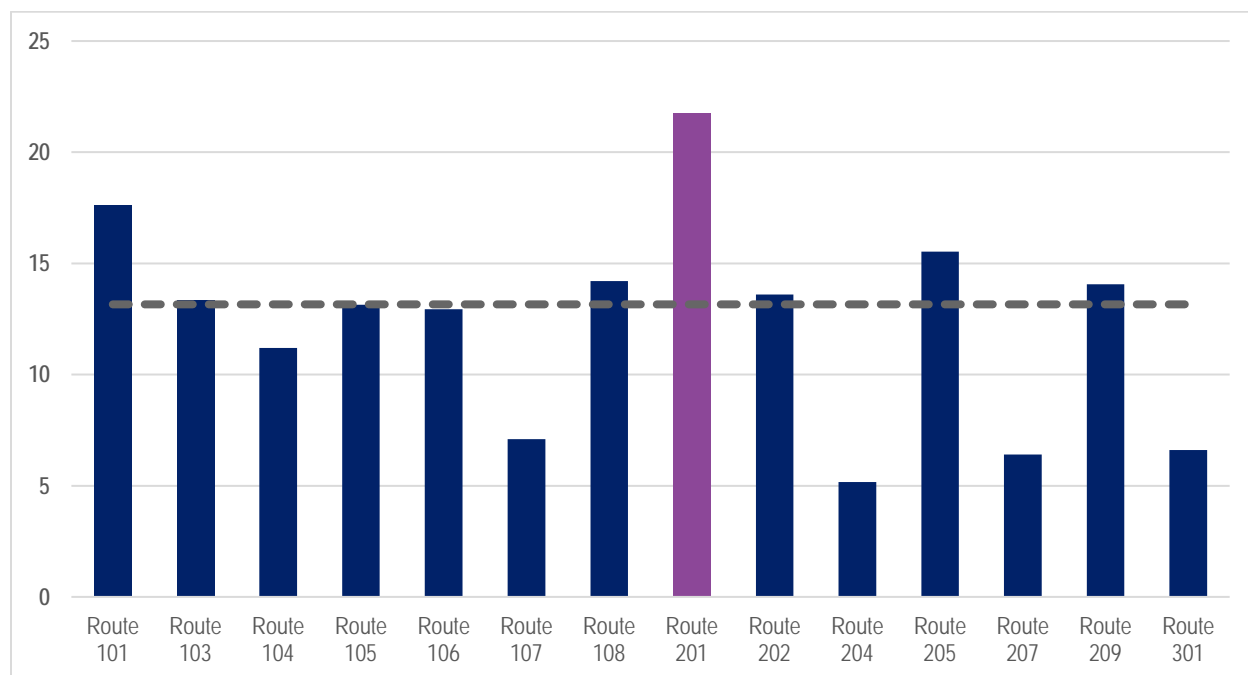
## Service Performance and Productivity

Route 201 averages 326 passengers per day, 70% greater than system average (192) (Figure 2). The route serves 21.7 passengers per vehicle hour, which ranks 1st among fixed-routes and is 76% greater than the system average (12.3 PPH) (Figure 3).

**Figure 2 | Average Daily Passengers per Route**



**Figure 3 | Average Passengers per Vehicle Hour**





## Service Improvement Opportunities

Opportunities to strengthen Route 201 are listed below. Some suggestions may be contradictory, as there is usually more than one approach to improving a route.

- **Cost-Neutral Service Improvements:**
  - Service on Route 201 Carolina Beach Road is recommended to be removed on George Anderson Drive, 17<sup>th</sup> Street, and St. Andrews Drive. Service on 17<sup>th</sup> Street and St. Andrews Drive will be replaced by a new proposed Route 210 - 17<sup>th</sup> Street. Service on George Anderson drive will be discontinued.
  - Service on Route 201 is recommended to serve the new Downtown Transit Center. Outbound, Route 201 will travel south on 3<sup>rd</sup> Street, turn right on Market Street, turn left on Front Street, and continue onto Carolina Beach Road. Inbound, Route 201 will travel north on Carolina Beach Road, turn right on Burnett Boulevard, and transition onto 3<sup>rd</sup> Street as it returns to the Downtown Transit Center.
- **Future Service Improvements:** An increase to 30-minute frequency during rush hours should be considered if resources become available.



WAVE TRANSIT

# ROUTE 202

Oleander West



## Route Overview

### Major Corridors

Route 202 provides service between Downtown Wilmington and Oleander Drive. Along the way, the route provides service to American Red Cross, Empie Park, Hanover Shopping Center, Independence Mall and several schools like Roland-Grise Middle School and Hoggard High School.

### Major Activity Centers / Points of Interest

- Roland-Grise Middle School
- Hoggard High School



- Jervay Housing Complex
- Hanover Shopping Center
- Independence Mall
- Brightmore Retirement Community

#### Schedule Statistics

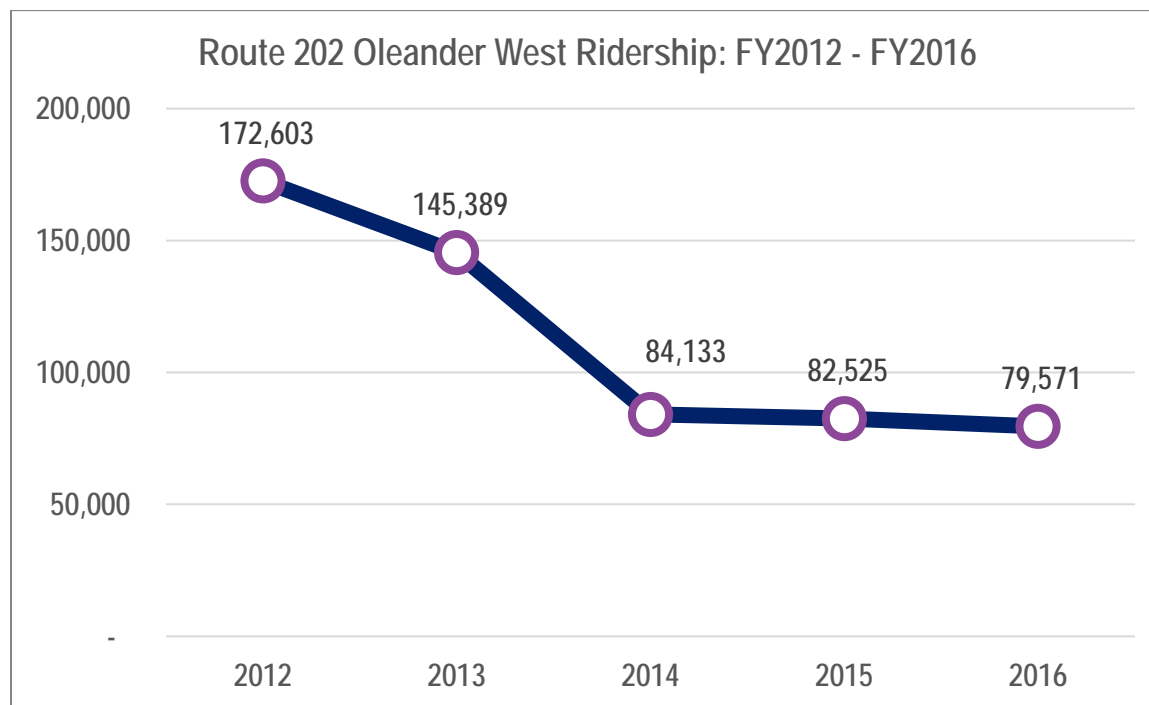
SERVICE DAY	SPAN OF SERVICE	FREQUENCY (MIN)	DAILY TRIPS (INBOUND/OUTBOUND)*
Monday-Friday	6:00 AM to 9:00 PM	60	15
Saturday	6:00 AM to 9:00 PM	60	15
Sunday	9:00 AM to 6:00 PM	60	12

\*All bus routes return to their starting point (bus stop #1) after leaving bus stop #10.

#### Ridership Overview

Route 202 averaged 112,844 annual passengers across the five year period from FY2012 to FY2016. Ridership during this period peaked in 2012, with 172,603 passengers; overall passenger trips have decreased by 54% from 2012 to 2016.

**Figure 1 Route 202 Ridership: FY2012 - FY2016**







## Service Performance and Productivity

Route 202 averages 204 passengers per day, 6% greater than system average (192) (Figure 2). The route serves 13.6 passengers per vehicle hour, which ranks 6th among fixed-routes and is 10% greater than the system average (12.3 PPH) (Figure 3).

**Figure 2 | Average Daily Passengers per Route**

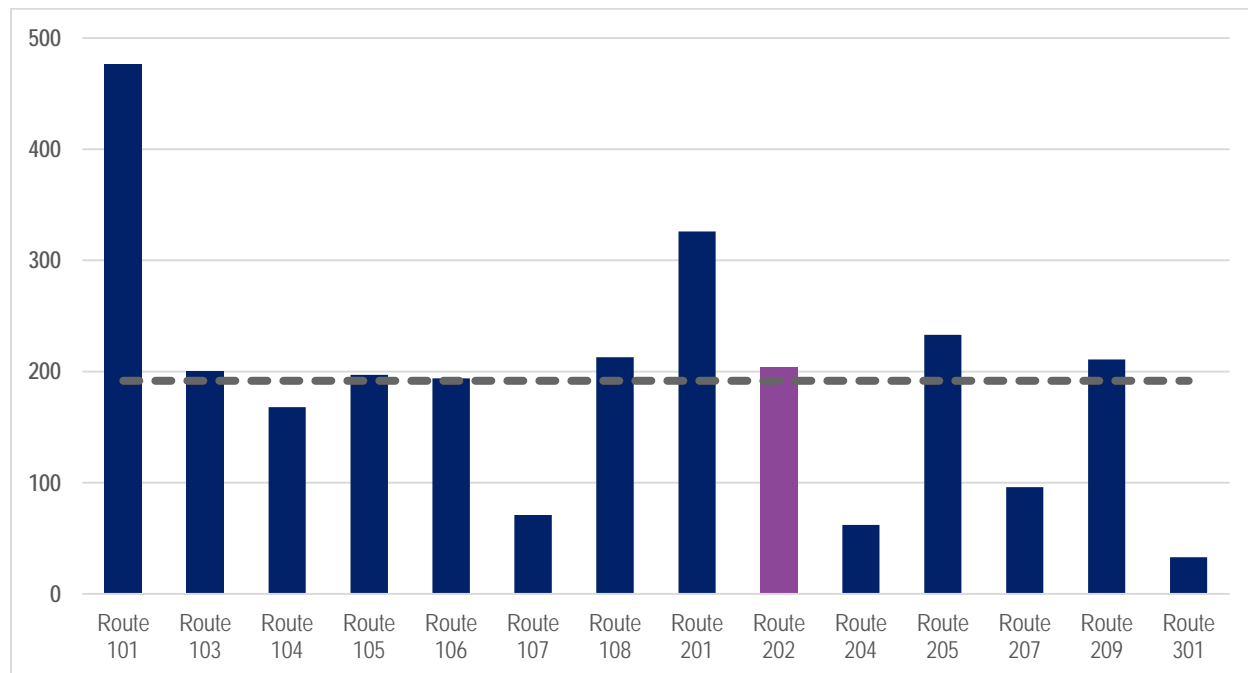
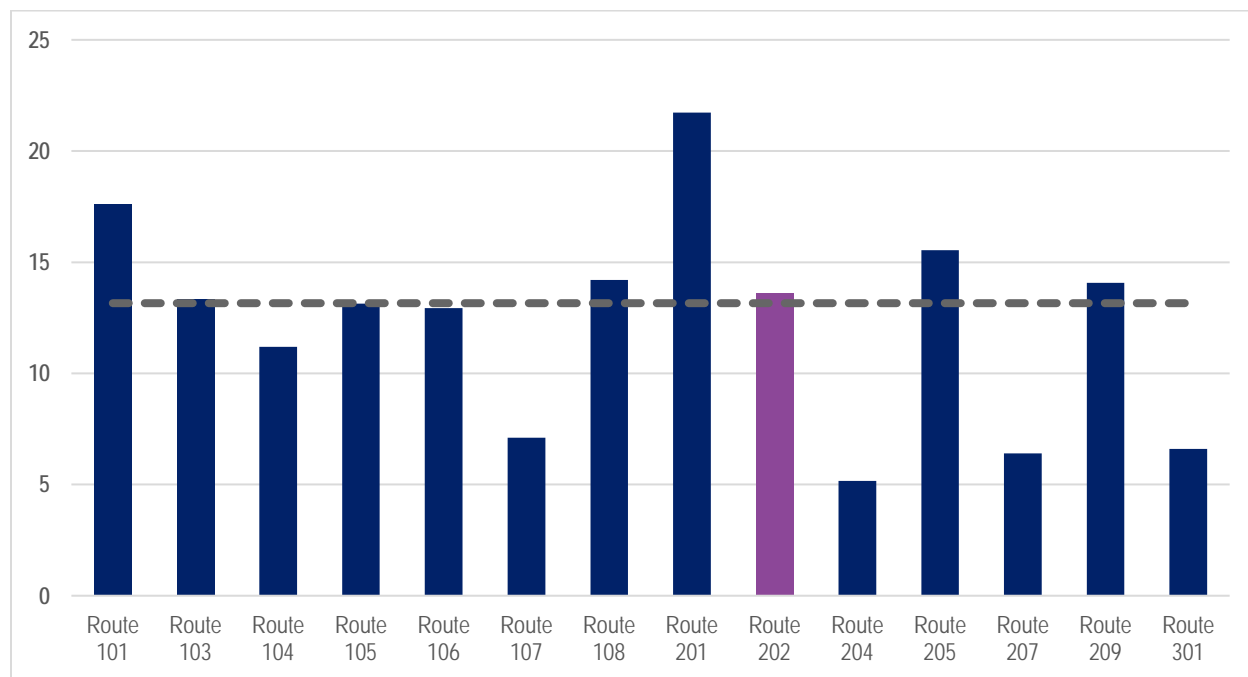




Figure 3 | Average Passengers per Vehicle Hour



## Service Improvement Opportunities

Opportunities to strengthen Route 202 are listed below. Some suggestions may be contradictory, as there is usually more than one approach to improving a route.

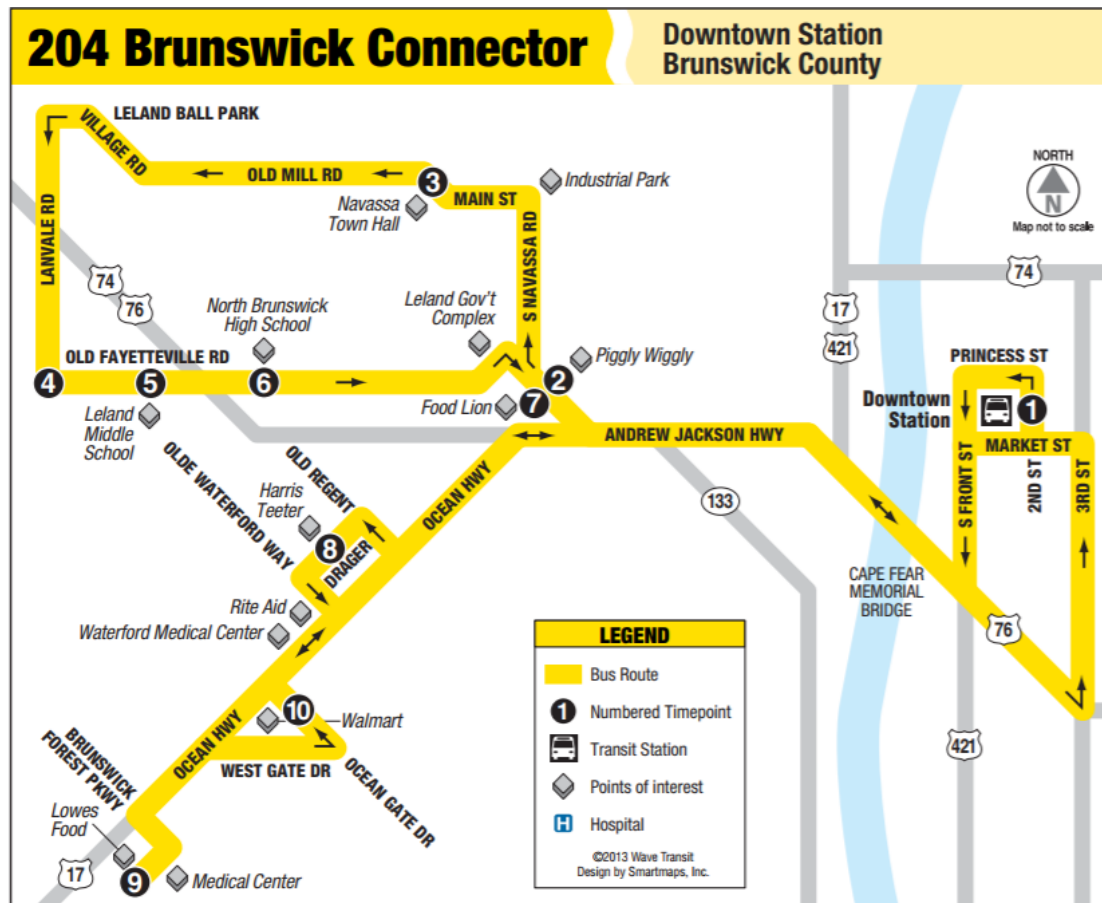
- **Cost-Neutral Service Improvements:** Route 202 is recommended to serve the new Downtown Transit Center. Outbound from the Downtown Transit Center, Route 202 will travel south on 3<sup>rd</sup> Street, turn left on Princess Street, right on 5<sup>th</sup> Avenue, and left on Dawson Street. Inbound, from Dawson Street Route 202 will turn right on 5<sup>th</sup> Avenue, left on Princess Street, and right on 3<sup>rd</sup> Street, terminating service at the Downtown Transit Center.
- **Future Service Improvements:** No future service improvements are recommended for Route 202 at this time.



WAVE TRANSIT

# ROUTE 204

Brunswick Connector



## Route Overview

### Major Corridors

Route 204 provides service between Downtown Wilmington Station and Brunswick County. Along the way, the route provides service to the Navassa Town Hall, Leland Government Complex, Industrial Park, and several schools like Leland Middle School and North Brunswick High School. The route also serves retailers including Rite Aid and Walmart.

### Major Activity Centers / Points of Interest

- Navassa Town Hall
- Leland Government Complex
- Waterford Medical Center
- Leland Middle School
- Walmart (West Gate Dr.)



### Schedule Statistics

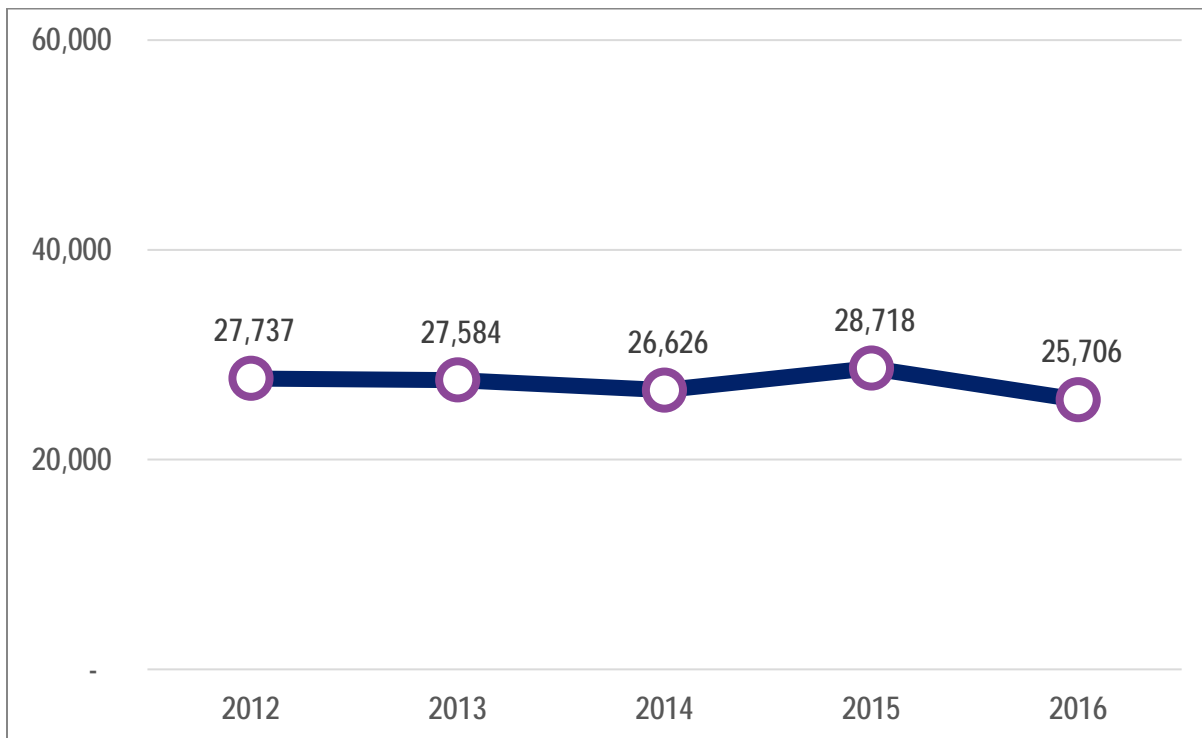
SERVICE DAY	SPAN OF SERVICE	FREQUENCY (MIN)	DAILY TRIPS (INBOUND/OUTBOUND)*
Monday-Friday	6:00 AM to 6:00 PM	60	12
Saturday	No Service	—/—	—/—
Sunday	No Service	—/—	—/—

\*All bus routes return to their starting point (bus stop #1) after leaving bus stop #10

### Ridership Overview

Route 204 averaged 27,274 annual passengers across the five year period from FY2012 to FY2016. Ridership during this period peaked in 2015, with 28,718 passengers; overall passenger trips have decreased by 7% from 2012 to 2016.

**Figure 1 Route 204 Ridership FY2012 - FY2016**





## Service Performance and Productivity

Route 204 averages 62 passengers per day, 167% less than system average (192) (Figure 2). The route serves 5.2 passengers per vehicle hour, which ranks 14th among fixed-routes and is significantly lower than the system average (12.3 PPH) (Figure 3).

Figure 2 | Average Daily Passengers per Route

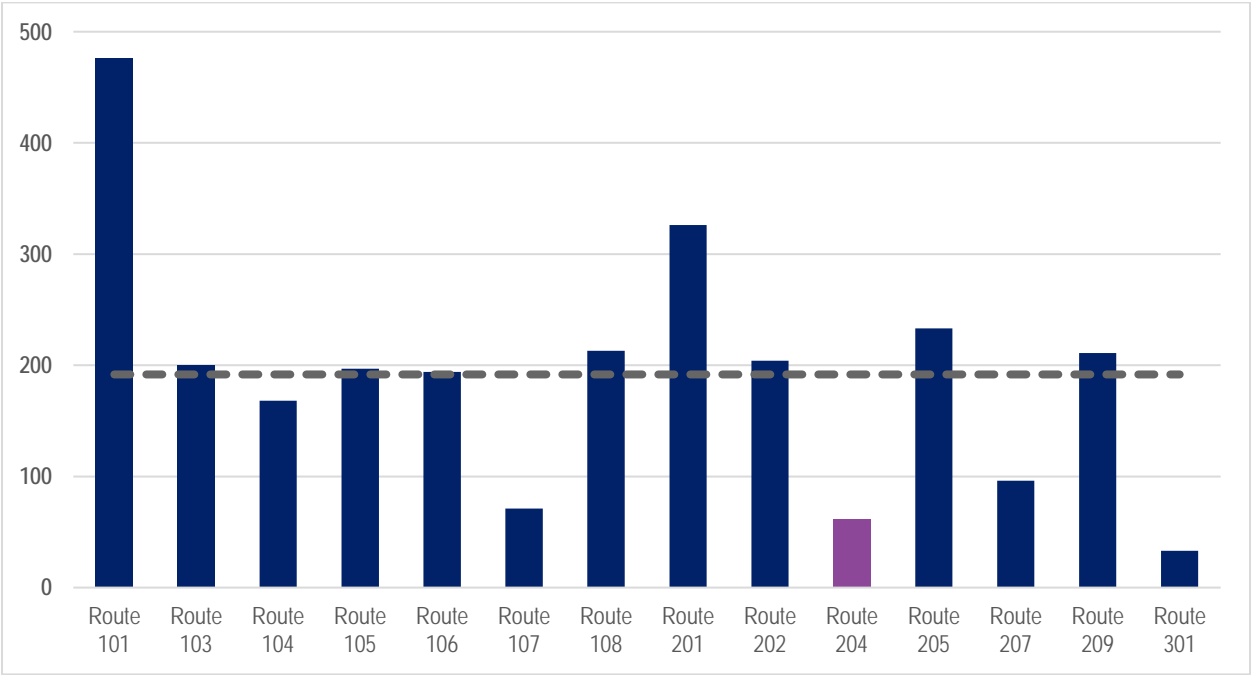
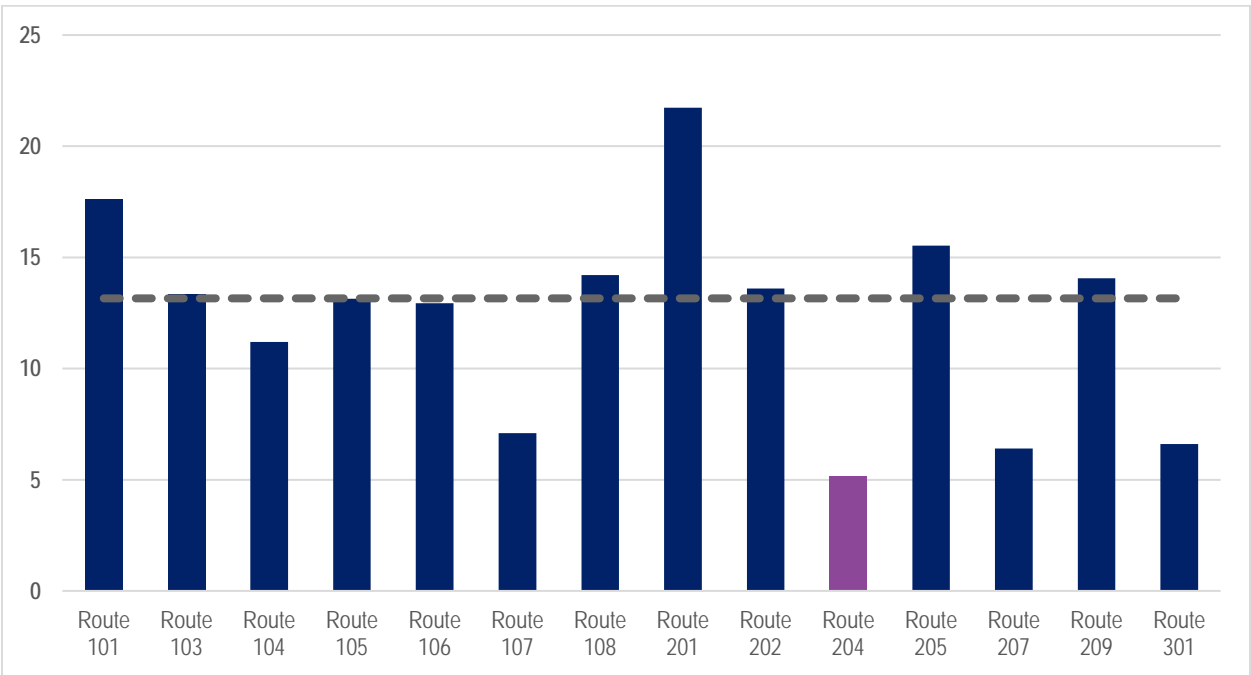


Figure 3 | Average Passengers per Vehicle Hour





## Service Improvement Opportunities

Opportunities to strengthen Route 204 are listed below. Some suggestions may be contradictory, as there is usually more than one approach to improving a route.

- **Cost-Neutral Service Improvements:** Route 204 Brunswick Connector is recommended to serve the new Downtown Transit Center. In both the outbound and inbound directions, Route 204 will travel on 3<sup>rd</sup> Street and Andrew Jackson Highway.
- **Future Service Improvements:** Extending service until 9PM weekdays will allow greater flexibility for commuters. Adding Saturday service should also be considered if resources become available.

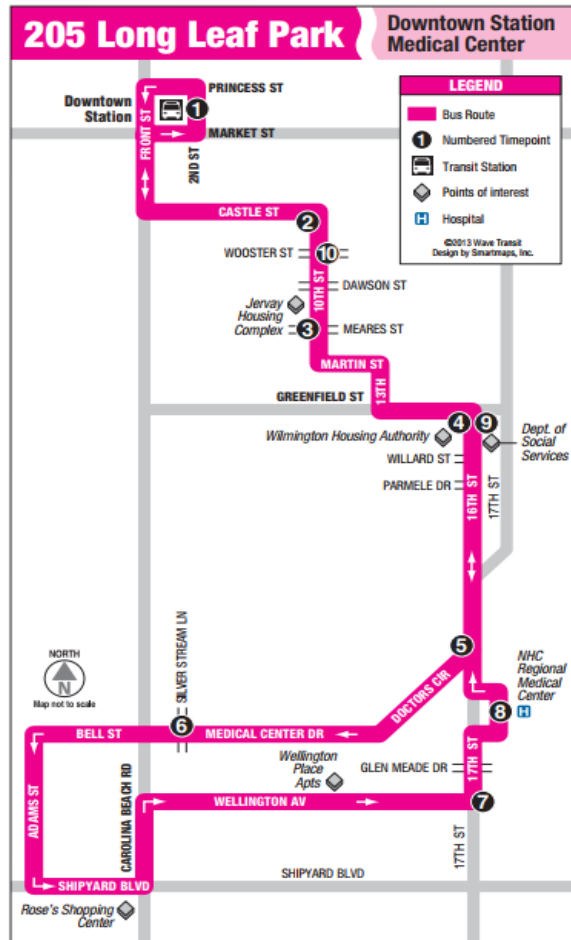




WAVE TRANSIT

# ROUTE 205

Long Leaf Park



## Route Overview

### Major Corridors

Route 205 provides service between Downtown Wilmington Station and Long Leaf Park. Along the way, the route provides service to the Wilmington Housing Authority, NHC Regional Medical Center, Department of Social Service, and residential complexes like Wellington Place Apartments and Jervay Housing Complex.

### Major Activity Centers / Points of Interest

- Wilmington Housing Authority
- Department of Social Service
- NHC Regional Medical Center
- Jervay Housing Complex
- Rose's Shopping Center



## Schedule Statistics

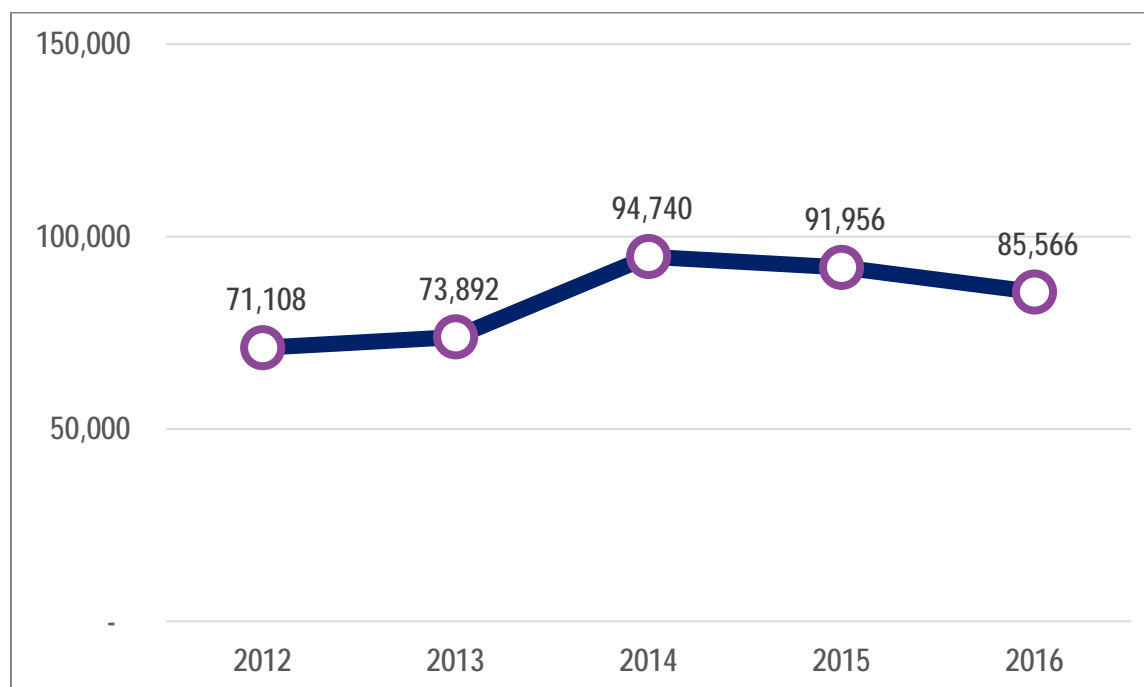
SERVICE DAY	SPAN OF SERVICE	FREQUENCY (MIN)	DAILY TRIPS (INBOUND/OUTBOUND)*
Monday-Friday	6:00 AM to 9:00 PM	60	15
Saturday	6:00 AM to 9:00 PM	60	15
Sunday	9:00 AM to 6:00 PM	60	12

\*All bus routes return to their starting point (bus stop #1) after leaving bus stop #10

## Ridership Overview

Route 205 averaged 83,452 annual passengers across the five year period from FY2012 to FY2016. Ridership during this period peaked in 2013, with 94,740 passengers; overall passenger trips have increased by 20% from 2012 to 2016.

**Figure 1 Route 205 Ridership FY2012 - FY 2016**





## Service Performance and Productivity

Route 205 averages 233 passengers per day, 21% greater than system average (192) (Figure 2). The route serves 15.5 passengers per vehicle hour, which ranks 3rd among fixed-routes and is 26% greater than the system average (12.3 PPH) (Figure 3).

Figure 2 | Average Daily Passengers per Route

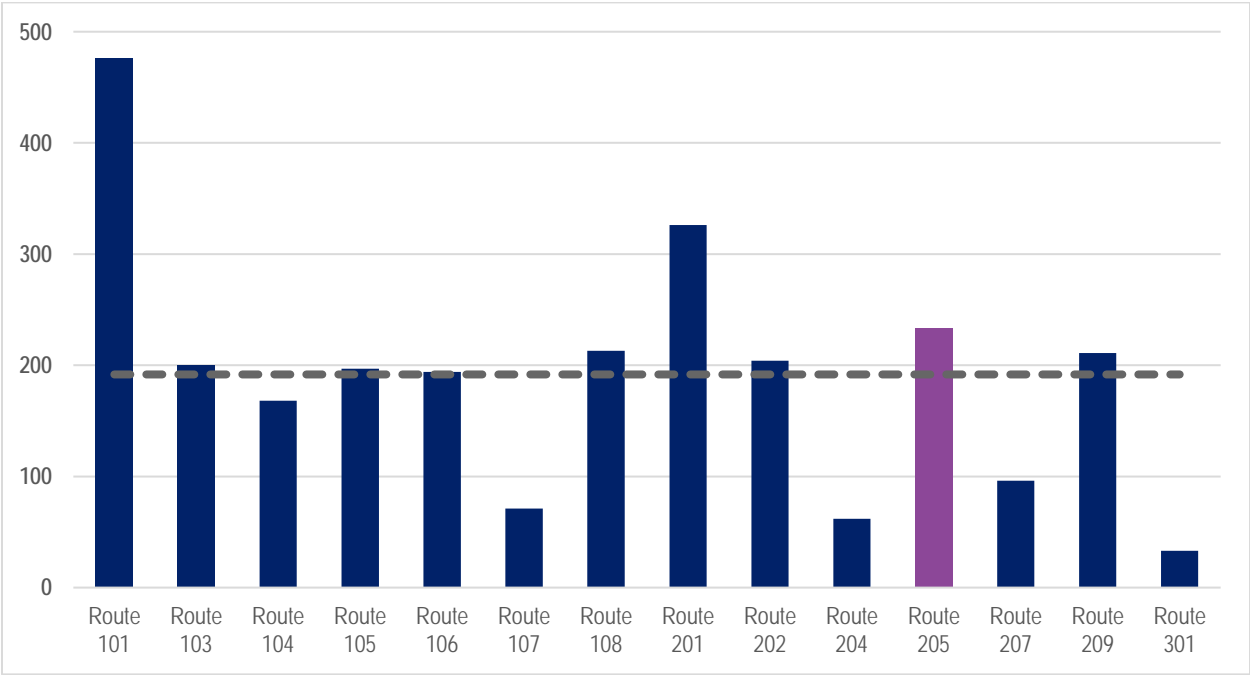
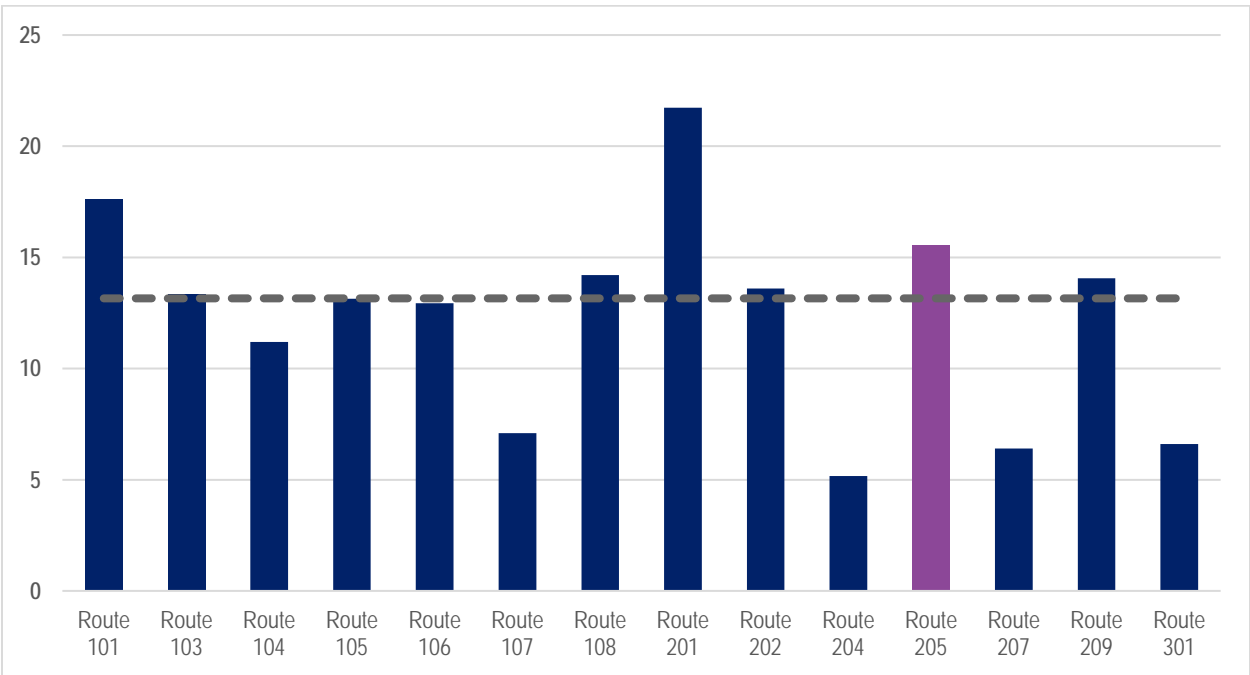


Figure 3 | Average Passengers per Vehicle Hour





## Service Improvement Opportunities

Opportunities to strengthen Route 205 are listed below. Some suggestions may be contradictory, as there is usually more than one approach to improving a route.

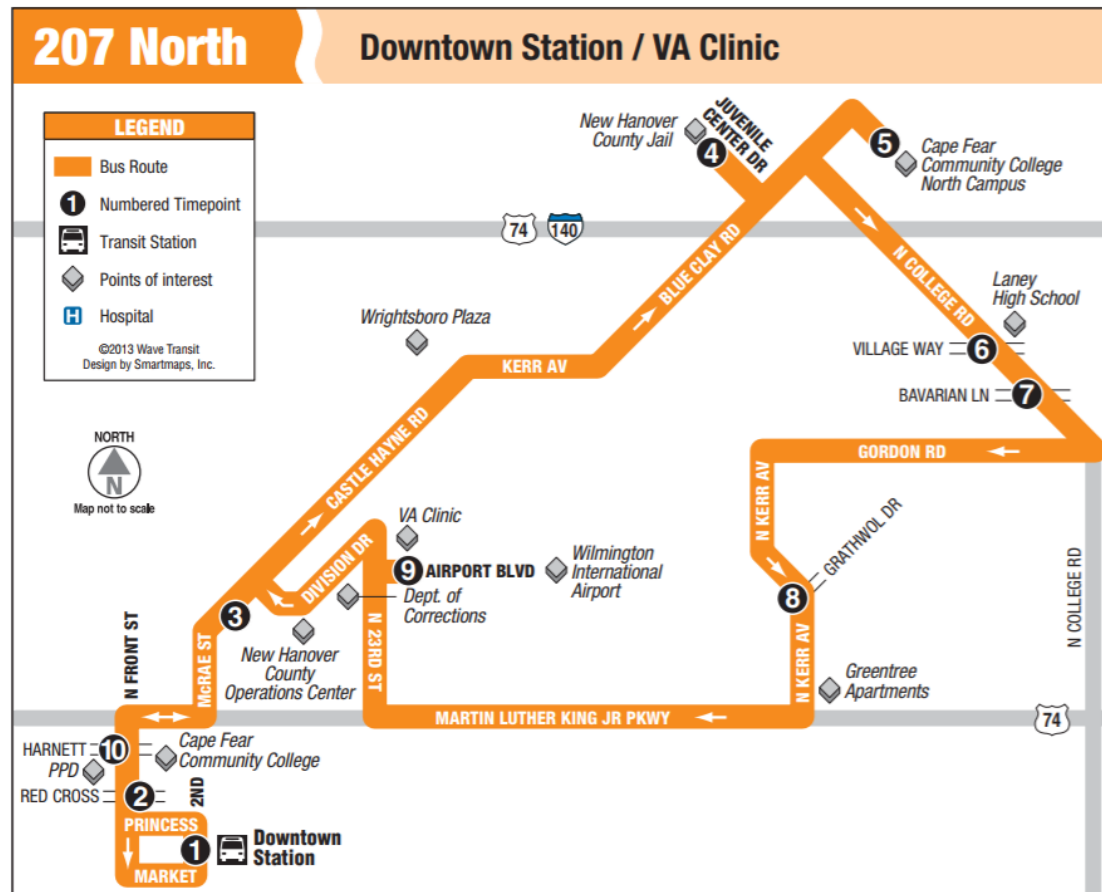
- **Cost-Neutral Service Improvements:**
  - Route 205 is recommended to be consolidated with Route 209 Independence.
  - Route 205 is recommended to serve the new Downtown Transit Center. Outbound from the Downtown Transit Center, Route 205 will travel south on 3<sup>rd</sup> Street, turn left on Castle Street, turn right on 10<sup>th</sup> Street, left on Martin Street, right on 13<sup>th</sup> Street, left on Greenfield Street, and then follow the current alignment on 16<sup>th</sup> Street, Medical Center Drive, Shipyard Boulevard, and Wellington Avenue. Inbound, from 17<sup>th</sup> Street the route will turn left on Greenfield Street, and right on 3<sup>rd</sup> Street, terminating service at the Downtown Transit Center.
- **Future Service Improvements:** Weekday peak period (6AM-6PM) frequency of every 30 minutes should be considered, especially if ridership increases after consolidation with Route 209.



WAVE TRANSIT

# ROUTE 207

North



## Route Overview

### Major Corridors

Route 207 provides service between Downtown Wilmington Station and Cape Fear Community College's North Campus. Along the way, the route provides service to Wrightsboro Plaza, the New Hanover County Regional Jail, Wilmington International Airport, Laney High School, the New Hanover County Operations Center, and PPD.

### Major Activity Centers / Points of Interest

- VA Clinic
- New Hanover County Jail
- Laney High School
- Wilmington International Airport
- Cape Fear Community College (North Campus)



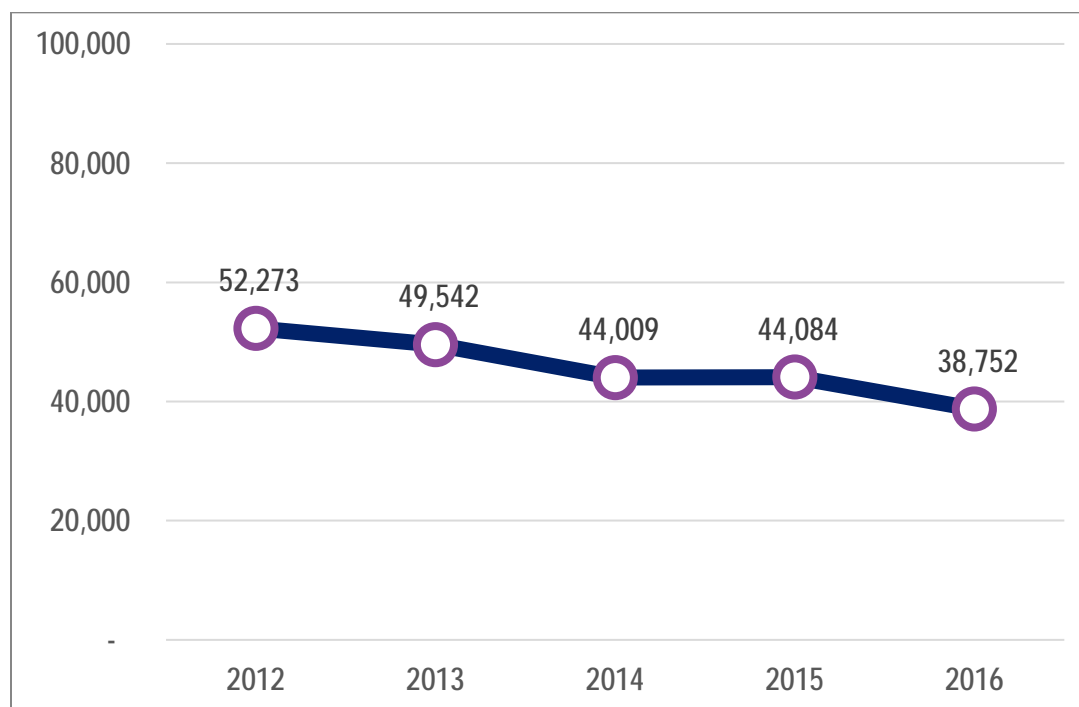
### Schedule Statistics

SERVICE DAY	SPAN OF SERVICE	FREQUENCY (MIN)	DAILY TRIPS (INBOUND/OUTBOUND)
Monday-Friday	6:00 AM to 9:00 PM	60	15
Saturday	No Service	—/—	—/—
Sunday	No Service	—/—	—/—

### Ridership Overview

Route 207 averaged 45,472 annual passengers across the five year period from FY2012 to FY2016. Ridership during this period peaked in 2012, with 52,273 passengers; overall passenger trips have decreased by 26% from 2012 to 2016.

