Seacoast Transit Stop Accessibility Study

Assessment and recommendations to improve pedestrian access on the COAST and UNH Wildcat Transit Systems

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ACKNOWLEDGMENTS

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APPENDICES

GLOSSARY

AADT   Average Annual Daily Traffic

ADA   Americans with Disabilities Act

BLTS   Bicycle Level of Traffic Stress

COAST   Cooperative Alliance for Seacoast Transportation

GIS   Geographic Information System

LOS   Level of Service

LTS   Level of Traffic Stress

MPO   Metropolitan Planning Organization

NHDOT   New Hampshire Department of Transportation

PHB   Pedestrian Hybrid Beacon (a.k.a. "HAWK" beacon)

PLTS   Pedestrian Level of Traffic Stress

PSU   Plymouth State University

RPC   Rockingham Planning Commission

RRFB   Rectangular Rapid Flashing Beacon

SRPC   Strafford Regional Planning Commission

UNH   University of New Hampshire

SEACOAST TRANSIT STOP ACCESSIBILITY STUDY

1. INTRODUCTION

Public Transportation in the New Hampshire Seacoast provides residents with critical access to jobs, medical care, education and training, grocery shopping and other basic life needs. COAST and UNH Wildcat Transit also provide area employers access to an expanded labor pool, particularly given challenges with housing affordability in employment centers like Portsmouth and Dover, and UNH's main campus in Durham.

While many of the 441 stops on COAST's fixed route network and 143 stops on UNH Wildcat Transit's regional network are in relatively walkable downtown areas, many others are along auto-oriented arterials with inconsistent or in some cases nonexistent sidewalks and crossing safety measures. To some degree this is simply a result of the economics of land development, as affordable land tends to be outside of downtown centers, so that's where affordable housing is built, and where many workers critical to the region's economy tend to live. Other commercial development along these corridors tends to be auto-oriented, such that to date municipalities have not invested in pedestrian facilities there, or required developers do so as new projects are permitted and built.

The intent of this project is to assess pedestrian access in the vicinity of transit stops on the COAST and Wildcat fixed route networks. This includes not just whether sidewalks exist on the main streets and roads where transit stops are located; but also where gaps exist on connecting streets that transit riders use to walk from the stop to their neighborhood, to work, to the library or the park. For the project sidewalk data were collected and analyzed with a model of Pedestrian Level of Traffic Stress (PLTS) to identify road segments in transit stop areas where sidewalks do not exist, or are in deteriorated condition. To assist municipalities in prioritizing sidewalk gaps and rehabilitation needs, the project also includes a series of connectivity analyses identifying segments that connect to the greatest number of nearby destinations.

From these analyses the report identifies a series of recommended pedestrian facility projects with high potential to improve access to transit stops. While in many cases municipalities undertake sidewalk projects with local funding or federal grants, there is also a need to ensure that planning boards consider connections to transit when reviewing new commercial and multi-family developments, as this is a key opportunity to engage developers making access improvements. A companion report, _Enhancing Transit Access: Site Plan Review Regulations Audit_, provides recommendations on land use policies and site plan review procedures to ensure that municipal staff and boards and developers work collaboratively with the region's transit systems to ensure new developments connect to both pedestrian and transit networks.

2. PEDESTRIAN LEVEL OF TRAFFIC STRESS ANALYSIS

2.1 Introduction to Level of Traffic Stress

Level of Traffic Stress (LTS) is a measure of the suitability of a given stretch of roadway for bicycling or walking, originally developed in the context of bicycling (Bicycle Level of Traffic Stress or BLTS) at the Mineta Transportation Center in 2012 by Maaza Mekuria, Peter Furth and Hilary Nixon (Mekuria et al. 2012). It was intended to be an easily understood measure of the suitability of a given segment of roadway for bicyclists with differing levels of tolerance for riding with automobile traffic. The original measure was in turn designed to facilitate analysis of connectivity between origin and destination points for utilitarian trips short enough to be taken by bicycle where traffic stress conditions permitted.

The measure was developed in part as an alternative to the traditional Highway Capacity Manual Level of Service (LOS) measurement, which categorizes facilities largely based on capacity and traffic flow. While LOS analysis has been adapted to address people walking and bicycling (PLOS and BLOS), those methodologies treat all pedestrians and bicyclists as having the same skill level and sensitivity to automobile traffic. The original BLTS classification system characterized traffic stress on a given road segment based on how comfortable bicycle riders of varying abilities would feel riding that segment.
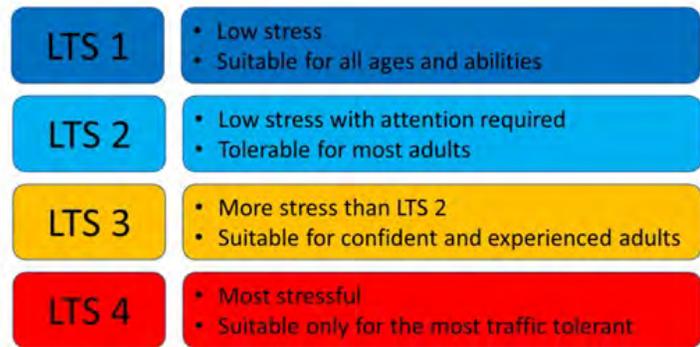
Figure 2.1 – Description of Level of Traffic Stress Ratings

2.2. Use of Level of Traffic Stress Modeling in New Hampshire

The original Mineta Transportation Center BLTS model considered an extensive list or road attributes, many of which are not included in the NH Department of Transportation's GIS road layer. Between 2016 and 2020 faculty and graduate students at Plymouth State University worked with several New Hampshire regional planning commissions to adapt the Mineta BLTS model to the more limited level of road attribute data available to most municipalities in New Hampshire. In 2019-2020 five regional planning commissions, including RPC and SRPC, worked with PSU to collect detailed road data and characterize bicycle level of traffic stress for their entire regions. The 2023 New Hampshire Bicycle and Pedestrian Plan included a similar BLTS analysis for all state highways.

Various entities around the country have adapted the original BLTS concept to rate Pedestrian Level of Traffic Stress (PLTS), though this project is the first to do so in New Hampshire.

2.3 PLTS Model Development and Regional Data Collection

After reviewing several PLTS methodologies developed around the country, the study team compiled a list of metrics incorporated in most of those models. The list was compared to the various sidewalk data sets that SRPC and RPC member communities have available. Through this effort, the following sidewalk attributes were determined to be the most beneficial to the PLTS analysis:

- Sidewalk Presence – is there a sidewalk present, or is it necessary to walk on the road alongside moving vehicles? (Examined for both sides of the road)

- Sidewalk Material – Assessed because accessibility can vary between sidewalk materials like asphalt, concrete, stamped asphalt, brick, gravel, dirt (trails), or other surfaces.

- Sidewalk Condition – Assessed for cracking, loose aggregate, major deterioration, faulting, patching, and other rough surfaces. Brick sidewalks, while popular in some downtowns for aesthetic reasons, tend to deteriorate rapidly creating uneven surfaces.

- Sidewalk Width – Assessed how much passable distance each sidewalk segment has

- Buffer Presence – Whether a sidewalk segment is physically separated from the road by a buffer, or simply has vertical curb immediately next to the road. Road shoulder is not considered buffer.

- Buffer Type – The type of buffer present. Typically grass, gravel, or a physical barrier (again not including roadway shoulder).

- Buffer Width – how wide the buffer is between the sidewalk segment and the adjacent roadway.

In addition to these sidewalk variables, the following road specific variables are incorporated into the new model:

- Total Lanes – The number of vehicle lanes a road has running in both directions. This is available in the NHDOT road layer.

- AADT – The average amount of daily traffic (AADT) vehicles generate in the roadway. This NHDOT road layer includes this metric for major roads, though data for minor roads if they exist are often rough estimates. More refined estimates were developed for the 2019-2020 multi-MPO/PSU bicycle level of traffic stress project.

- Speed limits – The posted speed limit for vehicles in the roadway adjacent to sidewalk segments. While prevailing speed is the preferred measure, availability of date on this is inconsistent so posted speed limit is used instead.

Data on all of these parameters were collected by the project team for all roads within three quarters of a mile (0.75 mile) of COAST and Wildcat Transit fixed route bus stops, including in the communities of Dover, Durham, Exeter, Farmington, Newmarket, Portsmouth, Rollinsford, and

Somersworth. In some cases data were largely available in municipal GIS databases, while in other communities substantial new data were collected with use of Google Street View backed with site visits.

Once all data were incorporated, the model produced three Pedestrian Level of Traffic Stress (PLTS) scores for each segment defined in the road network as seen in Map 2.1. These include a score for each side of the road and a Crossing Score depicted in the middle of the road.

Initial model outputs were reviewed by staff from both planning commissions, and with planning department and public works staff from the cities of Portsmouth and Dover as part of broader collaboration on the site plan review audit component of the project. Segment PLTS scores identified as either too high or too low were adjusted by revisiting condition assessments, adjusting thresholds in scoring tables, or adjusting how the model linked sidewalk and roadway layers. Manual adjustments to PLTS scores for specific segments were avoided to better allow future updates to the analysis.

One sees in Figure 2.2 that a large majority of local roads are rated as low stress (dark blue for PLTS1 or light blue for PLTS2), though this does not necessarily mean that they have sidewalks. In the absence of sidewalks the model can assign a low stress rating based on a combination of low speed and low traffic volume. This includes most neighborhood streets and some connector roads. Most state

Figure 2.2 – PLTS for COAST and UNH Transit Service Areas

highways and major arterials on the regional map show up as red (PLTS4) or orange (PLTS3) reflecting higher traffic, higher speeds, and typically an absence of sidewalks.

The model results shown in Figure 2.2 are not clipped to the 3/4 -mile radius around transit stops, though beyond that radius no new field data collection was conducted, so model ratings are based purely on data available in the NHDOT GIS road layer. A full explanation of the PLTS model and scoring tables is included in *Appendix A – Pedestrian Level of Traffic Stress Scoring Model Methodology*.