**Figure 1 Route 207 Ridership FY2012 - FY2016**







## Service Performance and Productivity

Route 207 averages 96 passengers per day, 50% less than system average (192) (Figure 2). The route serves 6.4 passengers per vehicle hour, which ranks 13th among fixed-routes and is 48% less than the system average (12.3 PPH) (Figure 3).

Figure 2 | Average Daily Passengers per Route

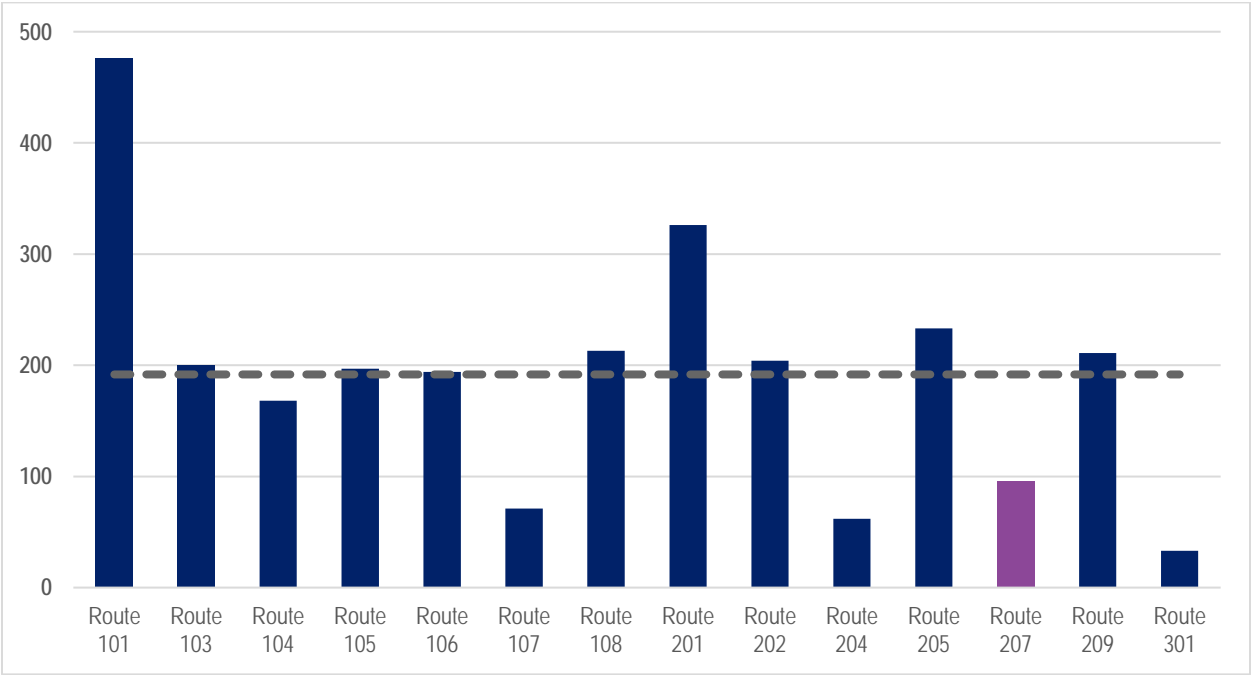
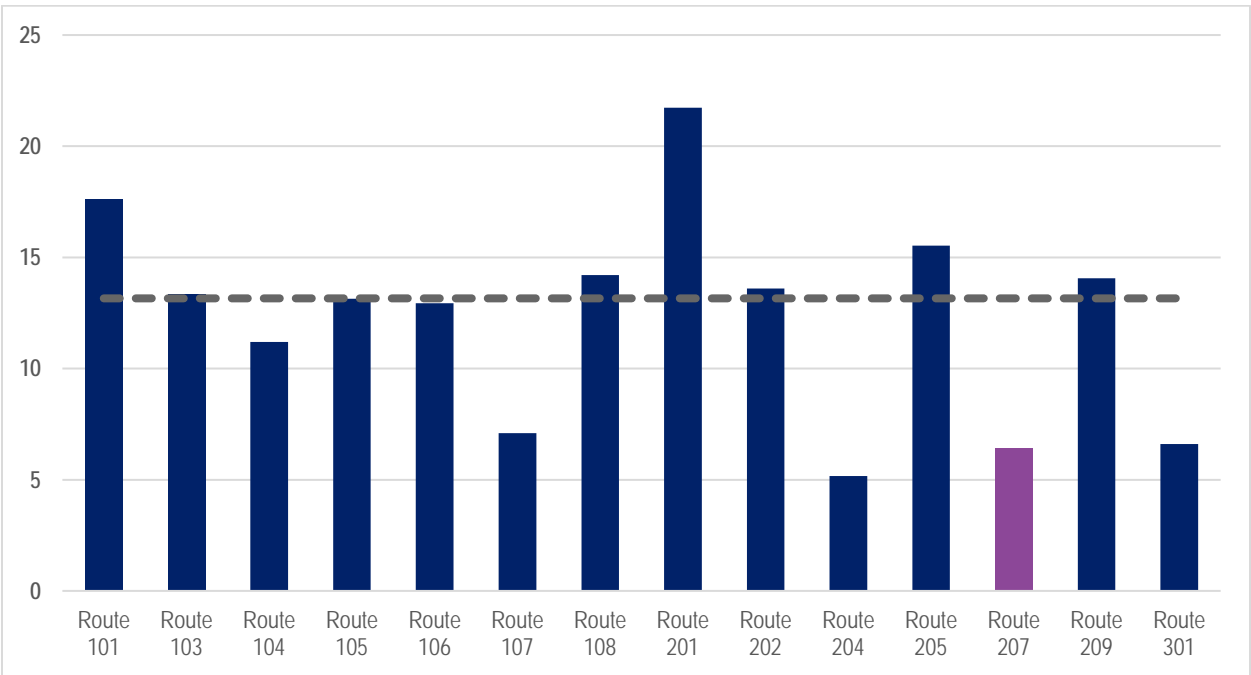


Figure 3 | Average Passengers per Vehicle Hour





## Service Improvement Opportunities

Opportunities to strengthen Route 207 North are listed below. Some suggestions may be contradictory, as there is usually more than one approach to improving a route.

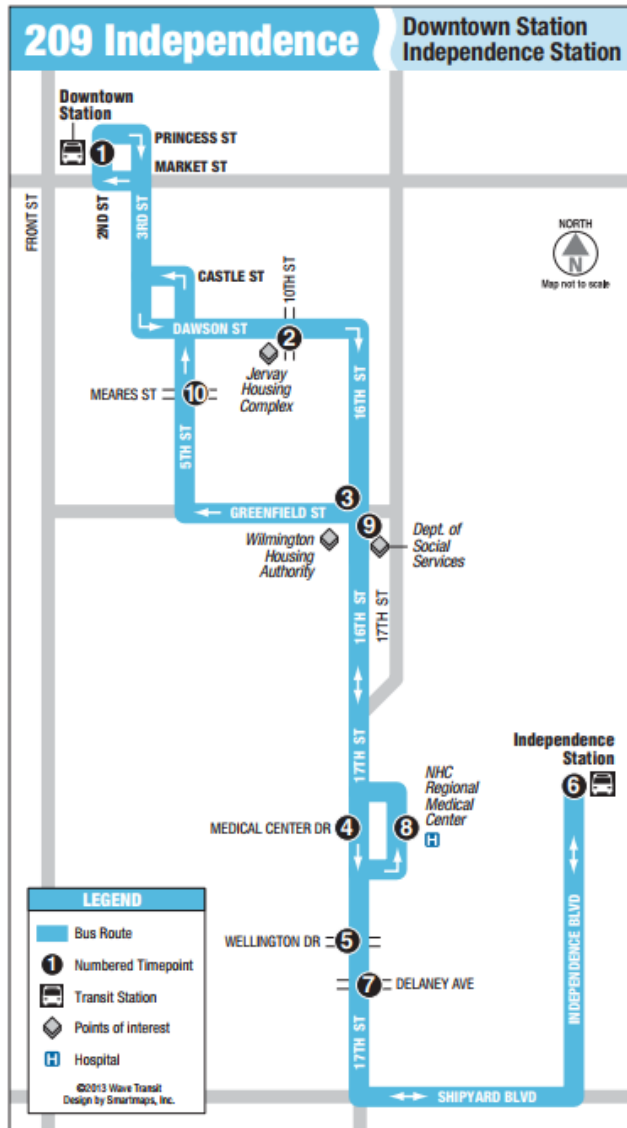
- **Cost-Neutral Service Improvements:**
  - Route 207 North is recommended to serve Wilmington International Airport (ILM) and the New Hanover County Jail on every trip. Traveling north on Castle Hayne Road, Route 207 will turn right on Gordon Road, right on 23<sup>rd</sup> Street, and left on Airport Boulevard, serving ILM. Departing the airport, Route 207 will turn right on 23<sup>rd</sup> Street, and turn right to return to Castle Hayne Road.
  - Route 207 is recommended to provide a safer transfer opportunity with Route 104 Northeast at the intersection of Farley Drive and Kerr Avenue. Traveling south on College Road, Route 207 will turn right on Bavarian Lane, left on Farley Drive, and right on Kerr Avenue at the intersection of Farley Drive, Kerr Avenue, and Gordon Road.
  - Route 207 is recommended to serve the new Downtown Transit Center. Traveling outbound and inbound, Route 207 will travel on Red Cross Street and Front Street in downtown Wilmington.
- **Future Service Improvements:** Route 207 North is recommended to operate service between the Downtown Transit Center and Cape Fear Community College's North campus, to allow for bidirectional service, replacing the existing large one-way loop segment. Service to Forden Station will be provided by the newly created Route 109, which will operate service from Forden Station on Ringo Street, New Centre Drive, Kerr Avenue, Farley Drive, Bavarian Lane, College Road, Blue Clay Road, and Sea Devil Boulevard, terminating at CFCC North Campus.



WAVE TRANSIT

# ROUTE 209

Independence



## Route Overview

### Major Corridors

Route 209 provides service between Downtown Wilmington Station and Independence Station. Along the way, the route provides service to the Wilmington Housing Authority, Jervay Housing Complex, and NHC Regional Medical Center.



### Major Activity Centers / Points of Interest

- Jervay Housing Complex
- Wilmington Housing Authority
- Department of Social Services
- NHC Regional Medical Center

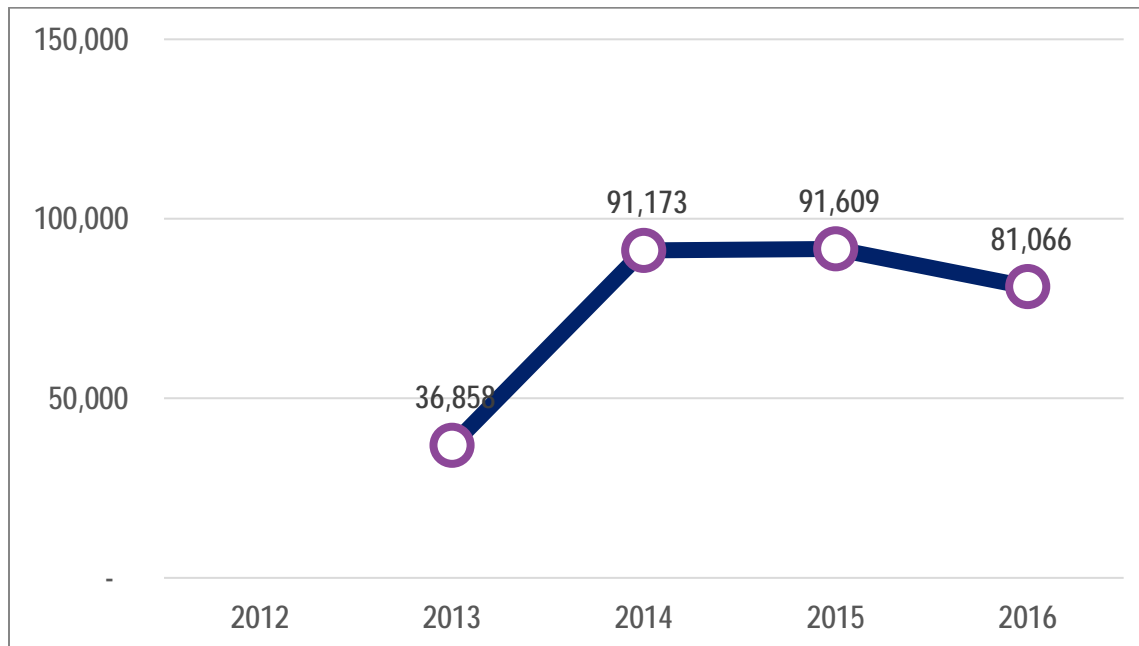
### Schedule Statistics

SERVICE DAY	SPAN OF SERVICE	FREQUENCY (MIN)	DAILY TRIPS (INBOUND/OUTBOUND)*
Monday-Friday	6:00 AM to 9:00 PM	60	15
Saturday	6:00 AM to 9:00 PM	60	15
Sunday	9:00 AM to 6:00 PM	60	12

### Ridership Overview

Route 209 averaged 75,177 annual passengers across the four year period from FY2013 to FY2016. Ridership during this period peaked in 2015, with 91,609 passengers; overall passenger trips have increased by 120% from 2013 to 2016.

**Figure 1 Route 209 Ridership FY2012 - FY2016**





## Service Performance and Productivity

Route 209 averages 211 passengers per day, 10% greater than system average (192) (Figure 2). The route serves 14.1 passengers per vehicle hour, which ranks 5th among fixed-routes and is 14% greater than the system average (12.3 PPH) (Figure 3).

Figure 2 | Average Daily Passengers per Route

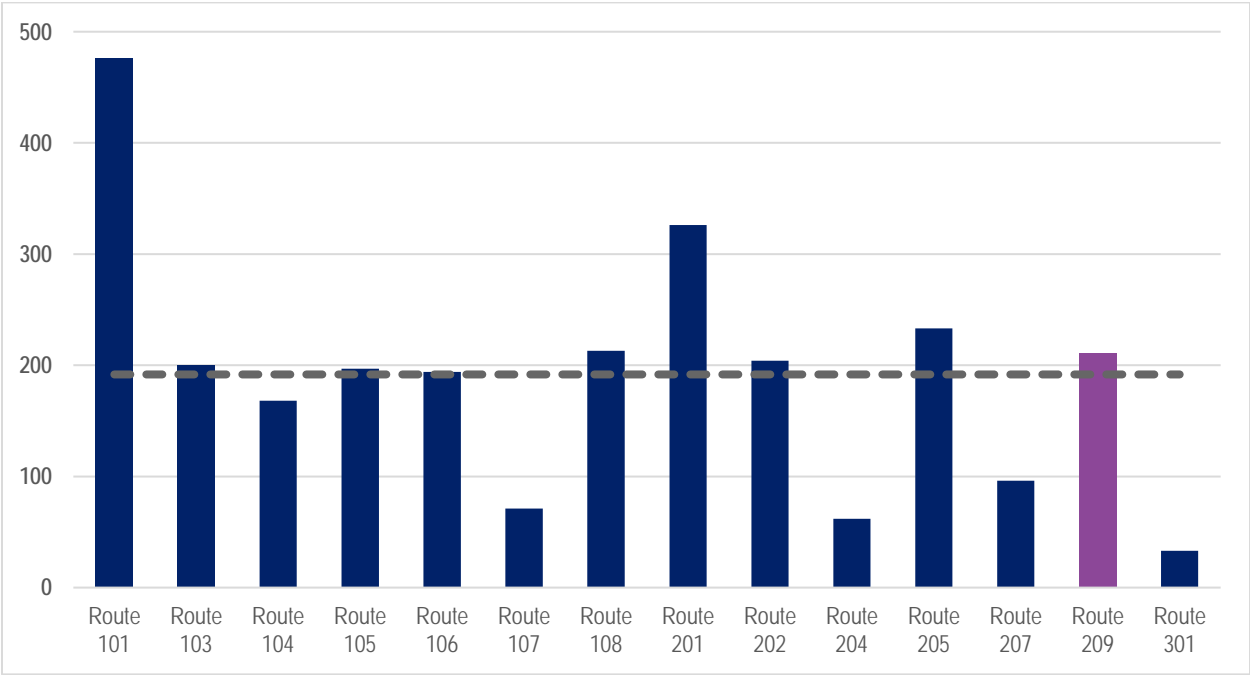
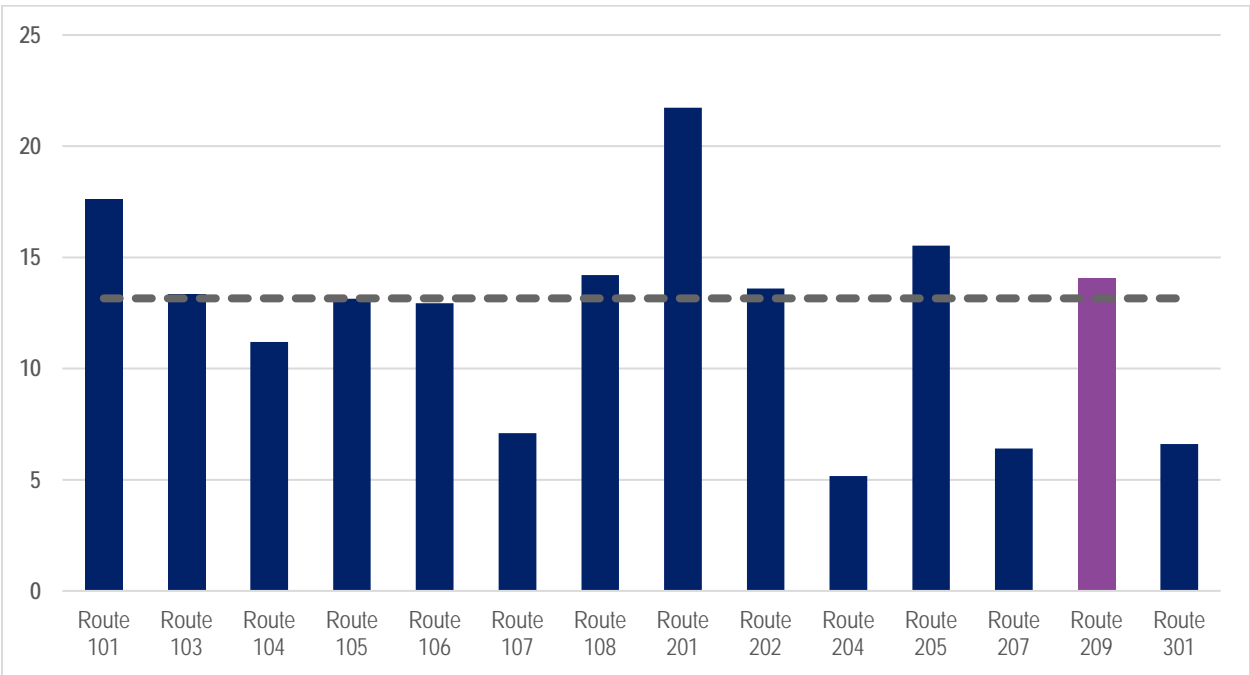


Figure 3 | Average Passengers per Vehicle Hour





## Service Improvement Opportunities

Opportunities to strengthen Route 209 are listed below. Some suggestions may be contradictory, as there is usually more than one approach to improving a route.

- **Cost-Neutral Service Improvements:** Service on Route 209 is recommended to be consolidated with Route 205, since much of Route 209's alignment overlaps with other routes. Service on 17<sup>th</sup> Street will be replaced and augmented by the new Route 210. However, service to Independence Mall from downtown Wilmington will now require a transfer.
- **Future Service Improvements:** There are no future service improvements are recommended for Route 209 at this time.

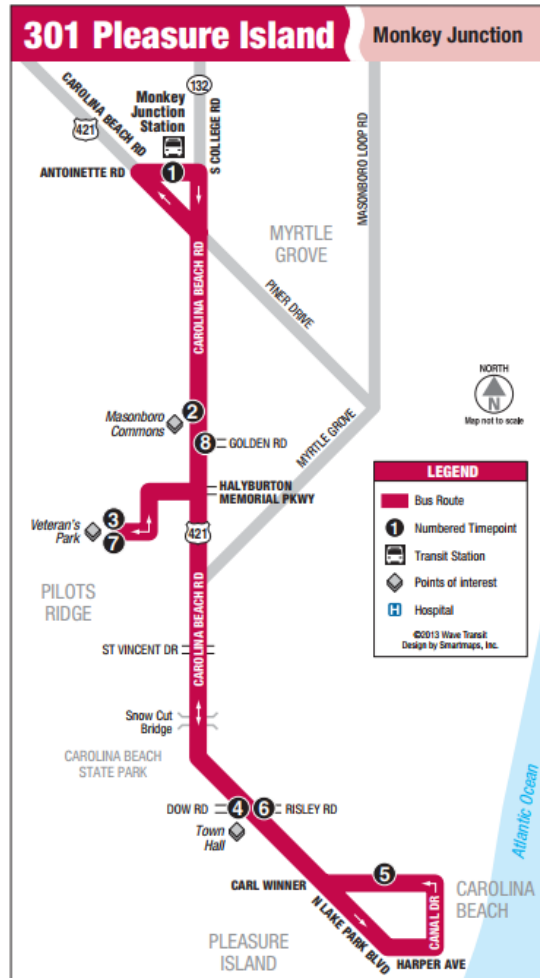




WAVE TRANSIT

# ROUTE 301

Pleasure Island



## Route Overview

### Major Corridors

Route 301 provides service between Monkey Junction Station and Carolina Beach. Along the way, the route provides service to the Masonboro Commons, Veteran's Park, Town Hall, and the Carolina Beach State Park.

### Major Activity Centers / Points of Interest

- Carolina Beach
- Pleasure Island
- Masonboro Commons
- Veteran's Park



## Schedule Statistics

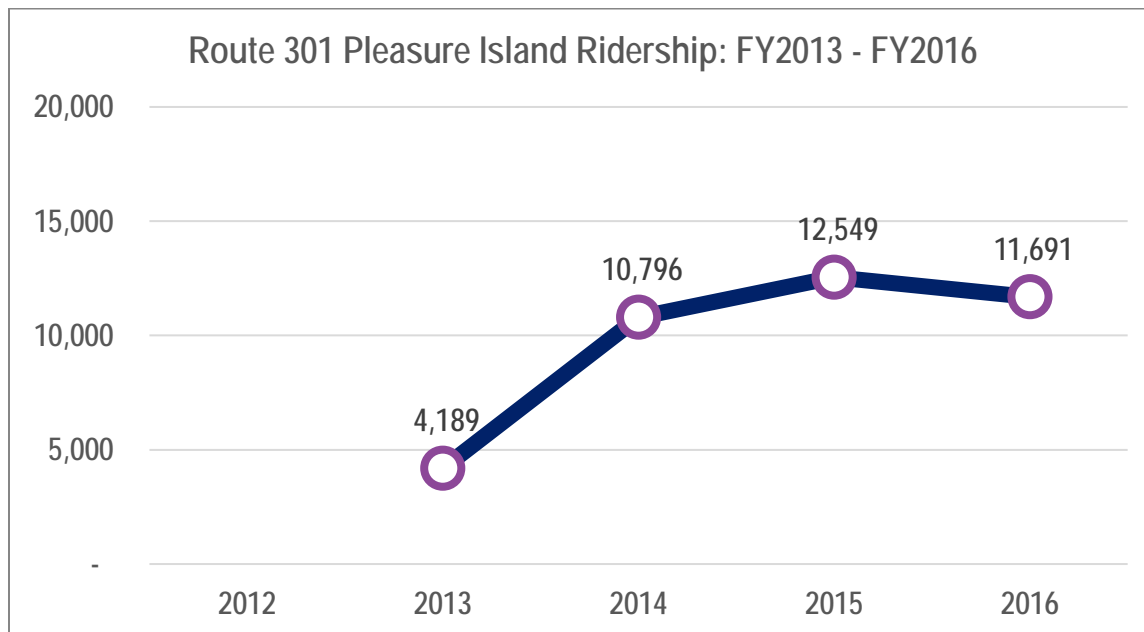
SERVICE DAY	SPAN OF SERVICE	FREQUENCY (MIN)	DAILY TRIPS (INBOUND/OUTBOUND)*
Monday-Friday	7:30 AM to 7:30 PM	180	5
Saturday	7:30 AM to 7:30 PM	180	5
Sunday	10:30 AM to 4:30 PM	180	3

\*All bus routes return to their starting point (bus stop #1) after leaving bus stop #8.

## Ridership Overview

Route 301 averaged 9,806 annual passengers across the four year period from FY2013 to FY2016. Ridership during this period peaked in 2015, with 12,549 passengers; overall passenger trips have decreased by 179% from 2013 to 2016.

**Figure 1 Route 301 Ridership FY2013 - FY2016**





## Service Performance and Productivity

Route 301 averages 33 passengers per day, significantly below the system average (192) (Figure 2). The route serves 6.6 passengers per vehicle hour, which ranks 12th among fixed-routes and is 46% less than the system average (12.3 PPH) (Figure 3).

Figure 2 | Average Daily Passengers per Route

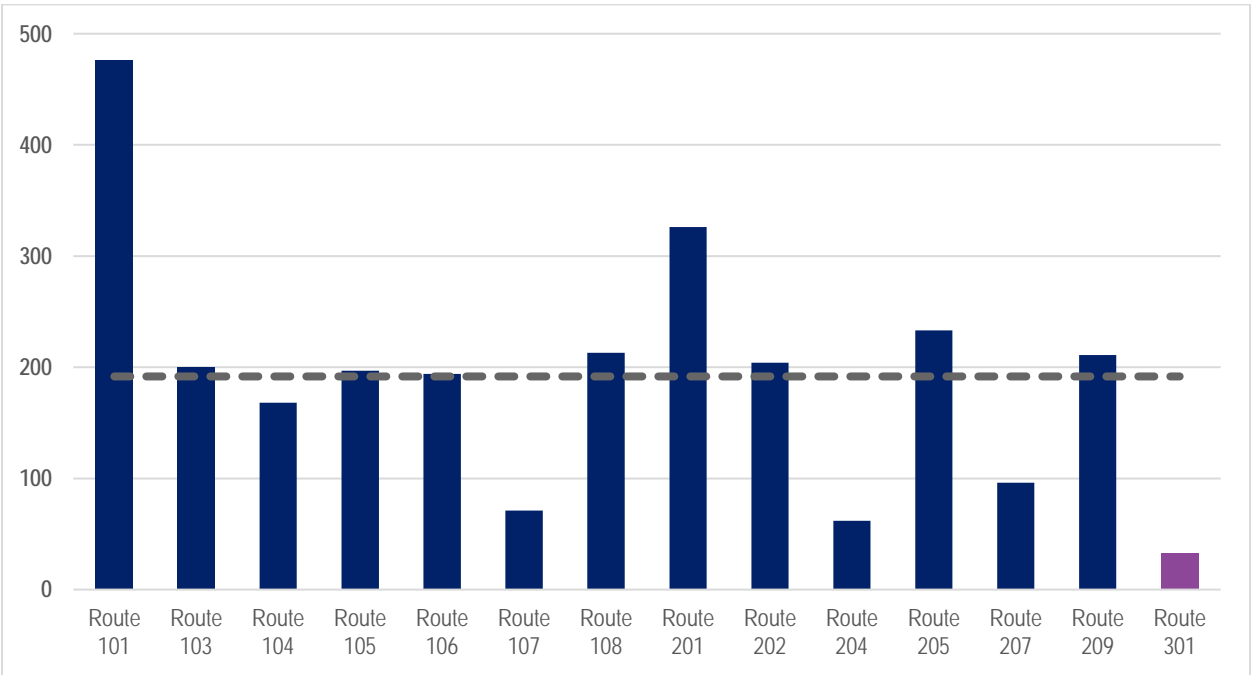
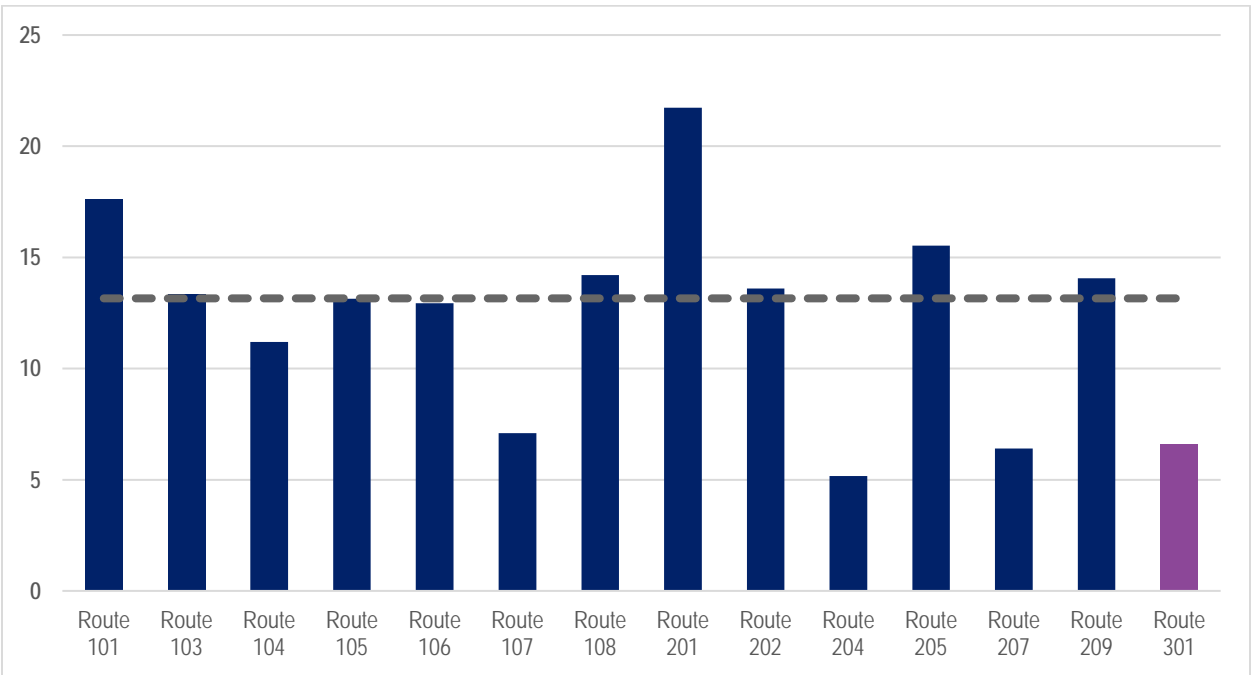


Figure 3 | Average Passengers per Vehicle Hour





## Service Improvement Opportunities

Opportunities to strengthen Route 301 are listed below. Some suggestions may be contradictory, as there is usually more than one approach to improving a route.

- **Cost-Neutral Service Improvements:** No cost-neutral service improvements are recommended for Route 301 Pleasure Island at this time.
- **Future Service Improvements:** Improving weekday and Saturday frequency to hourly (from every three hours) is recommended for Route 301 Pleasure Island. This recommendation will likely be implemented with the restoration of hourly service on Route 107 College Road.

# Appendix C

## Public Engagement Memo

See attached documents



# Wave Transit Short Range Transit Plan

## Summary of Public Engagement

April 2018



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## Table of Contents

	Page
<b>1 Introduction .....</b>	<b>5</b>
<b>2 Public Engagement .....</b>	<b>6</b>
September Public Meeting.....	6
February Public Meeting.....	8
Public Outreach.....	9
Online Engagement.....	9
<b>3 Stakeholder and Wave Transit Engagement .....</b>	<b>12</b>
Steering Committee Findings.....	13
Wave Transit Staff Focus Groups.....	15
Free Downtown Trolley Focus Group.....	18
Stakeholder Interviews.....	18
<b>4 Wave Transit Fixed-Route Survey Analysis .....</b>	<b>21</b>
Approach.....	21
Summary Survey Findings.....	21
Combined Survey Results.....	23
On-Board Survey Results.....	28
Online Survey Results.....	31
<b>5 Wave Transit Free Downtown Trolley Survey Analysis .....</b>	<b>39</b>
Approach.....	39
Summary Survey Findings.....	39
Combined Survey Results.....	41
<b>6 UNCW Seahawk Shuttle Survey Analysis .....</b>	<b>62</b>
Approach.....	62
Summary Survey Findings.....	62
Combined Survey Results.....	64
On-Board Survey Results.....	68
Online Survey Results.....	71
<b>7 Recommendations Survey .....</b>	<b>79</b>
Approach.....	79
<b>8 Summary and Conclusions .....</b>	<b>87</b>

## Table of Figures

	Page
Figure 1   September Public Meeting at Forden Station.....	7
Figure 2   September Public Meeting at Forden Station.....	7
Figure 3   Wave Transit Park(ing) Day Outreach.....	9
Figure 4   SRTP Wikimapping Page.....	10
Figure 5   Wikimapping Comments.....	10
Figure 6   July 2017 Steering Committee Meeting.....	12
Figure 7   Steering Committee's Prioritized Goals/Values.....	13
Figure 8   Steering Committee Voting Exercise.....	14
Figure 9   Free Downtown Trolley Focus Group Attendees.....	18



Figure 10   Stakeholder Outreach.....	19
Figure 11   How often do you ride Wave Transit?.....	23
Figure 12   If you purchased a pass product, where did you buy it?.....	23
Figure 13   What is your gender?.....	24
Figure 14   What is your age? .....	24
Figure 15   Which of the following best describes your employment status?.....	25
Figure 16   What is your approximate household income?.....	25
Figure 17   Which of the following describe the reasons that you use Wave Transit?.....	26
Figure 18   Based on your experience riding Wave Transit buses, how strongly do you agree with the following statements? (1 = Strongly Disagree, 5 = Strongly Agree).....	26
Figure 19   How did you pay for your fare today? (On-board) / How do you typically pay for your fare on Wave Transit (Online)?.....	27
Figure 20   Service Preferences.....	27
Figure 21   Including this bus, which Wave Transit routes will you use to complete this one-way trip? (1st route).....	28
Figure 22   Including this bus, which Wave Transit routes will you use to complete this one-way trip? (2nd route).....	28
Figure 23   Where did you begin this one-way trip? .....	29
Figure 24   Where is your final destination on this one-way trip?.....	29
Figure 25   If you're riding Route 204 Brunswick Connector, in which county does your trip end?.....	30
Figure 26   If this route didn't exist, how would you have made this trip?.....	30
Figure 27   If possible, would you purchase pass products with a credit or debit card?.....	31
Figure 28   What type of trips do you make most often on Wave Transit? (Select all that apply).....	31
Figure 29   What are the primary reasons why you do not use Wave Transit? (Select all that apply).....	32
Figure 30   If there were no factors preventing you from riding Wave Transit, what kind of trips would you make riding the bus? (Select all that apply).....	32
Figure 31   On a typical weekday, what is your primary mode of transportation? (All respondents).....	33
Figure 32   Do you support greater local and regional financial support for Wave Transit?.....	33
Figure 33   Additional Comments.....	34
Figure 34   On-Board Survey Instrument (Front).....	37
Figure 35   On-Board Survey Instrument (Back).....	38
Figure 36   Have you ever ridden the free Downtown Trolley?.....	41
Figure 37   How often do you ride the free Downtown Trolley?.....	41
Figure 38   Do you typically connect with any other Wave Transit route? .....	42
Figure 39   What is the purpose of your trip?.....	42
Figure 40   In which county do you reside?.....	43
Figure 41   How did you get to downtown? .....	43
Figure 42   Where did you park?.....	44
Figure 43   Which of the following describe the reasons that you use the free Downtown Trolley? (select all that apply).....	44
Figure 44   If the Downtown Trolley was not free, what would be a reasonable fare? .....	45
Figure 45   Does the free Downtown Trolley serve the necessary areas?.....	45



Figure 46	What other areas should the free Downtown Trolley serve? (Select all that apply)...	46
Figure 47	Increased coverage area might require a longer riding time. Would you be willing to ride.....	46
Figure 48	How did you hear about the Wave Downtown Trolley?.....	47
Figure 49	Based on your experience riding the Downtown Trolley, how strongly do you agree with the following statements?.....	47
Figure 50	Service Preferences.....	48
Figure 51	What is your gender?.....	48
Figure 52	What is your age?.....	49
Figure 53	Which of the following best describes your employment status?.....	49
Figure 54	What is your approximate household income?.....	50
Figure 55	What suggestions do you have to increase awareness of the Wave Downtown Trolley?.....	50
Figure 56	Additional Comments.....	53
Figure 57	Additional Perception Responses.....	56
Figure 58	On-Board Survey Instrument (Front).....	60
Figure 59	On-Board Survey Instrument (Back).....	61
Figure 60	How often do you ride the Seahawk Shuttle?.....	64
Figure 61	Which of the following describe the reasons that you use the Seahawk Shuttle? (Select all that apply).....	64
Figure 62	If you are a UNCW student, where do you live?.....	65
Figure 63	Based on your experience riding the Seahawk Shuttle, how strongly do you agree with the following statements? (1 = Strongly Disagree, 5 = Strongly Agree).....	65
Figure 64	Service Preferences.....	66
Figure 65	What is your gender?.....	66
Figure 66	What is your age?.....	67
Figure 67	What is your primary affiliation with UNCW?.....	67
Figure 68	Including this bus, which Seahawk Shuttle or Wave Transit routes will you use to complete this one-way trip? (1st route).....	68
Figure 69	Including this bus, which Seahawk Shuttle or Wave Transit routes will you use to complete this one-way trip? (2nd route).....	68
Figure 70	Including this bus, which Seahawk Shuttle or Wave Transit routes will you use to complete this one-way trip? (3rd route).....	69
Figure 71	Where did you begin this one-way trip?.....	69
Figure 72	Where is your final destination on this one-way trip?.....	70
Figure 73	If this route didn't exist, how would you have made this trip?.....	70
Figure 74	Which of the following describe the reasons that you use the Seahawk Shuttle?.....	71
Figure 75	Have you used the Wave Transit smartphone app?.....	71
Figure 76	How often do you use the Wave Transit smartphone app?.....	72
Figure 77	Which features within the Wave Transit smartphone app are most useful?.....	72
Figure 78	Where do you live?.....	73
Figure 79	Additional Comments.....	73
Figure 80	Seahawk Shuttle On-Board Survey Instrument (Front).....	77
Figure 81	Seahawk Shuttle On-Board Survey Instrument (Back).....	78
Figure 82	How often do you ride Wave Transit?.....	80



Figure 83	What type of improvements would make you MORE LIKELY to use Wave Transit? (Select all that apply).....	80
Figure 84	Route 210 will add service to 17th Street (south of Shipyard Boulevard), Cameron Art Museum, and the Point at Barclay Hills Shopping Center. However, transfers will now be required for trips between downtown and Independence Mall.....	81
Figure 85	Route 101 will add service to Creekwood, but will only serve Walmart hourly.....	81
Figure 86	The following future recommendations will be implemented by Wave Transit with additional funding at an undetermined date. Please select only three projects that should be prioritized.....	82
Figure 87	Have you used the Wave Transit smartphone app?.....	83
Figure 88	What is the primary reason that you DO NOT use the Wave Transit smartphone app?.....	83
Figure 89	How often do you use the Wave Transit smartphone app?.....	84
Figure 90	Please enter your home ZIP code.....	84
Figure 91	Which Downtown Trolley scenario do you prefer? .....	85
Figure 92	The SRTP is considering introducing a nominal fare to ride the Downtown Trolley to emphasize the trolley's value, and to help cover operating costs. Do you feel \$1 is a reasonable fare for riding the Downtown Trolley?.....	86
Figure 93	Please enter your home ZIP code.....	86



# 1 INTRODUCTION

Wave Transit conducted a five-year Short Range Transit Plan (S RTP) to determine how to best improve fixed-route bus service and public transportation throughout the Cape Fear region. In conjunction with the S RTP, Wave Transit conducted a comprehensive public engagement effort. Public meetings and outreach, stakeholder engagement, consultations with the S RTP Steering Committee, and input from the Cape Fear Public Transportation Authority (CFPTA) Board will guide the plan's direction and inform the S RTP's final recommendations.

Coordinated public engagement was consolidated during four primary periods: July 2017, September 2017, October-December 2017, and February-March 2018. The S RTP actively worked with prominent community stakeholders, including a focus group with downtown economic business groups to discuss the Free Downtown Trolley, and a meeting with transportation officials and faculty from the University of North Carolina Wilmington (UNCW). Project staff and consultants also met with elected officials and transportation representatives from the City of Wilmington, New Hanover County, Town of Carolina Beach, Town of Wrightsville Beach, Brunswick County, and Pender County.

Since June 2017, Wave Transit project staff have led monthly meetings with the S RTP Steering Committee. Project consultants have met with the Steering Committee periodically, and have presented project updates to the Cape Fear Public Transportation Authority Board. An overview of public and stakeholder engagement by month is outlined below.

## **July 2017**

Project staff and consultants presented an update to the Cape Fear Public Transportation Authority (CFPTA) Board and conducted a focus group and breakout sessions with the Short Range Transit Plan Steering Committee.

## **September 2017**

Project staff and consultants conducted a Free Downtown Trolley focus group meeting with economic interest groups in downtown Wilmington, and hosted a public meeting at Forden Station, the Authority's administration and transfer facility. In addition, meetings were conducted with transportation representatives and faculty from UNC Wilmington and New Hanover County Manager, Chris Coudriet. Wave Transit also introduced the S RTP project bus to increase awareness of the S RTP.

## **October - December 2017**

Project staff and consultants conducted interviews with eight additional stakeholders. An overview of participating stakeholder is listed in Figure 9 and key points from stakeholder interviews are summarized on page 11 and 12.

## **February - March 2018**

Project staff and consultants conducted a second round of public meetings in February 2018 to present the proposed recommendations. Additionally, two online surveys were conducted to measure and solicit public feedback on both recommendations to the fixed-route network and for the Downtown Trolley.





## 2 PUBLIC ENGAGEMENT

Public engagement associated with the SRTP included the following activities: input from residents and community members through public meetings and informal outreach events (e.g. Park(ing) Day); engagement with prominent local and regional stakeholders; interactive online engagement; and meetings with oversight groups and Wave Transit staff. Additionally, Wave Transit distributed three public surveys—targeted to reach users of the fixed-route service, Free Downtown Trolley, and the Seahawk Shuttle—at public meetings, on-board vehicles and online to help inform the SRTP’s goals. A comprehensive overview of survey response data and response trends is located in Section 4-6.

### SEPTEMBER PUBLIC MEETING

Wave Transit hosted a town-hall style public meeting at Forden Station on September 21, 2017 to provide an update on the progress of the SRTP and to gather input from community members. More than 25 community members attended the public meeting. Several themes and key findings emerged from the community input and feedback:

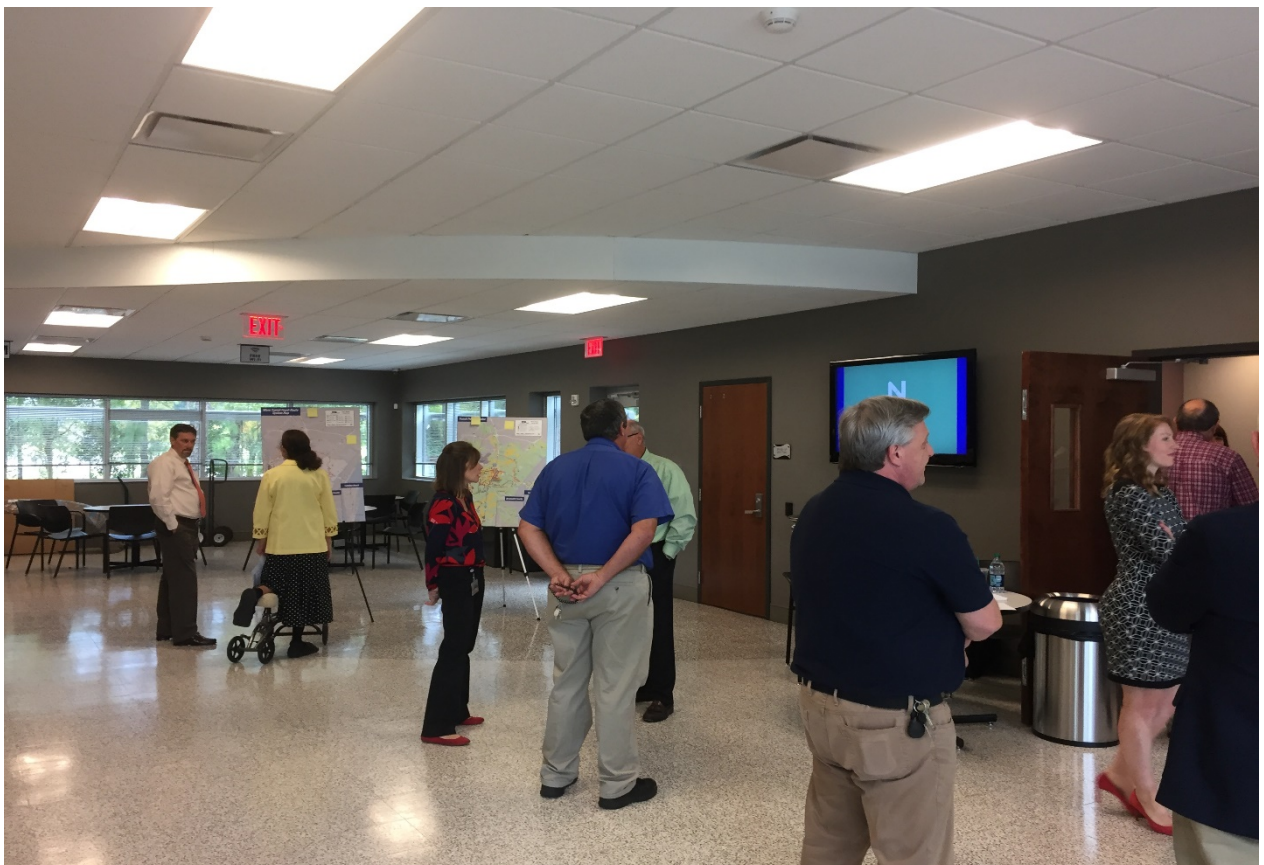
- Multiple attendees requested that the Free Downtown Trolley expand to serve the Brooklyn Arts District on N. 4<sup>th</sup> Street. Wave Transit buses are currently prohibited from operating on 4<sup>th</sup> Street due to weight limit restrictions on the 4<sup>th</sup> Street bridge between Hanover Street and Campbell Street. Presently, Wave Transit’s fixed-route vehicles exceed the weight restrictions of the 4<sup>th</sup> Street bridge between Hanover Street and Campbell Street, making it challenging to serve the Brooklyn Arts District.
- Attendees appreciated Wave Transit hosting the public meeting to provide an update on the SRTP. Several attendees requested that Wave Transit increase communication and outreach with community organizations and requested future public meetings in specific neighborhoods (Brooklyn Arts District), as well as public meetings in advance of the opening of the Downtown Transit Center. The SRTP was added to the agenda of a subsequent community meeting in Brooklyn Arts District.
- Improved pedestrian and bicycle access to Wave Transit routes was requested by multiple community members, including making bus stops accessible to people with disabilities, building new bus shelters, and improving connections for bicycles. Additional bicycle parking in downtown Wilmington and improved bus shelters on Princess Place Drive were also mentioned. Wave Transit is currently updating the system’s bus stop infrastructure and amenities through a five-year Bus Stop Enhancement Plan, and the SRTP will make some recommendations related to bus stops enhancements.
- Service recommendations compiled from attendees include: shuttle from downtown to Wrightsville Beach on the weekends; more frequent service to Carolina Beach; coordination with the school board to develop on-demand service; earlier service on Route 101; improved service to East Wilmington; purchase of additional energy efficient buses; expand and improve trolley access to growing small business community; improve the interactive trolley map; make service more reliable (on-time performance).