All mapping of traffic stress as well as transit stop volumes, connectivity analysis and gap analysis described in the following sections of this report are included in the Seacoast Transit Stop Accessibility Study interactive online map

Figure 2.3 – PLTS Results for Downtown Portsmouth
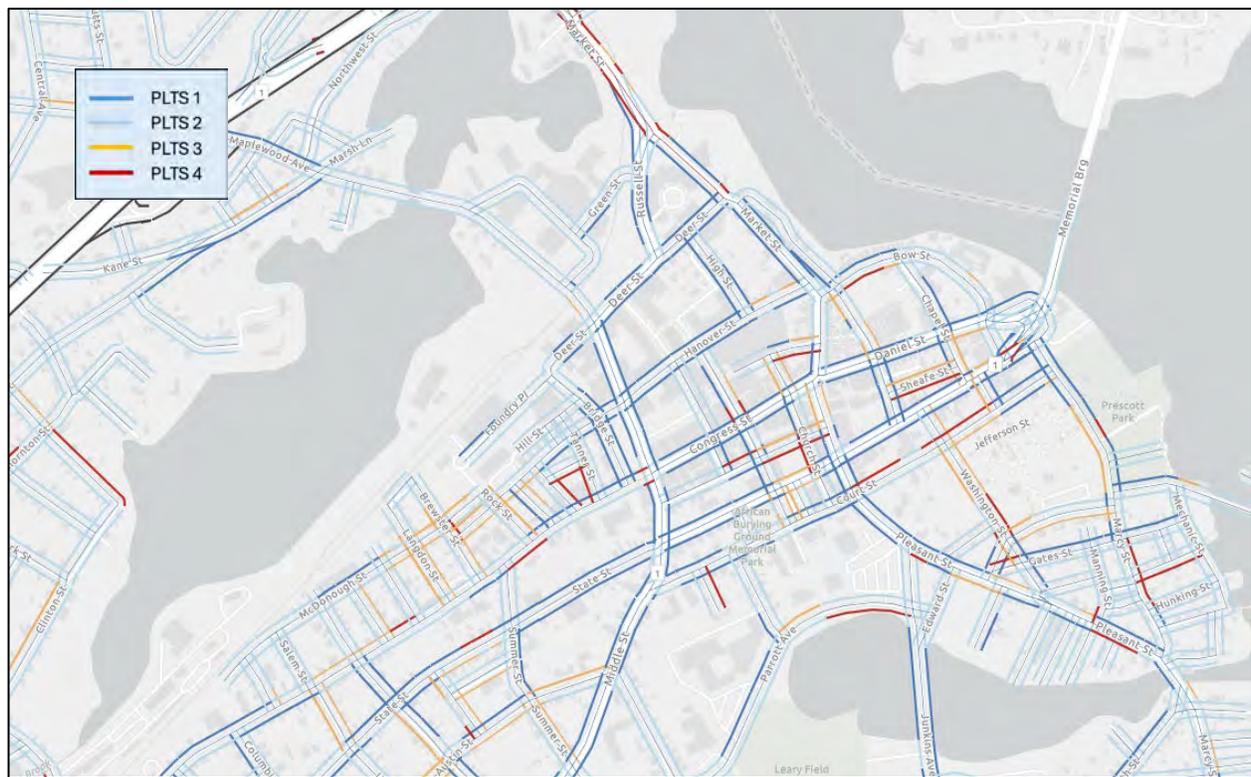
While virtually all streets in downtown Portsmouth and downtown Dover have sidewalks, notice that multiple sidewalk segments are rated by the model as PLTS3 or PLTS4. The PLTS model and the data collection process that shaped it included a particular emphasis on sidewalk accessibility for individuals with disabilities, whether users of wheelchairs or other mobility devices for whom uneven surfaces can be a particular problem. Substantial weight is placed on sidewalk material and condition. This is a useful feature for helping planners and public works staff identify sidewalk segments in need of upgrade from an ADA standpoint. That said, this emphasis has a side effect of somewhat overestimating pedestrian level of stress for walkers without disabilities on older

sidewalks narrower than four feet, and brick sidewalks where any degree of settling or heaving has occurred. An example of this can be seen on Figure 2.3 of downtown Portsmouth where both sides of Pleasant Street between State and Congress streets are rated PLTS3. While this block has wide sidewalks and parking buffers, they are brick and somewhat uneven in locations so the model adds an extra point in stress rating, resulting in a PLTS3 rather than PLTS2 given that deterioration of brick sidewalks can proceed quickly once it begins. Other sections of brick sidewalk in downtown Portsmouth are scored similarly by the model.