Figure 1 | September Public Meeting at Forden Station



Figure 2 | September Public Meeting at Forden Station





## FEBRUARY PUBLIC MEETING

Wave Transit hosted a public meeting at Forden Station on February 13, 2018 to present the SRTP's preliminary recommendations. More than 30 community members attended the public meeting, with members of multiple social service and community organizations also present. Several themes and key findings emerged from the community input and feedback:

- Multiple attendees voiced strong support for returning transit service to Creekwood, noting the high population of transit dependent residents from 23<sup>rd</sup> Street to Kerr Avenue. These residents depend on Wave Transit to reach jobs, education, and medical services – it's vital to their existence. Wave Transit shortened Route 101 in 2013 due to schedule adherence problems; Scientific Park Drive is expected to open in two-three years, and will provide greater connectivity to Creekwood.
- Improving the service and usefulness of the Downtown Trolley was a key concern. Several attendees expressed a desire for the trolley to provide connections to north end of downtown, including Sawmill Point Apartments, North Waterfront Park, and N. 4<sup>th</sup> Street. Wave Transit noted maintaining a reasonable headway (service frequency) is imperative, and that tradeoffs exist between all scenarios, regarding geographic coverage, service frequency, and equity concerns. Several downtown business owners in attendance indicated that business owners are willing to provide funding and feel that charging a fare is desirable.
- Multiple attendees were interested in learning more about the potential on-demand service. Wave Transit suggested this service may be implemented in low-density areas that currently serve fewer than 10 passengers per hour with fixed-route service.
- Updates on improvements to Wave Transit's passenger facilities were requested by several attendees. Wave Transit provided an update of the agency's ongoing passenger facility initiatives, including the Bus Stop Improvement Plan, and reviewed cost estimates, necessary amenities, right-of-way and regulation concerns, and sponsorship opportunities for bus stops.
- Concern was voiced for residents that cannot afford to ride Wave Transit. Wave Transit maintains a strong relationship with the Wilmington Housing Authority. However, the location of Section 8 housing recipients is protected by law, which makes it difficult to target service. Additionally, Wave Transit highlighted the Making Waves Foundation, which provides grants to social service organizations with Wave Transit passes for low-income/disabled individuals.
- Attendees are interested in alternate fare collection options, as relying on cash to pay fares is not user friendly in today's environment. The ability to purchase fare cards at retail locations is appreciated. Wave Transit is working to upgrade fare collection technology so it is more convenient for users.





## PUBLIC OUTREACH

Wave Transit further promoted the SRTP with an event in downtown Wilmington celebrating national Park(ing) Day on September 15, 2017 (Figure 3). The Park(ing) Day event was operated by Wave Transit staff, and included the Wave Transit project bus, which contained material and information about the SRTP, presentation boards soliciting feedback on the Free Downtown Trolley route, and Wave Transit-branded promotional items.

The project bus was deployed at several events around the Cape Fear region (including Brunswick County) and helped generate feedback from members of the public that are unfamiliar with the SRTP or are underrepresented otherwise in the public participation process.

Figure 3 | Wave Transit Park(ing) Day Outreach



## ONLINE ENGAGEMENT

### Surveys

The Wave Transit STRP conducted three separate surveys during the first phase of the SRTP: Wave Transit Fixed-Route Survey, Wave Transit Free Downtown Trolley Survey, and the UNCW Seahawk Shuttle survey. Each survey included an on-board and online component. The on-board surveys for the fixed-route and Seahawk Shuttle were conducted in April 2017; the on-board survey for the Free Downtown Trolley was conducted in June 2017. Online versions of each survey were posted on the Wave Transit website from June through October 2017.

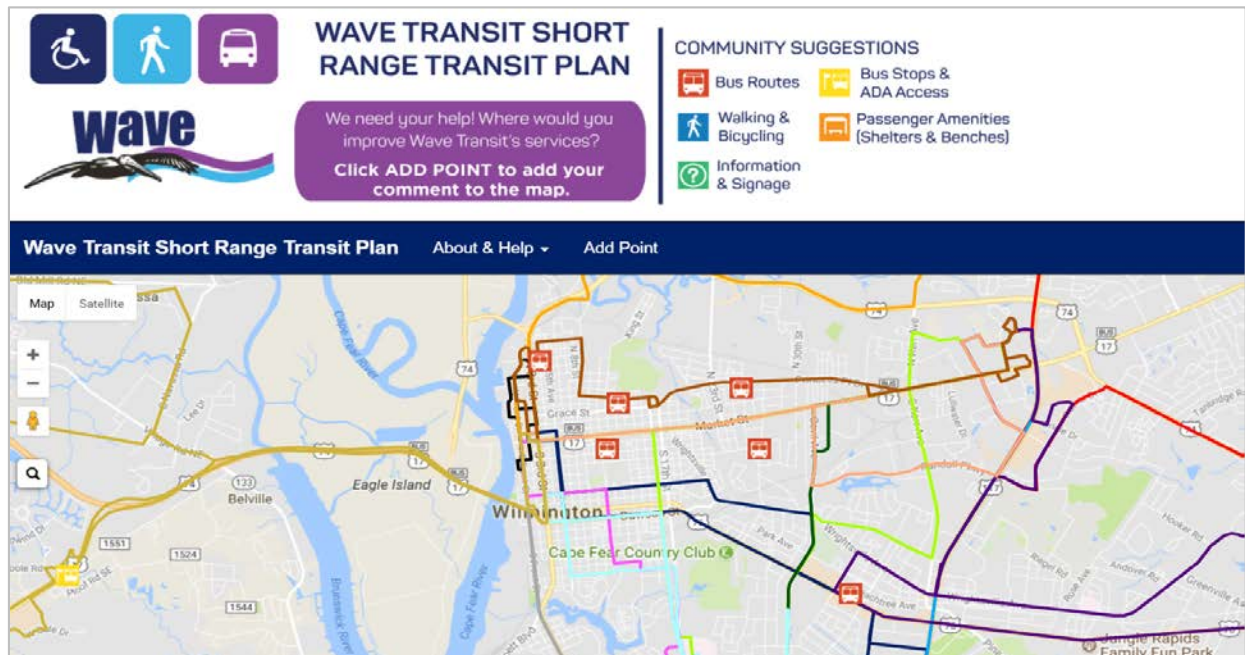
Two surveys gauging public feedback on the proposed recommendations were available online in February and March. A comprehensive overview of the survey results are in Section 4, Section 5, Section 6, and Section 7.



## Wikimapping

In addition to surveying, the SRTP solicited comments and feedback from the general public through an interactive, online tool called Wikimapping. Wikimapping allows users to leave location-specific comments. Respondents could select one of five comment categories: Bus Routes, Bus Stops & ADA Access, Information & Signage, Passenger Amenities (Shelters & Benches), and Walking & Bicycling. Text comments are listed in Figure 5.

Figure 4 | SRTP Wikimapping Page



New service is requested on Masonboro Loop Road, Military Cutoff Road (bidirectional service), Pine Grove Drive, at the junction of 17<sup>th</sup> Street and Independence Boulevard, Oleander Drive (bidirectional service), in Wrightsville Beach, and to the North Carolina Aquarium at Fort Fisher. New bus stops are requested in Leland, Sunset Park (Burnett Boulevard), and on Greenville Loop Road. An alternate alignment for the Free Downtown Trolley was also proposed. Icons that did not include comments are not included in Figure 5.

Figure 5 | Wikimapping Comments

Comment	Category	Location
With the development of the River Road corridor, it might make sense to add routes here, and down the Shipyard area/connect to CB Road and downtown.	Bus Routes	River Road at Rockledge Road
Bus route down Masonboro Loop Road will be great.	Bus Routes	Leisure Avenue
Please consider adding service to the beaches - at least seasonally.	Bus Routes	Wrightsville Beach
The 104 route needs to run in both directions. Doing so will shorten travel times and make the route a lot more convenient.	Bus Routes	Ogden (Military Cutoff Road at Gordon Road)



Comment	Category	Location
Redirect trolley to begin at mixed modal center or, if trolley can't cross bridge, Foxes Boxes on N 4th. Proceed north on 4th, turn onto Davis, cross 3rd and follow Front to Orange or Ann. Return along the same route. Add a second trolley and extend the route down Front to Castle, to 5th, to Greenfield, to Front and return on Front to start on 4th St. A simple direct route will be the speediest route so that it can compete, will connect the four business areas, strengthening each, connect people to various downtown parks, serve as a spine connecting many of Wilmington's arts offerings and provide access to downtown jobs for people living along the route. This route would parallel some of the great happenings along the river. Paul Lawler	Bus Routes	Downtown Wilmington (N 4 <sup>th</sup> Street at Bladen Street)
Oleander Drive (and maybe Wrightville ave) needs to have one route continuous route in both directions to at least Eastwood Rd.	Bus Routes	Oleander Drive at 39 <sup>th</sup> Street
A new route that starts at the Forden Station and goes down College Ave until the route turns on Pine Grove Dr. The route will continue down Pine Grove Dr/Masonboro Loop Rd until it turns onto Piner Rd to terminate at Monkey Junction. This route will bring public transportation to a section of the town that currently has none.	Bus Routes	Masonboro Loop Road at Beasley Road
Since the hospital Business office is here - it would be good to have a stop here	Bus Routes	17 <sup>th</sup> Street at Independence Boulevard
Greenville Loop Rd could use quite a few stops as there are many residents and businesses that could benefit from it.	Bus Stops & ADA Access	Greenville Loop Road at Greenville Loop
The entire Sunset Park area is underserved. A new or expanded route would be very welcome.	Bus Stops & ADA Access	Burnett Boulevard at Central Boulevard
Hawthorne Apartments- New Apartments	Bus Stops & ADA Access	Leland (Ploof Road SE)
Good job on adding service to the airport. However, buses should enter the airport on northbound trips as well so that it doesn't take 40 minutes to get to the airport from downtown and you don't have to ride almost the whole route. Weekend service should also be added.	Bus Stops & ADA Access	Wilmington International Airport
Route 301 should be extended to the aquarium. Hourly service would also be nice.	Bus Stops & ADA Access	North Carolina Aquarium at Fort Fisher

In addition to the comments received for Bus Routes, icons were placed at the following locations: Wrightsville Beach (Lumina Avenue), Gores Row at Ann Street, 12<sup>th</sup> Street at Chestnut Street, 25<sup>th</sup> Street at Chestnut Street, Colonia Drive at Forest Hills Drive, and at Hays Lane in Porters Neck. Icons for Walking & Bicycling were placed at multiple locations along River Road, Myrtle Grove Road, Sanders Road, Piner Road, and Dow Road in Carolina Beach; no comments were included with these entries.





### 3 STAKEHOLDER AND WAVE TRANSIT ENGAGEMENT

Wave Transit project staff and consultants conducted a focus group with the SRTP Steering Committee in July 2017. The purpose of the meeting was to introduce the SRTP to the Steering Committee and to determine project goals and desired outcomes. Albert Eby, Megan Matheny, and Vanessa Lacer represented Wave Transit.

The Steering Committee is comprised of local and regional stakeholders and representatives from the City of Wilmington; New Hanover County; Brunswick County; Pender County; Town of Leland; Town of Carolina Beach; Town of Kure Beach; the regional planning organization (WMPO); educational institutions (UNCW and Cape Fear Community College); medical centers (New Hanover Regional Medical Center); and social service departments, community organizations, and community partners including the Department of Social Services, the NHC Senior Resource Center, the Wilmington Housing Authority, the Disability Resource Center, and Pender Adult Services (Figure 6).

Figure 6 | July 2017 Steering Committee Meeting

#### Participants

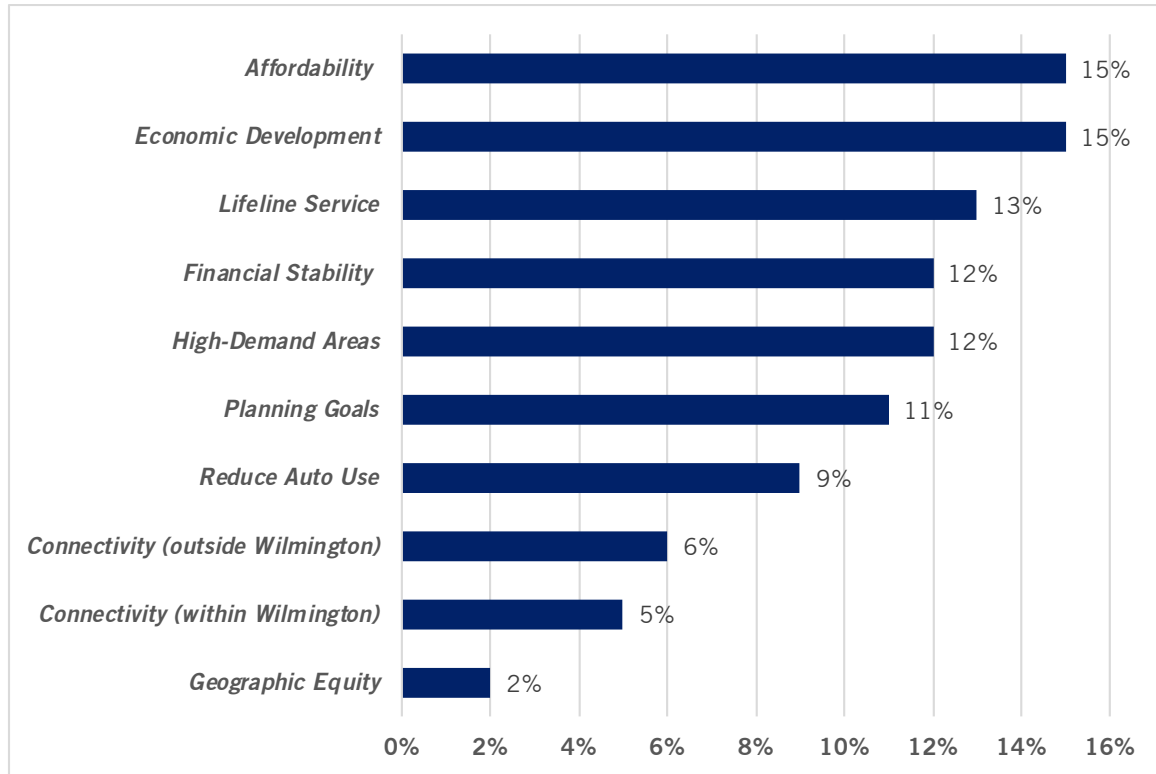
Barbara Scott Akinwale  
Pat Batleman  
Joseph Conway  
Sabrina Dionne  
Chris Dodson  
Olivia Herndon  
Ken Kaiser  
Andy Koeppe  
Mike Kozlosky  
Julie Moeller  
Katrina Redmon  
Suzanne Rogers  
Amber Smith  
Valeria Sutton  
Emilie Swearingen  
Lynn Sylvia

SRTP Steering Committee members participated in a voting exercise to help prioritize goals and values for the Short Range Transit Plan. Steering Committee members were given the option for 10 themes to prioritize for the SRTP (eight votes each). The members were given eight voting dots, and could choose from the 10 themes tailored to address the future of Wave Transit and mobility in the Cape Fear region. As shown in Figure 7, the Steering Committee supports a broad range of goals and values for Wave Transit's SRTP. No goal/value received more than 15% of the vote,



while six were supported by more than 10%. Affordability and economic development each scored the highest, with 15%.

Figure 7 | Steering Committee's Prioritized Goals/Values



## STEERING COMMITTEE FINDINGS



### Ensure Equity

The Steering Committee recognizes that Wave Transit is a vital mobility lifeline for many Cape Fear residents. However, the tradeoff between expanding transit coverage (serving new areas) and increasing transit frequency (more trips per hour), was acknowledged. While systemwide 15-minute frequency is optimal, the Steering Committee recognizes that existing ridership demand and financial constraints may not warrant this level of service.



### Support Tourism

Tourism is a principal industry in the Cape Fear region, and tourists contribute heavily to the region's traffic congestion. As such, the Steering Committee is invested in leveraging Wave Transit's resources to enhance the mobility of tourists while limiting the impact of private vehicles on the region's roads. Limited access to Pleasure Island, as well as the expectation of increased traffic on River Road following the construction of a 2,000+ unit residential development, was also noted.



### Promote Economic Development

Improving fixed-route service between downtown Wilmington and Leland was suggested to provide greater flexibility for commuters and to support the development of new business in Leland. Attracting new businesses to the Cape Fear region by leveraging and improving public transit service is also a priority.

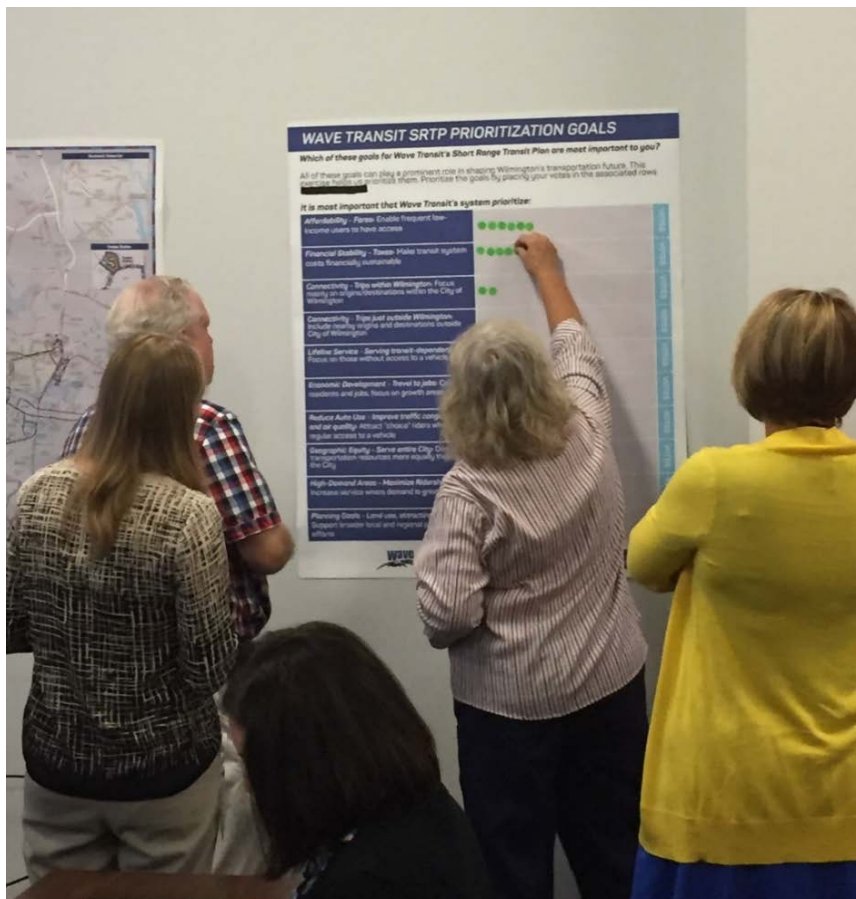


### Expand Service

Several Steering Committee members recommended that Wave Transit expand its current service area and function more as a regional transit system, as opposed to focusing service in the City of Wilmington and New Hanover County. Shuttle service between Carolina Beach, Kure Beach, Fort Fisher, and the Southport ferry was proposed to support connectivity on Pleasure Island. Gauging Pender County's interest in fixed-route transit services and discussing greater coverage with Brunswick County officials was also recommended.



Figure 8 | Steering Committee Voting Exercise





## WAVE TRANSIT STAFF FOCUS GROUPS

Consultants met with Wave Transit staff and drivers in July 2017 to discuss the existing route alignment, facilities and infrastructure, and potential operational improvements. The following themes were mentioned by multiple staff members and drivers: Bus stops, passenger amenities, and access to bus stops needs to be improved throughout the system; schedule adherence was highlighted an issue on Route 101, to New Hanover Regional Medical Center (Route 205 and 209), and to Wilmington International Airport (Route 207); frequency should be improved to Carolina Beach (Route 301); service should be expanded to Porters Neck. Comments received from Wave Transit staff and drivers are listed below.

### Systemwide

- There are often not safe places for people with wheelchairs to safely access and exit buses or bus stops
- Routes aren't keeping up with the amount of development around Wilmington
- Place bus stops closer together systemwide

### Scheduling/Timing

- Schedule is difficult to maintain on the following routes: 101, 201, 204, and 207, 712
- On Route 205 it's difficult to serve New Hanover Regional Medical Center and stay on time
  - Consider making NHRMC an on-demand stop (similar to the stop at the New Hanover County Jail on Route 207)
- Transfers at Independence Station are not always well-timed
- Add more frequent peak serviced on Routes 104, 205, and 209
- Increase service hours on Route 204
- Increase frequency on Route 301
- Add weekend service for Route 204 and 207

### Capacity

- Ridership capacity concerns on Route 104, 105, 205, and 209 during peak periods

### New/Improved Stops

- Add a stop on Route 202 at the Rite Aid on Dawson Street and 16<sup>th</sup> Street
- Add a stop on Route 202 at Kent Street and Wrightsville Avenue
- Improve pedestrian and accessibility access at Monkey Junction stop
- Add a bus shelter on Route 105, 205, and 209 at the New Hanover Department of Social Services (bus stop enhancements are planned at this location)
- Add a bus shelter on Route 105 and 209 and the Food Lion on 17<sup>th</sup> Street
- Need employee bathrooms at new Downtown Transit Center



- Is there a cheaper way to provide canopies even if shelters can't be installed?
- Need stop on Route 202 by Veterans house on Wrightsville
- Need stop inbound on Route 202 Shipyard Blvd by Emerge (OB exists)
- Add more bus shelters on Route 101
- Increase stop frequency on Route 204 (stops too far apart)
- Route 205 stop on Martin Street is on a steep hill

#### **Expand Service**

- Serve Porters Neck Walmart and shopping areas
- Extend service on Route 105, 106, and 209 to intersection of 17<sup>th</sup> Street and Independence Boulevard
- Route 301 should run more often to Carolina Beach

#### **Route Specific Suggestions**

- **Route 101**
  - Hard to stay on time for bus drivers as there is no time allocated for breaks
  - Walmart time point should be moved earlier in each direction
  - There are several wheelchair passengers; the loading and unloading time adds time onto the route
  - Sometimes the wheelchair equipment will not operate electronically and must be operated manually
  - The school zone speed limits and railroad track slows the route down
  - Recommendation to create a new route serving Walmart and removing service to Walmart on Route 101
  - Recommendation to travel straight down 4<sup>th</sup> Street to Red Cross, cross over 3<sup>rd</sup> and turn left on Cape Fear to make route more efficient with less traffic
  - Consider adding a third route to augment service for Routes 101/207
  - Add more bus shelters
- **Route 201**
  - Shouldn't travel down Front Street and should travel on 3<sup>rd</sup> due to bridge traffic
- **Route 203**
  - Confusing for tourists; tourists often mistake Wave Transit bus for private tour
- **Route 204**
  - Route end time should be extended from 6 p.m. to 9 p.m.
  - Add weekend service
  - Increase stop frequency on Route 204 (stops too far apart)
- **Route 207**
  - Serving the airport slows the route down
  - If this route stays the same, another bus should be added or a new route should be created



- Add more weekend service
- **Route 301**
  - Should make more runs to the beach
  - Only runs every three hours and should run more often
  - Add more stops, specifically at Carolina Beach Road and Myrtle Grove Road
- **Route 712**
  - Increase cycle time from 20 minutes to 30 minutes

## Customer Service Representatives

Consultants met with Wave Transit Customer Service Representatives (CSRs) in September 2017 to discuss frequent customer complaints and potential operational improvements. Comments from the CSRs are listed below.

### Customer Complaints

- Time points can be hard to explain/relate to customers
  - Some classes at UNCW end later than the Seahawk Shuttle operates
- Route 712 Teal ends service at 6:40 p.m.
- Route 301 Carolina Beach
  - Increase frequency on Route 301 Carolina Beach
  - Add stops on Carolina Beach Road (Ashley High School)
- Concerns with reliability and schedule adherence
- Add weekend service on Route 204 Brunswick Connector and Route 207 North
- Requests for bus stop improvements are forwarded to Megan
- Later service requested often
- Improved amenities requested at Forden Station for Greyhound and Amtrak Thruway passengers, some are at the station for multiple hours
- Add stops in Ogden

### New Service Areas

- Porters Neck
- Myrtle Grove

### CSR Requests

- CSRs would like ability to contact bus drivers directly at night
  - Would simplify communication, especially when the dispatcher is unavailable





## FREE DOWNTOWN TROLLEY FOCUS GROUP

Redesigning the Free Downtown Trolley is a central focus of the SRTP. As such, downtown Wilmington stakeholders were invited to participate in a focus group to discuss how to improve the Free Downtown Trolley (attendees listed in Figure 9). The primary takeaways and recommendations from the focus group are as follows:

- The Free Downtown Trolley is confusing for tourists, and is not viewed as an effective transportation option. As a result, the Free Downtown Trolley is losing the support of downtown business owners. Attendees recommend that Wave Transit partner with downtown business groups to address their concerns, gain support, and to improve the Free Downtown Trolley.
- Parking in downtown Wilmington is scarce, and planned developments will eliminate several existing parking facilities. Connecting the Free Downtown Trolley to remote parking facilities located outside downtown should be considered.
- Several attendees recommended that Wave Transit redesign and expand the Free Downtown Trolley route (or create multiple downtown routes) to connect with the Brooklyn Arts District, Castle Street, South Front Street, and North Waterfront Park (scheduled to open in 2019).
- Several attendees advocated for increased marketing opportunities, such as cross-promoting the trolley with downtown businesses, producing an educational map or brochure highlighting downtown attractions, coordinating with downtown ambassadors to promote the trolley, and rebranding the trolley vehicles so that it's more distinctive.

Figure 9 | Free Downtown Trolley Focus Group Attendees

Attendee	Organization	Position
Terry Espy	MoMentum Companies/Downtown Business Alliance	Principal (MoMentum), President (DBA)
Betsy Knowles	ArtWorks/Downtown Business Alliance	Board Member (DBA)
Joan Loch	MoMentum Companies/Downtown Business Alliance	Commercial Broker (MoMentum)
Sheryl Mays	Cape Fear Museum	Director
Stephen Whitney	Wilmington Downtown Inc.	Board Member
Ed Wolverton	Wilmington Downtown Inc.	President and CEO

A similar group of representatives from these downtown organizations came together in Spring 2018 in order to advise on a revised trolley route which was tested during the 2018 Azalea Festival Parade.

## STAKEHOLDER INTERVIEWS

As part of this engagement effort, members of the consulting team conducted stakeholder interviews with City of Wilmington and New Hanover County jurisdictions and agencies, transportation partners, medical and social services institutions, and business organizations. This chapter presents an overview of the input received via these stakeholder interviews. In total, 11 interviews were conducted with the following stakeholders: Brunswick County, New Hanover



County Department of Social Services, New Hanover County Planning Department, New Hanover County Manager, Pender County, Town of Carolina Beach, Town of Wrightsville Beach, the University of North Carolina Wilmington, Wilmington City Manager, Wilmington Chamber of Commerce, and the Wilmington Housing Authority (Figure 10).

Figure 10 | Stakeholder Outreach

Stakeholder	Participants	Interview Date
Brunswick County	Ann Hardy, Kirstie Dixon, David Hollis	November 20, 2017
New Hanover County Department of Social Services	Michelle Winstead, Wanda Marino, Karen Brown, Mike Bennett, Brenda Haggerty	November 1, 2017
New Hanover County Planning Department	Ken Vafier	November 6, 2017
New Hanover County Manager	Chis Coudriet	September 22, 2017
Pender County	Kyle Breuer, Pat O'Mahony, Valeria Sutton	October 26, 2017
Town of Carolina Beach	Ed Parvin, Gary Doetsch	October 23, 2017
Town of Wrightsville Beach	Tim Owens	December 19, 2017
University of North Carolina Wilmington	Sharon Boyd, Ken Kaiser, Brian Dailey, Megan Allred	September 22, 2017
Wilmington City Manager	Sterling Cheatham	June 5, 2017
Wilmington Chamber of Commerce	Natalie English	November 9, 2017
Wilmington Housing Authority	Katrina Redmon	November 13, 2017

*All meetings were led by either Greg Strangeways or Walker Freer of Nelson\Nygaard; Wave Transit staff participated in meetings with New Hanover County DSS, New Hanover County Planning Department, UNCW, and the Wilmington Chamber of Commerce; Jenny Shultz of HNTB participated in the meeting with UNCW.*

Key points from each meeting are briefly summarized below:

- **Brunswick County:** The existing Wave Transit route (204 Brunswick Connector) is well located in Brunswick County and serves the areas where the majority of development is occurring. Brunswick County representatives stressed the importance of pedestrian connections to the three Wave Transit park-and-ride lots, and hope usage of these facilities can be increased.
- **New Hanover County Department of Social Services:** The key priority for the NHC DSS is to ensure that Wave Transit provides service to their new building in coordination with WHA, which is scheduled to open in 2019. Providing service to NHC Government Center on voting day and event transportation for the agency's annual fatherhood conference in the spring were suggested. DSS would also appreciate a greater understanding of the travel training program, and notice for future service changes associated with the SRTP, so they can be fully prepared for service modifications. Wave Transit is actively coordinating with the DSS as the agency develops/designs their new facility.
- **New Hanover County Manager:** The County Manager stressed that transit service should coordinate closely with zones designated for development by New Hanover County, specifically the three growth nodes identified in the county's Comprehensive Plan: Monkey Junction, Porter's Neck, and N. College Road/Blue Clay Road. Additionally, he noted that



the three year Capital Improvement Plan includes funding for bicycle and pedestrian infrastructure improvements, which could help improve access to Wave Transit bus routes.

- **New Hanover County Planning Department:** New Hanover County is expecting its population to reach 130,000 by 2040 and is encouraging more mixed-use developments. The Planning Department is interested in considering express commuter service on Market Street to ease traffic congestion between downtown, midtown, and I-40.
- **Pender County:** Pender County representatives do not feel that fixed-route transit is warranted within the SRTTP's five-year planning horizon. However, they are interested in improving the regional transportation network as more than 60% of county residents commute to jobs outside the county. The county is focusing development along NC-210 and locations south, which could eventually support fixed-route transit.
- **Town of Carolina Beach:** Carolina Beach officials value Wave Transit service (Route 301 Pleasure Island) and do not want the service to be discontinued; many service/hospitality employees rely on the route to commute to/from Pleasure Island. Officials are interested in how ridership is affected by festivals and large events (held nearly every weekend during the shoulder season).
- **Town of Wrightsville Beach:** Wrightsville Beach officials are primarily concerned with traffic congestion on roadways leading to/from Wrightsville Beach, managing employee parking, and congestion on N. Lumina Avenue caused by Uber/Lyft pick up and drop offs near bars and restaurants. Officials indicated that parking is sufficient on most days during the summer, but can be difficult on summer weekends; they are concerned that fixed-route transit or a shuttle bus would stress existing municipal services by bringing more people than would otherwise arrive.
- **University of North Carolina Wilmington:** Multiple planned on- and off-campus developments will increase the need for the Seahawk Shuttle, such as additional on-campus housing and the potential extension of Hurst Drive. Short-term goals for the Seahawk Shuttle include better education for incoming students on how to use the shuttle, better coordination with and service to off-campus housing developments, improved amenities (bus shelters), additional remote parking facilities, and operating larger capacity buses to handle expected ridership increases. UNCW is also willing to consider a dedicated transitway through campus (potentially Price Drive).
- **Wilmington City Manager:** The main topic was city funding of Wave Transit. The SRTTP includes a look at how peer systems are funded, and the City is also undertaking a study of the topic which will likely include more detail. It was agreed to coordinate the studies as much as possible, in order to more accurately project local funding for Wave Transit in the future. There were no particular service requests from the City. It was also agreed that the consultants would follow up with Wilmington Housing Authority separately.
- **Wilmington Chamber of Commerce:** The Chamber of Commerce expressed the importance of public transit in the Wilmington region and hopes that Wave Transit will continue to offer service for employees working non-traditional hours (shift and hospital workers).
- **Wilmington Housing Authority:** WHA representatives stressed that individuals and families served by WHA are dependent on public transit, and that Wave Transit service is very important to their clients. They expressed concern that Wave Transit does not immediately serve the Creekwood housing development (closest stop is on Princess Place).



Additionally, a new development is planned west of Creekwood that includes 200 units of workforce housing (expected to be completed by 2019). WHA does not feel that coordinated on-demand service operated by Uber/Lyft would sufficiently serve the Creekwood development. WHA would appreciate bus shelters at the Hillcrest and Houston Moore housing developments.

## 4 WAVE TRANSIT FIXED-ROUTE SURVEY ANALYSIS

### APPROACH

The on-board Wave Transit fixed-route survey was conducted in April 2017, and was completed by 282 respondents (44% of all respondents). Consultants rode each Wave Transit fixed-route and distributed paper surveys, which were completed by passengers on-board the transit vehicle. The on-board survey instrument is presented in Figure 33 and Figure 34.

The electronic online survey was conducted through SurveyMonkey and was open from July through October 2017, and was completed by 361 respondents (56% of all respondents).

### SUMMARY SURVEY FINDINGS

#### Rider Frequency and Fare Payment

One-quarter of total survey respondents and 50% of on-board survey respondents ride Wave Transit daily; nearly one-third of respondents do not actively use Wave Transit (Figure 11). Nearly 80% of respondents pay fares in cash (64% full-fare and 15% reduced fare). Pass products represent 18% of fare payments, with 60% purchased on-board a Wave Transit vehicle (Figure 19 and Figure 12). Three-quarters of online respondents indicated they would pay for Wave Transit fares with a debit or credit card, if available (Figure 27). Among surveyed passengers on Route 204, 80% are ending their trip in New Hanover County.

#### Use and Purpose

Among non-Wave Transit users, 91% drive alone as their primary mode of transportation (Figure 30). The primary reasons non-users do not ride Wave Transit among is because they need a car for work or errands (39%), Wave Transit takes too long (37%), and they can't get where they need to go (35%). Nearly 50% of survey respondents ride Wave Transit because they do not own a personal vehicle (Figure 17). However, if no factors were preventing non-users from riding Wave Transit two-thirds would use Wave Transit for recreational or social trips, 54% would shop or run personal errands, and nearly half would commute to or from work.

Respondents agree or strongly agree that service is dependable (68%), fares are reasonable (67%), and that routes go where they need to go (65%). Respondents are in less agreement that Wave Transit schedules meet their travel needs (51% agree/strongly agree), that buses are comfortable and well kept (60% agree/strongly agree), that Wave Transit staff is professional and courteous (59% agree/strongly agree), and that maps and schedules are easy to understand (63% agree/strongly agree) (Figure 18).



## Demographics

Nearly two-thirds of survey respondents are female and 53% of respondents are age 36 to 64 (Figure 13 and Figure 14). Approximately half of respondents are employed full-time, 19% are employed part-time, and 13% are retired (Figure 15). Significant disparities in income and vehicle ownership exists between on-board and online respondents: 36% of online respondents earn \$75,000 or more, while 49% of on-board respondents earn less than \$10,000 and 39% earn between \$10,000 and \$29,999; 61% of on-board respondents do not own a personal vehicle.

## Service Preferences

Overall, survey respondents prefer more frequent bus service (63%) over longer service hours (37%), more bus stops for a shorter walk to bus stops (74%) versus fewer bus stops for faster bus service (26%), and operating buses more frequently on fewer streets (60%) than operating buses on more streets but less frequently (40%). Respondents are evenly split between improving existing service and serving new areas, and slightly prefer more weekend service (54%) over adding more weekday service (46%) (Figure 20).

Notable differences in service preference exist between on-board and online respondents. Online respondents prefer more frequent bus service at a higher rate than on-board respondents (71% to 50%); on-board respondents prefer more weekend service (65%) while online respondents prefer greater weekday service (54%); and on-board respondents marginally prefer improving existing service (54%), while online respondents slightly prefer serving new areas (52%).

Most critically, strong support exists for enhanced funding: 87% of survey respondents support greater local and regional financial support for Wave Transit.

## Additional Comments

Survey respondents are appreciative of Wave Transit's services. Comments provided by survey respondents request more frequent service systemwide (30-minute frequencies) and specifically on Route 301 Pleasure Island and bus stops with improved passenger amenities (shelters and benches). Multiple comments also reference professionalism of Wave Transit drivers (equally positive and negative) (Figure 33).



COMBINED SURVEY RESULTS

Figure 11 | How often do you ride Wave Transit?

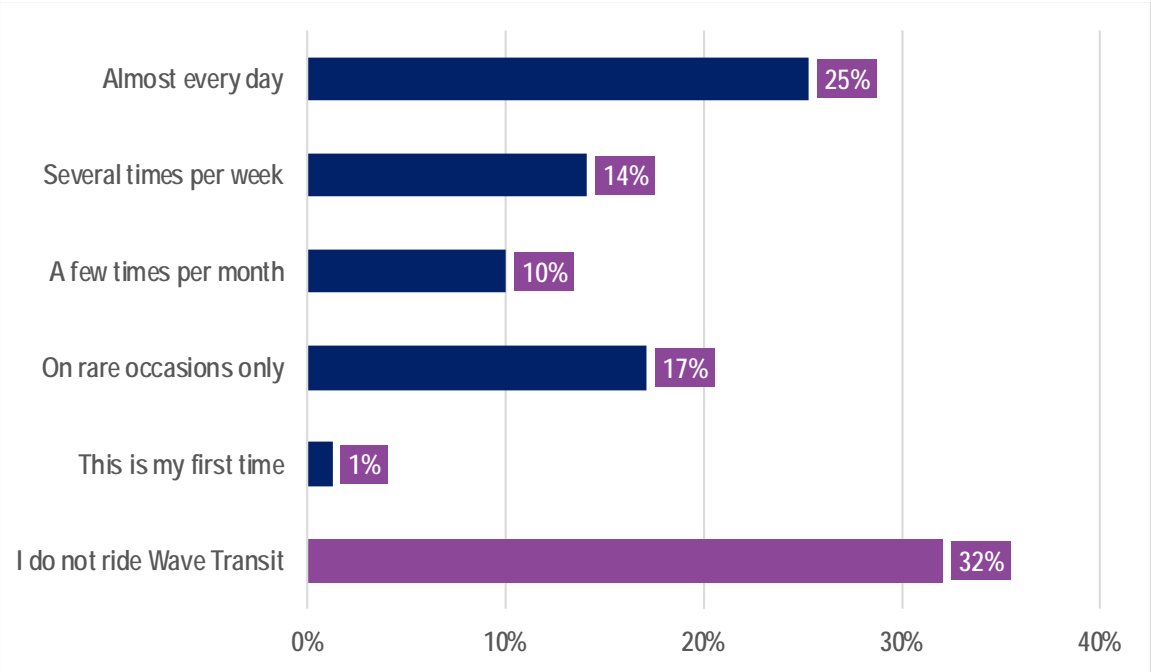


Figure 12 | If you purchased a pass product, where did you buy it?

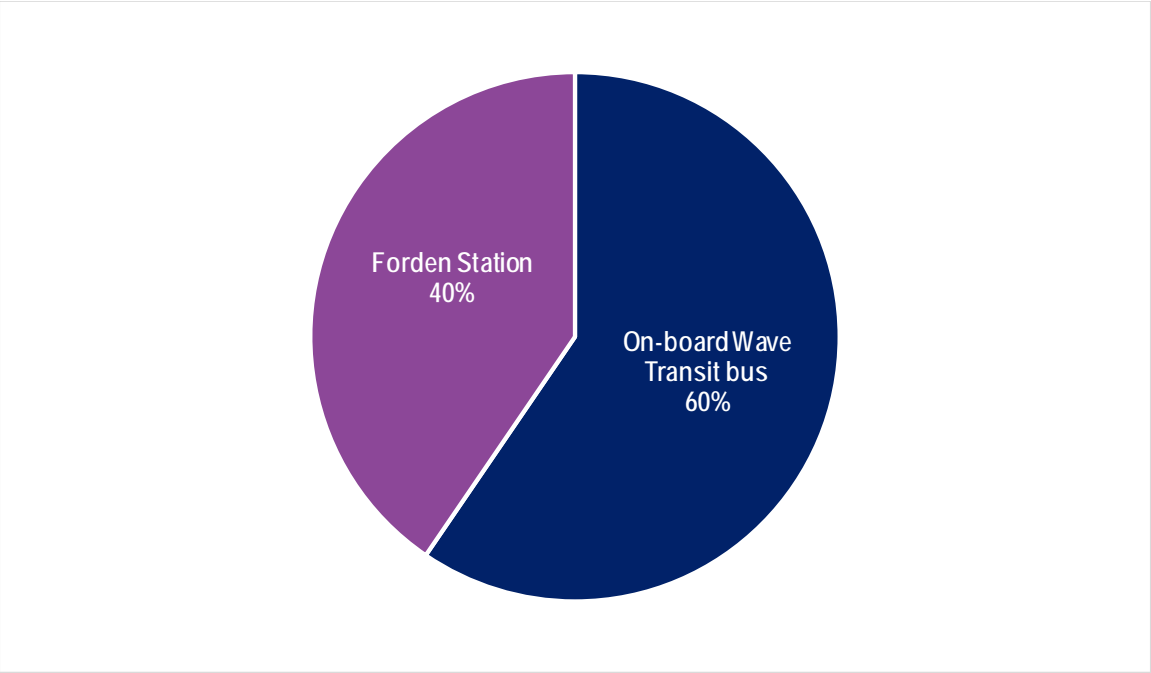






Figure 13 | What is your gender?

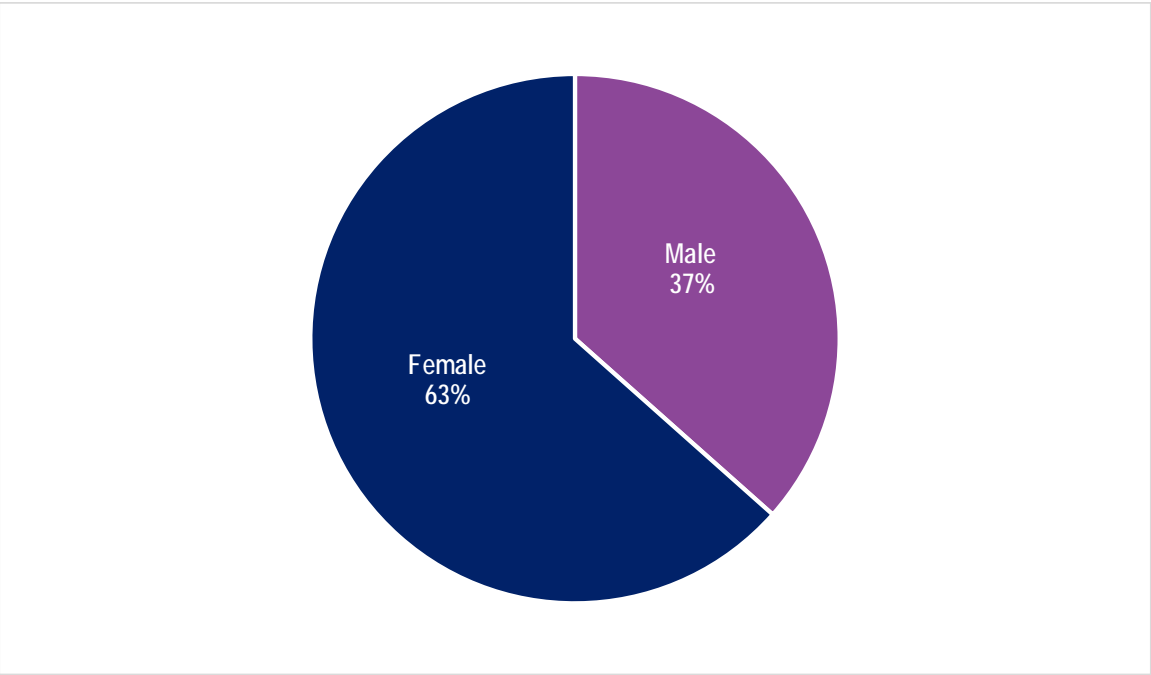


Figure 14 | What is your age?

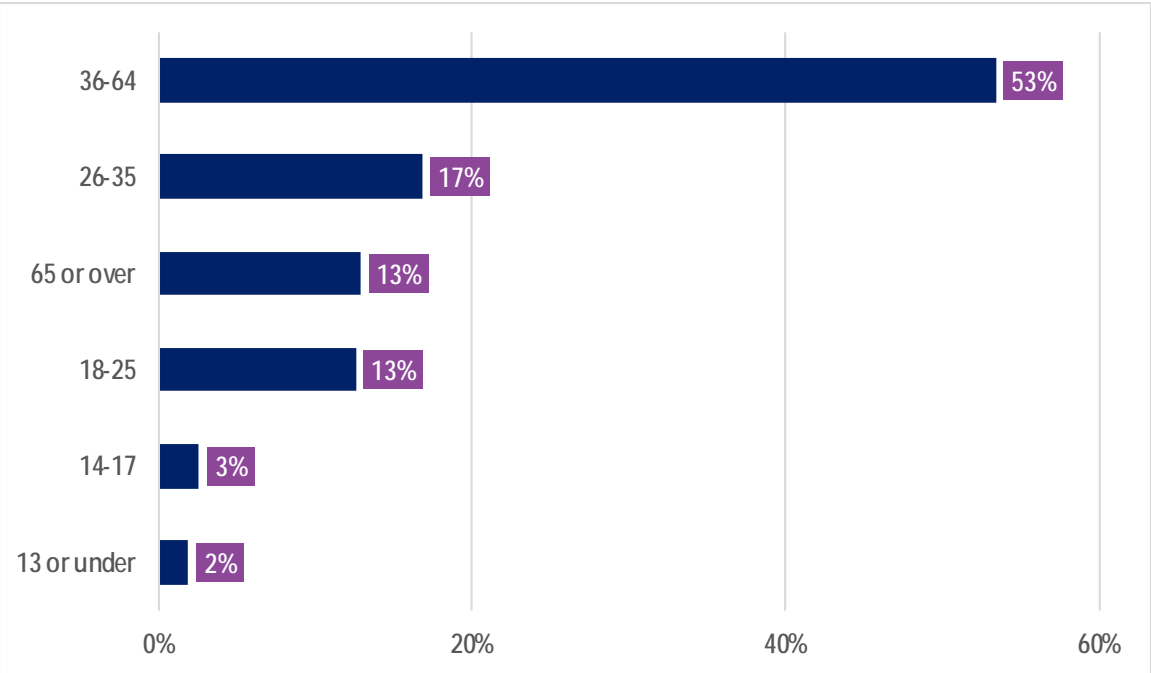




Figure 15 | Which of the following best describes your employment status?