Figure 2.4 – PLTS Results for Downtown Dover
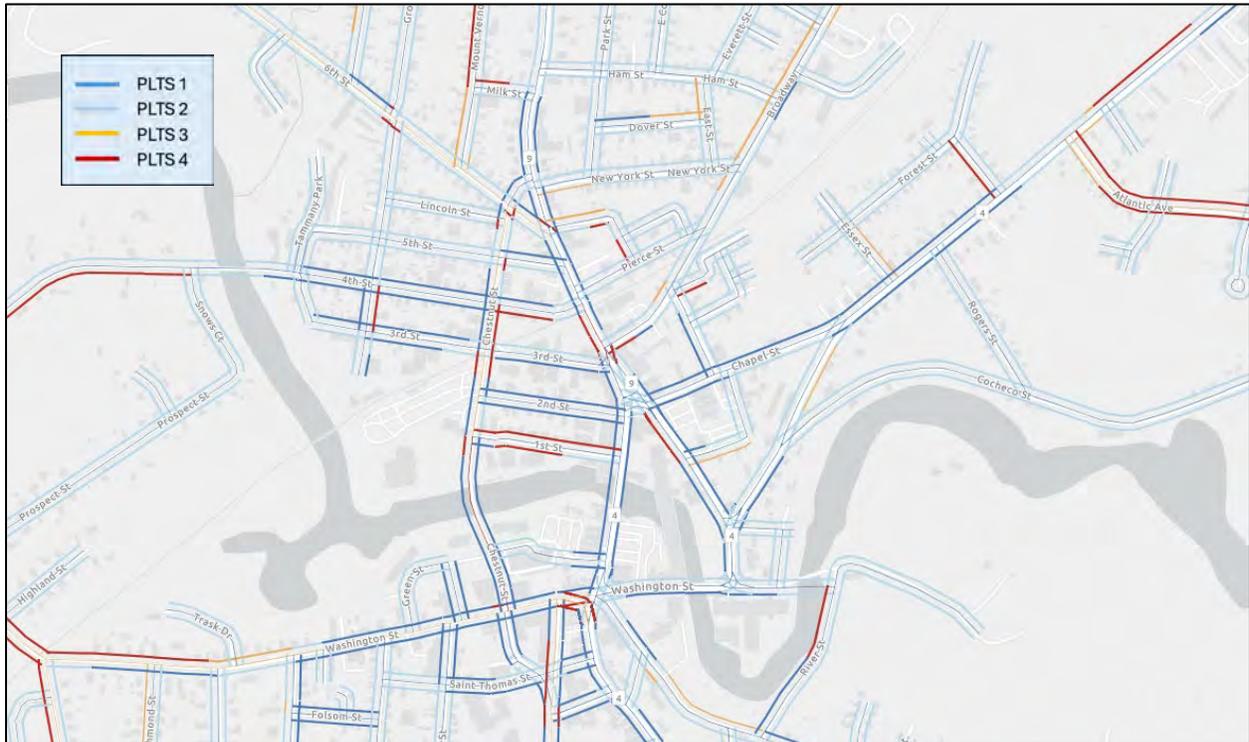
Sections of brick sidewalk in downtown Dover on First Street, Main Street and elsewhere similarly receive a PLTS rating one point higher than their width and buffer would otherwise dictate. While recommendations for priority pedestrian improvements in Section 5 of the report focus on adding sidewalks and crossing facilities where none exist currently, communities with brick sidewalks should carefully monitor their condition and maintain them to minimize unevenness that can present a hazard for pedestrians and transit riders with disabilities.

3. FIXED ROUTE AND ADA TRANSIT STOP VOLUME ANALYSIS

The Pedestrian Level of Traffic Stress (PLTS) analysis on the preceding pages provides a snapshot of pedestrian access within a ¾-mile radius of all transit stops on the COAST and UNH Wildcat regional route networks. In order to focus these data to help identify needed investments in pedestrian access near transit stops, the project team next looked at most popular destinations for users of both transit services. This involved tabulating and mapping alighting counts (people getting off the bus) at all fixed stops on the COAST and Wildcat networks; as well as high volume destinations for COAST's Americans with Disabilities Act (ADA) complementary paratransit service. Results from each of these analyses including heat maps are discussed on the following pages.

3.1.   Transit Stop Volume on the COAST Fixed Route Network

The Cooperative Alliance for Seacoast Transportation (COAST) is the regional public transit agency serving eleven communities in the New Hampshire and Maine Seacoast Area. COAST provides fixed route bus and ADA paratransit service in Dover, Farmington, Portsmouth, Newington, Rochester, and Somersworth in New Hampshire; and Berwick, South Berwick, Eliot, and Kittery Maine. The system also operates public demand response service in Exeter and Newmarket New Hampshire with a single designated stop in Stratham. COAST's network of 13 local and regional routes is designed to cover a broad catchment of residential areas, downtowns and other employment centers, medical facilities and other key community destinations.

Most COAST local and regional routes operate six days a week, Monday through Saturday, with services spans of 13-15 hours a day, starting by 6:30am and some extending as late as 9:30pm. While ridership on COAST and most transit systems across the country declined sharply during the COVID-19 pandemic, the system has seen ridership rebound steadily. In 2024 fixed route trip volume had recovered to approximately 87% pre-COVID numbers, and in 2025 is on track to provide over 400,000 trips, equaling or surpassing pre-COVID trip volume in 2019. ADA paratransit and other demand response services have come back even faster, with the 23,006 trips in 2024 representing over 98% of pre-COVID volume; and ridership in 2025 is on track to 26,000 trips and surpass pre-COVID numbers.

To identify the most heavily used stops on the COAST fixed route network, the project team analyzed boarding and alighting (on/off) data from COAST for the eight month period of January to August 2023. For stops served by multiple routes, alighting counts were aggregated into a single number for each location. Figure 3.1 shows the top 30 most heavily traveled COAST bus stops by name, municipality, and estimated annual alighting count. Annual alightings were extrapolated from the 8 month sample data. Note that Hanover Street in Portsmouth and Dover Transportation Center are major hubs and transfer points for the system and are served by multiple routes.

Figure 3.1 - Top 30 COAST Bus Stops by Alighting Volume

#	Stop Name	Municipality	Estimated Annual Alightings
1	Dover Transportation Center	Dover	34,695
2	Hanover Station	Portsmouth	33,887
3	Wakefield Street (Rochester City Hall)	Rochester	8,724
4	High Street (Tri-City Plaza #140)	Somersworth	6,447
5	High Street (WalMart)	Somersworth	6,083
6	Lilac Mall	Rochester	5,255
7	South Main / Linden Streets (AutoZone)	Rochester	4,613
8	Lafayette Road (WalMart)	Portsmouth	4,548
9	Wilson Road (Market Basket) Outbound	Portsmouth	3,318
10	Chestnut / Lincoln Streets (Carswell Auto Parts)	Dover	3,240
11	Lafayette Roast (Cross Roads House)	Portsmouth	3,012
12	Rochester Park & Ride	Rochester	2,969
13	Market Square	Portsmouth	2,967
14	Franklin / Green Streets Northbound	Somersworth	2,963
15	Strafford County Courthouse	Dover	2,963
16	Dover Point Rd. / Homestead Lane Southbound	Dover	2,952
17	Fox Run Mall	Newington	2,817
18	Central Avenue (Shaw's Plaza)	Dover	2,669
19	Lafayette Road (Patriots Park Apts.)	Portsmouth	2,364
20	Market Street / I-95 Outbound	Portsmouth	2,336
21	Central Avenue (Central Towers)	Dover	2,241
22	Kearsarge Way / Mangrove St.	Portsmouth	2,168
23	South Main Street (Bank of America)	Rochester	2,114
24	New Rochester Rd. / Hotel Dr. (Weeks Crossing Plaza)	Dover	2,043
25	Farmington Road (Walmart)	Rochester	2,004
26	Russell / Deer Streets	Portsmouth	1,901
27	Main / Pleasant Streets	Farmington	1,865
28	Court Street (Feaster Apartments)	Portsmouth	1,857
29	Lafayette Road (Hillcrest Estates)	Portsmouth	1,736
30	Middle Street / Miller Avenue (Margeson Apartments)	Portsmouth	1,700

Figure 3.2 similarly depicts alightings by transit stop for all stops on the COAST fixed route network. The larger the circle marking the stop, the higher the total alighting count for the year (2023).

Figure 3.2 – Alighting Volume by COAST Bus Stop

COAST Fixed Route Passenger Volume
by Transit Stop
Passenger Alightings 1/1/23-8/31/23
Range: 1-23,130
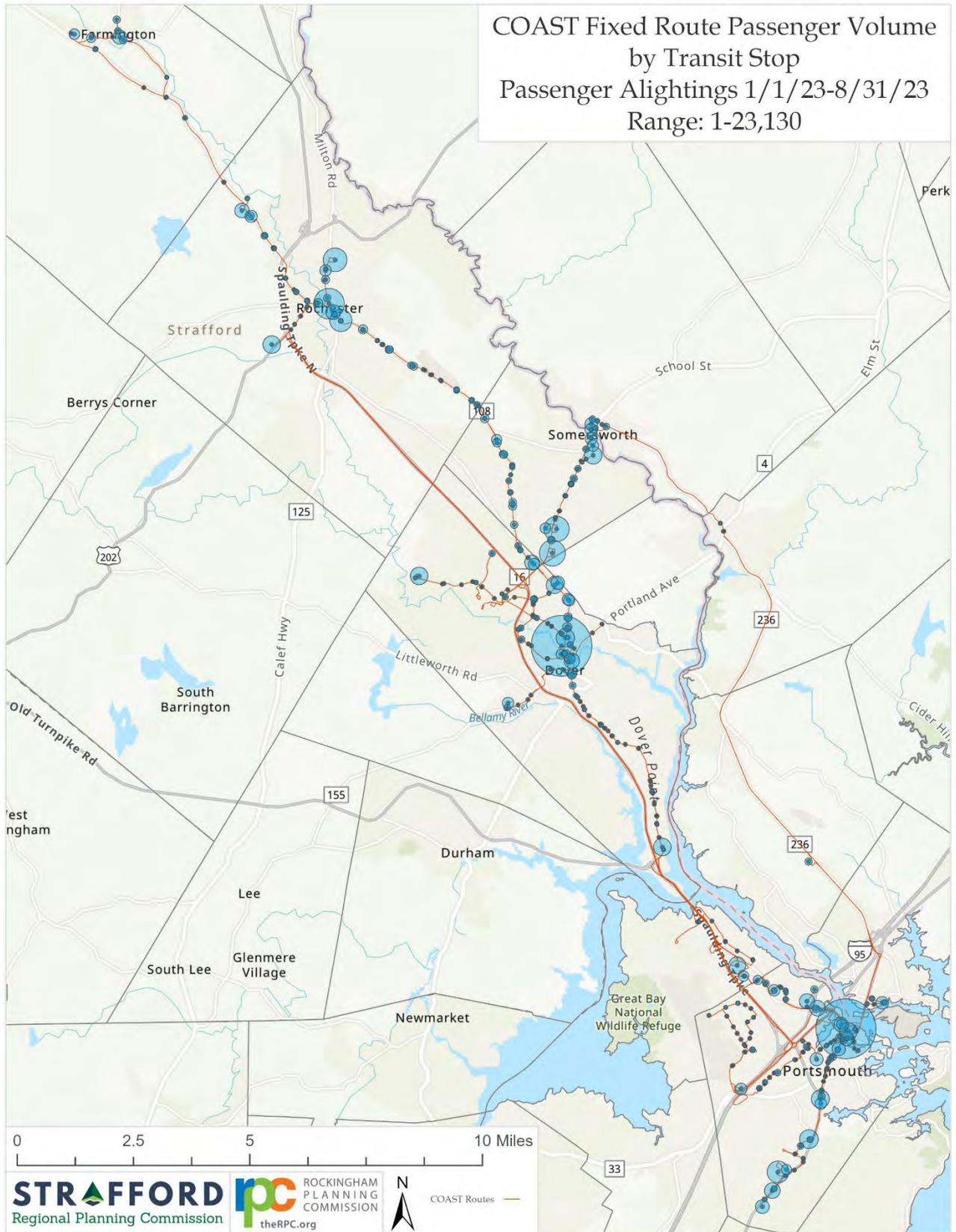
3.2. Transit Stop Volume on UNH Wildcat Transit Regional Route Network