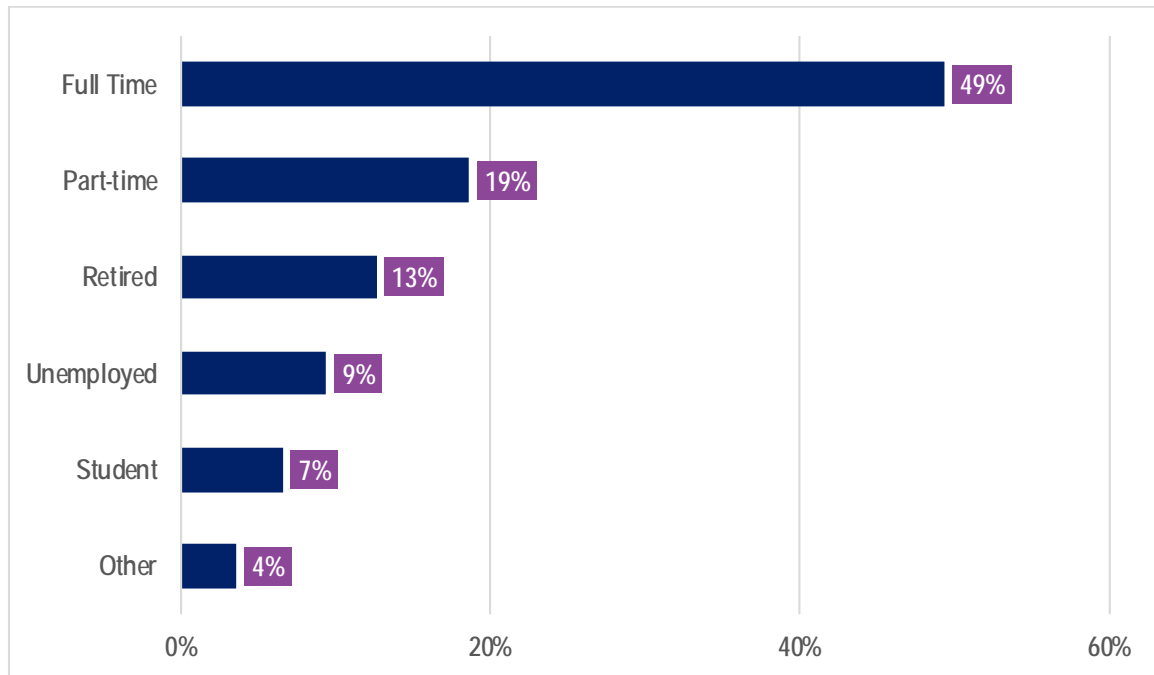


Figure 16 | What is your approximate household income?

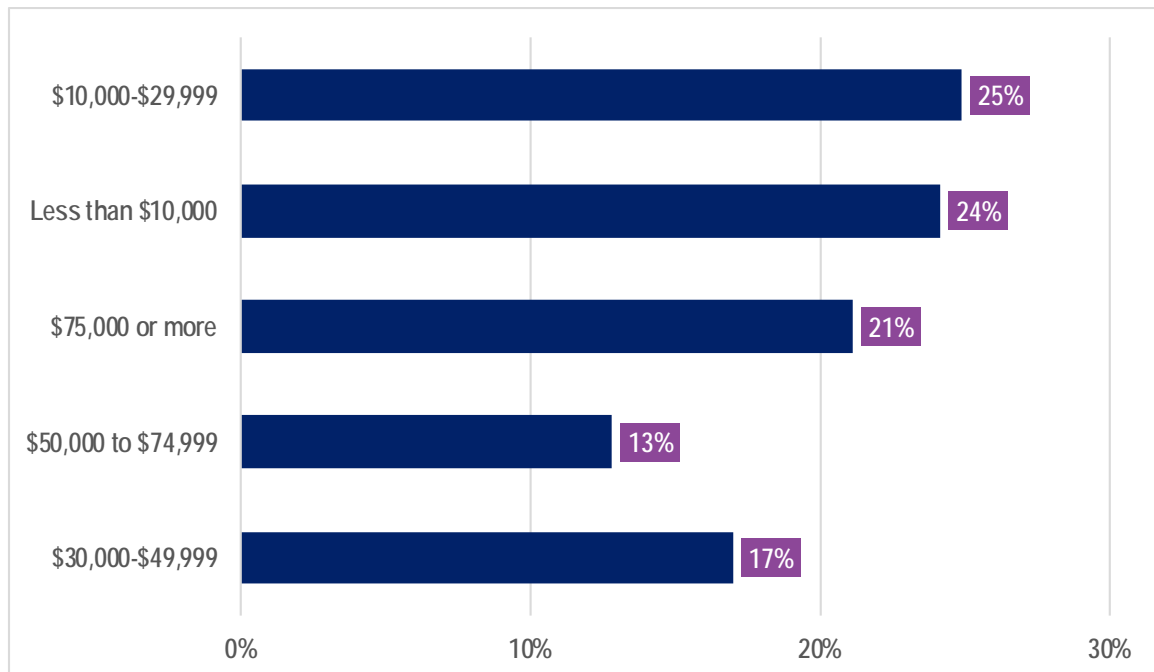




Figure 17 | Which of the following describe the reasons that you use Wave Transit?

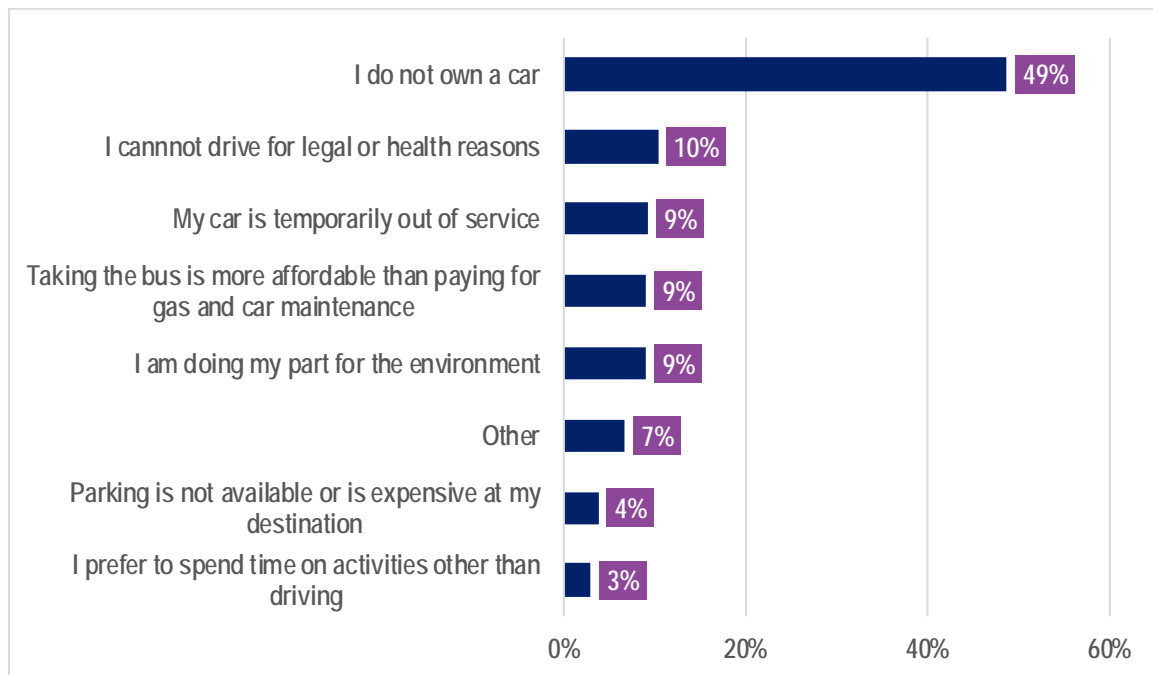


Figure 18 | Based on your experience riding Wave Transit buses, how strongly do you agree with the following statements? (1 = Strongly Disagree, 5 = Strongly Agree)

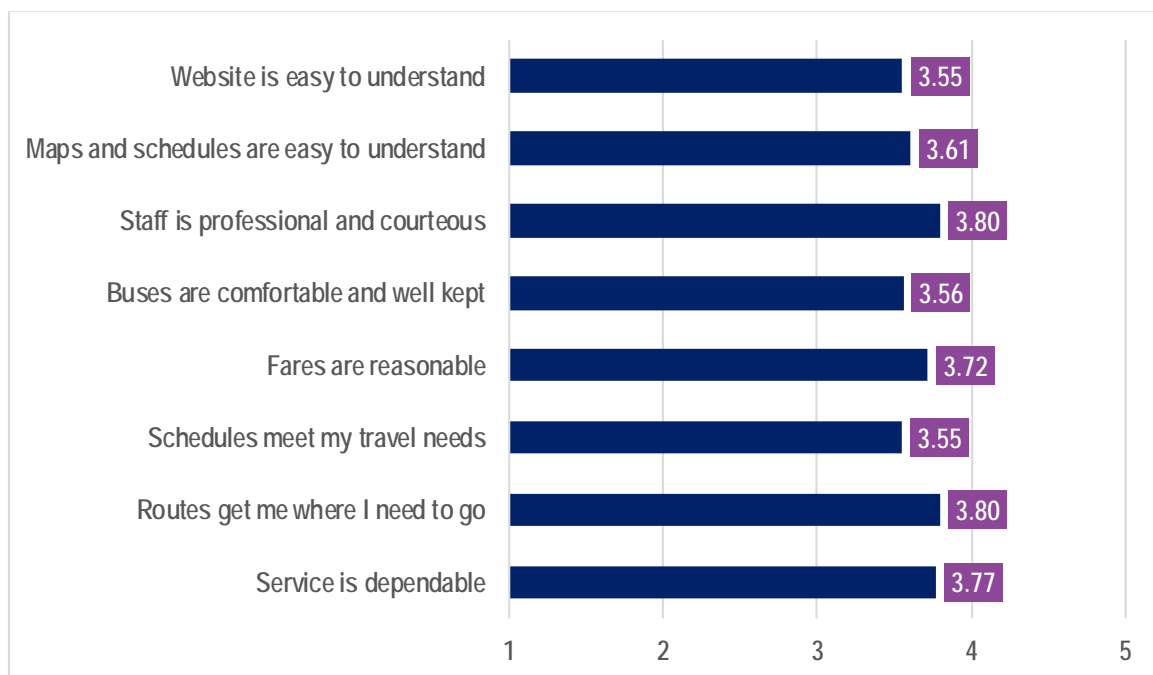




Figure 19 | How did you pay for your fare today? (On-board) / How do you typically pay for your fare on Wave Transit (Online)?

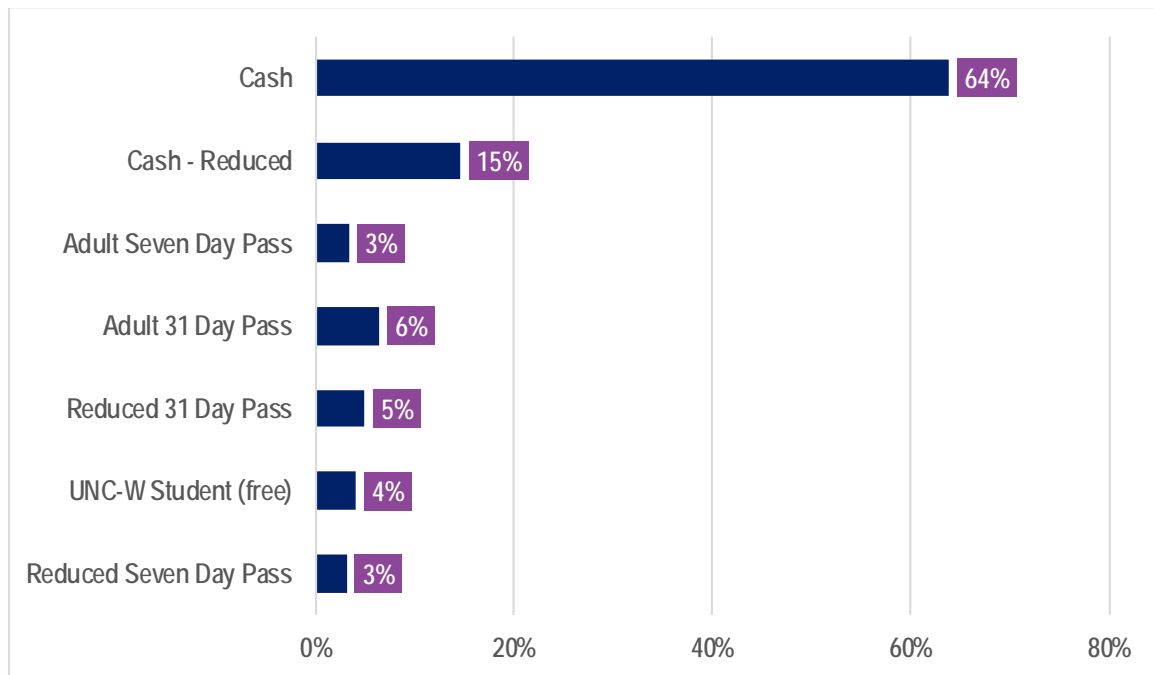
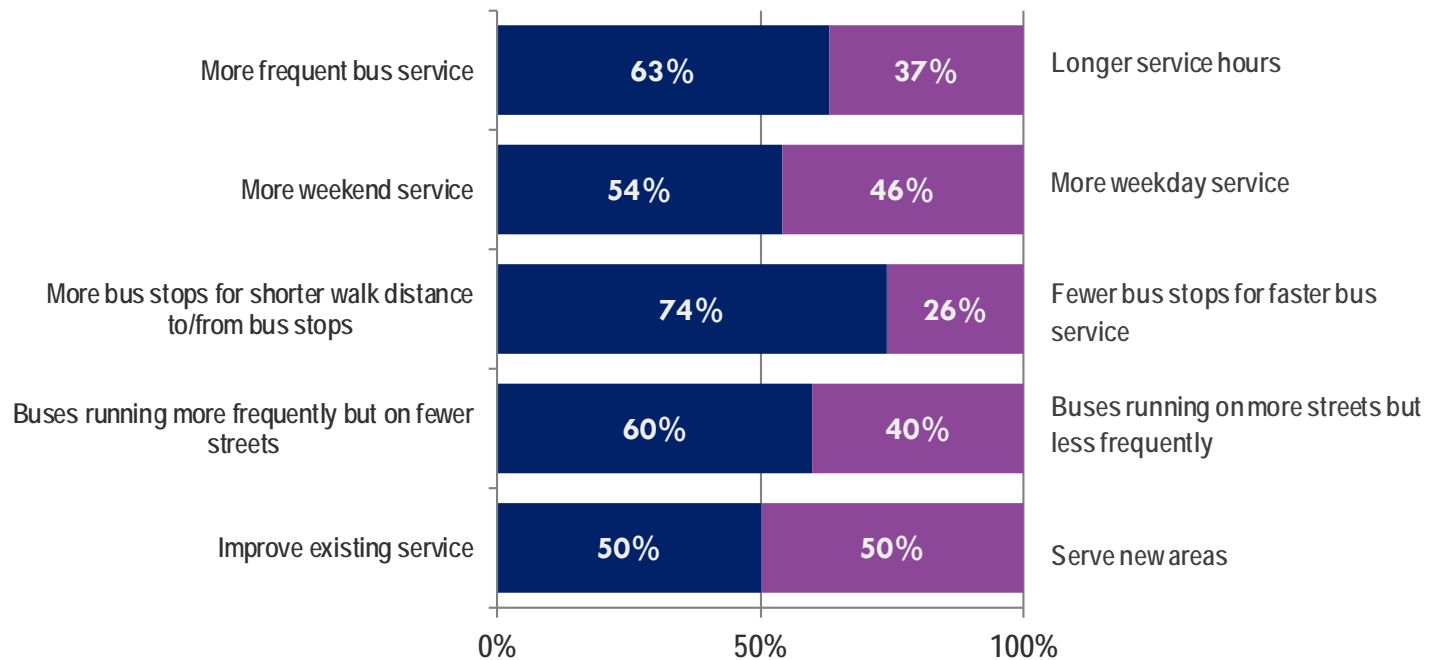


Figure 20 | Service Preferences





## ON-BOARD SURVEY RESULTS

Figure 21 | Including this bus, which Wave Transit routes will you use to complete this one-way trip? (1st route)

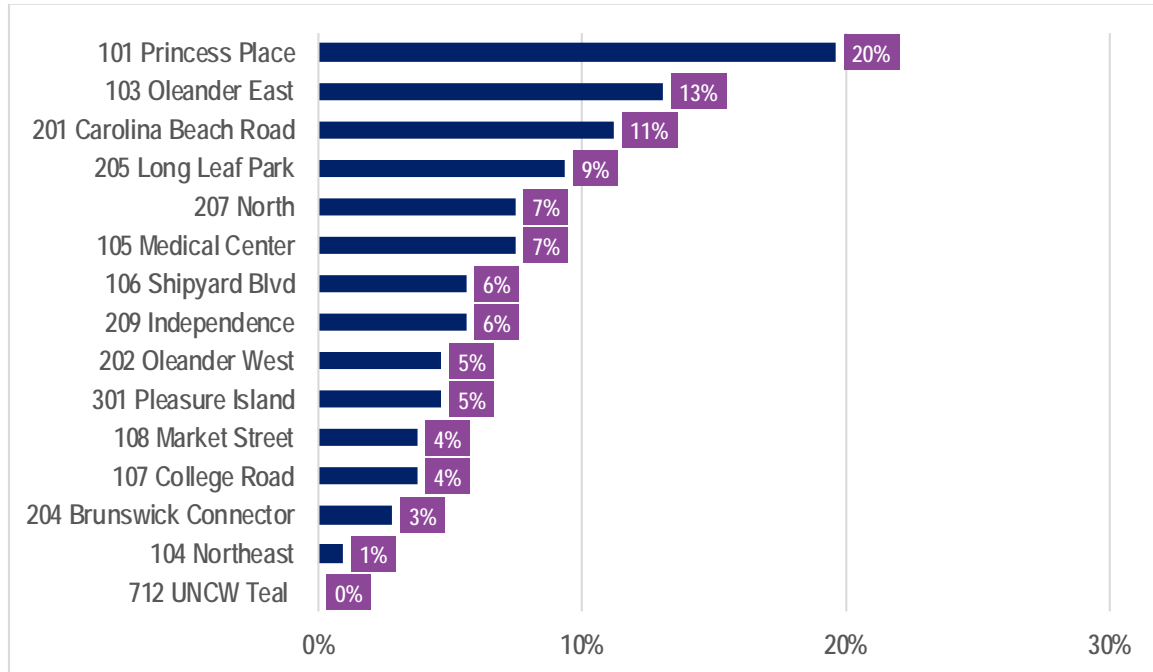


Figure 22 | Including this bus, which Wave Transit routes will you use to complete this one-way trip? (2nd route)

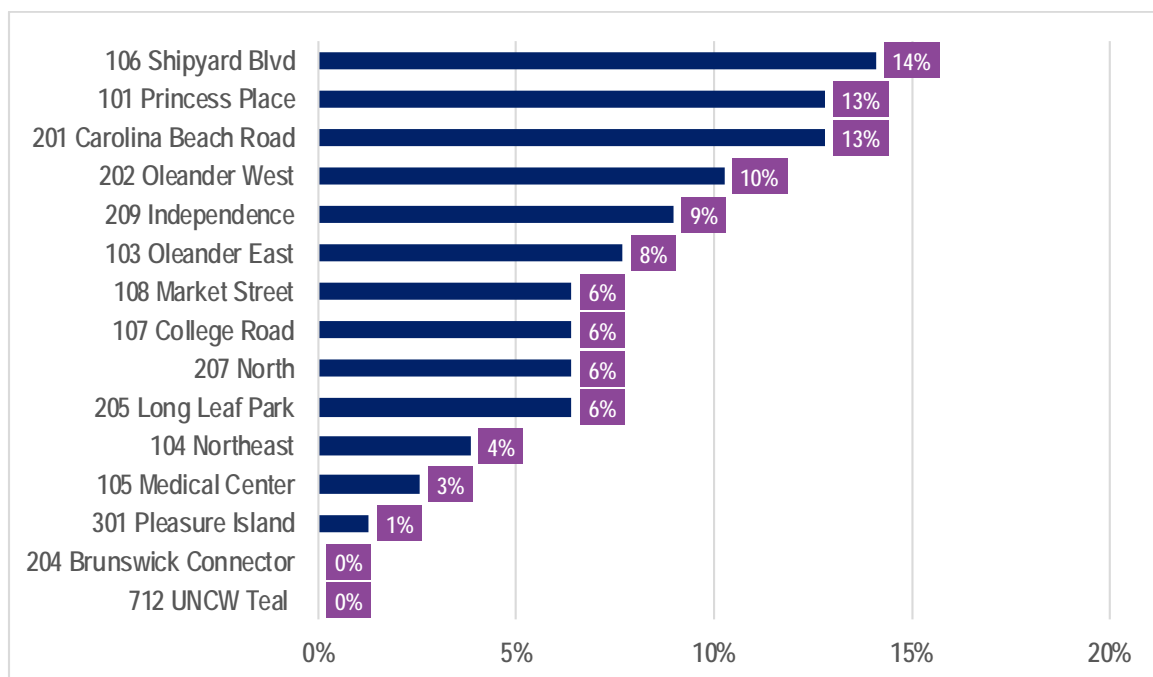




Figure 23 | Where did you begin this one-way trip?

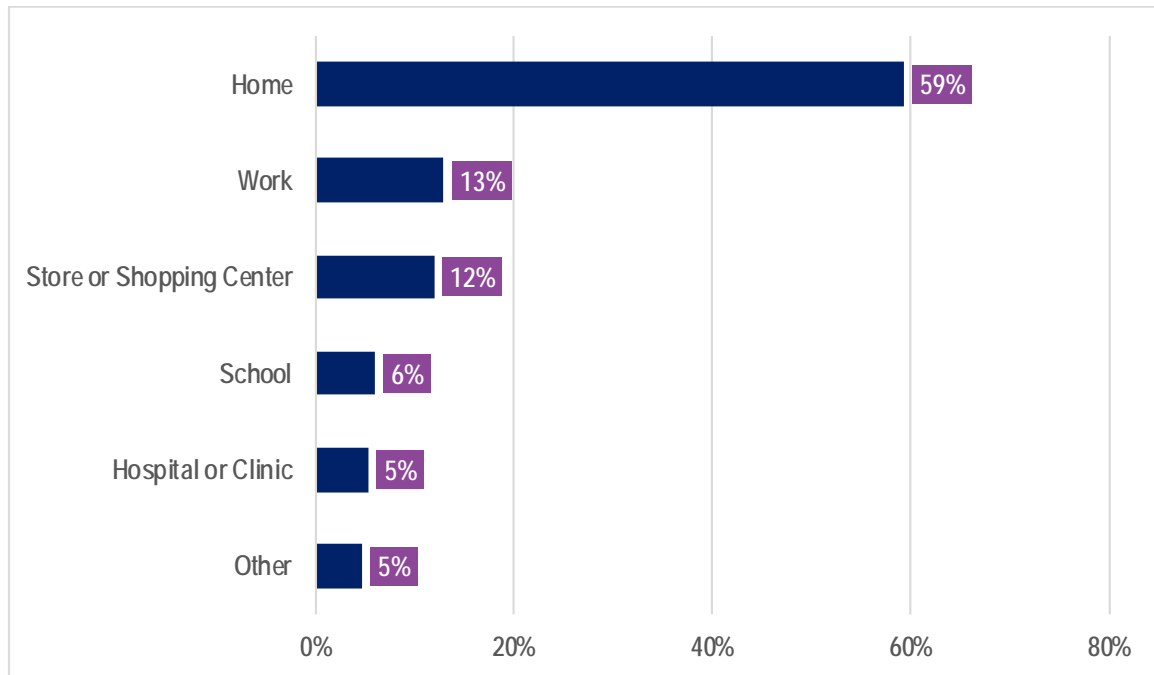


Figure 24 | Where is your final destination on this one-way trip?

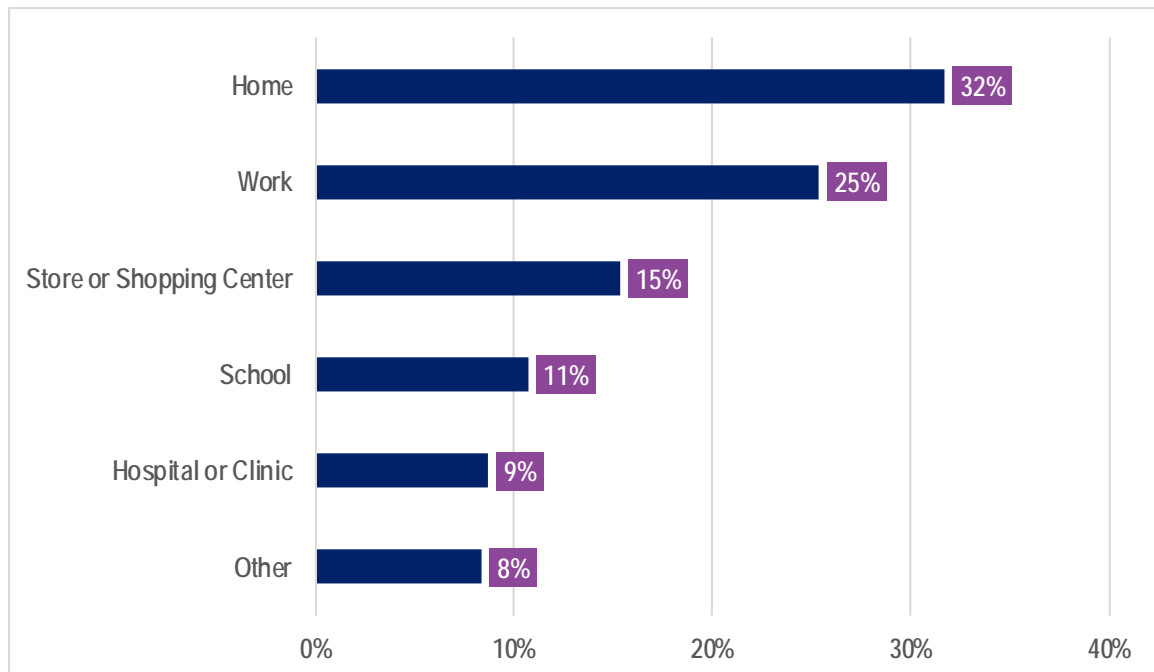






Figure 25 | If you're riding Route 204 Brunswick Connector, in which county does your trip end?

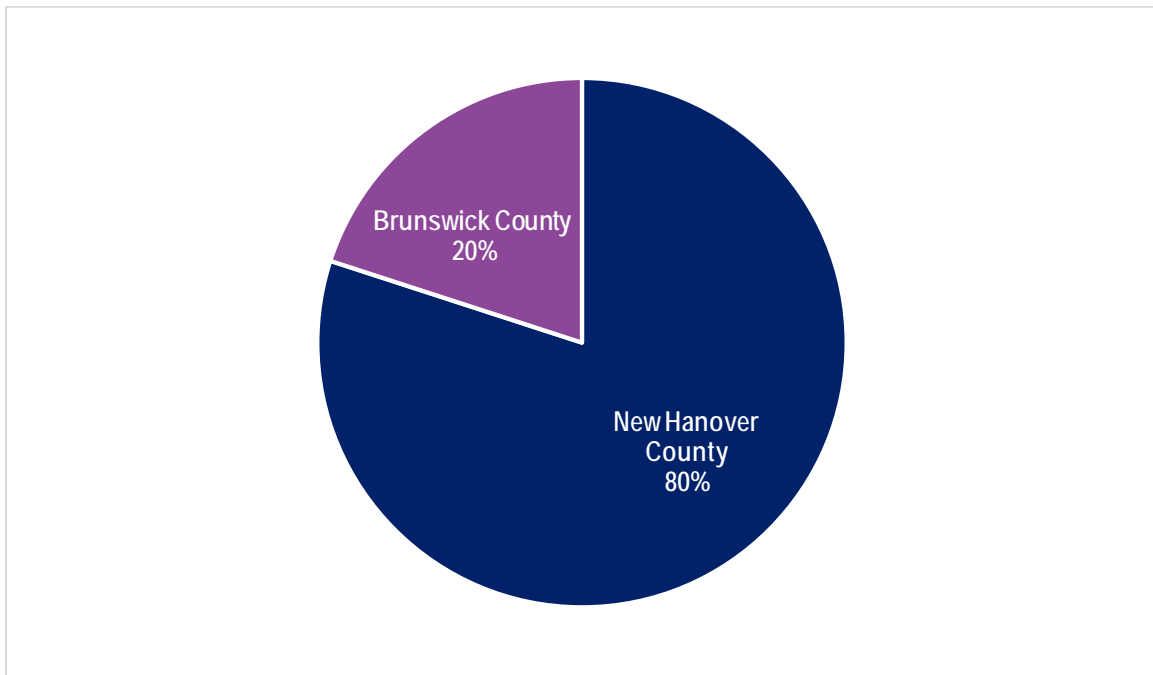
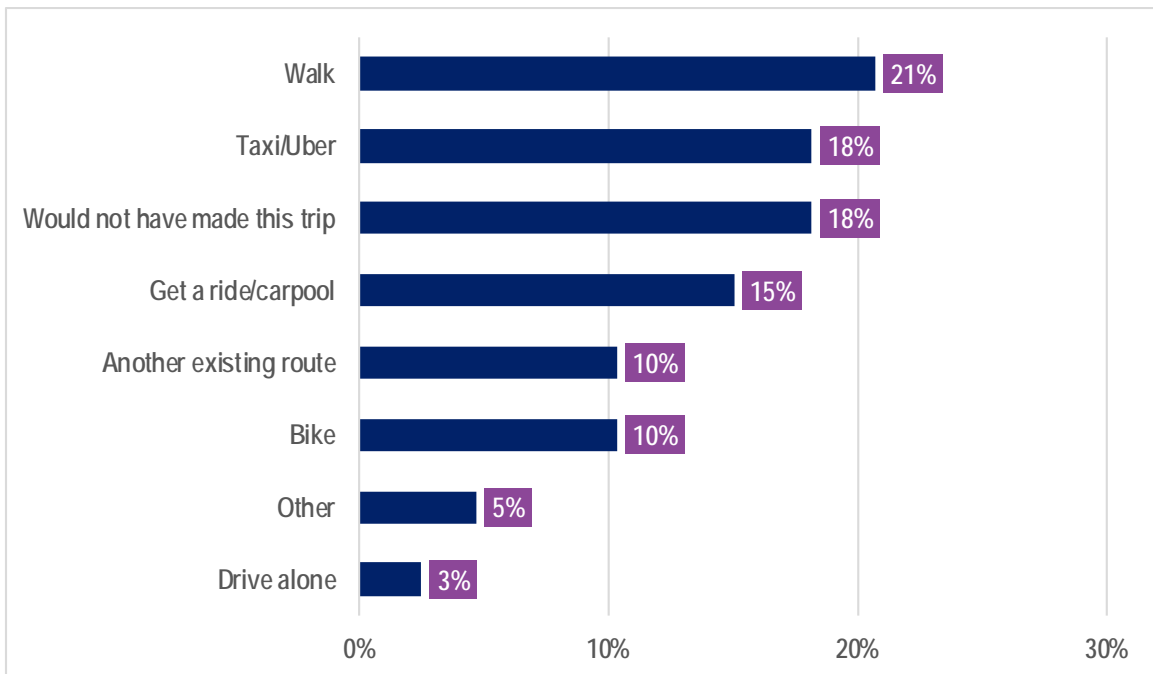


Figure 26 | If this route didn't exist, how would you have made this trip?





ONLINE SURVEY RESULTS

Figure 27 | If possible, would you purchase pass products with a credit or debit card?

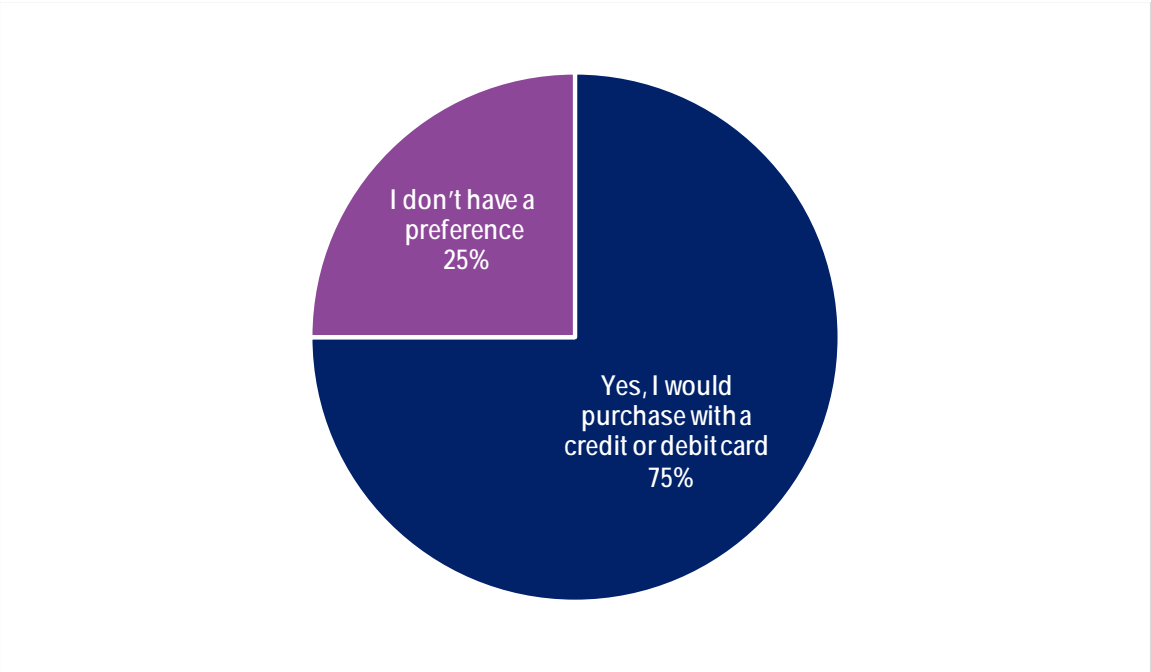


Figure 28 | What type of trips do you make most often on Wave Transit? (Select all that apply)

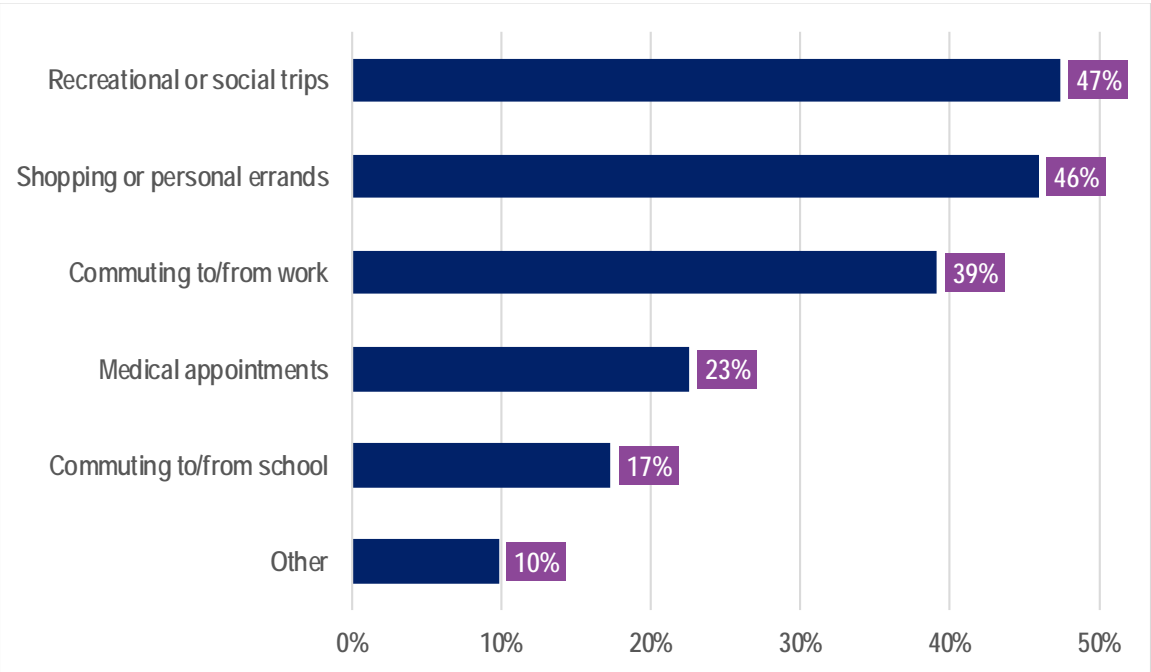




Figure 29 | What are the primary reasons why you do not use Wave Transit? (Select all that apply)

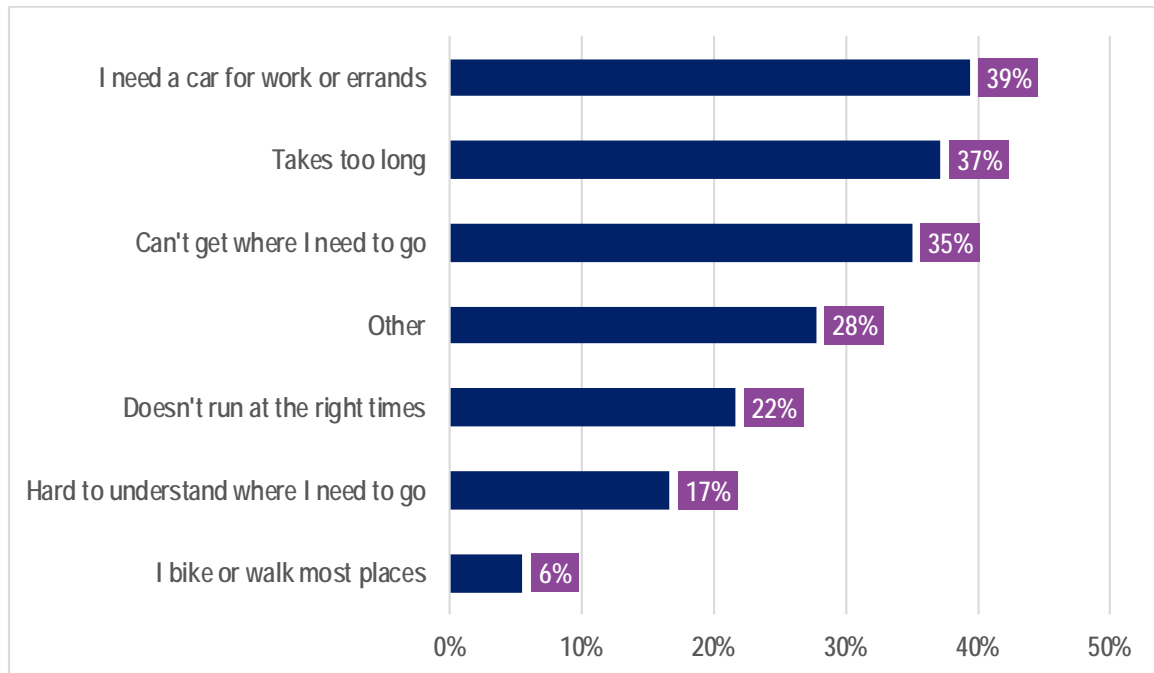


Figure 30 | If there were no factors preventing you from riding Wave Transit, what kind of trips would you make riding the bus? (Select all that apply)

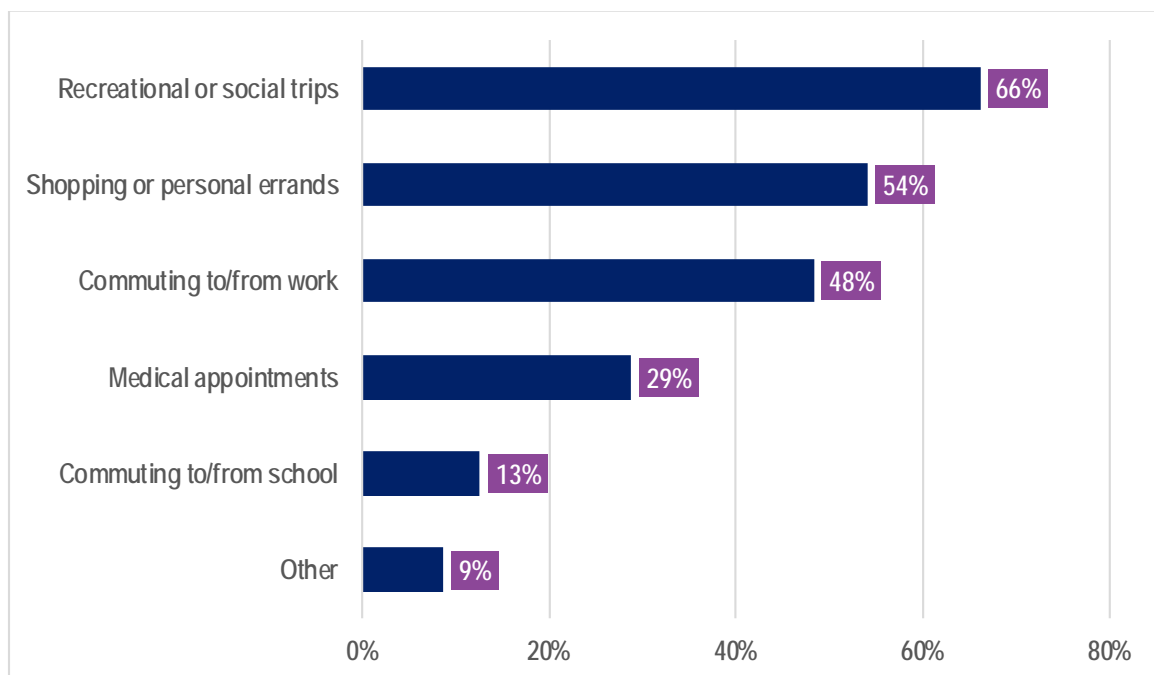




Figure 31 | On a typical weekday, what is your primary mode of transportation? (All respondents)

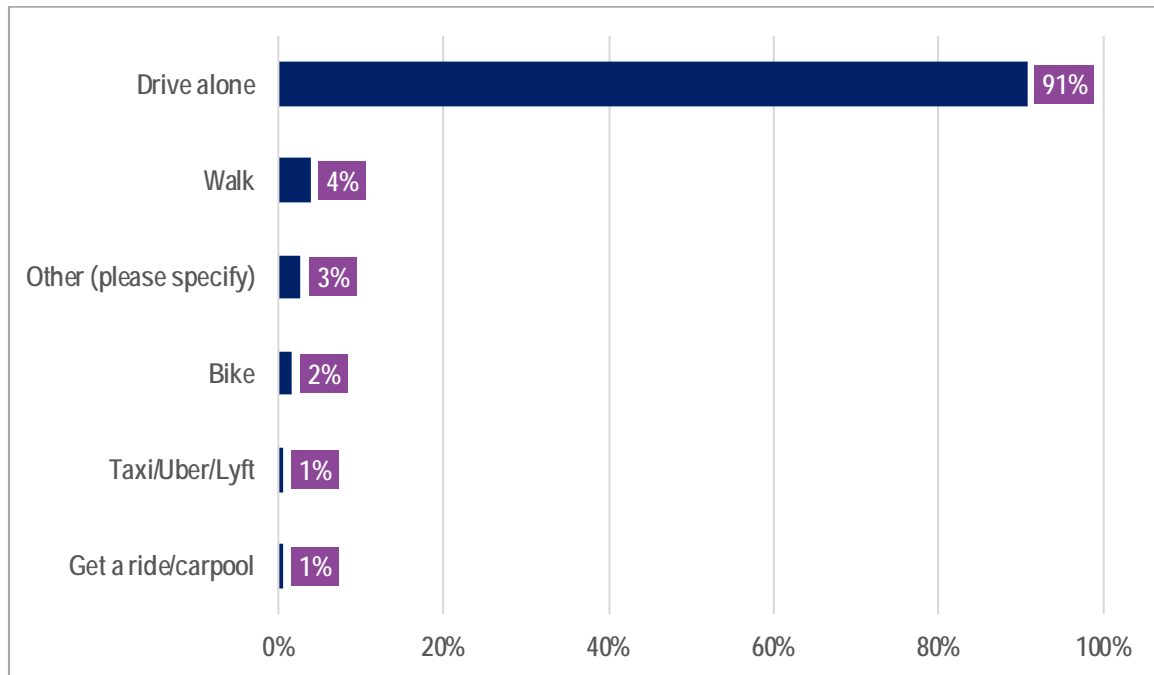


Figure 32 | Do you support greater local and regional financial support for Wave Transit?

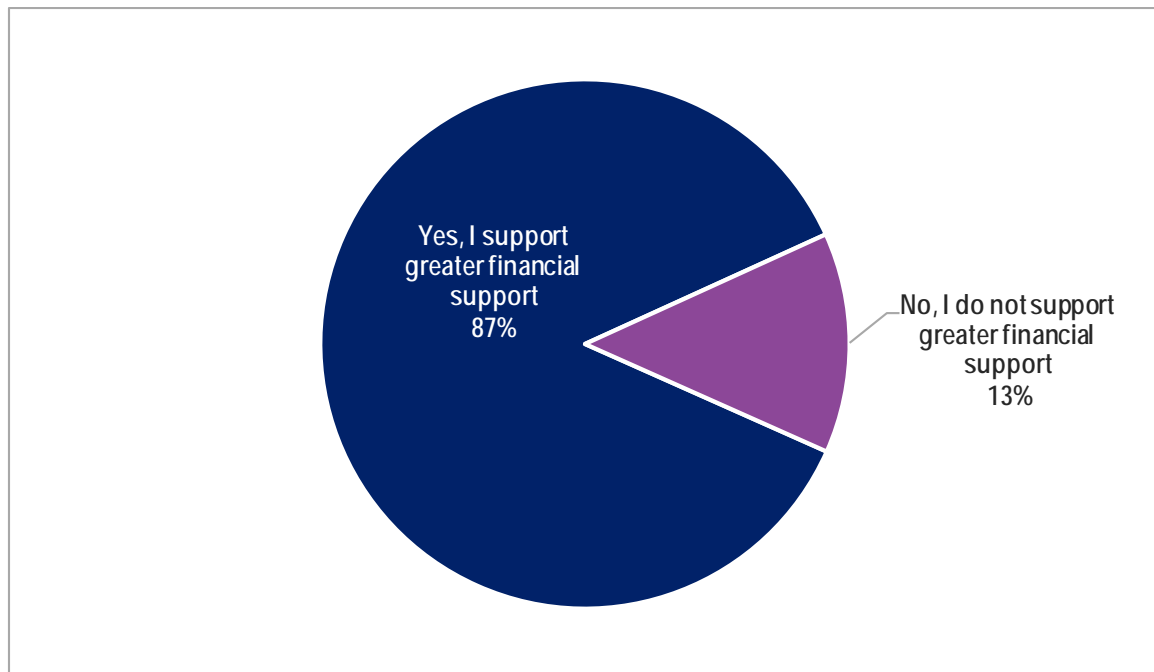




Figure 33 | Additional Comments

Evening routes-stops at intersections-buses are either boiling hot or freezing cold-maps often missing-help desk often very rude & uninformative-why don't some routes go two ways?
I enjoy riding the bus it gets me to work & home very quickly-the buses are clean & the drivers are nice
My only other thing about the bus is the distance you have to walk when you complete your ride
103 doesn't have all there bus stops listed on website-my dad had to drive around & show me where they were-i was very surprised they didn't have it-i've lived in wilmington my whole life & know other rtes like the back of my hand such as 201-101-202-207-106 i really know my stuff so i am kinda out of my element please revampy your website
The drivers are wonderful
I'm new to wilmington from new york-i do like the fact this bus line is near my house but work love to see it run more than what it does
103 bus am is an excellent driver-professional knows other bus routes for passengers-polite intelligent always asks how i am as well as the rest of the passengers
Happier bus drivers especially on the 201 am bus
Comfy seats!
There are plenty times i wlak-sometimes drive but bus is cheaper & safer than driving or biking
I would like to see more options to paying fare-perhaps a rfid prepaid card with reloading stations around the city-also create a street car system
I had to do the paper on this one-work due to person could not read or write
If buses could run more frequently that would be awesome-i work mon-fri from 8:30am-5pm-however due to the bus schedule my travel time begins at 6:30am and ends at 6:30pm-i am grateful for public transportation though-thank you!
Thanks for providing me transportation when i need it
Bus drivers are friendly!
I have been riding wave transit for over 10 years & it has greatly improved-back then buses broke down & were never on time-making us miss our connecting bus & we were late for work & appts-it is not like that now-buses are never more than a few minutes late & if we were going to miss our transfer the bus driver would asst us if anybody needed another bus held & they do-this enables us not to be late for our wherever we need to go-all of the staff are polite courteous & knowledgeable about all rtes if we ask them which bus goes where-good job wave transit
No place to get out of the rain or to sit down
Need to go over where the exit doors are
Age 8 years old
On holiday please run 1/2 day
I'm happy w/wave transit
Please-please start cleaning the buses-sometimes more often than not the bus can smell & be messy-make the experience better by a clean fresh smelling bus-it would make passengers happy-also it would be great if the bus ran on 30 min intro (every 30 min to give more time in a days travel-thanks



Should be more training on drivers being polite-respectful/understanding to passengers needs-should be more routes & frequent longer service for those who work & go to school-i've notice the buses are filthy & have an odor on some-cleaner buses & more seating is important-should be shelters at bus stops for when it rains & benches so those who have problems standing (elderly/disabled) can sit down-better pay for drivers & protection in case of an emergency on the bus-longer breaks for drivers to eat lunch use restroom & do other things-also if bus is running early/late there should be a five to ten min waiting period to catch up
I don't like now cff has to pay but uncw doesn't-we pay for college to just in case you didn't know
It would be more convenient if they ran on forty five minutes schedule
It would be great if there were either more buses or more routes that went to and from monkey junction instead of one bus & one route that only runs every other hr from forden and every 3 hrs from the walmart bus stop
Bus driver for 107 is awesome and friendly-bus 301 needs its own bus
2 multiple buses due to construction detour @ greenfield lake & missed connection-8 & 14 i go to places that have bus routes and no other transportation-service has improved over last year-bus drivers are 50%/50% courteous safe drivers-riders get to know the drivers-vice versa-some passengers don't even say "thank you"
Shery-james-harold & lily are wonderful-melanie on the 201 is rude/aggressive & horrifying & i have no clue how she continues to be employed
Your drivers-the service the 301 are the most professional people-i have rode with since riding wave transit & i have been riding wave for going on 2 1/2 years-ms sherri is my favorite driver on this route you can be having a bad day and get on her bus and she just brightens your day up with her pleasant smile
Running the 301 route every 3 hours is inconvenient
Please let the 301 run all day thank you
We need the 301 to run every hour and the buses to run a full day on sunday-have the buses run until 12:00 pm the bus should be more work friendly-we need to get back and forth from the beach to work and unlike wave transit the rest of us need a full day on sunday
I love wave-it help me get there i going-my first year riding the wave
Some drivers 201 in morning woman drive too fast and stop too quick-carolina beach needs more bus service
Routes get me to where i need to go-disagree there are not enough options which causes long walk times to get to stops & destinations-schedules meet travel needs-disagree i live in carolina beach most jobs start by 8 am-first bus don't leave until 8 am which causes 2-3 hours tardies to work-i was just released from my job due to relying on wave as my transportation to work
Should have veterans discount for bus fare
Some of well most of you drivers are extremely rude and unpleasant even some of the people in the office are rude with nasty attitudes-one particular bus drivers are the dark skinned curly haired black woman who drives mornings on the 201 her attitude is horrible and she seems to always be in a bad mood-other than your horrible customer service the service is okay
Routes like 207 need to come 1/2 hr both ways-1/2 hour service would be better
202 driver is mean & not very kind to passengers-aa female
More buses-more stops
Thank you for doing your job






The older gentleman who drives the 202 si the sweetest bus driver i have ever met-a special thanks to him for being so kind-thank you all for doing your job
You have good services
You took the bus stop away from lincoln rd by eastbrook estates now i have a very long walk to the next bus stop-you moved it to mt misery rd in front of nursing home which was close enough but then you moved it again farther down the rd????
Would love to see bruns cona to run on weekends
Buses need to run every 30 min because if they do not connect you have to waist another hour which puts you behind where you need to go thats important like doctores & work appointments
I would like to see the bus run on the weekend on the brunswick route for job purposes & family bin brunswick county that i would like to get to on the weekend-i spent \$40 on sunday just to get from leland to and from work-would have rather spent \$4-i have a 8 mounth old baby
Need some seats at some bus stops
Dave sucks-unfriendly drivers & rude-bus times need to be extended past 9pm-transfer should be excepted at 1 min expired-buses need to run more frequently than every hour-drivers need to be more knowledgeable about all routes-routes need to be extended to other areas of wilmington-i had a serious run-in with doreen where the police were called because my transfer expired by 3 mins at 2:05 stop by bp which used to be at 25 after-horrible experience
Improve customer service desk-i was ticked off when i forgot my reduced letter but i was on my way to pick up my card-i had to pay full price-they would not give me a charge card & laughed at me-luckly i had enough to go home & pay for the card i tried to pay for ahead of time-they would not accept the moeny then
Wave need to update their bus stop signs most of the times are wrong which make conflict with some passengers
I have to schedule my days two hours ahead of class times (on the hour) due to the bus schedule-buses arrive at the downtown station on the hour of the same time classes start so in order for me to arrive to class on time i have to leave extremely early & arrive an hour early-this makes it difficult to arrive to school on time-i wish buses arrived to downtown station earlier/more frequently or at least stopped closer to cape fear campus (more than 105 & northbound bus)
Some of the times it take for the next bus is rediculously long
No weekend service-bus always late on bus 207-breakdow more
Greentree should have buses on the weekend so i don't have to pay for a taxi to work
Better staff
Maybe more services to areas to where people can work or to where they live-castle hayne it would provide more revenue for company and provide more services to the community
I wish the buses were still every half-hour
She is always on the phone
Get rid of 201 person-go back to every 30 minutes



Figure 34 | On-Board Survey Instrument (Front)



## WAVE TRANSIT CUSTOMER SURVEY

Please help Wave Transit improve transit service in the Cape Fear Region by completing the survey below.

*If you have already taken this survey on another trip, you do not need to take it again.*

Sequence Number:

**1. How often do you ride Wave Transit?**

☐ Almost every day
☐ On rare occasions only

☐ Several times per week
☐ This is my first time

☐ A few times per month
  

**2. Including this bus, which Wave Transit routes will you use to complete this one way trip?**

1st Route: \_\_\_\_\_ 2nd Route: \_\_\_\_\_ 3rd Route: \_\_\_\_\_

**3. Where did you begin this one-way trip?**

☐ Home
☐ Store or Shopping Center

☐ Work
☐ Hospital or Clinic

☐ School
☐ Other \_\_\_\_\_

Please provide an address or description of where this place is located:

**4. Where is your final destination on this one-way trip?**

☐ Home
☐ Store or Shopping Center

☐ Work
☐ Hospital or Clinic

☐ School
☐ Other \_\_\_\_\_

Please provide an address or description of where this place is located:

**5. If you're riding Route 204 Brunswick Connector, in which county does your trip end? (Skip this question if you're not on Route 204)**

**6. How did you pay for your fare today?**

☐ Cash
☐ Cash - Reduced (students, older adults and those with disabilities)

☐ Adult Seven Day Pass
☐ Reduced Seven Day Pass (older adults and those with disabilities)

☐ Adult 31 Day Pass
☐ Reduced 31 Day Pass (older adults and those with disabilities)

☐ UNC-W Student (free)
  

**7. If you purchased a pass product, where did you buy it?**

☐ Forden Station
☐ On-board Wave Transit bus

**8. If this route didn't exist, how would you have made this trip?**

☐ Another existing route
☐ Walk

☐ Drive alone
☐ Bike

☐ Get a ride/carpool
☐ Would not have made this trip

☐ Taxi/Uber
☐ Other \_\_\_\_\_

**9. What is your gender?**

☐ Male
☐ Female

**10. What is your age?**

☐ 13 or under
☐ 14-17
☐ 18-25

☐ 26-35
☐ 36-64
☐ 65 or over

**11. Which of the following best describes your employment status?**

☐ Full-Time
☐ Part-Time
☐ Unemployed

☐ Student
☐ Retired
☐ Other \_\_\_\_\_

**12. What is your approximate household income? (Optional)**

☐ Less than \$10,000
☐ \$10,000-\$29,999
☐ \$30,000-\$49,999

☐ \$50,000-\$74,999
☐ \$75,000 or more

**13. Which of the following describe the reasons that you use Wave Transit? (Select all that apply)**

☐ I do not own a car
☐ My car is temporarily out of service

☐ I cannot drive for legal or health reasons
☐ I prefer to spend time on activities other than driving

☐ Parking is not available or is expensive at my destination
☐ Taking the bus is more affordable than paying for gas and car maintenance

☐ I am doing my part for the environment
☐ Other \_\_\_\_\_

**14. Based on your experience riding Wave Transit buses, how strongly do you agree with the following statements?**

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Service is dependable	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Routes get me where I need to go	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Schedules meet my travel needs	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Fares are reasonable	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Buses are comfortable and well-kept	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Staff is professional and courteous	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Maps and schedules are easy to understand	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Website is easy to understand	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**15. The following questions ask your preference. Please check ONE box per row only?**

More frequent bus service	◀ <input type="checkbox"/> OR <input type="checkbox"/> ▶	Longer service hours
More weekday service	◀ <input type="checkbox"/> OR <input type="checkbox"/> ▶	More weekend service
More bus stops for shorter walk distance to/from bus stops	◀ <input type="checkbox"/> OR <input type="checkbox"/> ▶	Fewer bus stops for faster bus service
Buses running more frequently but on fewer streets	◀ <input type="checkbox"/> OR <input type="checkbox"/> ▶	Buses running on more streets but less frequently
Improve existing service	◀ <input type="checkbox"/> OR <input type="checkbox"/> ▶	Serve new areas

**10. What is your age?**

☐ 13 or under
☐ 14-17
☐ 18-25

☐ 26-35
☐ 36-64
☐ 65 or over

**11. Which of the following best describes your employment status?**

☐ Full-Time
☐ Part-Time
☐ Unemployed

☐ Student
☐ Retired
☐ Other \_\_\_\_\_

**12. What is your approximate household income? (Optional)**

☐ Less than \$10,000
☐ \$10,000-\$29,999
☐ \$30,000-\$49,999

☐ \$50,000-\$74,999
☐ \$75,000 or more

**13. Which of the following describe the reasons that you use Wave Transit? (Select all that apply)**

☐ I do not own a car
☐ My car is temporarily out of service

☐ I cannot drive for legal or health reasons
☐ I prefer to spend time on activities other than driving

☐ Parking is not available or is expensive at my destination
☐ Taking the bus is more affordable than paying for gas and car maintenance

☐ I am doing my part for the environment
☐ Other \_\_\_\_\_

**14. Based on your experience riding Wave Transit buses, how strongly do you agree with the following statements?**





## 5 WAVE TRANSIT FREE DOWNTOWN TROLLEY SURVEY ANALYSIS

### APPROACH

Understanding the qualitative perception of transit service is an important element to meeting the needs of customers and non-customers alike. Transit agencies who struggle with financial resource allocations must continually check the pulse on how the service accomplishes the daily transport needs of its customers be it work, leisure, education and so forth.

The consultant team took a two-pronged approach in gathering customer perception of Wave Transit's Free Downtown Trolley service. This positioned the surveying in a manner which allowed for a cross-section of respondents and the possibility of valid results.

#### On Board Survey

For the first approach, consultants conducted on board surveys of trolley customers over a six-day period. During June 19 through June 24, 2017, consultants rode the trolley at differing six hour blocks of time during the day. We intentionally broke up the day into morning, lunchtime, late afternoon and evening time periods to capture a varying ridership base. A tablet platform and editable PDF survey instrument made completion and tabulation of the surveys efficient. The survey instrument is presented in Figure 53 and Figure 54.

#### Online Survey

The second approach afforded the potential for a wider reach of customers. Using the online survey service, SurveyMonkey, and promotion on the Agency social media platform, we reached a wider audience. Additionally, tabulation of the survey results was done in real time, which allowed for interim assessment of the results.

#### Infographic Public Meeting Boards

In support of the public outreach campaign associated with the Wave Transit Short Range Transit Plan, three infographic boards were created. These boards display data and information generated through development of the project and are intended to be informative and educational.

### SUMMARY SURVEY FINDINGS

#### Rider Frequency

Many online respondents do not ride the trolley often and when they do, they do not connect to other routes.

In contrast, the majority surveyed on-board ride the Free Downtown Trolley almost every day. The frequent riders tend to be more transit-dependent than those who ride more infrequently due to the current route.

When the Free Downtown Trolley riders connect to other Wave routes, the most frequently used route is Route 101 whether the trolley rider is a frequent or infrequent rider.



## **Trolley Use and Purpose**

Both online and on-board survey respondents use the Free Downtown Trolley most frequently for leisure purposes. For online respondents seeking to visit an attraction, the most frequently visited are restaurants and shopping. Many of the on-board respondents used the trolley to get to work or to the Salvation Army.

Both types of survey respondents also ride the trolley because of its convenience.

## **Free Downtown Trolley Pricing**

Respondents for both surveys indicated they would be willing to pay to ride the trolley. Fee suggestions ranged from a donation-based fee to \$15 per week for an unlimited number of trips. The \$1 per trip was reported most often as the fee one would be willing to pay in the event of a fee-based trolley ride.

## **Route Coverage**

When asked if the Free Downtown Trolley serves the necessary areas on the on-board survey, most respondents indicated it did; however, there is a small margin between those who agree and disagree whether the trolley serves the necessary areas.

This differs significantly from those who took the online survey with a larger majority (almost 66%) believing the current route does not serve the necessary areas. With the online respondents being more infrequent riders than those surveyed on-board the trolley, one can assume the infrequent riders would ride more often if the trolley was on a different route.

Both the online and on-board respondents indicated the trolley route should serve the Brooklyn Arts District, as well as the Castle Street and South Front Districts. The online survey respondents also indicated various apartment complexes (i.e. Sawmill Point Apartments) and the Cape Fear Museum should also be served by the Free Downtown Trolley.

## **Ride Time/Frequency**

Most survey respondents indicated they would still be willing to ride the trolley if the ride time for the entire route increased to 30 minutes due to increased coverage. Many of the on-board riders who were surveyed stated they would ride the trolley no matter how long the ride time was as it is the only convenient and affordable transportation available to them. If the route continues with one trolley as today, then the frequency of service would also change from every 20 minutes to every 30 minutes.

## **Increasing Awareness**

Respondents for both surveys offered suggestions to increase awareness about the Free Downtown Trolley. The majority recommended an increase and improvement in clearer route and stop signage as well as the utilization of advertisements, both print and radio.



## COMBINED SURVEY RESULTS

Figure 36 | Have you ever ridden the free Downtown Trolley?

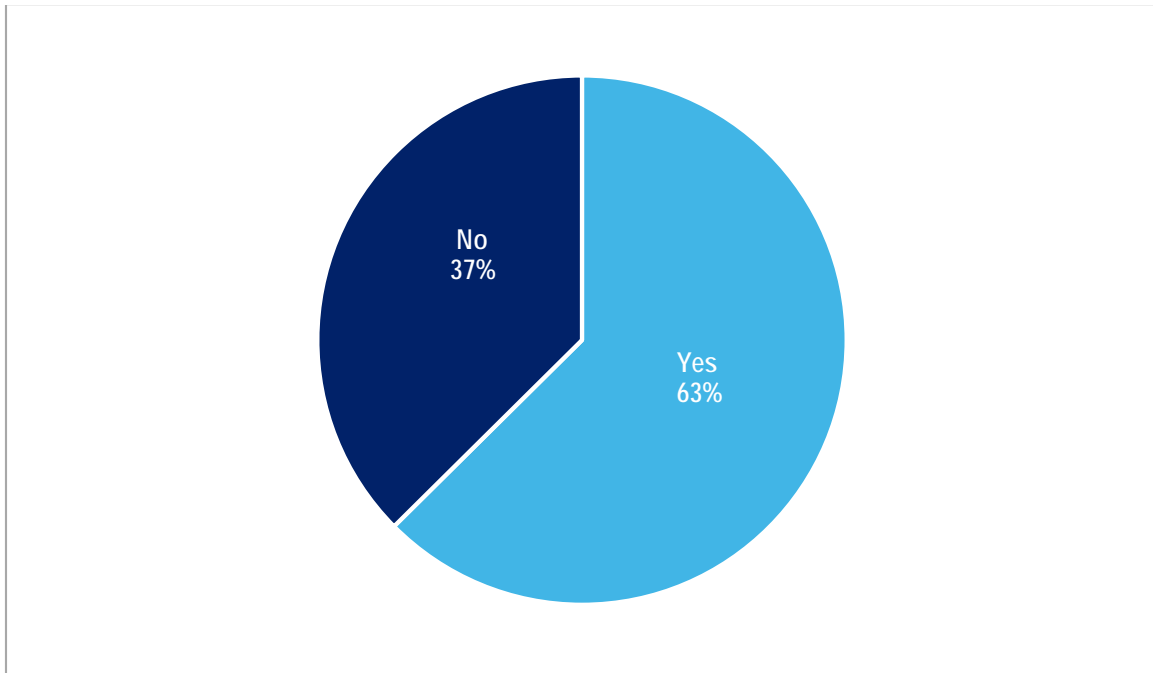


Figure 37 | How often do you ride the free Downtown Trolley?

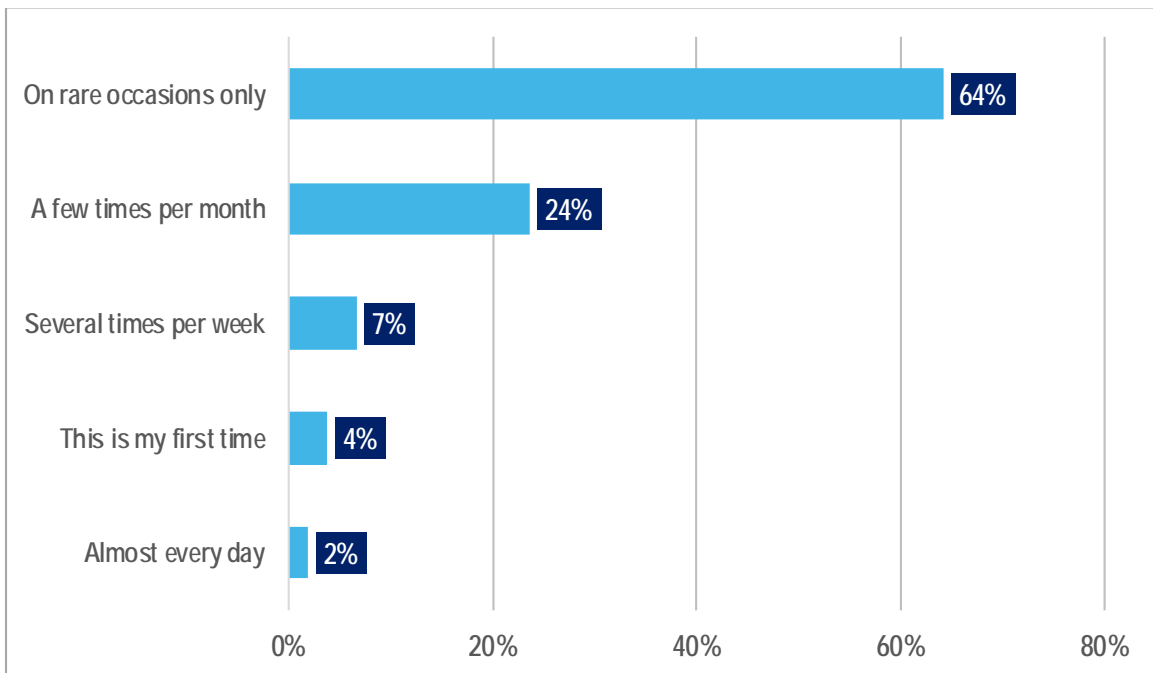






Figure 38 | Do you typically connect with any other Wave Transit route?

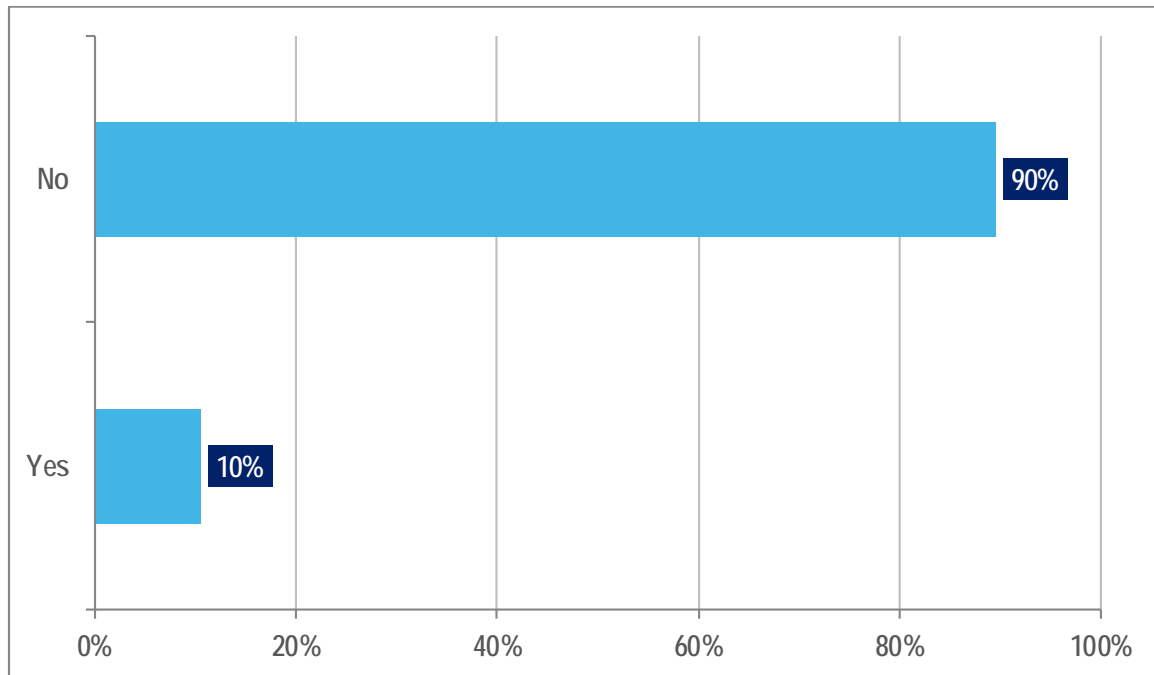


Figure 39 | What is the purpose of your trip?

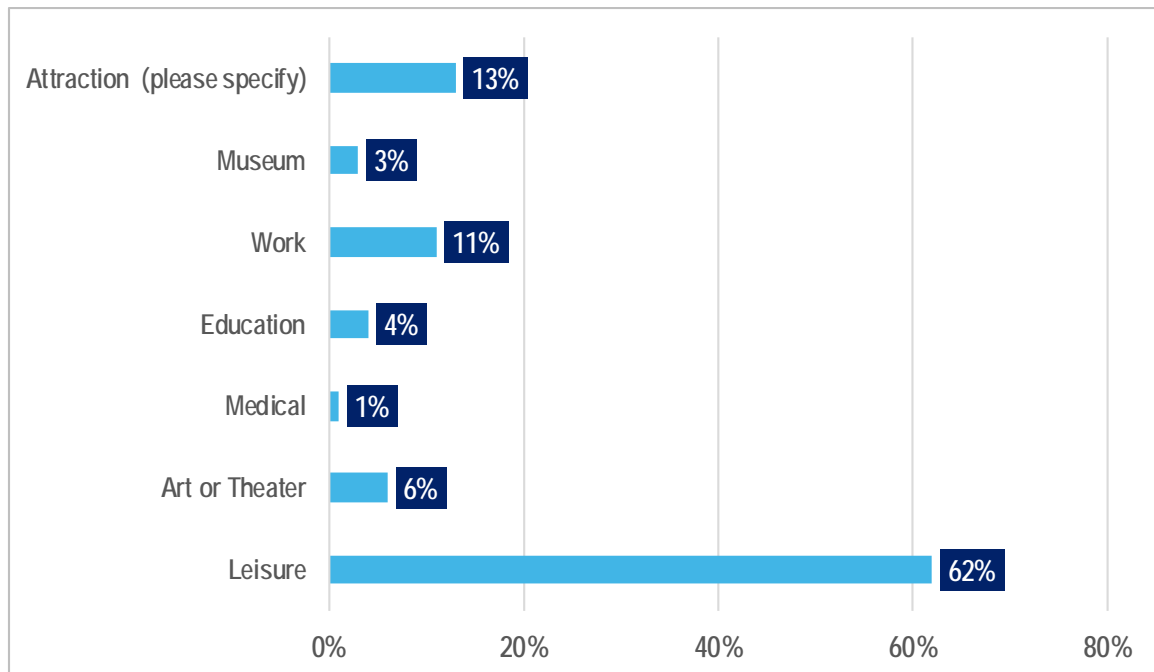




Figure 40 | In which county do you reside?

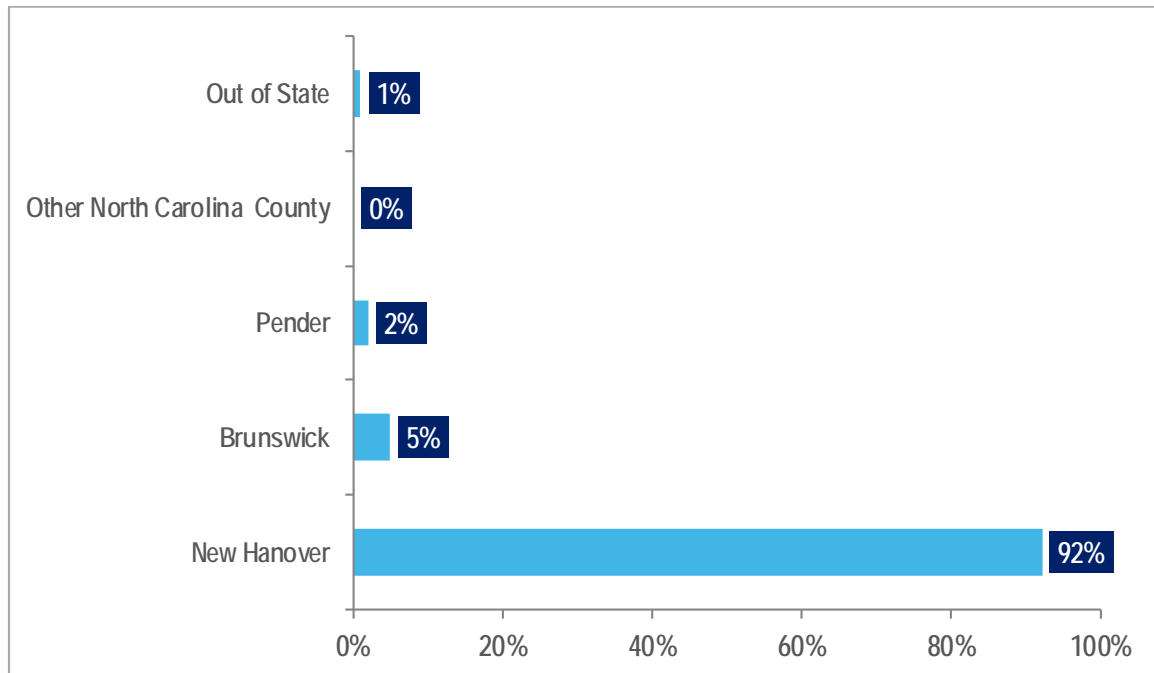


Figure 41 | How did you get to downtown?

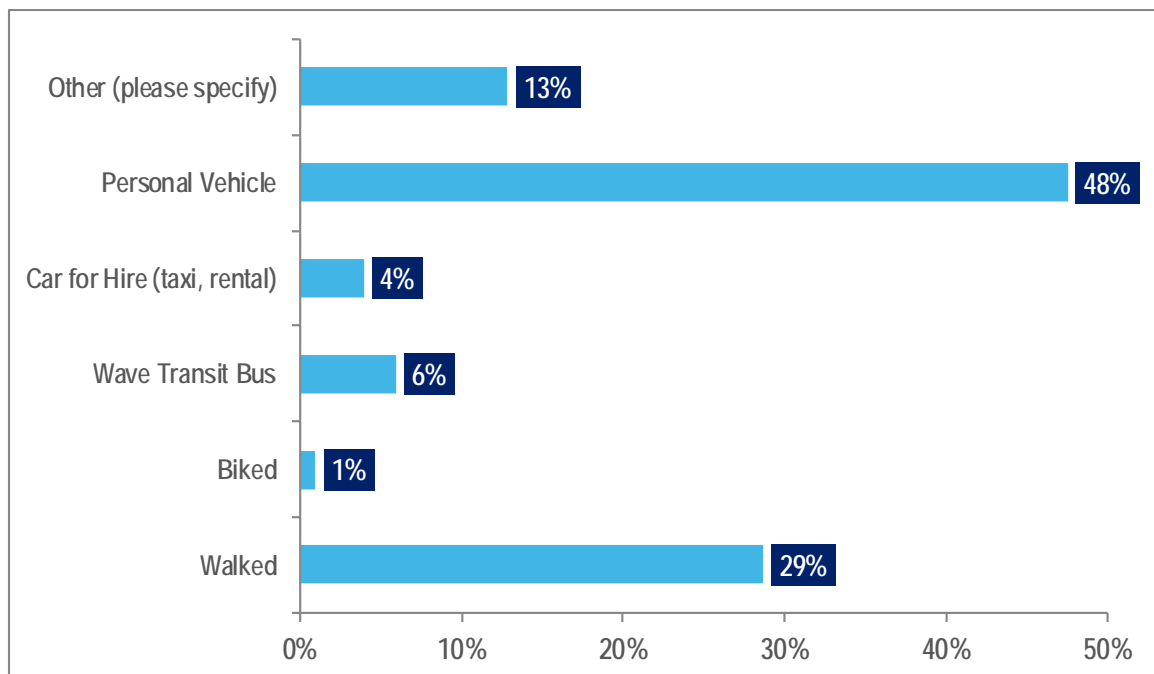




Figure 42 | Where did you park?

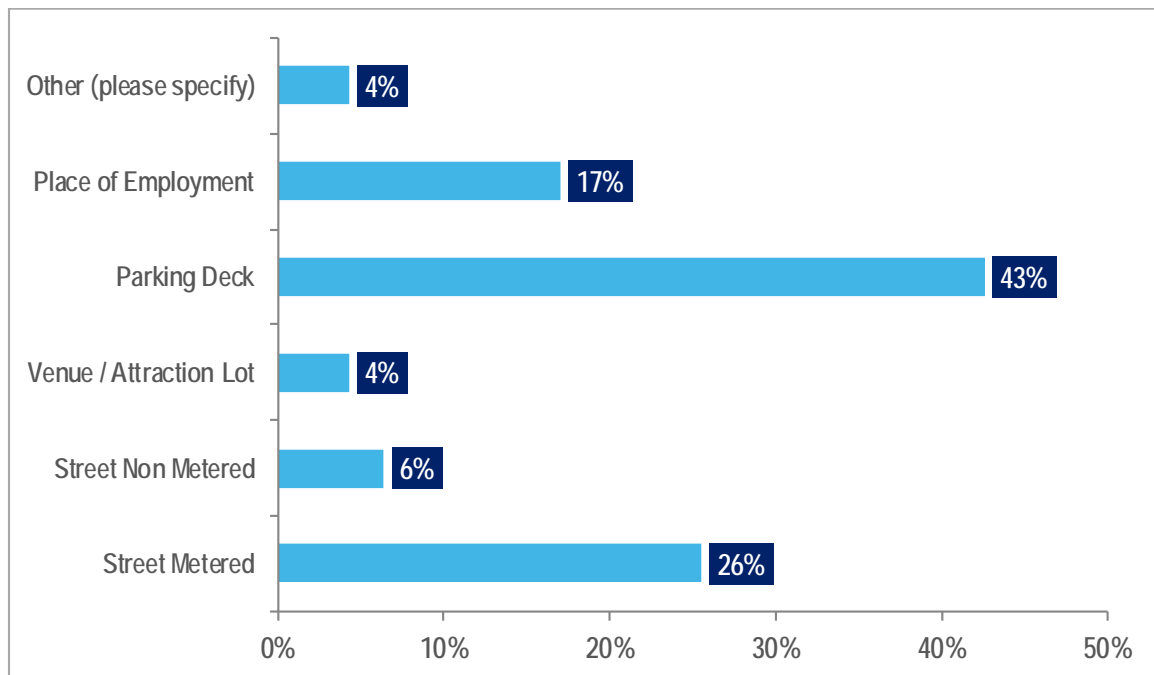


Figure 43 | Which of the following describe the reasons that you use the free Downtown Trolley? (select all that apply)

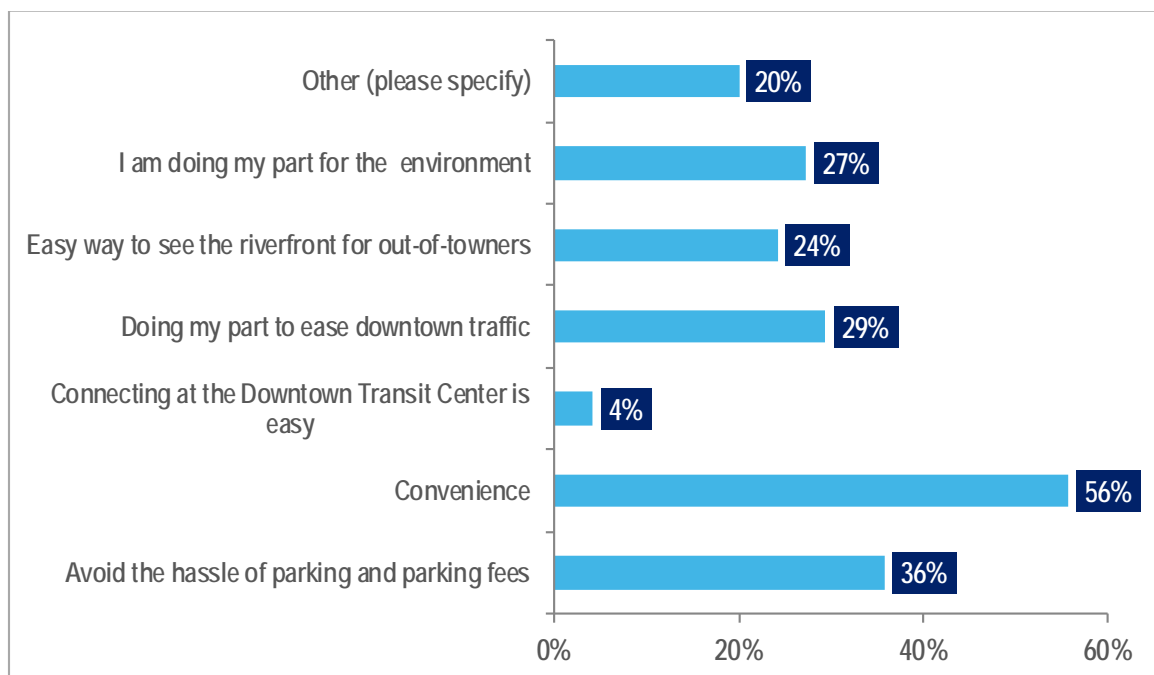




Figure 44 | If the Downtown Trolley was not free, what would be a reasonable fare?

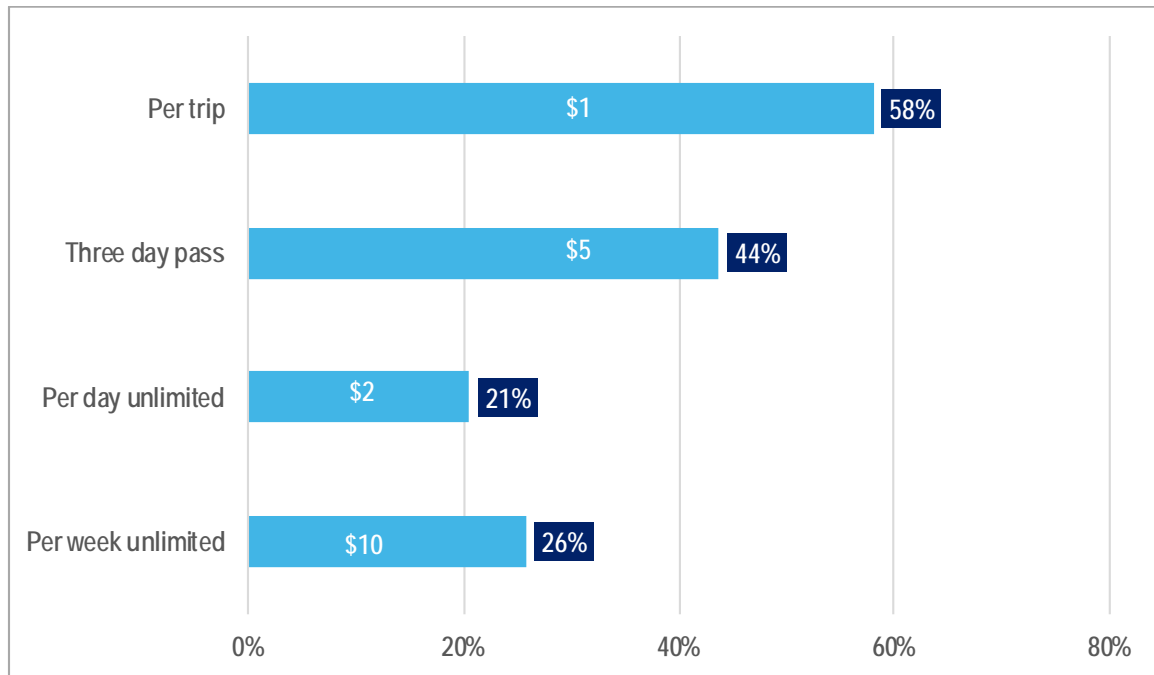


Figure 45 | Does the free Downtown Trolley serve the necessary areas?

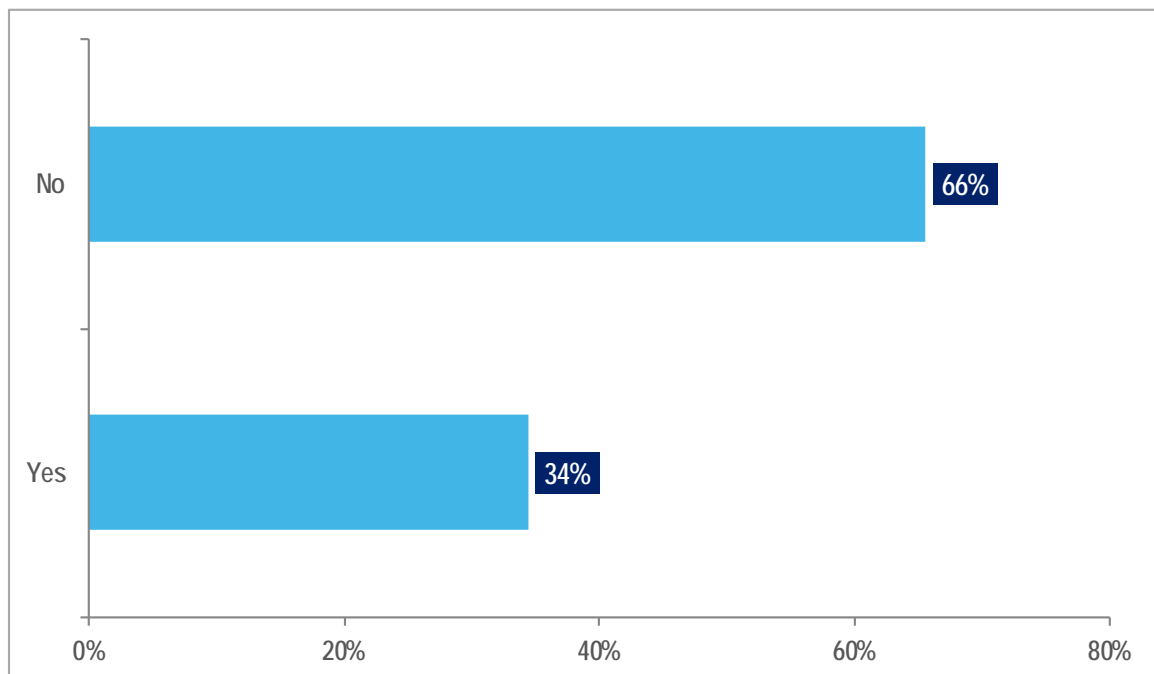




Figure 46 | What other areas should the free Downtown Trolley serve? (Select all that apply)

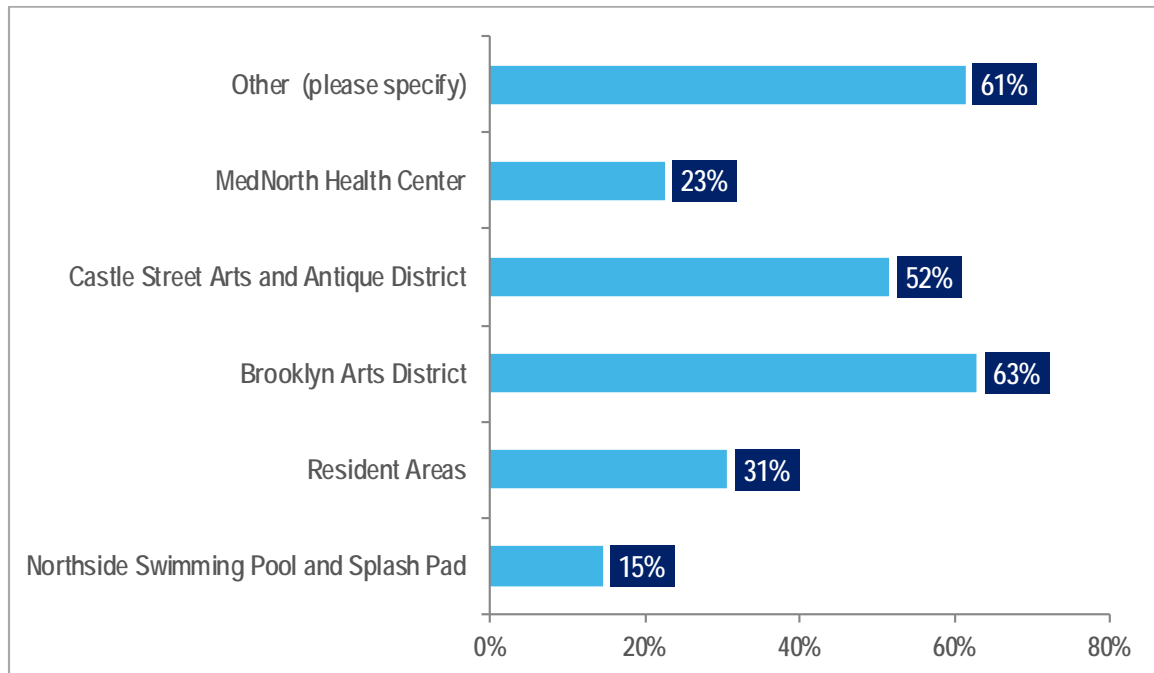


Figure 47 | Increased coverage area might require a longer riding time. Would you be willing to ride...

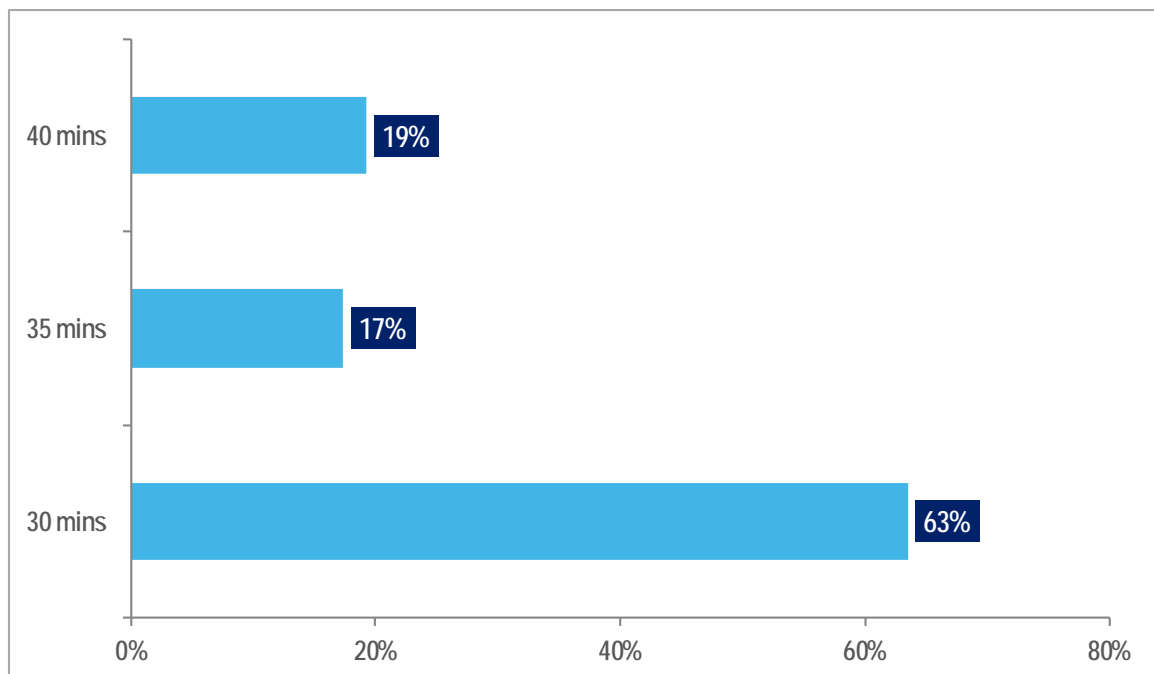




Figure 48 | How did you hear about the Wave Downtown Trolley?