Wildcat Transit is the transportation system for the University of New Hampshire at Durham. Wildcat Transit offers a high-frequency on-campus shuttle service known as the Campus Connector along with two regional routes. **Route 3** connects Durham to Dover with service along Route 108 to commercial and residential areas in downtown Dover. **Route 4** links Durham to Newington and Portsmouth including major destinations like Market Square in Portsmouth, Fox Run Mall and the Crossings at Fox Run in Newington, and various residential and commercial areas along Route 4 and Woodbury Avenue.

During the academic year Route 3 operates seven runs per day between 6:40am and 6:30pm, with hourly service in the morning and two-hour headways in the afternoon. Route 4 similarly offers seven runs per day, though extends further into the evening with the final return trip from Portsmouth to Durham after 10:00pm. During breaks in the academic calendar both routes run on a reduced service schedule with two trips/day on Route 4 and three trips/day on Route 3.

Wildcat Transit saw major ridership declines during the COVID-19 pandemic, more pronounced than for many public transit systems as during the pandemic the University transitioned to an all-online teaching model, reducing the need for commute trips to and from the Durham campus by students and faculty. As with COAST and other transit systems, Wildcat Transit has seen recovery in ridership on its regional routes. During FY2019 (the 2018-2019 academic year) Wildcat Routes 3 and 4 carried a combined 114,341 trips. In FY 21 this dropped to a low of 23,710, and by FY24 had recovered to 67,280, or approx. 59% of pre-COVID ridership. Another factor in slower recovery is continued expansion of off-campus student housing in Durham, reducing the number of students commuting from Dover and other communities to campus.

An analysis of on/off volume by stop was conducted for Wildcat Transit regional routes using data provided by UNH for Route 4 connecting the UNH Durham campus to Newington and Portsmouth, and Route 3 connecting the Durham campus to Dover. While Wildcat Transit does not tabulate all boardings and alightings at each stop throughout the year, they do conduct regular sampling. Alighting counts were estimated based on sampling during SFY2023 (July 2022-June 2023). Sampling was conducted on 61 separate dates representing each service day of the week, in both normal semester full operations and reduced service periods over the summer and holiday breaks.

The combined sampling dates were used to estimate average daily alightings by stop, and annual estimates were extrapolated based on average number of service days per year under both normal operations and reduced service periods. Estimated annual alightings by stop for the top 30 most heavily used stops on Routes 3 and 4 are shown below in Figure 3.3.

The four highest volume stops represent a combination of route starting points and other major destinations on the Durham campus, including dining halls, departmental classrooms/labs, dormitories, or central points on campus or in Durham's downtown.

Figure 3.3 - Top 30 Wildcat Transit Regional Route Stops by Alighting Volume

#	Stop Name	Municipality	Estimated Annual Alightings
1	Garrison Ave @ Sawyer Hall	Durham	5,642
2	Main Street @ Holloway Commons	Durham	3,744
3	Academic Way @ McConnell Hall	Durham	3,678
4	Main Street @ Hetzel Hall	Durham	2,414
5	Central Ave @ Central Towers	Dover	2,124
6	Mill Rd @ Campus Crossings	Durham	1,606
7	Main Street @ Janetos	Dover	1,321
8	Madbury Road @ Woodman Road	Durham	1,312
9	Newington Wal-Mart	Newington	1,243
10	Central Ave @ New York Street	Dover	1,238
11	Central Ave @ Tasker Funeral Home	Dover	1,231
12	Hanover Street @ High-Hanover Parking Facility	Portsmouth	1,213
13	Central Ave @ Shaws Plaza	Dover	1,199
14	Fox Run Mall	Newington	1,190
15	Commerce Way @ Marshall's Plaza	Portsmouth	1,184
16	Rte 108 @ Young Drive	Durham	1,150
17	Main Street @ Thompson Hall	Durham	1,092
18	Market Square	Portsmouth	1,091
19	Central Ave @ Wentworth Douglass Hospital	Dover	1,022
20	Islington Street @ Plaza 800	Portsmouth	944
21	Central Ave @ Dover City Hall	Dover	934
22	Gosling Road @ Winsor Road	Portsmouth	932
23	30 Madbury Road	Durham	901
24	Central Ave @ Oak Street	Dover	875
25	Chestnut Street @ Carswell Auto	Dover	753
26	Madbury Road @ Emerson Road	Durham	725
27	Rte 155 @ Westgate Apartments	Dover	725
28	Dover Transportation Center	Dover	692
29	Crossings at Fox Run @ Cold Stone Creamery	Newington	691
30	Rte 108 @ Arrow Brook Road	Dover	659