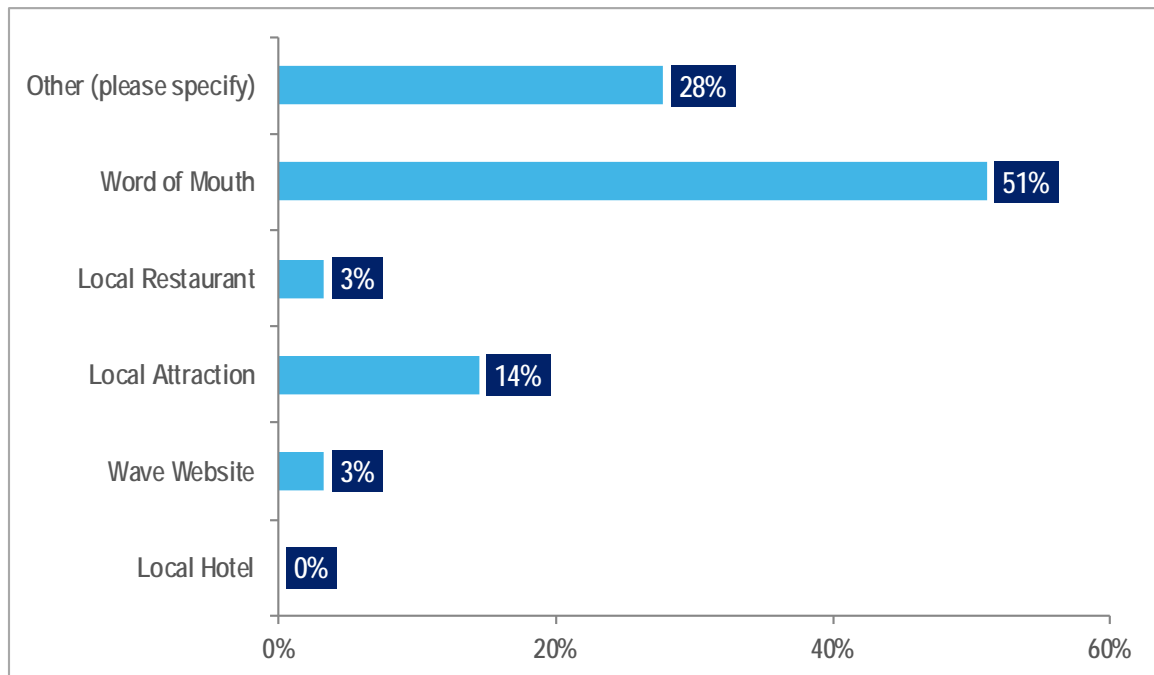


Figure 49 | Based on your experience riding the Downtown Trolley, how strongly do you agree with the following statements?

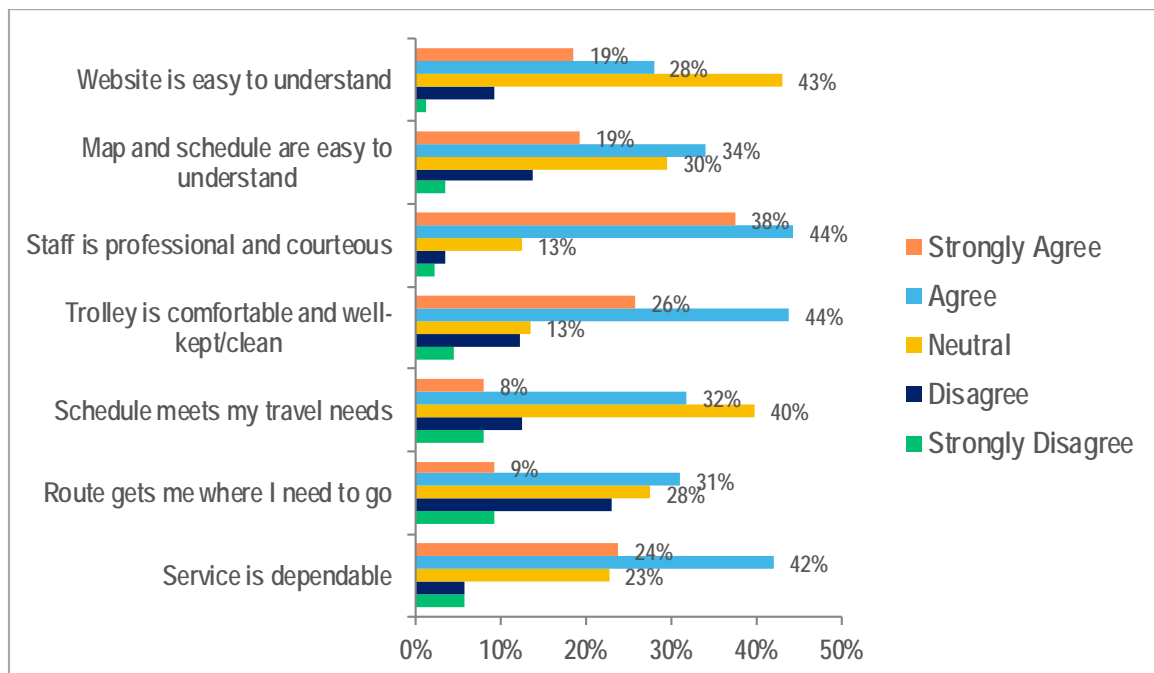




Figure 50 | Service Preferences

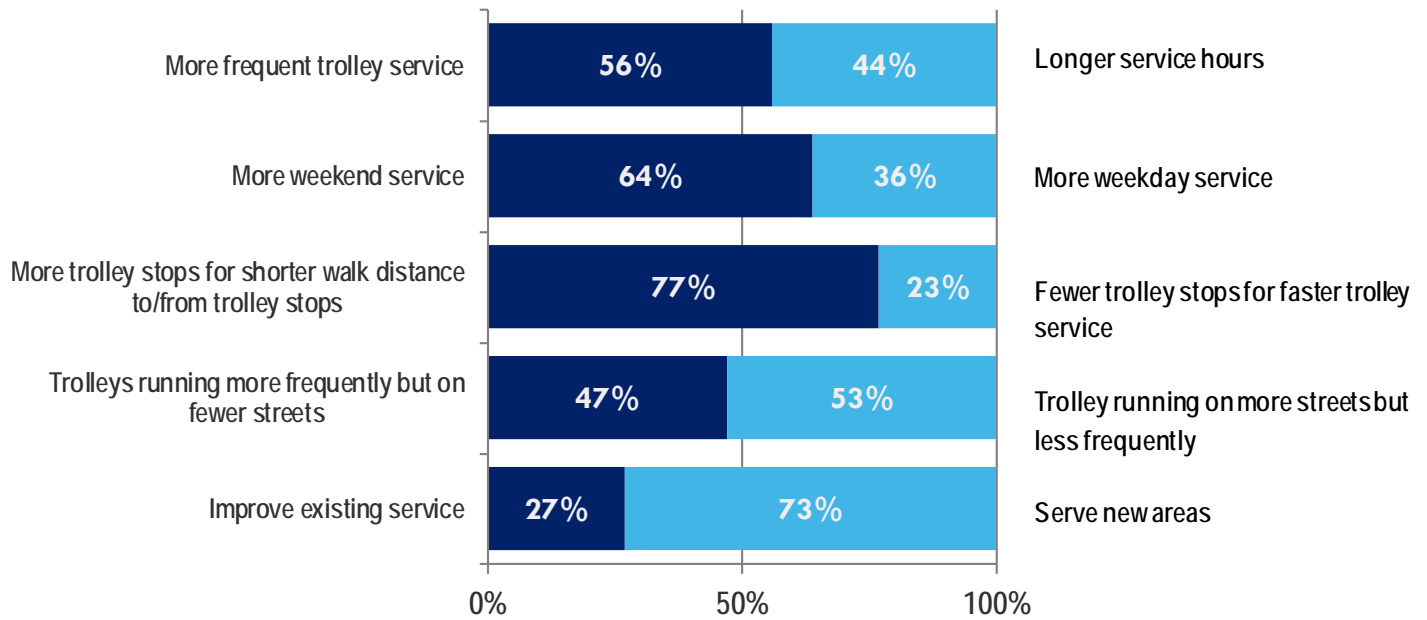


Figure 51 | What is your gender?

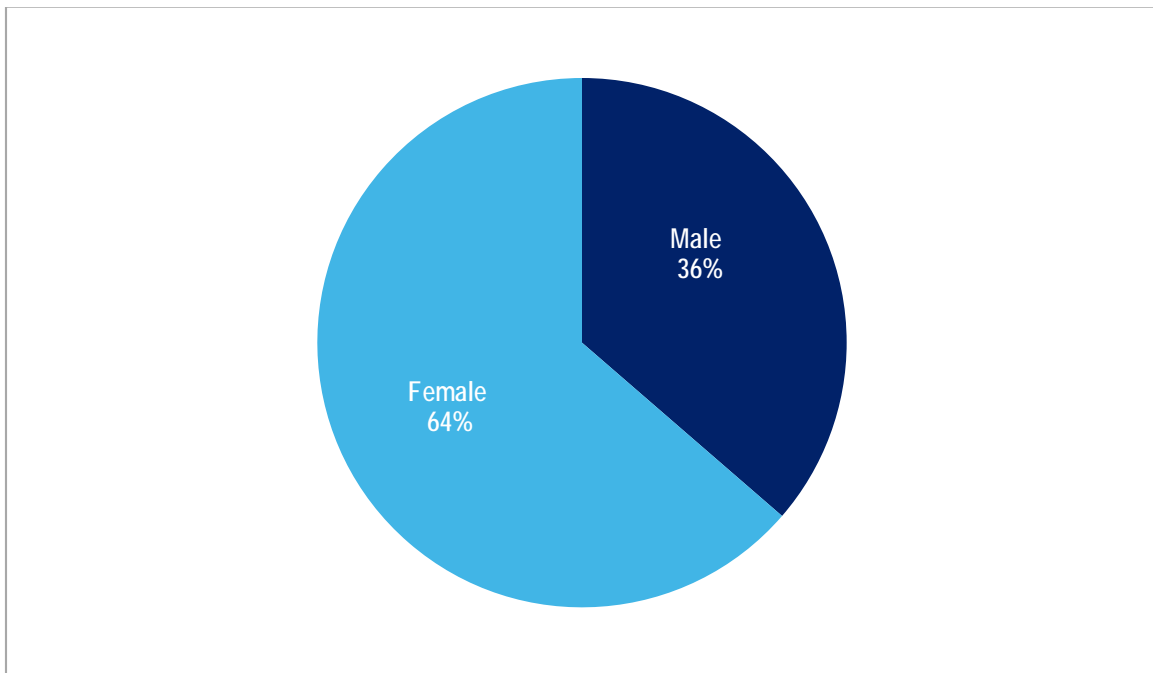






Figure 52 | What is your age?

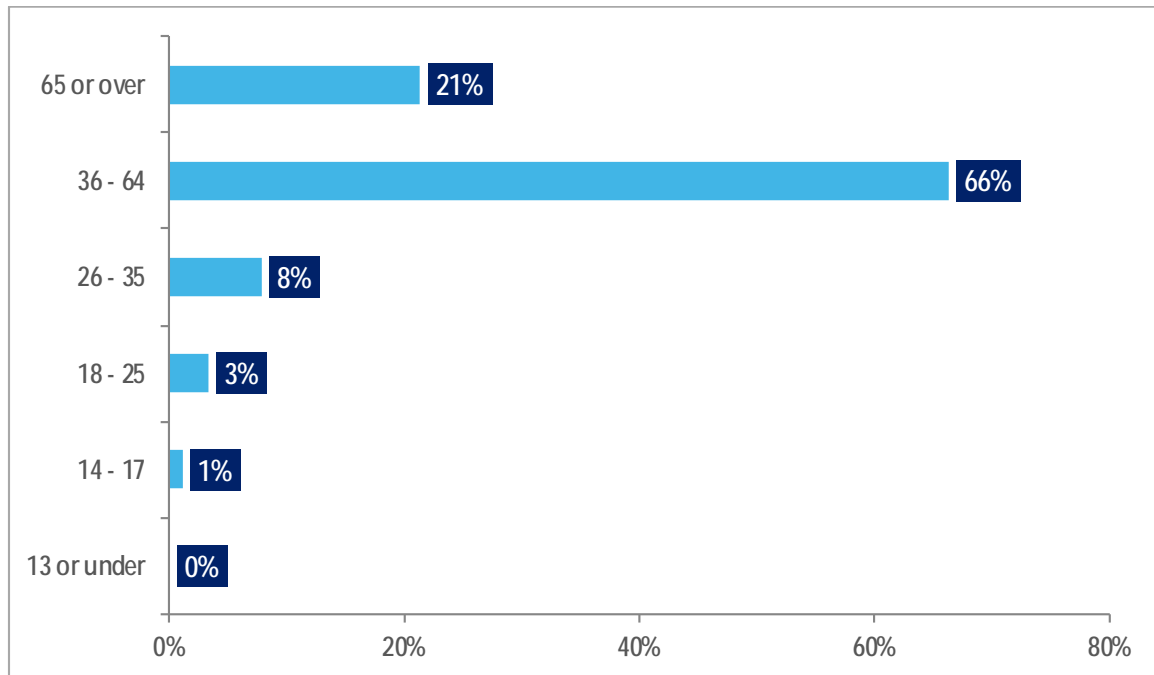


Figure 53 | Which of the following best describes your employment status?

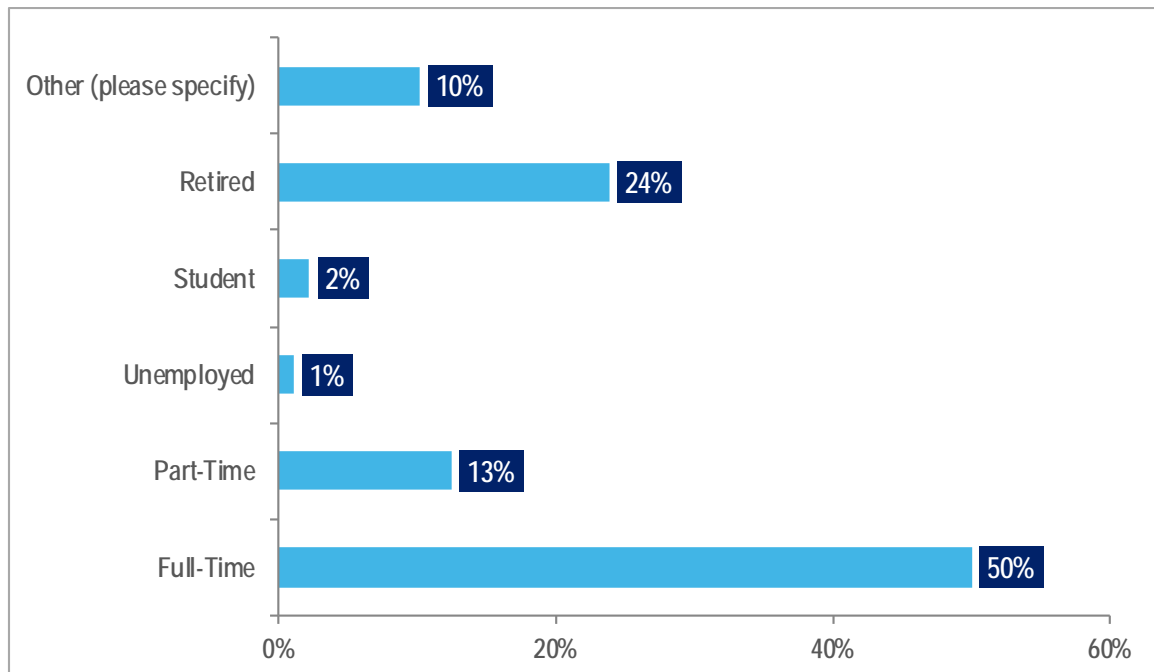




Figure 54 | What is your approximate household income?

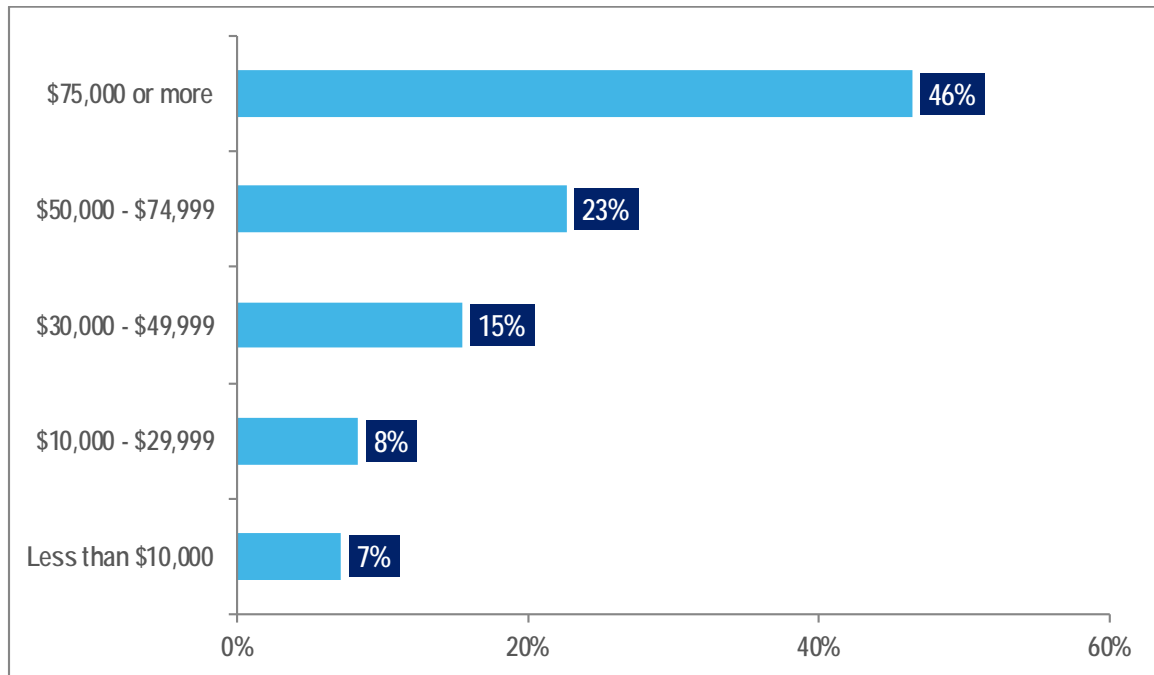


Figure 55 | What suggestions do you have to increase awareness of the Wave Downtown Trolley?

Radio ads
announcement on radio, emails to persons, penguin radio
Billboards in and on the way to town; ads for Wilm in AARP, Our State and In Flight mags; maybe partner with Wilson Center, Thalian and Convention Center on events for ease or crowds; extend service to Castle Street and Southside; maybe a figure 8 route or 2 routes that meet in the middle
Broader route around historic/tourist areas
Keep on doing the great PRICES
Easier route displays
We live in Sawmill Point apartments. It would be wonderful if the trolley would make a stop at the bottom of the hill by the apartments. Cowan St. & Nutt St. Wilmington. Thank you for your consideration.
The trolley is not a good use of Federal, State or Local tax payer funds. It is hardly every used and frankly it is dirty as compared to trolleys I have used in many other cities nationwide.
Word of mouth is fastest, also flyers at all the eateries and attractions downtown.
Direct Mail
Bell
Post trolley and bus schedule at all stops
e-mail blast



Maybe have two trolleys running so that the wait does not increase. Make the stops more prominent. Advertise on TV. The North End is growing - access to downtown would be such a plus. I am a senior and if I want to use the trolley I have to walk up a big hill on Cowan St to PPD -- very hard for me. Lots of new businesses in the Brooklyn Arts area and it would be nice to have a convenient easy way to take the trolley to get to them.
Trolley should stop at the circle at the end of Cowen St. by Sawmill Point Apartments. Eventually this Apartment complex could house upwards of 500 residents and I know that most would love to use this form of transportation rather than having to take their cars downtown. This additional stop would add no more than 1 minute to the current route. Wave transit should consider adding the stop ASAP to asses it's feasibility for the future. Please introduce this suggestion at your meetings as I will be out of town and unable to attend. You can advertise this new stop in the Encore Magazine, The Star News and with Flyers delivered to Sawmill Point.
Make very obvious, well placed, large friendly signs promoting the trolley at every stop, posting the schedule.
Ads or posters
Flyers, Newspaper ads, Radio messages and signage posted along main walking routes that coexist with trolley routes showing where the trolley will come and a rough timeline such as every 30 minutes.
If there was a trolley stop at the Cape Fear Museum on 8th street, it would increase ridership and awareness, because the residents in the area are so eager for it, they would spread the word like wildfire!
Local tv commercial, flier mailing
Bring the trolley down Market Street to the CAPE FEAR MUSEUM, then circle back to downtown. This would alleviate tourist traffic and promote another museum in the downtown area.
Improve the service by having the trolley travel to places folks want to go. Now it just wanders around.
Put signs & maps of route on Riverwalk. Put a big sign in the Visitor Center Rest Rooms. Work with local hotels, possibly have them hand out info or link to app when visitors check in.
Have it run on time. People will figure it out.
Better signage for stops, Bill boards, City Website, Visitor Bureau Website
Support the Artists in BADCO we are not downtown & harder to make a living here! Adele @A Studio
Map and brochure at visitor's booth, map at stops, app promoted by visitor's bureau and downtown organizations like wdi, dba and row.
It does not look like it is fun. The windows need to be either open or not tinted.
Brochure/sign at Bellamy Mansion gift shop/ticket center, hotels, Encore, visitor center, tv news mention, Willington Water Tours, restaurants
Information should be at visitor's bureau and information booth at end of Market & Front street
larger coverage area
Signs, promotional material at businesses and hotels.



Street signage
Newspaper coverage of sites it visits
Fun/funny reminders on social media sights
Signs in stores, Thalian, USO building something like "be sure to catch the Trolley and visit another stop downtown"...
Make it customer focused within the downtown
Stopping at more historic sites and museums which can then give more information about the trolley. Rack cards about the trolley?
Radio, television, print media, better signage on the Trolley, flyers on the trolley about art galleries and other places for people to take and share with other people
I do not think it is very effective and should be discontinued.
More signs and info at set stops
More Social Media
Start over - there is a complete disconnect between using the trolley and its route around town. It just runs around town with few onboard.
Better vehicles...the trolleys are horrible
Not sure
Total waste of tax dollars
More ads downtown and at attractions it serves.
hard to know what it does, where it goes and when it will be back.
Sign the route stops and add more on Fifth St.
Mail
Signage at all designated stops
Social media
As a business owner in the Brooklyn Arts District, I see a great opportunity for the businesses in the BAD and Castle Street District to promote the Downtown Trolley. Also, the residents at the new Sawmill Apartments, City Block, and the other apartment buildings on 4th Street and Castle Street could be provided information about the trolley with their lease agreements. Another way to increase awareness would be through the tourist bureau. Downtown Asheville has a trolley that provides on and off privileges, so visitors can stop, shop, and eat at different areas of town.
Run two buses during the lunch hour and 2 buses in the happy hour/ rush hour in the afternoon.
Retire it, it serves no purpose. I never see anyone on it.
Have more available.
I have no idea of what the route is or when it will be arriving. Sometimes if I get on going in one direction. It goes for one block then turns and goes back in the other direction. I don't bother taking it anymore.
posters to increase awareness, at local merchants, restaurants, parking deck, Northside Clinic CFCC



Designate trolley pick up/stops, especially in neighborhoods. Too many times they stop in middle of street, front street, to let people off and on. How many people would, that work in the service industry, ride if there were designated pickups in their neighborhood?
Add more vehicles and routes for the trolley system.
Advertise
Radio ads. Tourist sites.
more brochures

Figure 56 | Additional Comments

make a stop on Cowan street
The trolley is a moving face for the City and its hospitality; It has the ability to appeal to visitors more than locals; it needs more locals - take a trolley offline and offer a downtown Sunday Funday route or worship route for people to ride to the synagogue and downtown churches from parking decks; push marketing of a pub crawl once a month when downtown is slower (Wed); and or discover antiques; or take advantage of Restaurant Week; marketing needs to tie in to local events better to grab local attention; dress them up for holidays; make them fun; bring Santa to Greenfield lake, Mayfaire, the Cotton Exchange, the tree lighting events ; if people use it for 1 time routes they will get comfortable choosing it for fixed routes; and it would be important to tie in to the rail realignment project so that everyone behind the scenes seem to be on the same page since that it a potential future for riders and routes
Would love to see at stop at the end of Cowan St. in the cul-de-sac at Sawmill Apartments.
The downtown trolley is a total waste of money as I see it running empty every day. Sell off the trolley to a private company so they can operate city tours. Every major city in the USA has a private company that operates trolley tours. No private company would even consider it in Wilmington because there is a free trolley.
I live at Sawmill Point and it would be wonderful if the trolley could come around the circle and pick us up. Also, the trolley drivers are so nice and pleasant. Very professional drivers and safety is their first concern.
The north section of Down Town is growing. Saw Mill Point has 284 apartments, City Block Apt, Black Finn Rest & 2 more restaurants opening soon. Several Marinas. Embassy Suites in March - Having a stop at Saw Mill Point (furthest north) then stop at Cape Fear Marina would be ideal!
Add a stop at Sawmill Point
I think the trolleys could be updated. I rode one last week and it was ungodly hot in it!
This is a great service for so many reasons and I think it could be expanded; adding new stops and maybe another trolley. This way you would not have to extend the wait times while servicing a greater area.



<p>Since the Cape Fear Museum added the park 2 years ago, the number of visitors have increased. Their last Museum After Dark attracted over 400 people. Many of those folks would head farther downtown if there was a trolley stop at 8th street, because they wouldn't have to worry about finding parking.</p> <p>As a resident of that area, I know we would use the trolley regularly if it were available to us.</p> <p>We have a blind resident on South 8th street who enjoys going down to the river walk. It would be safer for her to ride the trolley downtown, because our crosswalks are not designed for the visually impaired.</p> <p>If residents that live near Market between 6th &amp; 10th, could take a trolley to get to the shops and restaurants closer to the river, it would cut down on traffic congestion down there and parking woes. The people living in those areas would go more often, because it would be a more pleasant experience. It would good for business, a real win-win.</p>
<p>Having additional trolley stops along Market would alleviate the need for as many WAVE buses downtown clogging up the already congested area. Putting a transfer point from an extended trolley line somewhere in vicinity of 16/17th St seems the most logical and cost effective.</p>
<p>Would love to see the Castle St and museum neighborhoods served...</p>
<p>We need a free trolley at the Cape Fear Museum.</p>
<p>Stops at museums, such as the Cape Fear Museum, help to promote the history of the area and provide enrichment to locals and tourists alike. The area around the Cape Fear Museum is underserved...now is the time to correct that.</p>
<p>Nicer trolley powered by natural gas. Current trolley is worn out. Re-do the outside with updated graphic wrap. Move route up to N. 4th St. Skip the Chestnut segment.</p>
<p>Start at convention Center on Water Street, Continue Water Street to Chandlers Wharf, Up to Front Street down to PPD. One simple loop.</p>
<p>I would like to see free transportation on 4th Fridays from galleries downtown to N 4th</p>
<p>We need trolley as part of a long-term solution to reduce vehicles and reduce need to build expensive parking decks downtown.</p>
<p>It is difficult to SEE whether the trolley is used very much. Dark tinted windows are not friendly.</p>
<p>I would love to see a stop at the Bellamy Mansion. The area around the fountain is very dangerous for walking/crossing roads to go to/from the Riverwalk. It is also too far for many tourists/locals to walk. I hope Sawmill Point is one of the stops to bring the residents to the restaurants/shops more frequently, too.</p>
<p>Need stop at. Ellamy Mansion</p>
<p>Trolley to Brooklyn Arts District would be wonderful.</p>
<p>Cape Fear Museum should be considered part of the total culture package for downtown Wilmington. It would be easy to add it as a stop, but difficult for some to walk to 8th Street from the trolley.</p>
<p>Include access to historical downtown mansions</p>



I live in Wilmington and visit downtown a lot, but I never think about the trolley. I think there are many others locals just like me - I hear people say "I never think about the trolley". If there were ways to get people like me to just remember, I think they would ride.
The Trolley is great. I especially appreciate the air conditioning in the trolley during the hot summer weather. I enjoy showing family and friends around town on the trolley. Very convenient and easy way to introduce people to downtown.
PLEASE EXPAND SERVICE TO SOUTH FRONT APARTMENTS!!!!
Wish route would enlarge a little!
I'd like to see the trolley run up Market to more museums. Bringing people to more attractions and businesses would improve the experience.
Total waste of tax payer's money and waste of clean air.
I enjoy the trolley. I would like it to extend the route closer to Solomon Towers as some residents would use it more with less walking.
Need smaller more efficient and comfortable bus and routing on north 4 Brooklyn arts district
Serving the Brooklyn Arts Center would be a plus. The current route on 3rd street doesn't make sense. No one ever gets on the trolley when it's on 3rd.
The Free Downtown Trolley is a waste of resources. It does not get enough use to justify the expense of it. Beyond this it really is a nuisance.
Museum/ fire dept. stop needed
I love seeing trolley service downtown and hope more residents and visitors will take advantage of it. Including historic overlay neighborhoods like Carolina Heights and Carolina Place in the route would be a great asset as parking is difficult downtown especially on weekends. Extended routes would as well assist aging population to enjoy downtown attractions like sunset on the Riverwalk, theater and restaurants. Thank You for your caring!
Service some of the neighborhoods, lots of industry people would use to commute to work, if there were a a stop near their house or apartment. Also, what about greenfield lake, would totally ride the trolley from downtown to the lake.
The schedule is so unreliable, we seem to always be waiting for the trolley and it never comes by. They need to strictly adhere to the stop schedule. The drivers are unfriendly and sometimes rude and discourteous.
I think the trolley is a good way to push the WAVE image. Currently my demographic does not take public transit because it has a bad image. Trolleys however, are considered cool. More trolleys will lead to more riders.
vehicles are clean but seating is uncomfortable. Any chance of GPS tracking at stop to give times between next vehicle?





Figure 57 | Additional Perception Responses

I'm not familiar with the route, the stops, and the schedule
Trolley is clean and driven by professional drivers.
Make a stop at the bottom of Cowan street by the circle
Nowhere to park downtown in order to ride the free trolley. Meter would expire before you could get back!!
my first thought is...am I supposed to wave down the driver? so downtown signage with a map (engage the arts group near WDI) so I understand where I will get to go or use the WDI - I should have emphasized that earlier...they are integral to being successful and disseminating info downtown (as well as the host of outdoor concerts during the summer); WDI was granted a downtown MSD which includes having 'downtown ambassadors' who could help inform people of trolley, route and how to catch it
Rough ride. Breaking down often. Like old look but need new mechanical drive (electric would be nice)
I do not know how to get on it. I would LOVE to ride it. I see it every day.
I find the trolley to be a very pleasant experience and a terrific aid to elderly people getting around downtown.
Stop the trolley immediately as it is totally ineffective.
I love the free trolley. I have gotten to know many of the drivers and the regular riders.
Sounds like fun and its practical
I'm new to town and haven't had a chance to check it out yet.
I am an 80-yr. young woman that does not care to drive downtown alone. I would like more info about it. Where does it take us to and from what area? I live near Porters neck. So, for me at night that is a distance to drive Thank you Caroline
It's a very convenient service!
they don't come to Sawmill Point
would be great if it went to sawmill point apartments!
We just moved here. We're hoping the trolley will service the Sawmill Point location near Cowan and Nutt Street.
We just moved downtown and plan to use it
I like the trolley but wish that it covered more ground. I would love a stop at sawmill point where I live and would like to be able to go to castle street or waterline brewery on the trolley. The trolley drivers are wonderful!
The biggest reason is the stop closest to me is at PPD - I live in the new apartments and it is hard for me to walk up or down the hill. I hate driving downtown and fighting for parking in the evenings. 8:30 is a bit early to stop the service.
Love the free Trolley service. Forgot to mention to add another stop at Black Finn Restaurant Complex at Port City Marina. For all the same reasons as mentioned earlier.
It doesn't service the area I work in
It doesn't come to SAWMILL POINT



seen it did not know much about it.
I love the free Downtown Trolley, from the classic design to the friendly drivers. The only reason I don't ride it more often, is because it doesn't have a stop at the Cape Fear Museum at the intersection of South 8th and Market Street.
We walk downtown often and would go more often if we could catch a trolley closer to where we live.
It doesn't take me to the Cape Fear Museum, a known Downtown attraction.
I don't know how or where the stops are.
Great way to integrate us all as neighbors, work commuters and sightseers, visitors and elderly citizens. More cities need this program
I don't rode trolley once downtown yet. As it expands, I might. Would ride it if it passed Cape fear museum to take a jaunt along the river, would even pay to take me to get fresh produce on weekends in season at farmer's market.
I would never take my family on this trolley. It's basically a free shuttle for the homeless drunks that plague downtown. Not safe!
Your unbiased, non-political decisions are appreciated. The underserved areas with historical tourist attractions need to be served by the Downtown Trolley.... i.e. The Cape Fear Museum!
It's of very little value. The community needs it to be a value and to be a model for how we create a valuable WAVE service
I like being able to wave down the trolley. Have not had problems but realize low income people use it a lot. Needs to be non-polluting (natural gas) to show visitors our commitment to the environment.
Not familiar with the free Downtown Trolley route or service. Would love to learn more.
I don't know how to get on it, and from where. Do I hail it...I do see some people do that; are the pick-up/drop-off stops around? I have not seen signage.
As a business owner I am always promoting the Wave Trolley to get from one end of town to the other. The problem is nobody know about it.
Maybe distributing maps. Signage at parking decks...
Outside appearance of the trolley is deplorable! You may increase ridership, and interest if you clean it up.
I personally like to walk, I used to live in NYC
Would like to ride the trolley - not that familiar with the stops, the hours, etc. Often see it after I've parked somewhere and walked to my destination.
I'm not aware of the route, stops, or times that the trolley runs
Trolley needs to cover bigger area and for longer hours, we need to run two or three trolleys to reduce wait time, and we need to think of trolley to move people without increasing vehicle traffic.
Adding coverage along Market for the Cape Fear Museum and the Bellamy Mansion and Museum would make these city treasures more accessible to our citizens and visitors.




Didn't know it was free!
Please send trolley to cape fear museum!
always wanted to but didn't know schedule or how to ride. I have since found this out and am planning on riding it this weekend. I suggest more advertisement of where and when it runs. It is a GREAT addition!
Just have not
The whole concept is great. I would like to know how popular it is and who is riding. It should be geared to the tourists and conventioners.
I frequent the Bellamy Mansion, and it does not stop there. I would go downtown in the winter and after dark, rather than only the summer/daylight if it stopped at the Bellamy.
I would like to be able to ride the free Trolley to all downtown attractions, including Cape Fear Museum of History and Science. There should be a stop in front of the Museum.
Never had a need to, but with parking so short I may in the future. Would like for it to cover a larger area, such as Market st to cape fear museum and castle st arts & antiques
Valuable service to provide downtown
It does not go out to great nearby areas, so it only services a small area.
I Love the idea of the free trolley and saves congestion for locals by lost tourists. I would suggest it be taken by out of town guests if it went by some of the big tourist locations like the Bellamy Mansion and Cape Fear Museum.
The few times my family has remembered to ride the trolley, we have all enjoyed it.
The trolley doesn't do a good enough job of connecting areas that are not easy to walk to from the core of downtown, such as Castle Street and the Brooklyn Arts District/N. 4th Street. It would also be great to look into connecting to the South Front area where Satellite, South Front Apartments, and the new development out there.
I love the idea but I never seem to see it stopped or understand where it stops... We love downtown Wilmington and could take advantage of the Trolley if we understood a bit more about the service... Saw the bus whiz by a few days ago, while coming out of the Cotton Exchange which reminded me I wish I knew more about it - service locations/times
Thank you for providing the trolley--it is a wonderful service.
NoFo & Brooklyn Arts District needs trolley service.
Love the trolley. Not many people know about the trolley. We don't have a double-decker bus like Washington, DC or London. But, the trolley is great for Wilmington for newcomers to receive an introduction to downtown and for old timers to refresh their memories. As Wilmington continues to grow and prosper, I believe the trolley needs to be upgraded and more visible with a longer route and perhaps more information and publicity.
I do not think it is effective and should be discontinued.
I wish it went down 4th street!
Just doesn't cover the area needed. Add 1 more trolley and expand service!



I see the "down and out" people riding it all the time and I think most people think this is for them only
As a downtown business owner I am very grateful for the presence of the trolley and the service it provides. Many visitors ask for information about it and utilize it. Thank you for making it part of downtown.
I may not ride the trolley, but as a business owner downtown, I am often told the trolley route is confusing and there is little signage. This should be improved to make it easier for visitors to get around.
I like to ride it especially when it is hot or cold!
It's a good idea.
Does not go anywhere
I love the idea! My only issue is that I don't know when it will come around and 20 minutes is a long time to wait outside if the weather is poor. I moved here from Annapolis MD and they have their free trolleys on a 5-minute rotation, making it easier to time catching the trolley.
We are lucky to have this great service. I think tourists enjoy it also.
it's too large for volume served! No suspension, poor climate control, website does not accurately track bus location or doesn't work at all, need accurate tracking app which would also bring more attention for visitors
We drive into town. Husband is handicapped and has a mobility scooter. Don't know routes of trolley.
I do not know much about it, but love downtown and so I look forward to learning about it.
I've lived in quite a few larger Coastal cities and have blind/deaf loved ones. Big proponent of mass transit and as a commuter to ILM would love more mass transit options (A TRAIN!!! off road commuter bike paths!!!) I've never seen the trolley anywhere but around front street and it was full of homeless people or the stops were loitering spots for homeless people. Probably revamping all the buses and public transport to match the trolley would help publicize where WAVE is available. (Repainting with lighter, more coastal colors and opening them especially the trolleys up as much as possible in warmer weather to catch attention. Right now, they just look like underwhelming mass trans) Personally, I think privatization could better the system.
The trolley always looks interesting but I have never seen enough maps located around downtown detailing where the trolley goes and how frequently it comes, that information should be much more widely distributed so people know.
I rode the trolley once to see the route. I was the only one on it besides the driver. It was hot inside the trolley, dirty, noisy and had a foul odor.
Would like to see Trolley maps posted/advertise so that more people can enjoy the Trolley!
I don't know the schedule or how it works



Figure 58 | On-Board Survey Instrument (Front)



**WAVE TRANSIT CUSTOMER SURVEY**

Please help Wave Transit improve bus service in Downtown Wilmington by completing the survey below.

If you have already taken this survey on the Free Downtown Trolley, you do not need to take it again.

Sequence Number:

1. How often do you ride the Free Downtown Trolley?
 

☐ Almost every day  
☐ Several times per week  
☐ A few times per month

☐ On rare occasions only  
☐ This is my first time
  
2. Will you be connecting to any other Wave Transit Routes to complete your trip?  
 1st Route: \_\_\_\_\_ 2nd Route: \_\_\_\_\_ 3rd Route: \_\_\_\_\_
  
3. What is the purpose for your trip?
 

☒ Leisure  
☐ Medical  
☐ Education

☒ Art or Theater  
☐ Museum  
☐ Attraction \_\_\_\_\_
  
4. In which County do you reside?
 

☐ New Hanover  
☒ Brunswick  
☐ Pender

☐ Other North Carolina County  
☐ Out of State
  
5. How did you get downtown?
 

☒ Walked  
☐ Biked  
☒ Wave Transit Bus

☒ Car for Hire (taxi, rental)  
☐ Personal Vehicle (see Q6)  
☐ Other \_\_\_\_\_
  
6. Where did you park?
 

☒ Street Metered  
☒ Street Non Metered  
☐ Parking Deck

☒ Venue / Attraction Lot  
☒ Place of Employment  
☐ Other \_\_\_\_\_
  
7. What is your gender?  
☒ Male ☐ Female
  
8. What is your age?
 

☐ 13 or under  
☒ 26-35

☒ 14-17  
☐ 36-64

☐ 18-25  
☐ 65 or over
  
9. Which of the following best describes your employment status?
 

☒ Full-Time  
☐ Student

☒ Part-Time  
☐ Retired

☐ Unemployed  
☐ Other \_\_\_\_\_
  
10. What is your approximate household income? (Optional)
 

☒ Less than \$10,000  
☐ \$50,000-\$74,999

☒ \$10,000-\$29,999  
☐ \$75,000 or more

☐ \$30,000-\$49,999
  
11. Which of the following describe the reasons that you use the Free Downtown Trolley? (Select all that apply)
 

☐ Avoid the hassle of parking and parking fees  
☐ Convenience  
☐ Connecting at the Downtown Transit Center is easy  
☐ Doing my part to ease downtown traffic  
☐ Easy way to see the riverfront for out-of-towners  
☐ I am doing my part for the environment  
☐ Other \_\_\_\_\_
  
12. If the Free Downtown Trolley was not free, what would be a reasonable fare?
 

☐ \$\_\_\_\_ per trip  
☐ \$\_\_\_\_ for 3 days, unlimited

☐ \$\_\_\_\_ per day, unlimited  
☐ \$\_\_\_\_ per week, unlimited
  
13. Does the Free Downtown Trolley serve the necessary areas?  
☒ yes ☐ no (see Q14)
  
14. What other areas should the Free Downtown Trolley serve?
 

☐ Resident Areas \_\_\_\_\_  
☐ Northside Swimming Pool and Splash Pad  
☐ Brooklyn Arts District  
☐ Castle Street Arts and Antique District  
☐ MedNorth Health Center  
☐ Coverage area is just right  
☐ Other \_\_\_\_\_
  
15. Increased coverage area might require a longer riding time. Would you be willing to ride...
 

☐ 30 minutes  
☒ 35 minutes  
☐ 40 minutes
  
16. How did you hear about the Wave Downtown Trolley?
 

☒ Local Hotel  
☐ Wave Website  
☒ Local Attraction  
☐ Local Restaurant

☒ Other \_\_\_\_\_
  
17. What suggestions do you have to increase awareness of the Wave Downtown Trolley?
 

☐ \_\_\_\_\_  
☐ \_\_\_\_\_  
☐ \_\_\_\_\_  
☐ \_\_\_\_\_

Continue ►



Figure 59 | On-Board Survey Instrument (Back)

18. Based on your experience riding the Downtown Trolley, how strongly do you agree with the following statements?

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Service is dependable	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Route gets me where I need to go	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Schedule meets my travel needs	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Trolley is comfortable and well-kept/clean	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Staff is professional and courteous	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Map and schedule are easy to understand	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Website is easy to understand	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

19. The following questions ask your preference. Please check ONE box per row only.

More frequent trolley service	◀ <input type="checkbox"/> OR <input type="checkbox"/> ▶	Longer service hours
More weekday service	◀ <input type="checkbox"/> OR <input type="checkbox"/> ▶	More weekend service
More Trolley stops for shorter walk distance to/from stops	◀ <input type="checkbox"/> OR <input type="checkbox"/> ▶	Fewer Trolley stops for faster service
Trolley running more frequently but on fewer streets	◀ <input type="checkbox"/> OR <input type="checkbox"/> ▶	Trolley running on more streets but less frequently
Improve existing service	◀ <input type="checkbox"/> OR <input type="checkbox"/> ▶	Serve new areas

Please provide any additional comments you have below. \_\_\_\_\_

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**Thank you for completing the Wave Transit Customer Survey**

Your input will help us continue to improve the service. Your responses will be kept strictly confidential.



## 6 UNCW SEAHAWK SHUTTLE SURVEY ANALYSIS

### APPROACH

The on-board Seahawk Shuttle survey was conducted in April 2017, and was completed by 323 respondents (40% of all respondents). The online survey was available and publicized in October 2017, and was completed by 476 respondents (60%). The on-board survey instrument is presented in Figure 79 and Figure 80.

### SUMMARY SURVEY FINDINGS

#### Rider Frequency and Travel Patterns

Over half of all survey respondents ride the Seahawk Shuttle on a daily basis, with nearly 75% of respondent riding at least weekly (Figure 59). Among on-board respondents, 55% began their one-way trip at home, and school is the final destination for 71% (Figure 70 and Figure 71). The 705 Loop Shuttle is the most popular route, followed by the 711 Grey Shuttle.

#### Use and Purpose

Nearly half of respondents use the Seahawk Shuttle because parking on campus is not available or too expensive, 15% don't own a personal vehicle, and 15% ride the shuttle because it is more affordable than paying for gas and car maintenance (Figure 60). If their primary route didn't exist, 47% of respondents would make their trip by walking, 15% would drive alone, and 14% would bike (Figure 72).

#### Demographics

Unsurprisingly, 93% of survey respondents are undergraduate students (89% are full-time) and 90% are age 18 to 25; 72% of respondents are female (Figure 64-Figure 66). More than 80% of respondents live off-campus, but between 51-56% live within the one-mile radius proscribed by UNCW, and cannot purchase a daytime parking pass (Figure 61 and Figure 73).

#### Service Preferences

Seahawk Shuttle Survey respondents overwhelmingly prefer to improve existing service (82%) over serving new areas (18%), operating buses more frequently but on fewer streets (79%) than operating buses on more streets but less frequently (21%), and increasing weekday service (69%) instead of adding more weekend service (31%). Respondents are closely split on their preference for more frequent bus service (52%) versus longer service hours (48%), and their preference between more bus stops for a shorter walk distance to/from bus stops (53%) or fewer bus stops for faster bus service (47%) (Figure 63).

Respondents agree that maps and schedules are easy to understand, staff is professional and courteous, buses are comfortable and well kept, fares are reasonable, and that routes get users where the need to go. Respondents are less enthusiastic regarding the website, overall service, and that Seahawk Shuttle schedules meet their travel needs (Figure 62).





## Increasing Awareness

Nearly 60% of survey respondents are aware of the Wave Transit smartphone app, but only 37% have used the app (Figure 74). Among respondents that do use the smartphone app, 23% access it daily and 31% use the app multiple times per week (Figure 75). Real-time vehicle arrival information was selected as the most useful feature by 58% of users, followed by route maps (18%), and the nearest stop (17%) (Figure 76).

## Additional Comments

Common themes from the additional comments received include later operating hours (to 9 or 10 p.m.), that buses aren't on-time, and negative comments regarding the professionalism of bus drivers. However, numerous positive comments regarding the quality of service were also received (Figure 78).



## COMBINED SURVEY RESULTS

Figure 60 | How often do you ride the Seahawk Shuttle?

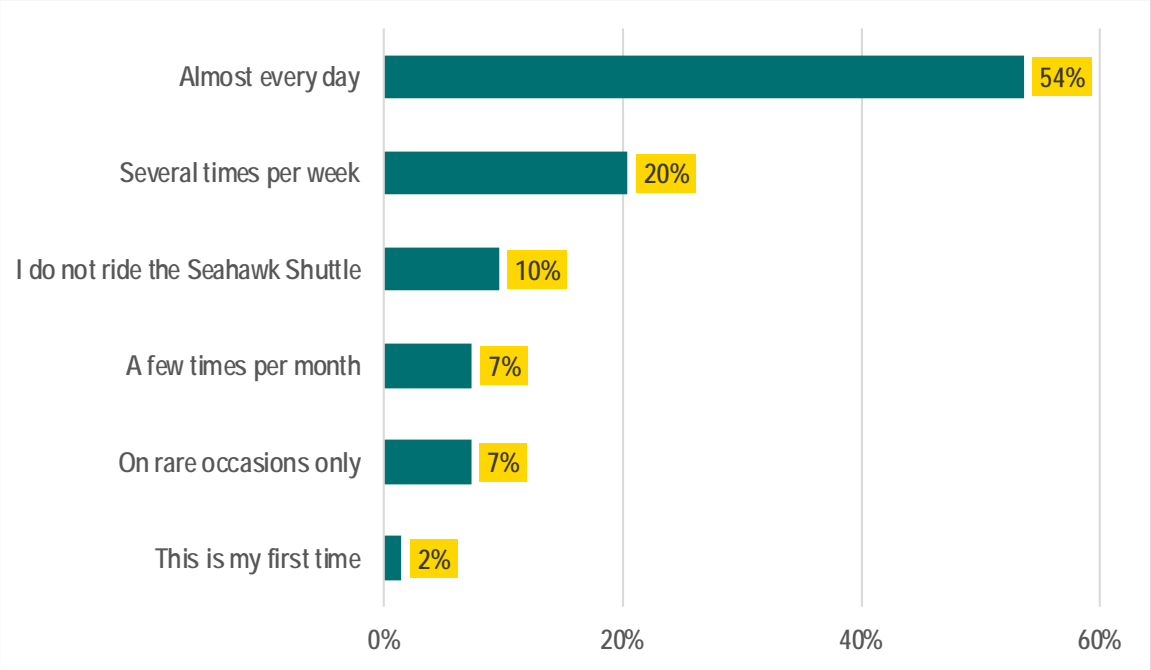


Figure 61 | Which of the following describe the reasons that you use the Seahawk Shuttle? (Select all that apply)

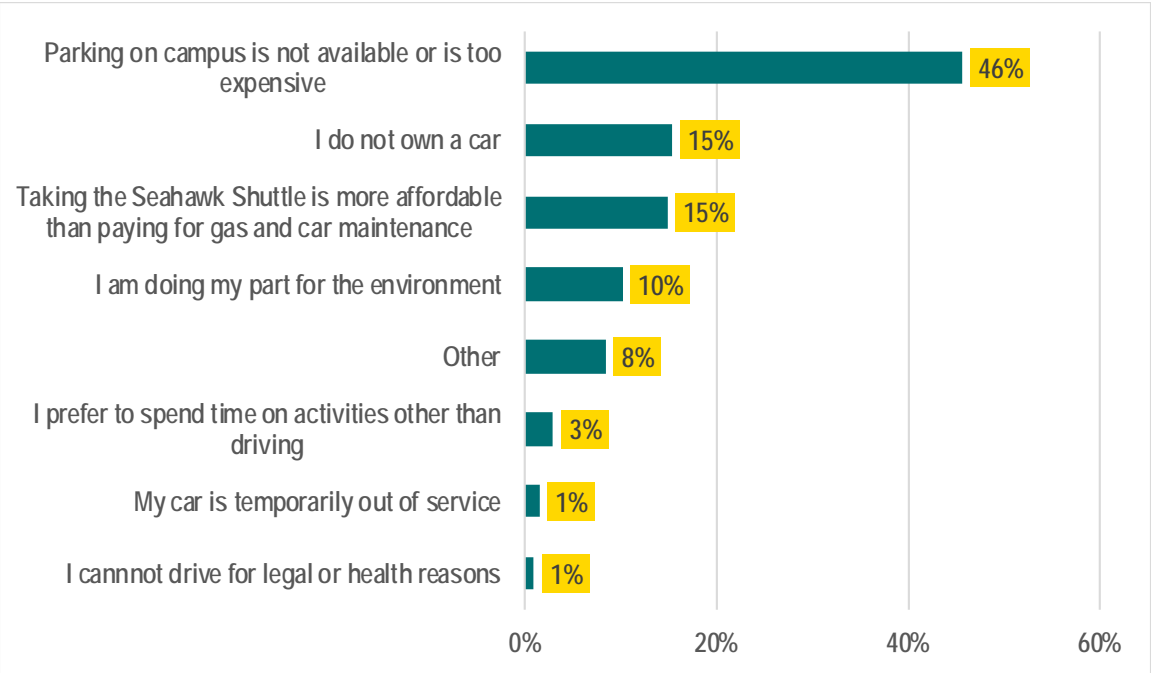




Figure 62 | If you are a UNCW student, where do you live?

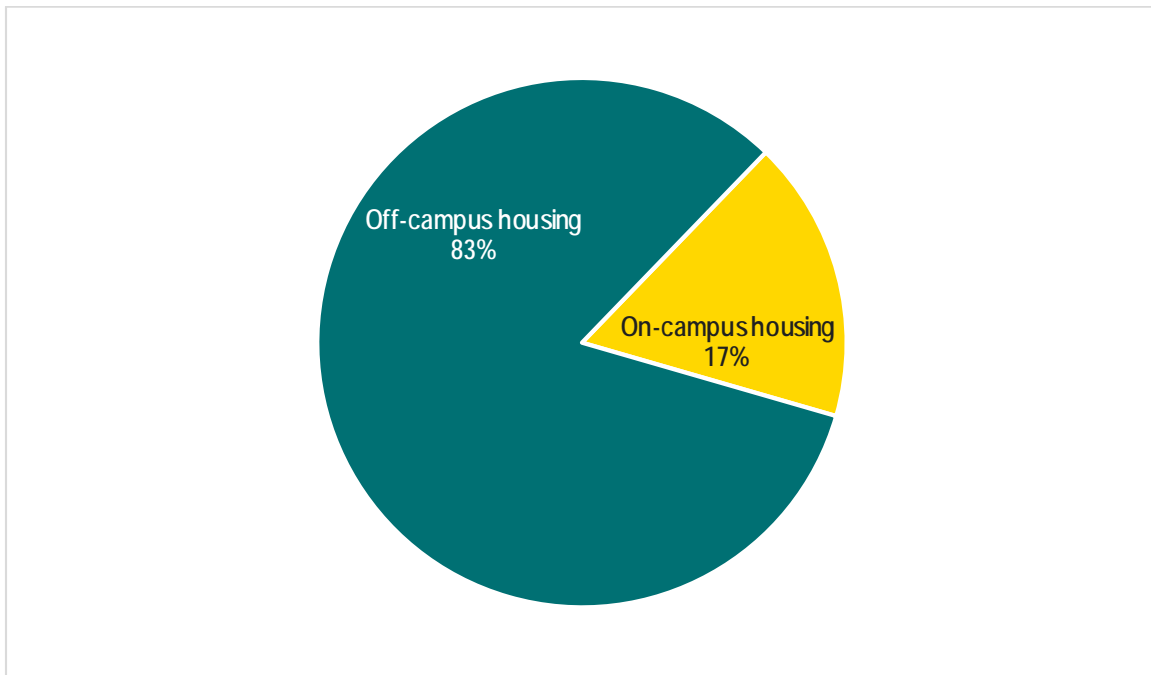


Figure 63 | Based on your experience riding the Seahawk Shuttle, how strongly do you agree with the following statements? (1 = Strongly Disagree, 5 = Strongly Agree)

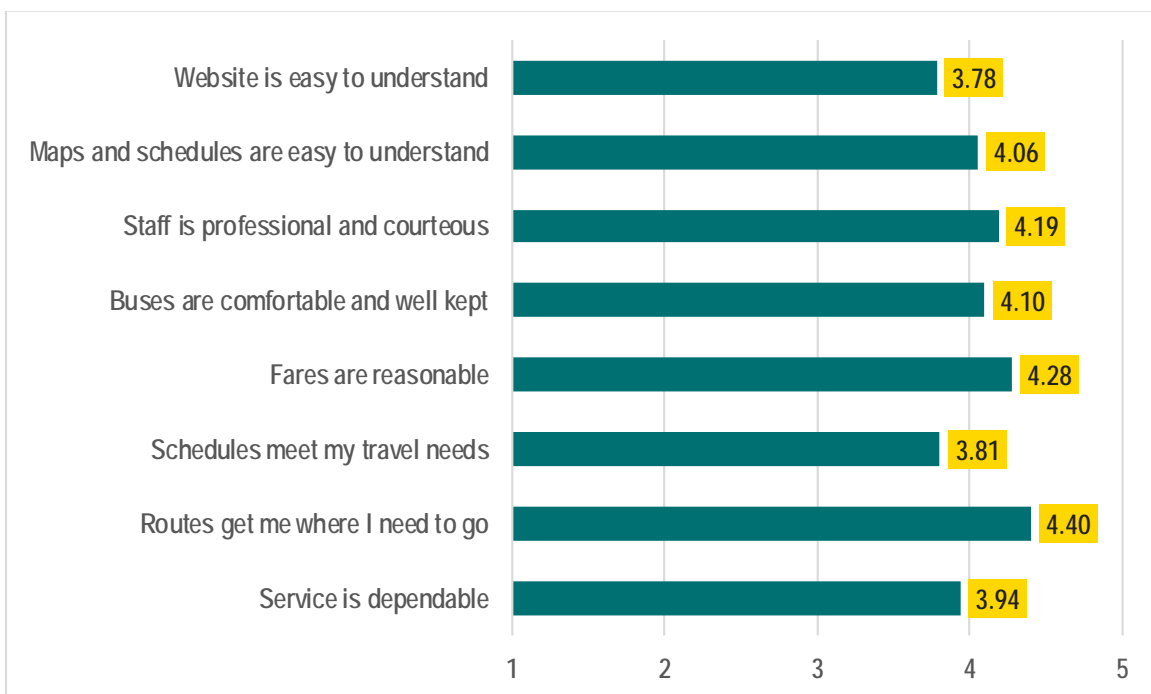




Figure 64 | Service Preferences

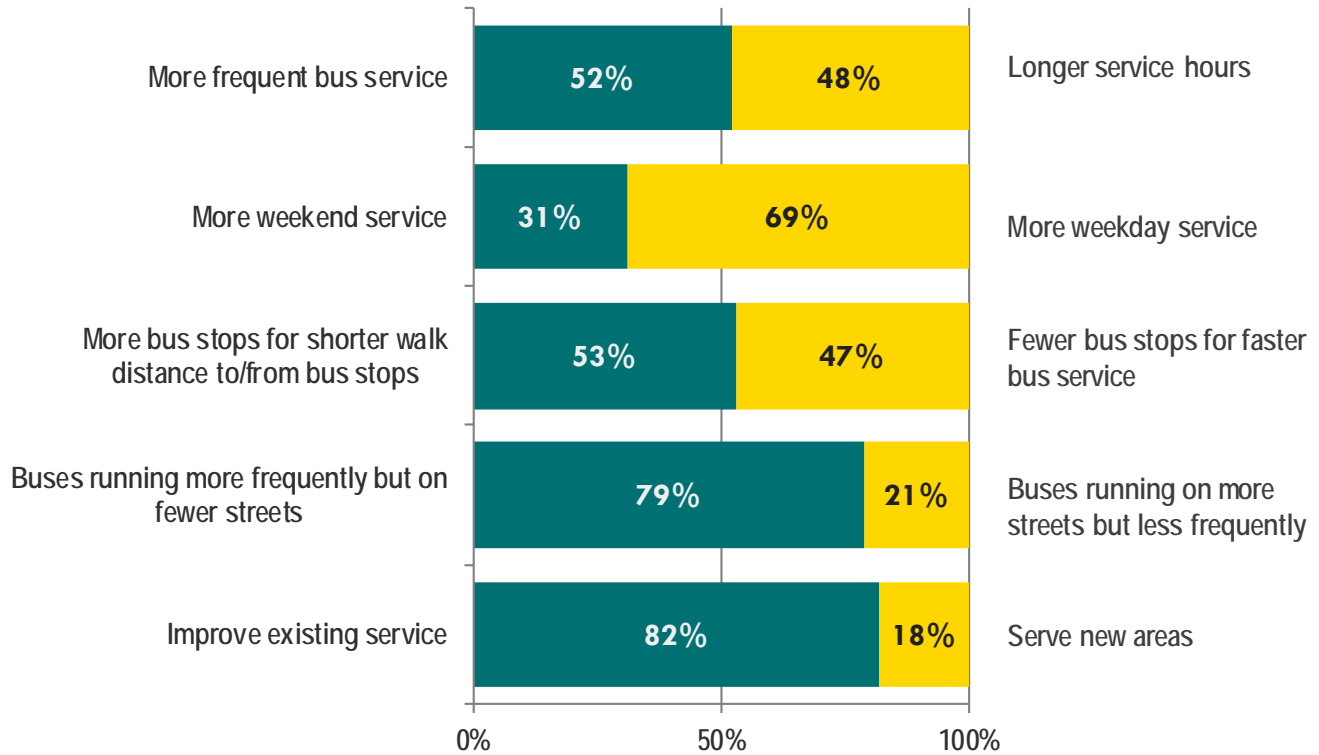


Figure 65 | What is your gender?

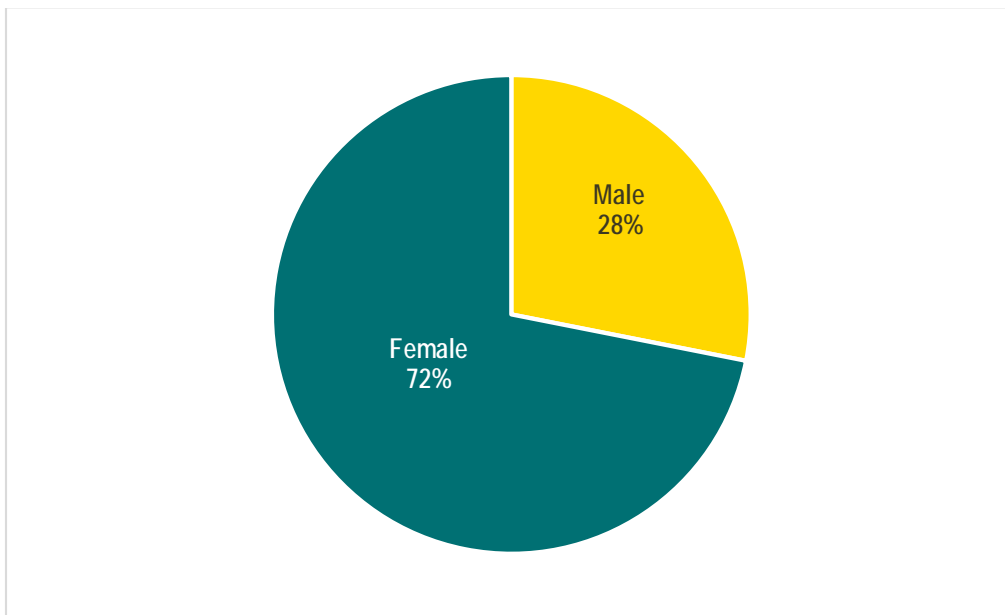




Figure 66 | What is your age?

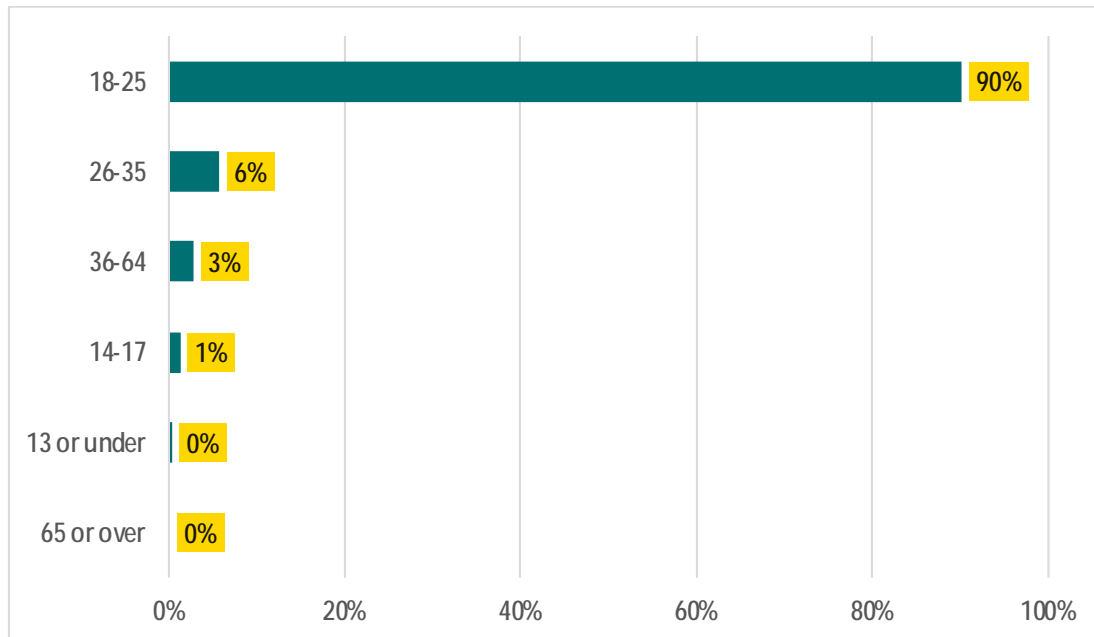
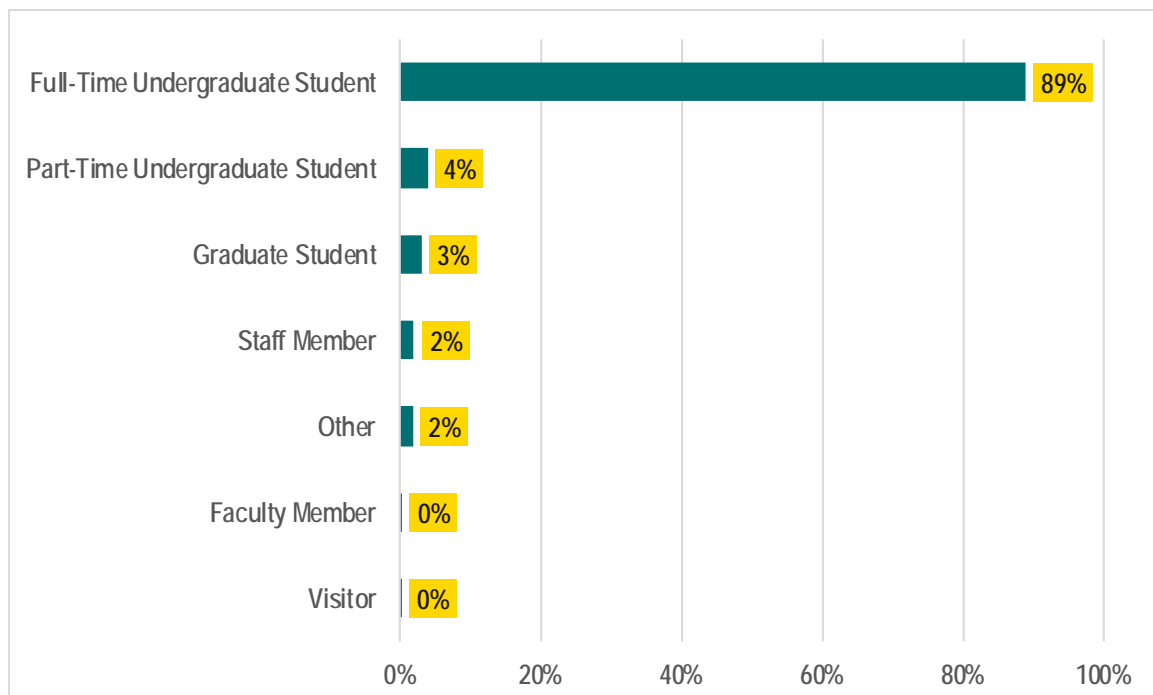


Figure 67 | What is your primary affiliation with UNCW?





## ON-BOARD SURVEY RESULTS

Figure 68 | Including this bus, which Seahawk Shuttle or Wave Transit routes will you use to complete this one-way trip? (1st route)

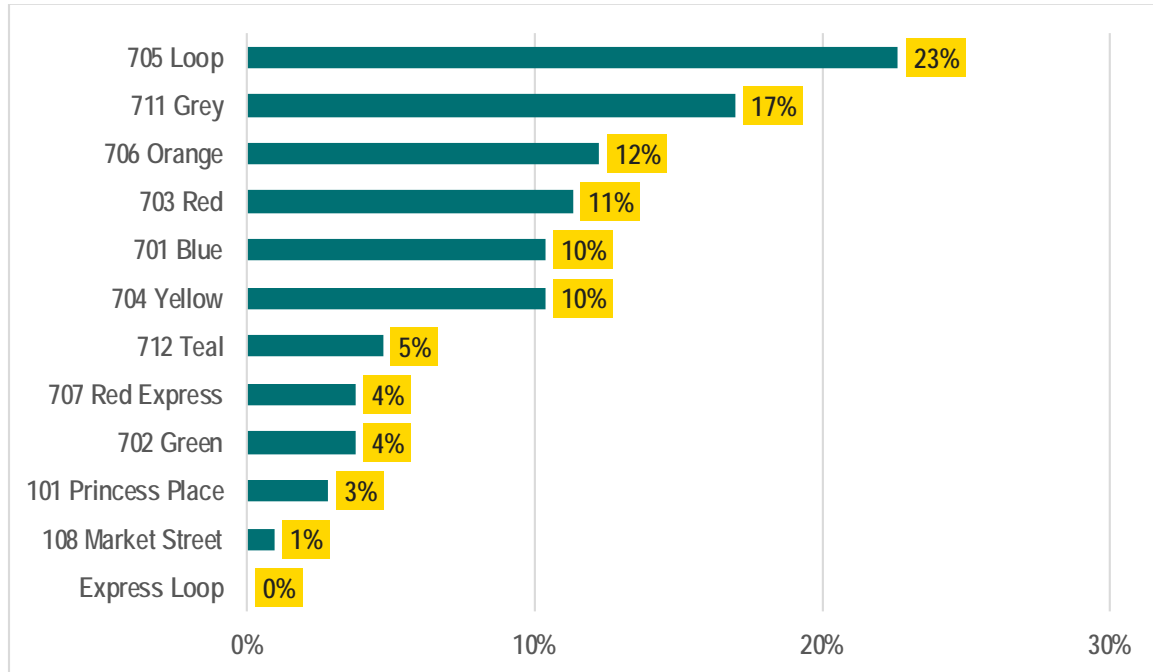


Figure 69 | Including this bus, which Seahawk Shuttle or Wave Transit routes will you use to complete this one-way trip? (2nd route)

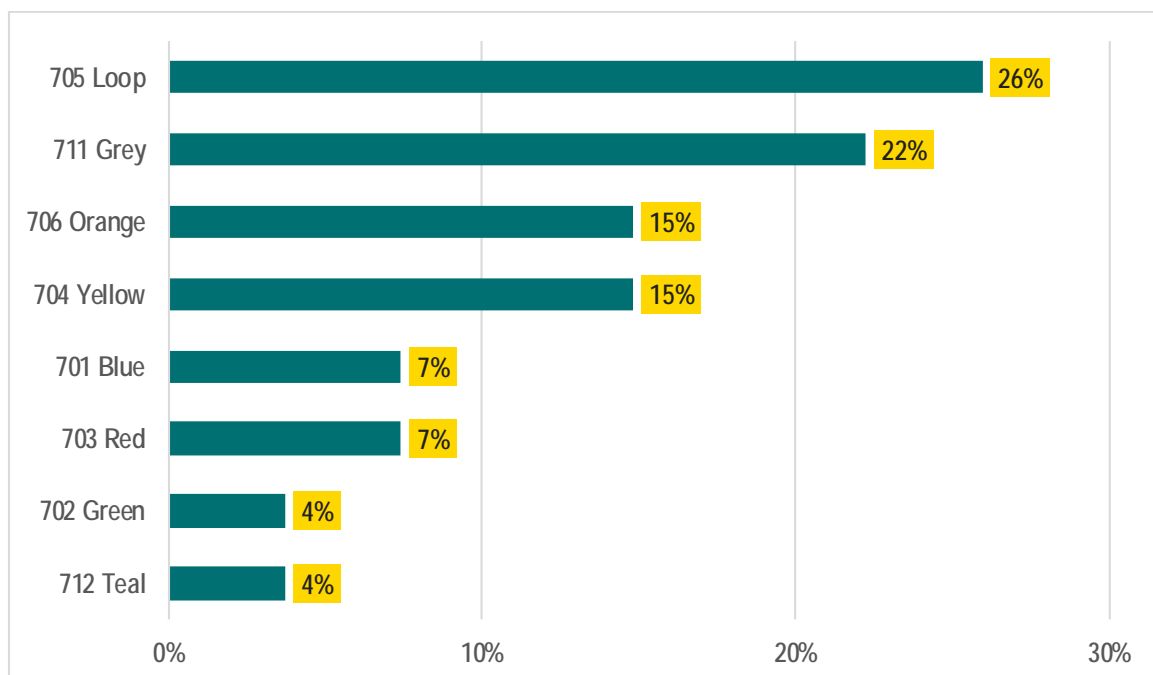




Figure 70 | Including this bus, which Seahawk Shuttle or Wave Transit routes will you use to complete this one-way trip? (3rd route)

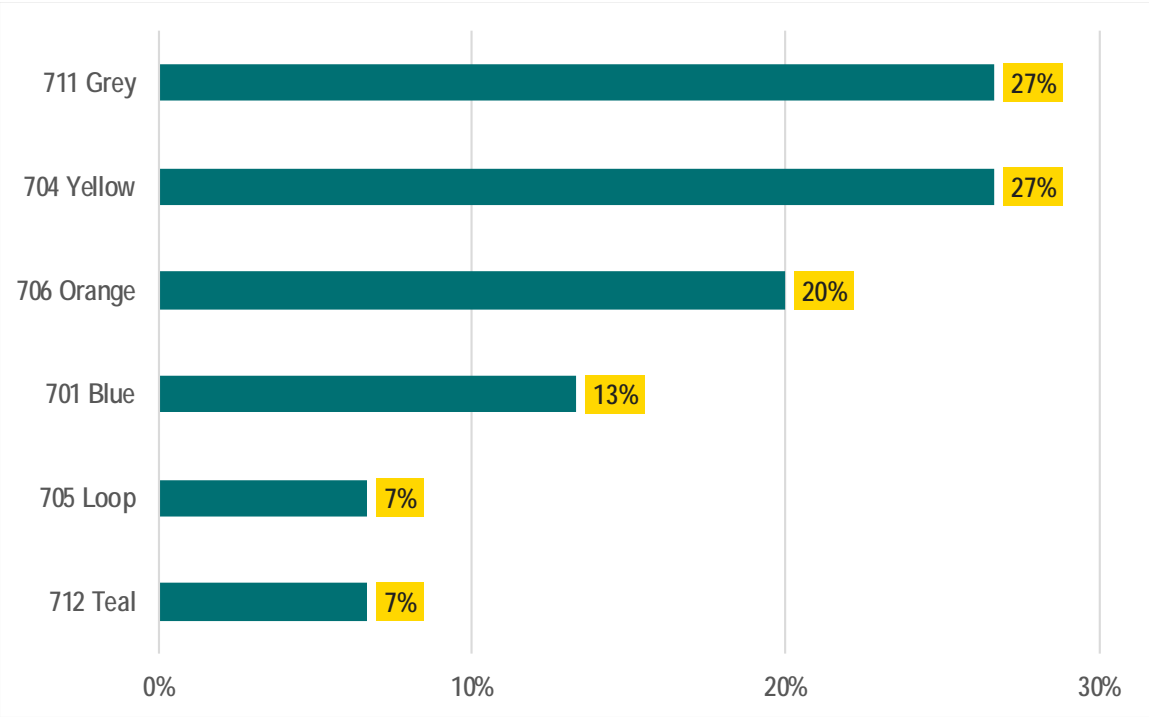


Figure 71 | Where did you begin this one-way trip?

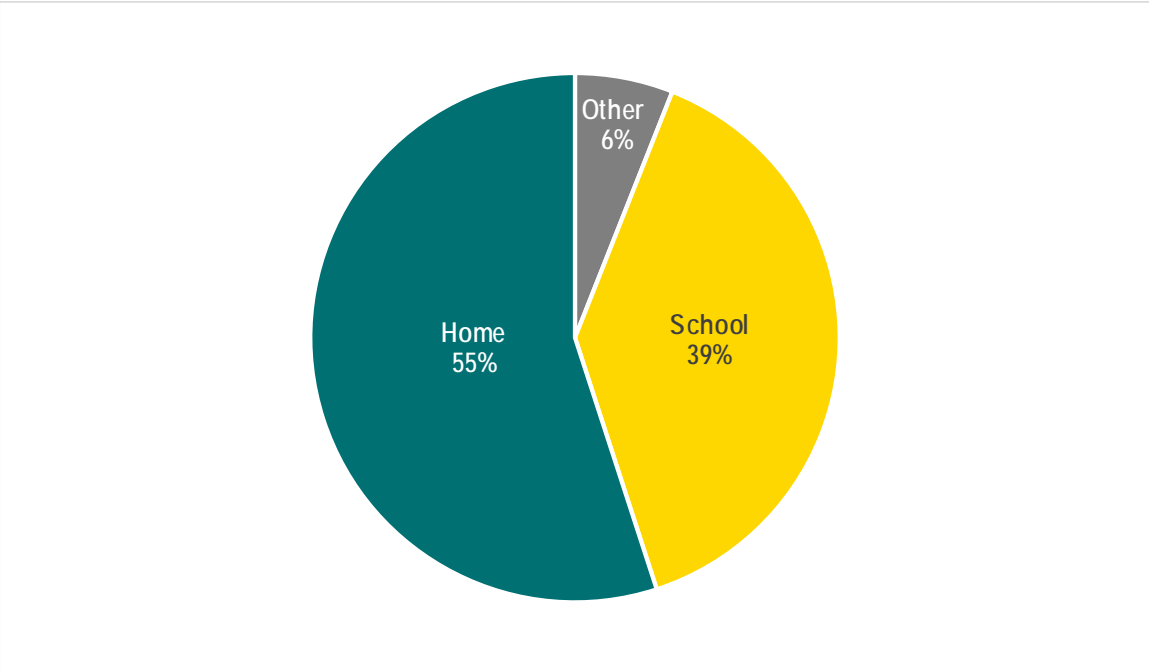






Figure 72 | Where is your final destination on this one-way trip?

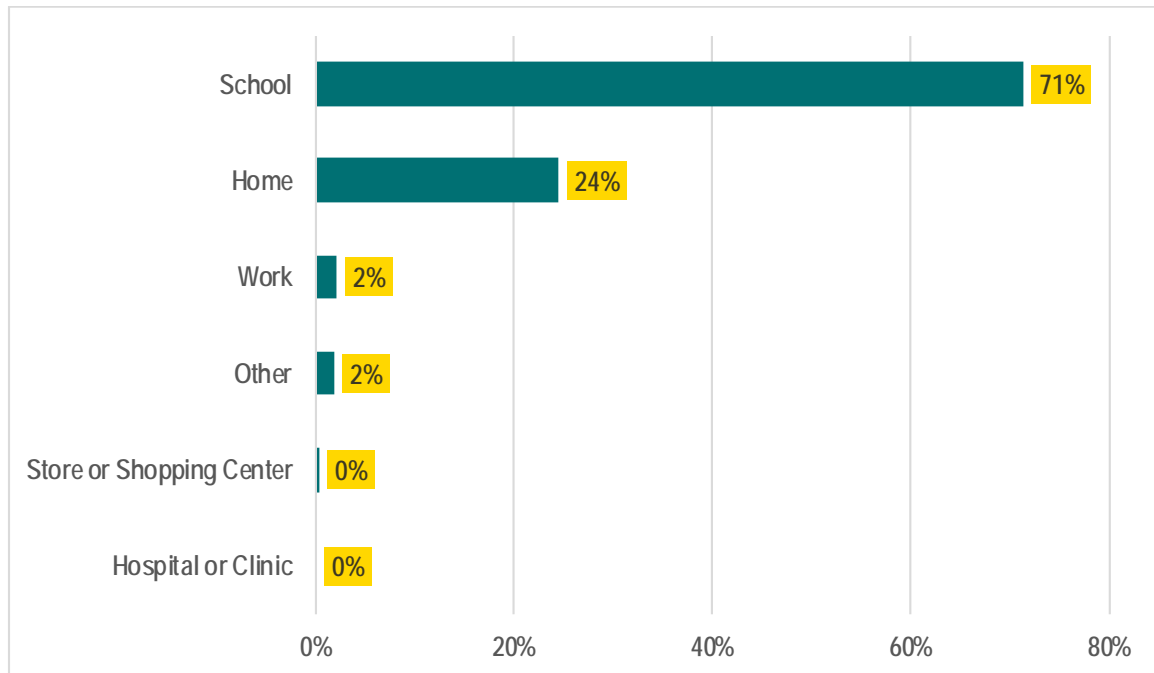
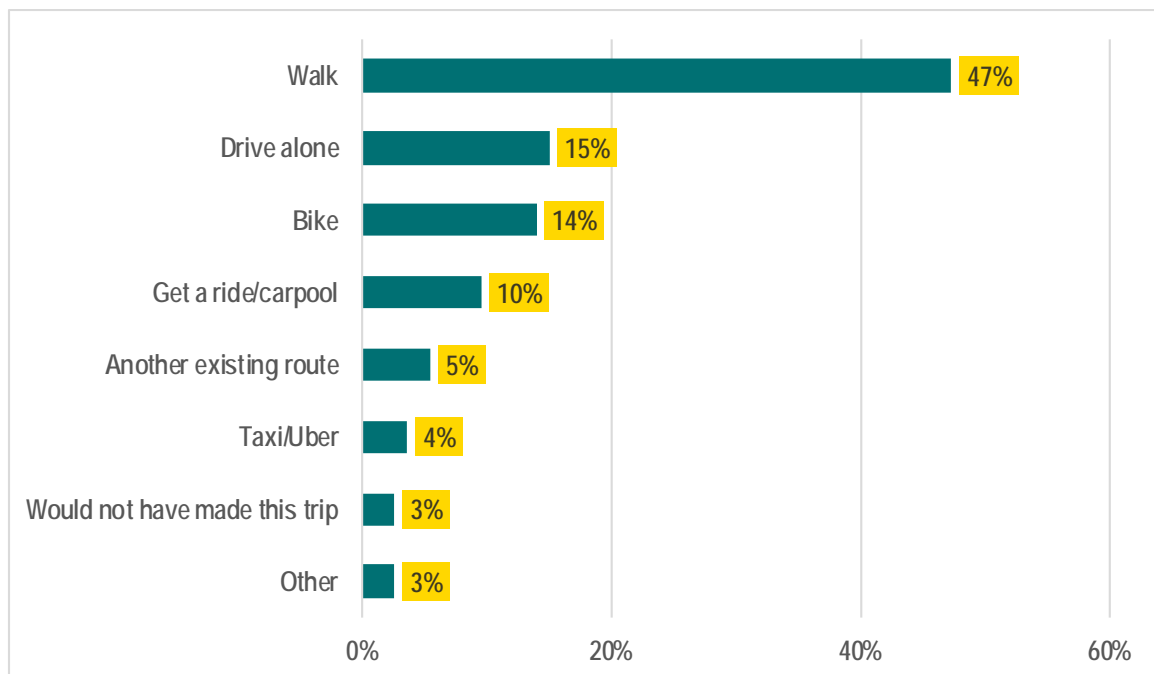


Figure 73 | If this route didn't exist, how would you have made this trip?





ONLINE SURVEY RESULTS

Figure 74 | Which of the following describe the reasons that you use the Seahawk Shuttle?

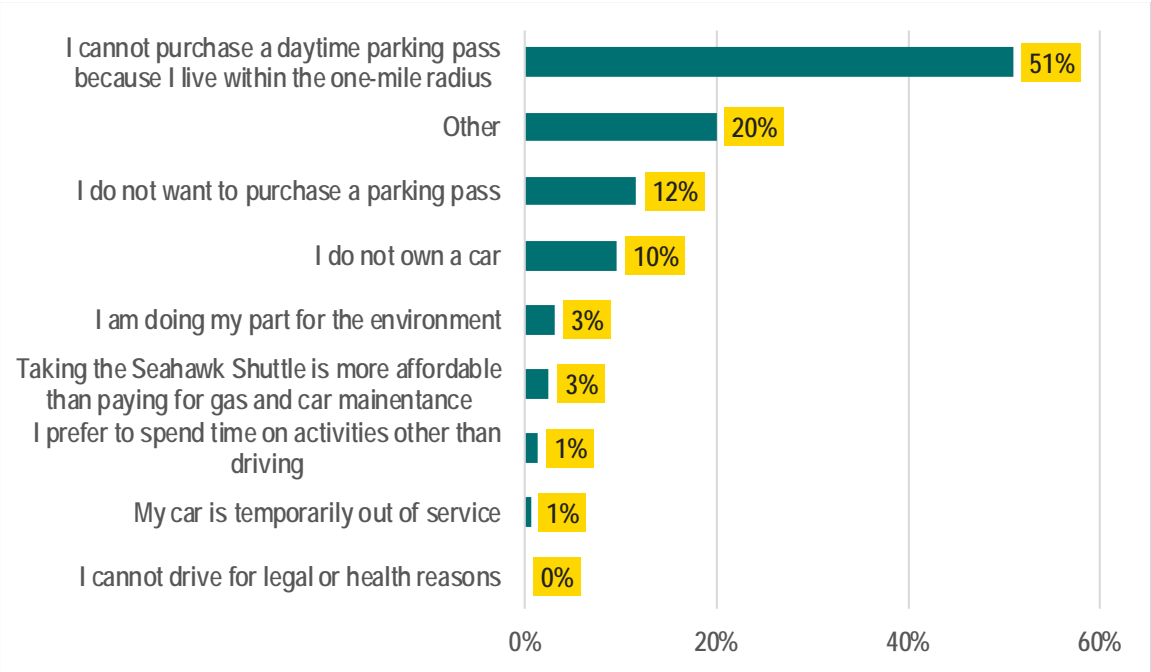


Figure 75 | Have you used the Wave Transit smartphone app?

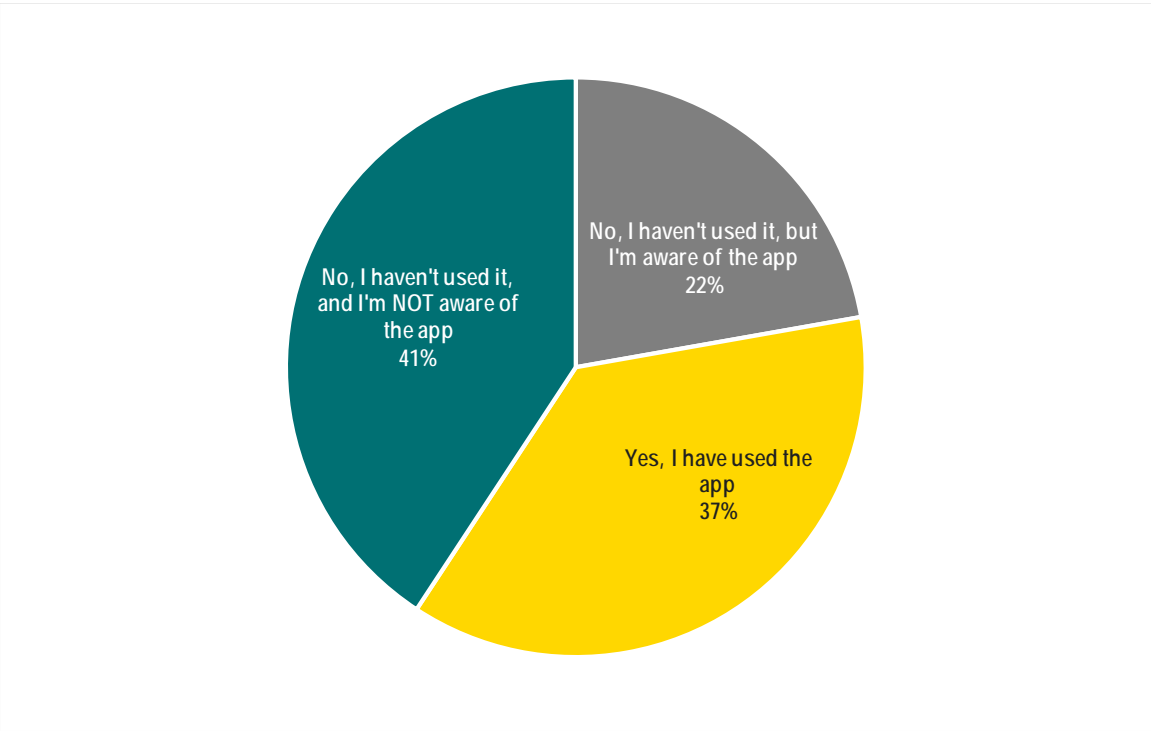




Figure 76 | How often do you use the Wave Transit smartphone app?

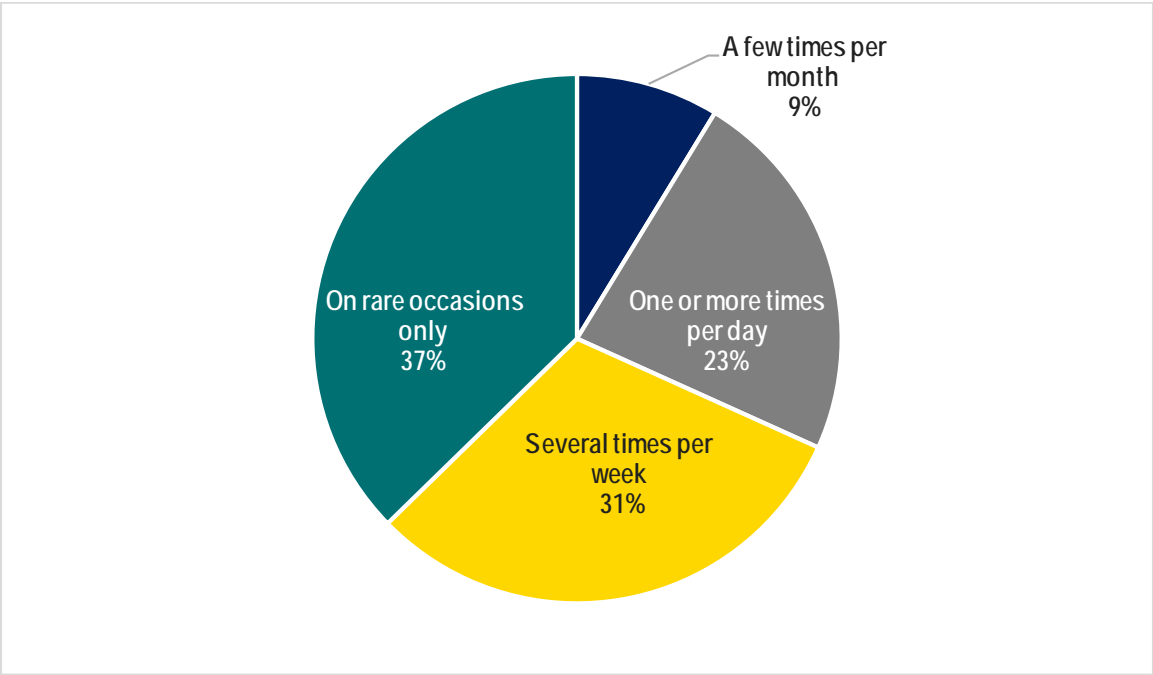


Figure 77 | Which features within the Wave Transit smartphone app are most useful?

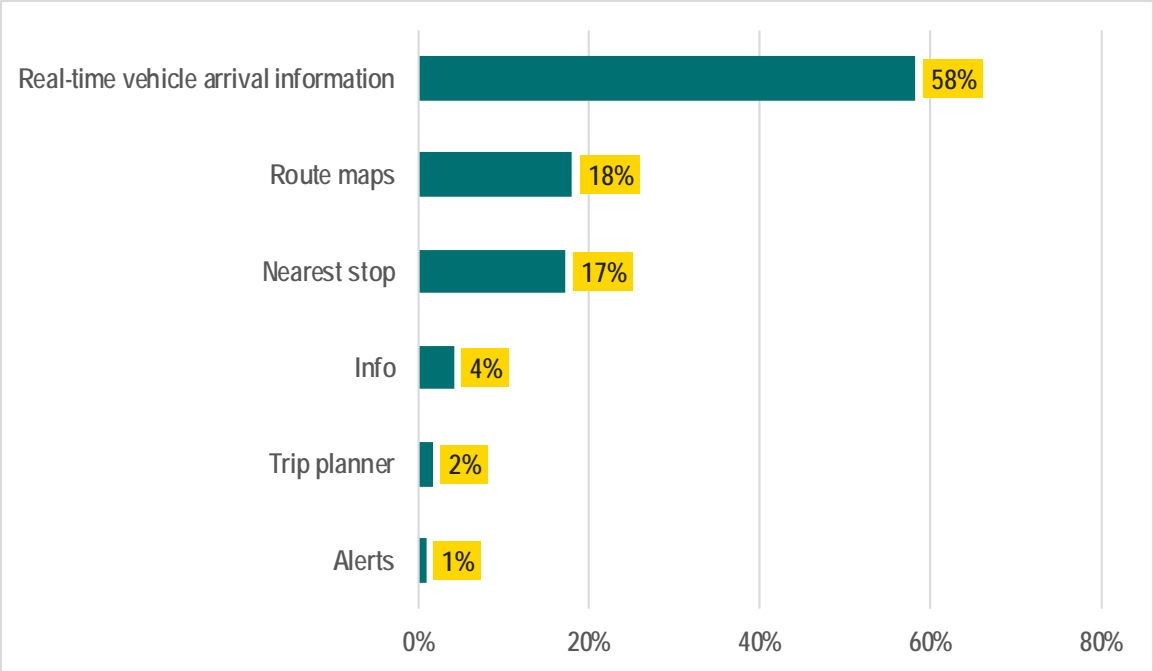




Figure 78 | Where do you live?