Figure 3.4 – UNH Wildcat Transit Alighting Volume by Stop – System-Wide

Wildcat Fixed Route Passenger Volume by Transit Stop
Passenger Alightings 7/1/22-6/30/23
Range: 50-5,642
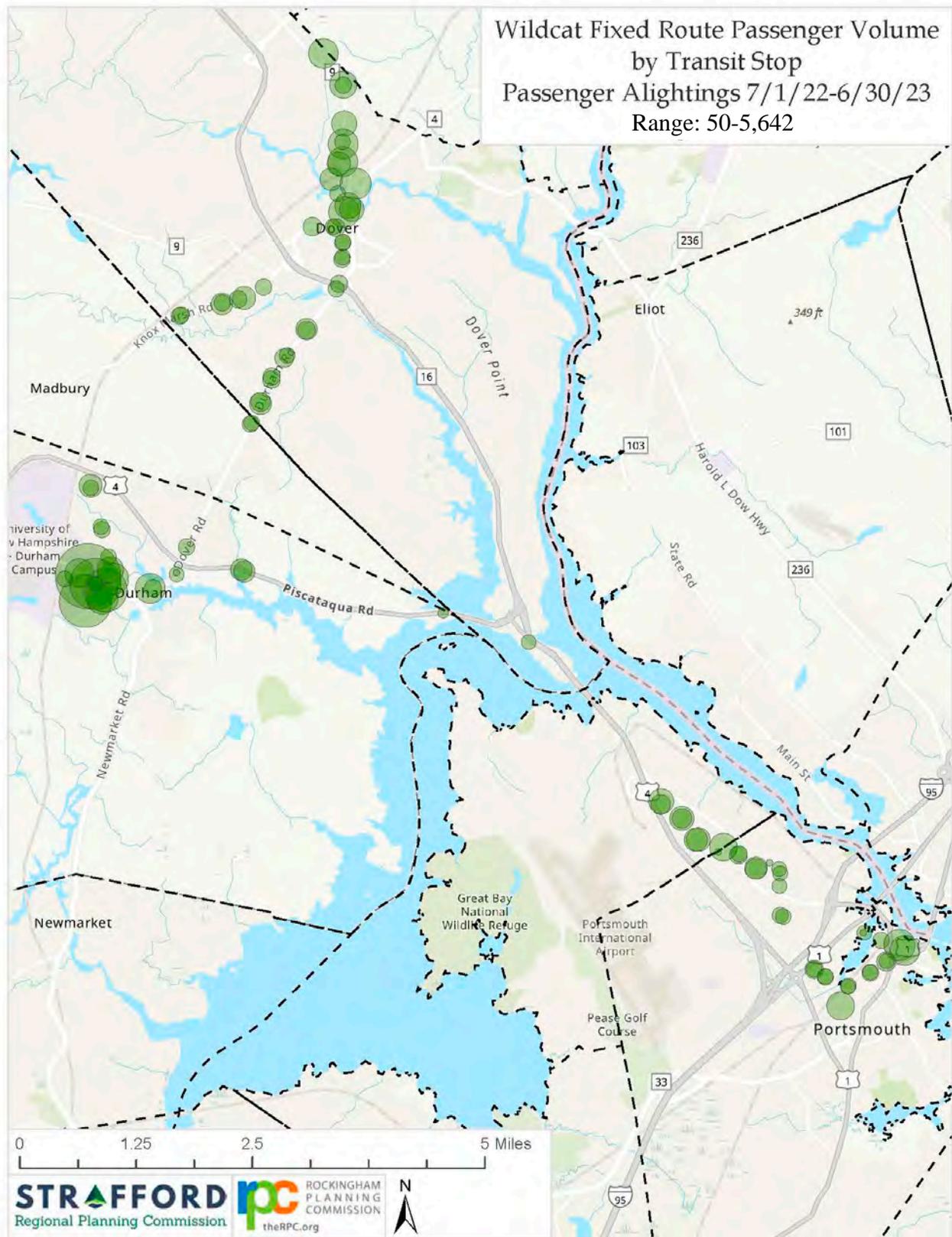
3.3 High Volume Origin and Destination Points for COAST ADA Paratransit

Along with its fixed route network COAST, like all federally funded public transportation systems, also offers complementary paratransit services under the Americans with Disabilities Act (ADA). This is an origin-to-destination service (typically curb to curb) provided for individuals with disabilities that prevent them from riding regular fixed route bus service. Rides are available to origin and destination points within ¾ miles of a COAST bus stop, and operates during the same times of day and days of the week as COAST fixed route services. The intention of ADA paratransit service is to provide access for people with disabilities equivalent to what is enjoyed by other transit riders without disabilities.