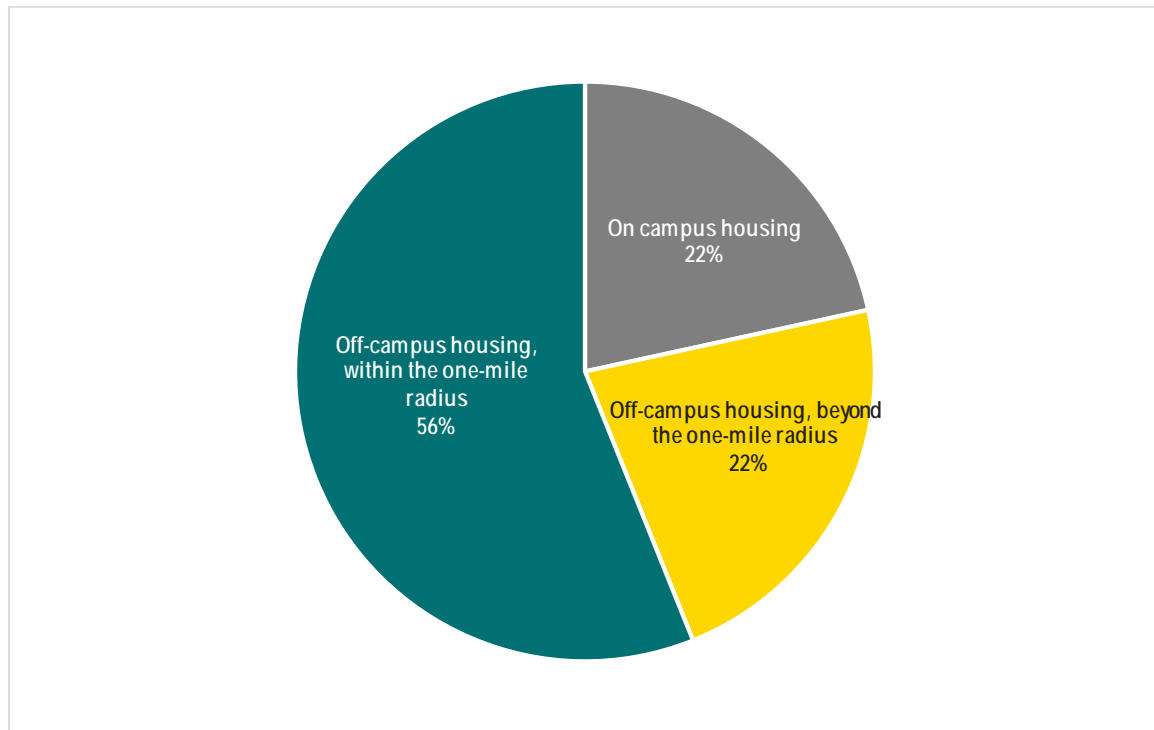


Figure 79 | Additional Comments

There is a lot of bus issues with them breaking down-sometimes the bus won't come at all making me miss ov be late for class-the bus app doesn't always pick a bus up on the radar- whenever the bus drivers switch drivers i'm left waiting 5-15 min until i can get back home
The only area that needs improvement is the tracker-when it is working it is great-however when it goes down it seems to take forever to fix
A few buses are very old and jerk frequently
I wish there were more stops from the buses further onto campus (gym etc) not just the morton/lentze stop & the trask/front of campus stop
The bus has been so late before that i have been late for work-it is the earliest bus so i cannot take an earlier one to get to work on time-has been 30+ minutes late before and i had to drive to campus and pay at a meter
Great service
I would love to see wave serving areas of food in secure populations in wilmington and being able to bring them to grocery stores
Bus drivers are always super nice
I think this service is really well but i think the close time should be increase 9pm to 10pm so it will be more helpful to us-we can stay more time in library
More advertising of the point to point option would assist people in later classes-also staff is always awesome
Run until 7pm or later hours would be nice-to have info or brochures available on the teal shuttle-to have an app to track where the bus is at all times



I would suggest maybe adding more routes-make the maps easier to understand
It would be incredibly useful if this bus ran until 9 or 10-i have many late classes or club commitments after 5:30 and i have to pay & park on campus or avoid the fee by walking
Driver transition often put bus behind schedule-some drivers stop at some stops for a longer period of time then others-bus tracking systems are often down making it difficult to catch the bus
Transtion to the afternoon drivers are super slow-takes an extra 10-15 to have campus & people get off because of his issues with buses showing up on the tracker was common & made them of schedule
Often times the green shuttle route isn't even on the website to track-can be very inconvient not knowing where the bus is and when it will be at my stop
The buses are old
On shift change in the afternoon the time isn't as reliable
We need weekend service
The 2:00 drivers switch is ridiculous-new drivers hould be at hawk for the switch not 15 minutes after
Love! The staff-makes riding less of a awkward time when the drivers are talkative and up beat-shoutout to mrs barbara (shes the bes) thanks for getting me to and from school
Please more buses for the mill creek stop
Shuttles take too long to come
I wait over 30 minutes everytime to get onto a shuttle & then when i get on the shuttle the drivers get off & 10-20 minutes to get back on-i live @ carolina cove & it takes me 20-30 minutes to get home & i am the first stop-also=yellow bus does not need to go to that stop behind taco bell
Sometimes i have been left by the bus because i was still walking to the stop but close enough where they could have waited a moment-i have had 1-2 interactions where the driver was a bit rude-overall though the drivers are great and the service runs frequently enough where i can get to school on time
There is one bus driver who is extremly rude does not even stop in the bus stop even if people are walking to get there-there should be a stop closer to progress 910
Providing bus services past 5pm is essential b/c some students have classes until 9pm but aren't allowed to park on campus-it is unsafe & irresponsible to imply that students should walk to their classes alone at 9pm in the dark-bus services should be available for as long as classes are ran till
Some of the bus drivers will see you walk up to the bus and pick up some students and drive away-some bus drivers actually take the time to wait for you-i think there needs to be improvements on the schedules and timing of bus drivers & more people who come to work and properly do their job
Orange bus not always on tracker-grey bus drivers are awesome
Always grateful for getting a ride on the bus-thank you so much



My main complaint about the buses is that they don't ever come at a certain time-there are times where i have sat at the bus stop for 35 minutes-one time i was not allowed into my class b/c the bus was so late-10 min stops at the park & ride are a waste of time-the orange bus am lady is tops rudest people i have ever encountered-she has literally shut the door in peoples faces and will not wait for people running to the bus-i would love love love the wave buses if they came every 15-20 mins like they are supposed to and the drivers are all nice
Enjoyed my time riding almost all of the drivers are kind but some of them do need to work on their friendliness-other than that thank you so much
Sometimes buses stack up and ride together making the pick up times in-efficient
Orange-grey-yellow rtes basically go the same rte but operate at the same time-it makes no sense if i miss one i miss all of them-they should run a few minutes apart so if i miss the grey i know the orange will be there 5 min later-not the grey & orange are there at the same time & gone at the same time-also if the drivers need a break someone should immediately take over for them-i've sat waiting for 15 minutes because the orange & yellow bus drivers both got off their buses at parking lot b & took a break-that's ridiculous i don't want to take the bus but the univ forces me to-i have places to be & need the buses to keep running
It would be awesome if there was a bus that picked people up from the same places as yellow-orange & grey but dropped us off at the end of chancelors-that would be awesome especially when its too cold hot or rainy/snowy & people have to walk or ride a bike
The air conditioning is nice always on point
This only applies to the yellow-i do not like the face that switching drivers sometimes takes up to 30 min at lot b that some drivers (not all) stop in lot b for way too long (sometimes 15 min or more) to wait on people when i know there are multiple buses coming and or that no people are about to arrive to the bus at lot b (which means the driver should go to campus and prevent students from being late-i've been late to work and class multiple times because of this rotation
I think the drivers all are so nice & professional minus the ridiculous amount of problems i've had with a particular lady-she has an awful attitude-is mean & i've seen mulitple students purposely wait for a bus so that they won't have to get on hers-she has also (not just with me) left students after stopping at a stop for less than 12 seconds & watched several students try to run to catch up when it was pouring down rain-she was told by others on the bus that there were people trying to catch it and left-she's not my favorite person
I appreciate the service provided by uncw shuttles but some drivers are unprofessional-stopping mid-service at park-ride shelter to make personal calls making us late etc
Staff members are very courteous except for the usual orange bus female driver she uses her phone leaves students and seems as if shes in a bad mood every day
Add a stop in front of progress 910 apartments at the stop sign
Sometimes they leave when i run to get to the stop
Spread buses out too close together
I adore mrs barbara she is so sweet and friendly
Some times i have to walk home because the bus stops before i need to leave campus-just a few more hours of service would be totally awesome
Keep up the good work!




It is inconvenient for students who can't have a parking pass but have to take a class at night when there is only one unpredictable shuttle that can take awhile to pick you up-love ms barbar-she's always dependable sweet & personal-dependability varies with the driver-the guy who drives the afternoon is never on time it seems
Ms peaches drives a red express bus and is the most wonderful driver
Great drivers!
Overall i always have a great experience using the shuttle system
The regular driver for the loop (male caucasian) is an absolute pleasure-he is always on time kind and gets you where you need to go
Buses need friday service
I greatly enjoy riding the shuttle on campus because all drivers are courteous and always have something nice to say-it is because of ken that i enjoy the wave
With the new shuttle service i always look forward to getting to know the drivers who are always fun and polite like ms joan who drives the trolley on a regular bases-the only improvement i would like to see would be a more reliable way to track buses and to see if they are on time or not-maybe with an app or on site tracker
Friendly drivers but not always on schedule
When i lived off campus outside the limit the bus was very inconvenient and drivers were rude-i love the trolley service!





Figure 80 | Seahawk Shuttle On-Board Survey Instrument (Front)



## SEAHAWK SHUTTLE SURVEY

Please help the Seahawk Shuttle improve transit service at UNCW by completing the survey below.

*If you have already taken this survey on another trip, you do not need to take it again.*

Sequence Number:

1. How often do you ride the Seahawk Shuttle?

☐ Almost every day

☐ On rare occasions only

☐ Several times per week

☐ This is my first time

☐ A few times per month

2. Including this bus, which Seahawk Shuttle or Wave Transit routes will you use to complete this one way trip?

1st Route: 2nd Route: 3rd Route:

3. Where did you begin this one-way trip?

☐ Home

☐ Store or Shopping Center

☐ Work

☐ Hospital or Clinic

☐ School

☐ Other

Please provide an address or description of where this place is located:

4. Where is your final destination on this one-way trip?

☐ Home

☐ Store or Shopping Center

☐ Work

☐ Hospital or Clinic

☐ School

☐ Other

Please provide an address or description of where this place is located:

5. If this route didn't exist, how would you have made this trip?

☐ Another existing route

☐ Walk

☐ Drive alone

☐ Bike

☐ Get a ride/carpool

☐ Would not have made this trip

☐ Taxi/Uber

☐ Other

6. What is your gender?

☐ Male

☐ Female

7. What is your age?

☐ 13 or under

☐ 14-17

☐ 18-25

☐ 26-35

☐ 36-64

☐ 65 or over

8. What is your primary affiliation with UNCW?

☐ Full-Time Undergraduate Student

☐ Faculty Member

☐ Part-Time Undergraduate Student

☐ Staff Member

☐ Graduate Student

☐ Other

☐ Visitor

9. Which of the following describe the reasons that you use the Seahawk Shuttle? (Select all that apply)

☐ I do not own a car

☐ My car is temporarily out of service

☐ I cannot drive for legal or health reasons

☐ I prefer to spend time on activities other than driving

☐ Parking on campus is not available or is too expensive

☐ Taking the Seahawk Shuttle is more affordable than paying for gas and car maintenance

☐ I am doing my part for the environment

☐ Other

10. If you are a UNCW student, where do you live?

☐ On-campus housing

☐ Off-campus housing

☐ I am not a UNCW student

11. Based on your experience riding the Seahawk Shuttle, how strongly do you agree with the following statements?

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Service is dependable	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Routes get me where I need to go	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Schedules meet my travel needs	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Fares are reasonable	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Buses are comfortable and well-kept	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Staff is professional and courteous	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Maps and schedules are easy to understand	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Website is easy to understand	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

12. The following questions ask your preference. Please check ONE box per row only?

More frequent bus service	◀ <input type="checkbox"/> OR <input type="checkbox"/> ▶	Longer service hours
More weekday service	◀ <input type="checkbox"/> OR <input type="checkbox"/> ▶	Weekend service
More bus stops for shorter walk distance to/from bus stops	◀ <input type="checkbox"/> OR <input type="checkbox"/> ▶	Fewer bus stops for faster bus service
Buses running more frequently but on fewer streets	◀ <input type="checkbox"/> OR <input type="checkbox"/> ▶	Buses running on more streets but less frequently
Improve existing service	◀ <input type="checkbox"/> OR <input type="checkbox"/> ▶	Serve new areas

If you would like to provide any additional details regarding your answers above, please use the space on the back.

Over ▶





## 7 RECOMMENDATIONS SURVEY

### APPROACH

Wave Transit conducted two surveys—focused on recommendations for the fixed-route network and the Downtown Trolley—in coordination with the SRTP’s February 2018 public meeting. Both surveys were available online from early February through early March. The Fixed-Route Network survey was completed by 375 respondents and 297 respondents completed the Downtown Trolley survey.

### Fixed-Route Survey

Overall, survey respondents heavily support proposed service improvements: 73% agree with the proposed alignment for Route 210 and 76% agree with the proposed service modifications for Route 101 (serving Creekwood). The most popular service improvements are future service to Wrightsville Beach (64%), increasing rush hour service on selected high ridership routes (47%), and improving weekday and Saturday service on Route 301 (46%). Respondents rated expanding service to new areas (68%), more frequent fixed-route service (41%), and improved passenger amenities (38%) as improvements that would make them more likely to use Wave Transit.

Respondents were also questioned on their familiarity with the Wave Transit smartphone app. More than two-thirds of respondents (69%) have not used the app and are unaware it exists; 18% haven’t use the app but are aware it exists; 13% have used the app. Of respondents that don’t use the Wave Transit app, 55% haven’t downloaded the app, 11% don’t own a smartphone, and 11% don’t understand how the app works. Among respondents that do use the Wave Transit app, 35% use it on rare occasions only, 27% use it a few times per month, and 27% use it several times per week.

Thirty-nine percent of respondents live in ZIP code 28401, which includes downtown Wilmington.

Figure 82-Figure 90 summarize the full survey results.



Figure 82 | How often do you ride Wave Transit?

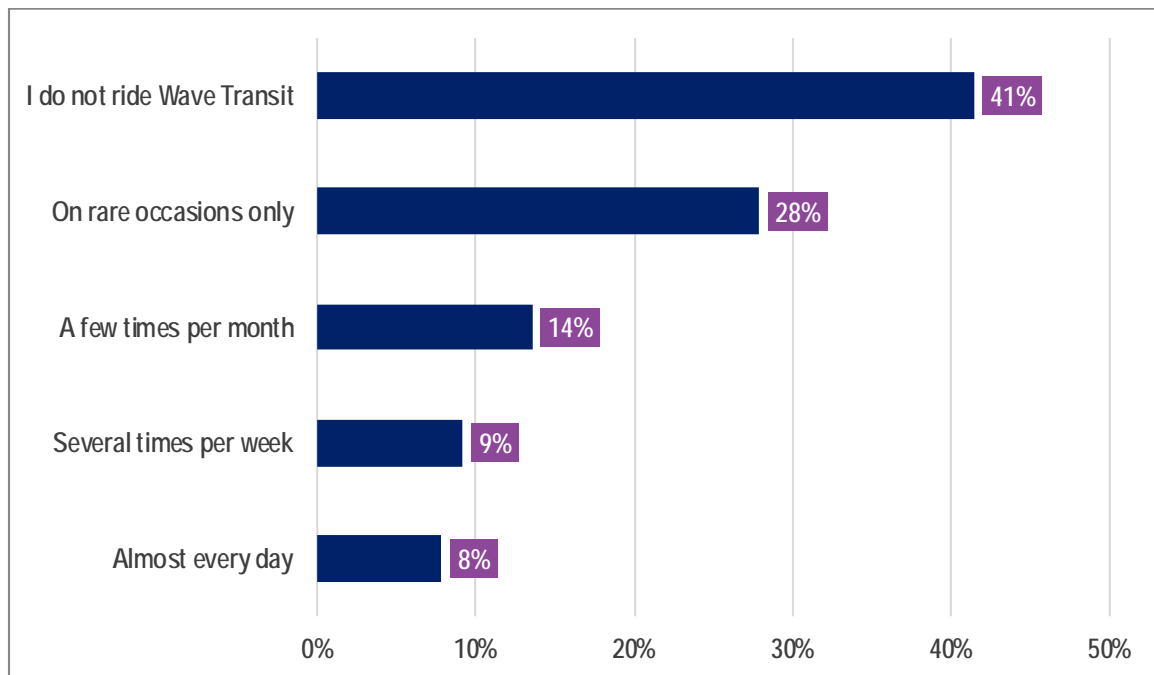


Figure 83 | What type of improvements would make you MORE LIKELY to use Wave Transit? (Select all that apply)

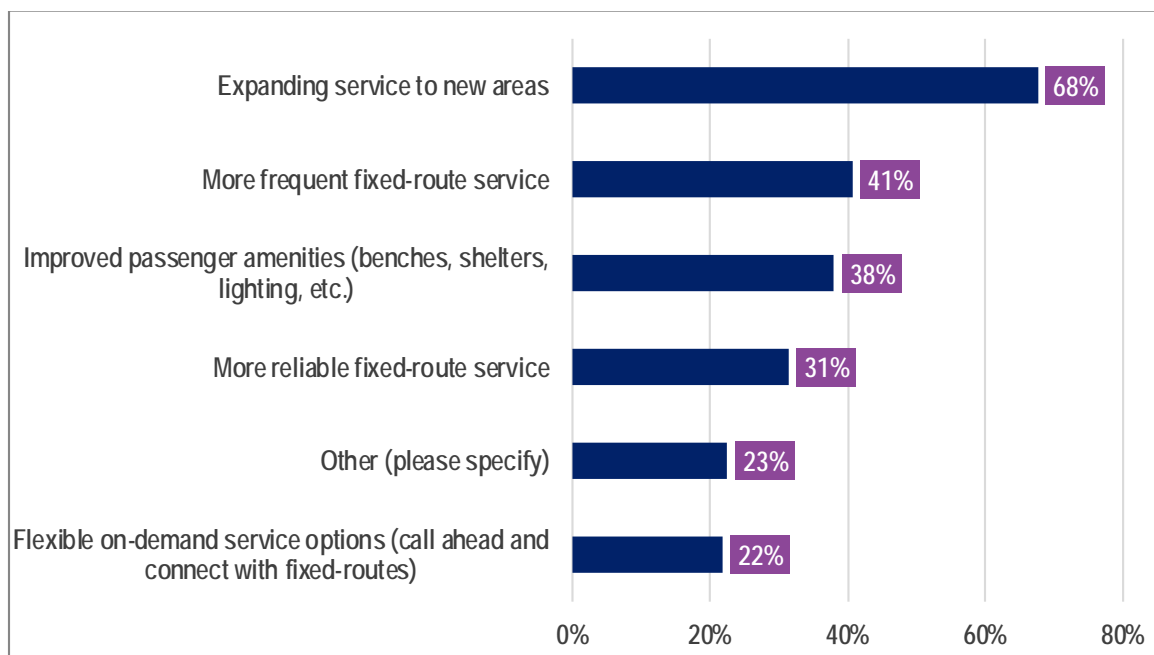




Figure 84 | Route 210 will add service to 17th Street (south of Shipyard Boulevard), Cameron Art Museum, and the Point at Barclay Hills Shopping Center. However, transfers will now be required for trips between downtown and Independence Mall.

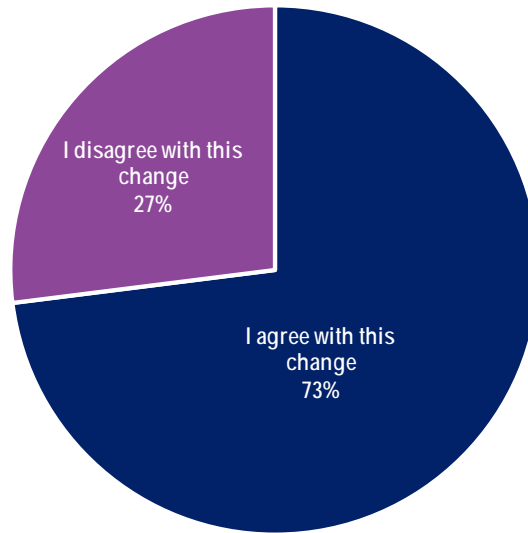


Figure 85 | Route 101 will add service to Creekwood, but will only serve Walmart hourly.

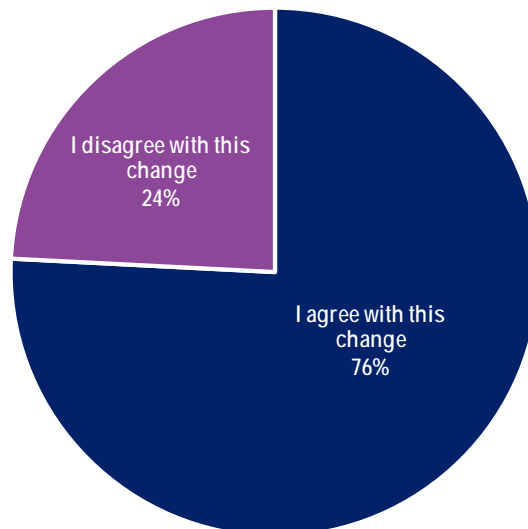




Figure 86 | The following future recommendations will be implemented by Wave Transit with additional funding at an undetermined date. Please select only three projects that should be prioritized.

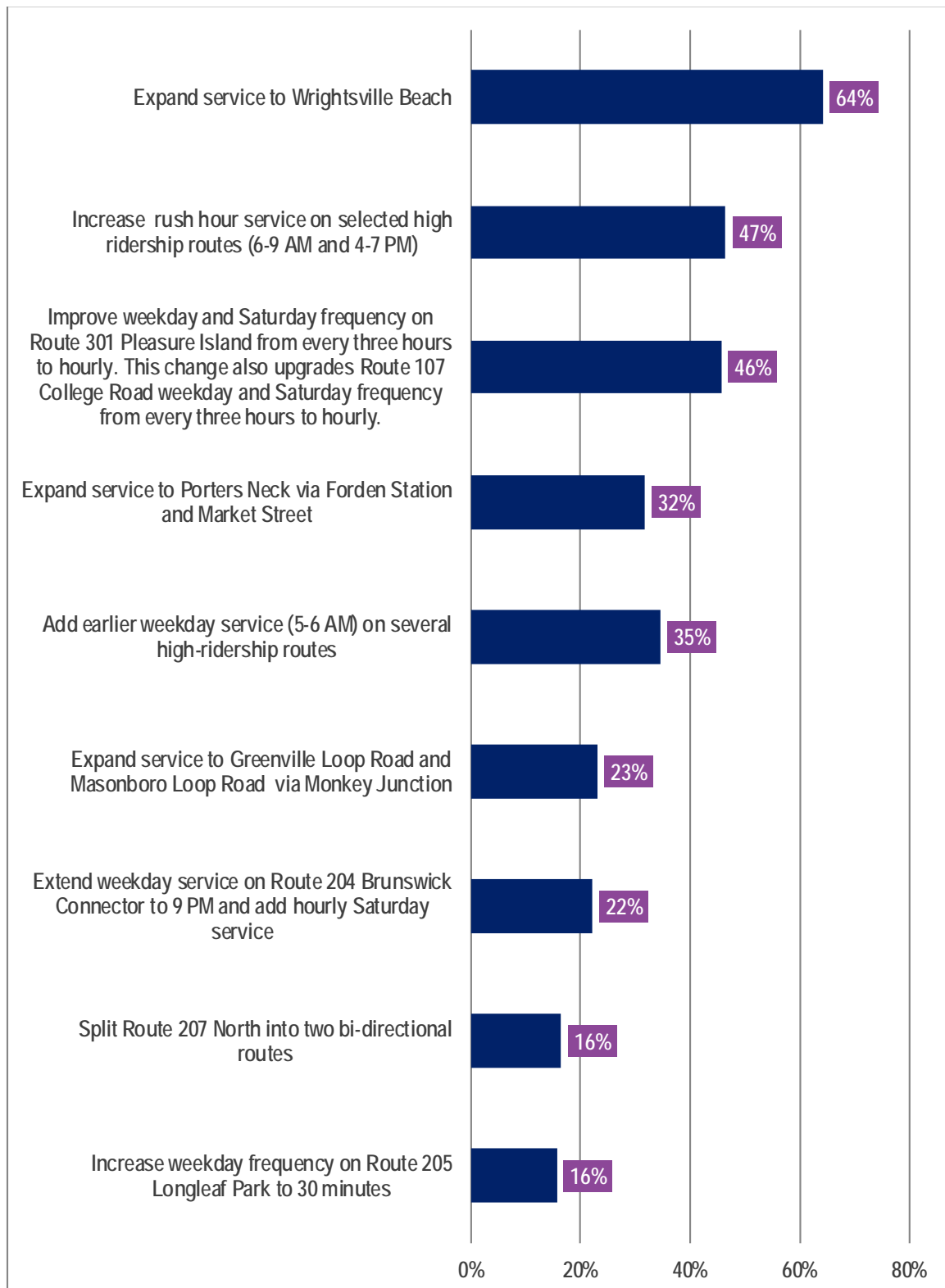




Figure 87 | Have you used the Wave Transit smartphone app?

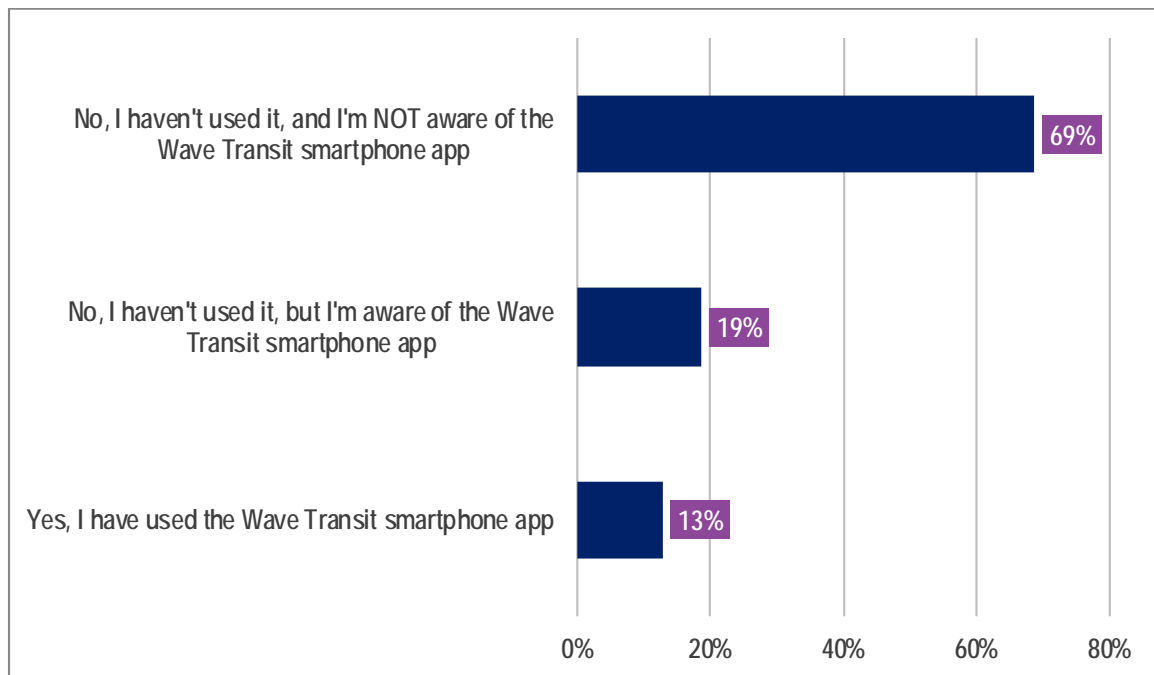


Figure 88 | What is the primary reason that you DO NOT use the Wave Transit smartphone app?

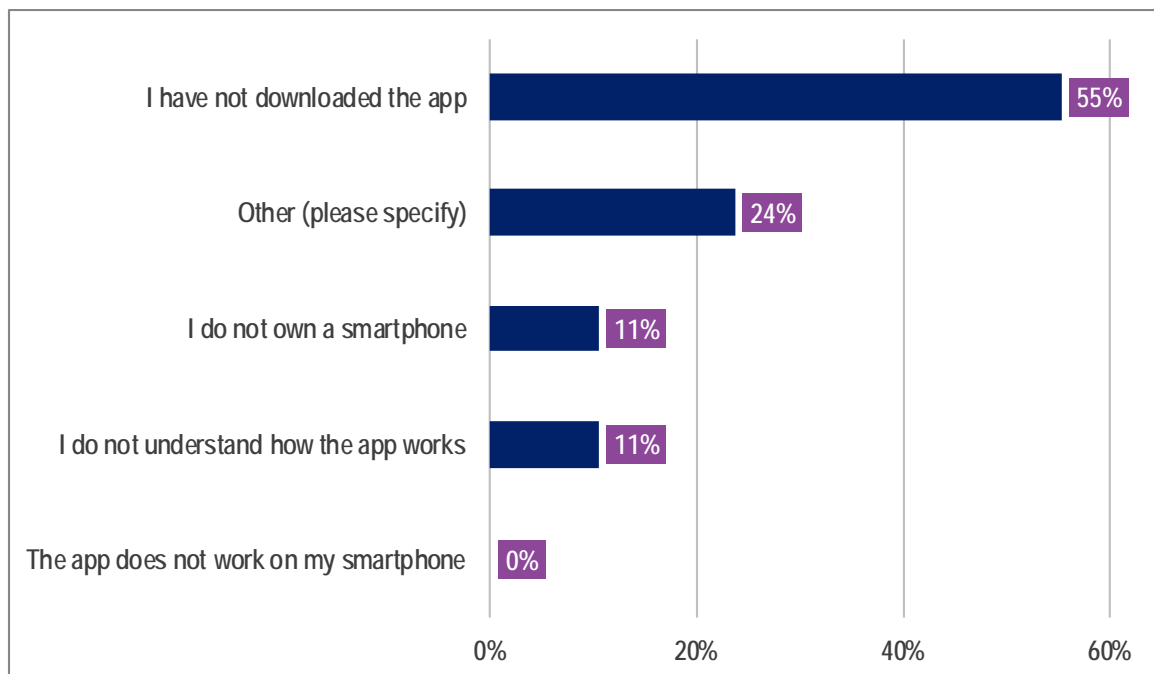






Figure 89 | How often do you use the Wave Transit smartphone app?

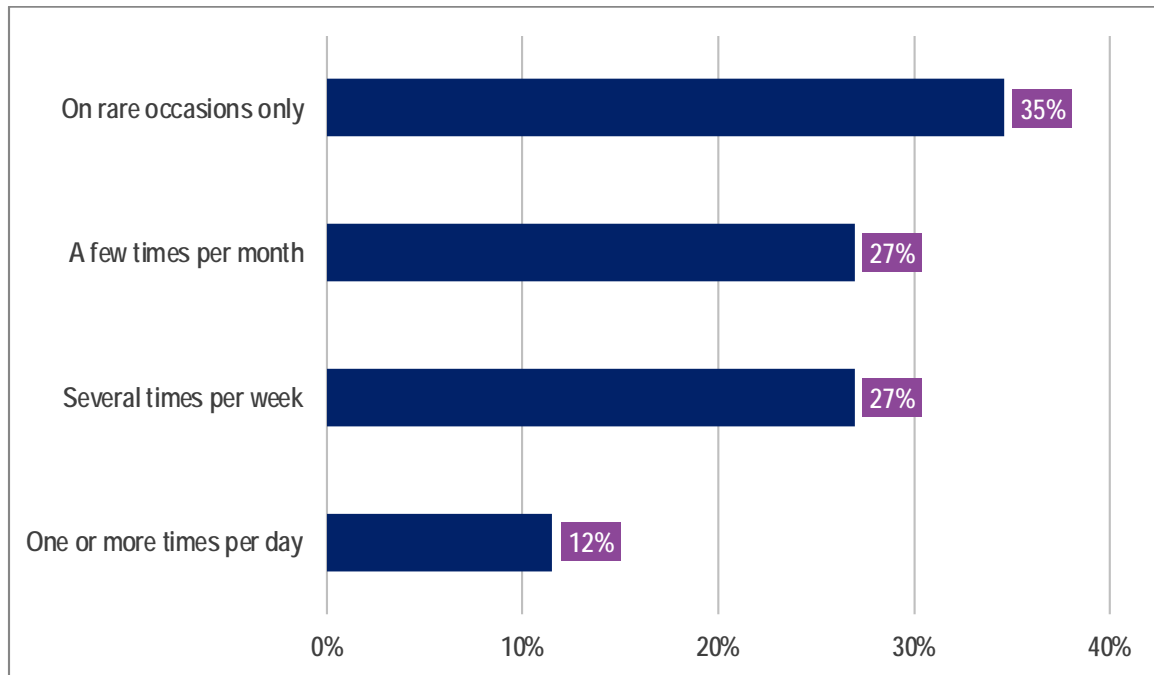
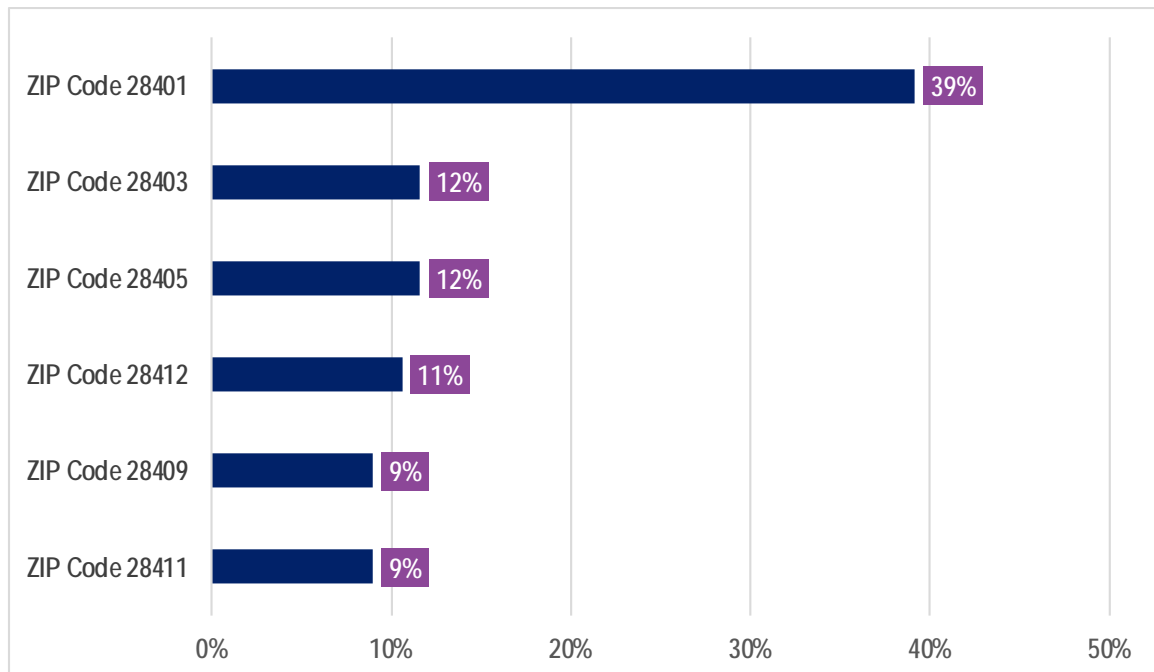


Figure 90 | Please enter your home ZIP code.





## Downtown Trolley Survey

Survey respondents overwhelmingly favor continuing the Downtown Trolley and the majority agree that \$1 is a reasonable fare. Among the four proposed Downtown Trolley alignments, 43% of respondents preferred Option D, which proposed operating two trolleys serving downtown Wilmington, Brooklyn Arts District, and Castle Street. Option C, which operates one vehicle serving downtown Wilmington, 8<sup>th</sup> Street, and Castle Street, but does not extend north of Brunswick Street, was favored by 24% of respondents. Only 9% of respondents favor eliminating the Downtown Trolley. Comments from respondents strongly favor extending the trolley south to serve the Castle Street business district, as well as the Cape Fear Museum. More frequent service, along with improved passenger amenities and signage, is also requested.

Nearly three-quarters of respondents (72%) agree that \$1 is a reasonable fare for the Downtown Trolley. However, comments from respondents also revealed strong support for continuing to operate the trolley fare-free. Additional comments focused on daily/weekly passes, concern that a fare will further reduce ridership, and concern for low-income riders that cannot afford the fare.

Forty-one percent of respondents live in ZIP code 28401, which includes downtown Wilmington.

Figure 91-Figure 93 summarize the full survey results.

Figure 91 | Which Downtown Trolley scenario do you prefer?

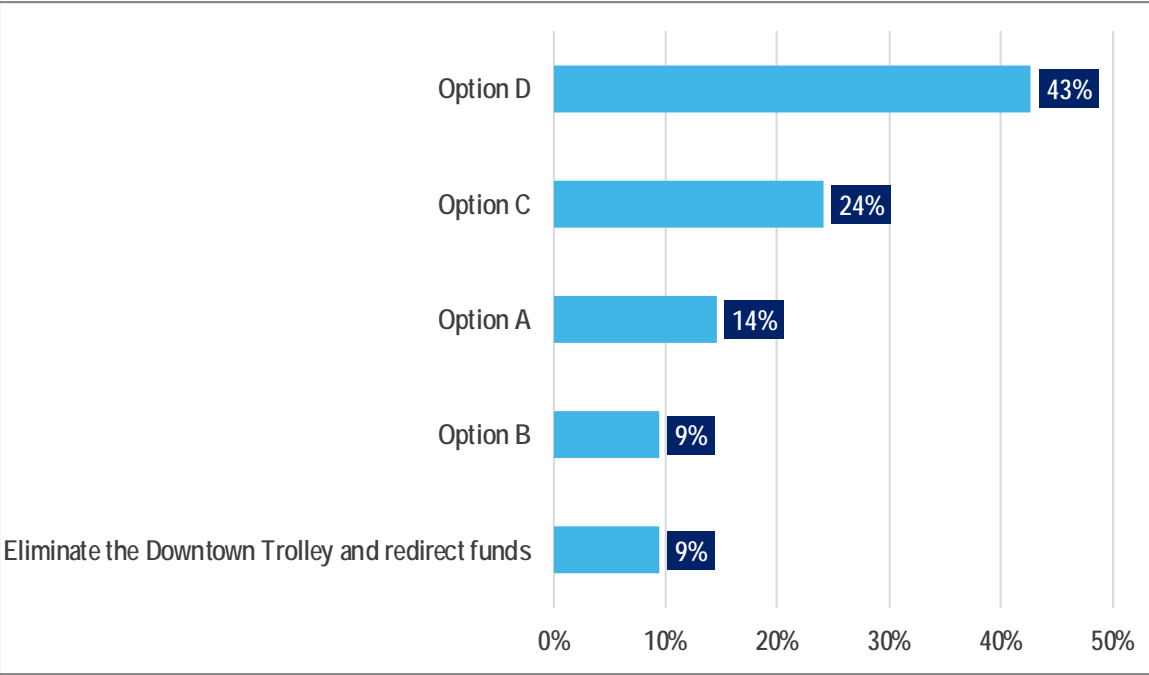




Figure 92 | The SRTP is considering introducing a nominal fare to ride the Downtown Trolley to emphasize the trolley's value, and to help cover operating costs. Do you feel \$1 is a reasonable fare for riding the Downtown Trolley?

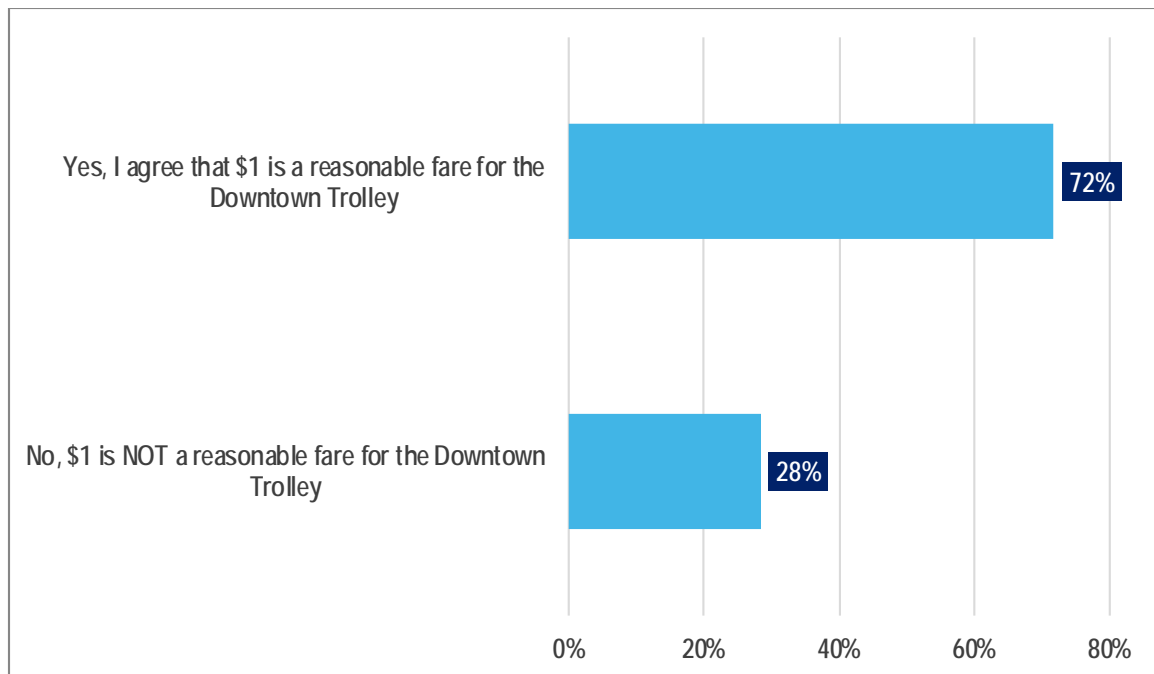
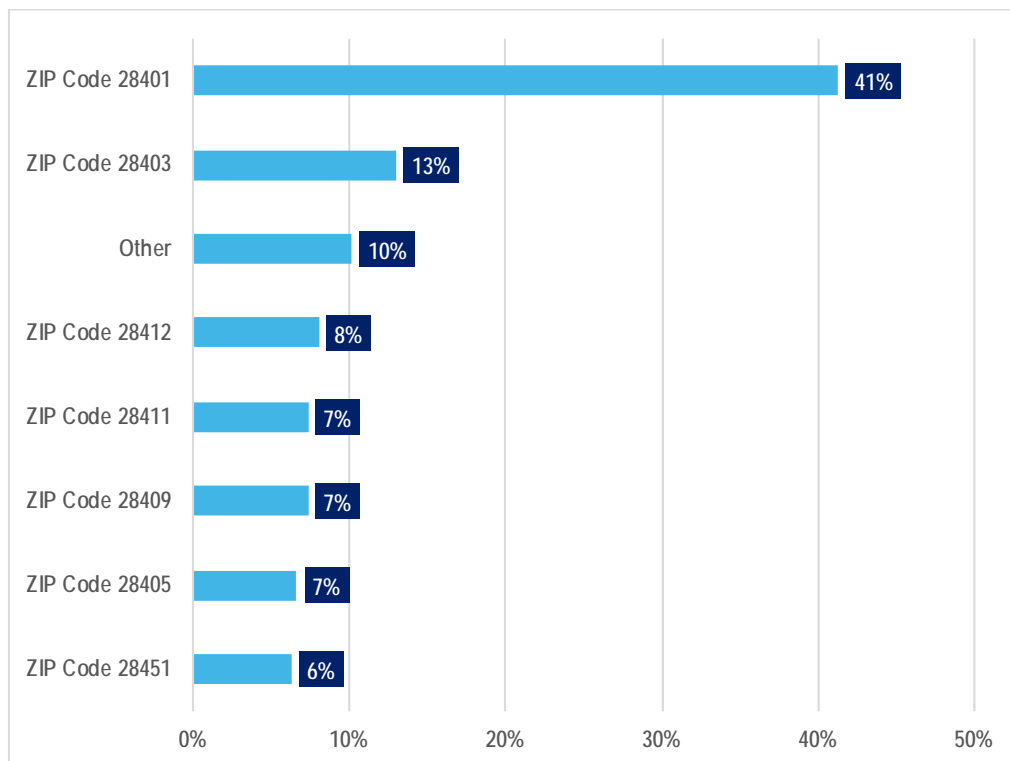


Figure 93 | Please enter your home ZIP code





## 8 SUMMARY AND CONCLUSIONS

The feedback received from the public and stakeholders is critical to creating recommendations for improving the Wave Transit system. Since resources are limited, prioritizing the most important and commonly-heard requests can ensure that those resources are used wisely. The breadth and quantity of feedback received during the project, whether communicated through surveys, interviews, or online, also instills confidence that the SRTP will reflect the desires of the community in the Cape Fear region. Overall, suggestions can be categorized into themes as shown below.

### Frequency

More frequent service is desired, with the most common request being for service every half hour instead of hourly. Increased frequency can be especially helpful if a transfer between routes is required. In addition, more frequent service on Route 301 Pleasure Island, which currently only has a few trips per day, was suggested.

### Span of Service

Requests for earlier service were received, mainly to be able to get to jobs which have an early start. Weekend service was also suggested, particularly for Routes 204 Brunswick Connector and 207 North, which currently have no weekend service.

### Coverage

New service to areas which have no existing transit service was another common theme. Requests include:

- Porters Neck/Ogden
- Creekwood
- River Road/Sunset Park
- Masonboro Loop and Greenville Loop Rds.
- Beach areas, perhaps seasonally only

### Fares/Payment

There is a desire for more payment options, including the use of credit and debit cards, a reusable smart card, and mobile phones.

### Information/Awareness

A smartphone app with real-time vehicle arrival information was introduced by Wave Transit midway through the public engagement process. This capability responds to customer desires for better information, and it is likely that continued promotion of the new app will increase its usage, and that any remaining kinks from the rollout will be ironed out.



## **Customer Service**

While it was acknowledged that many Wave Transit staff are professional and courteous, a desire was also expressed that this behavior become more universal among bus operators.

## **Bus Stops**

Feedback supports continuation of the program to upgrade bus stops and make more of them ADA accessible. A few locations for additional bus stops were noted as well. It should be noted that cooperation from outside parties is required for any improvements to sidewalks and bus stops.

## **Free Downtown Trolley**

Recommendations for the Free Downtown Trolley included:

- Serve Brooklyn Arts District
- Consider other business districts near downtown, and Sawmill Point apts.
- Consider charging a small fare
- Increase awareness as many people don't know much about the existing service

## **Seahawk Shuttle**

Suggestions for the UNCW services included:

- Later evening hours
- Adding weekend service
- More frequent service
- Improving driver shift change issues in the afternoon