COAST encourages ADA riders to use the fixed route service whenever they can. ADA service is critical for many transit riders in the Seacoast to maintain their independence. It is also very expensive to operate and has grown dramatically as a percentage of system costs. Pre-COVID, demand for COAST ADA service grew 880% from 2008-2018, and their cost to provide those services grew 744%. In 2024 ADA trips represented 4.4% of overall trip volume, and 21.9% of COAST's budget. Rising ADA costs have been a major driver of COAST cost increases in recent years, limiting opportunities for other types of system improvements such as increased schedule frequency. Demand for and cost to provide ADA paratransit services is projected to continue climbing in the coming decade as the region's population ages.

Eligibility for ADA services can be conditional. For example someone who uses a motorized wheelchair may be able to get from home to a fixed route bus stop via sidewalk during 3 seasons, but is unable to make that connection during winter months given snow and ice on the ground. Alternately eligibility can be conditioned based on specific destination points. An ADA rider may be able to get from home to the nearest fixed route stop and reach certain destinations by fixed route bus, but other places they need to go lack a safe, accessible pedestrian connection between the nearest bus stop and the final destination. In that case a trip would be taken by paratransit.

One strategy that can help COAST member municipalities manage the cost of ADA service is improving pedestrian access in the vicinity of fixed route stops to help ensure riders with disabilities can safely travel between fixed route stops and their final destination. COAST estimates that up to 20% of ADA riders would be capable of riding a fixed route if they were able to safely get from home to the bus stop and from the bus stop at the other end of their transit journey to their final destination. Beyond cost management benefits to COAST and its member municipalities, helping ADA riders transition to riding fixed route service for more of their trips will give greater travel schedule flexibility to the individual rider.

To help municipalities and COAST identify opportunities for targeted pedestrian improvements of this sort, the project team worked with COAST to assess high volume origin and destination points for ADA trips. Unlike fixed route service, origin and destination points for ADA trips include riders' home addresses, workplaces, medical offices and other personal destinations. To protect rider privacy, ADA trips were instead mapped the nearest fixed route stop.

Table 3.3 shows the 30 COAST fixed route stops with the greatest volume of ADA paratransit trip origin and destination points within a ¾ mile radius. While an ADA rider's specific trip origin point or final destination can't be pinpointed based on this analysis, the table describes nearby businesses, community facilities and residential areas that ADA riders may be accessing. These include a dialysis center, grocery stores and other major retail centers, hospitals, Great Bay Community College, and large apartment complexes.

Figure 3.5 - COAST ADA Paratransit Origin and Destination Analysis

#	Stop Name	City	ADA Trips	Nearby Destinations
1	Sixth St. / Heather Ln.	Dov	1177	Fresenius Dialysis
2	Portsmouth Blvd. / Shearwater Dr.	Port	1106	Market Basket Woodbury
3	Borthwick Ave. (Portsmouth Hospital)	Port	1104	Portsmouth Hospital, Borthwick employers
4	Lilac Mall	Roch	1048	Lilac Mall/ GBCC Rochester
5	215 West Rd.	Port	748	Office area behind Market Basket on Lafayette
6	High St. (WalMart)	Som	728	WalMart
7	Dover Point Rd. / Constitution Way	Dov	707	Possible residential
8	Wakefield St. (Rochester City Hall)	Roch	660	Rochester City Hall/Downtown/SOS
9	Central Ave. (Central Towers)	Dov	631	Central Towers, Downtown South
10	Franklin / Green Sts. Northbound	Som	628	Somersworth Housing Authority
11	Dover Point Rd. / Elliot Park Dr.	Dov	613	Possibly Residential
12	Wilson Rd. (Market Basket) Outbound	Port	578	Market Basket Plaza Lafayette
13	Rochester Park & Ride	Roch	548	Kohls Plaza / Homeless Center / Residential
14	Wakefield / Union Sts.	Roch	537	Possibly Linscott Apartments or Gafney Home
15	Central Ave. (Wentworth-Douglass)	Dov	529	Wentworth Douglass Hospital
16	Central Ave. / Union St.	Dov	479	Possibly Wadleigh House or Union Court
17	South Main St. (Bank of America)	Roch	476	Public Library, Possibly Residential
18	The Ridge Marketplace Northbound	Roch	466	Ridge Marketplace, Seasons Lane
19	Members Way (Went-Doug Offices)	Dov	444	Medical Offices
20	Green St. (Waldron Towers)	Dov	420	Waldron Towers
21	Central St. / Orchard Cir.	Far	415	Likely Residential - Orchard Circle?
22	Rochester Hill Rd. (So'Field Apts.)	Roch	413	So'Field Apartments, Albany/Safran
23	Central Ave. (Shaw's)	Dov	398	Shaws and Hannaford Plaza
24	High St. (Tri-City Plaza #140)	Som	389	Tri-City Plaza, Tara Meadow Apartments
25	Manchester Square	Port	376	Medical Offices, Great Bay Kids, Employment
26	Shattuck Way / Piscataqua Dr.	New	353	Employment? No nearby residential
27	Court / Chestnut Sts.	Port	348	Feaster Apartments
28	South Main St. (Rochester Pub. Library)	Roch	345	Frisbie Rehab, Urgent Care, Downtown
29	Rochester Hill Rd. (Homemakers)	Roch	345	Homemakers, Medical Offices
30	Lafayette Rd. / White Cedar Blvd.	Port	344	White Cedar Apartments, Salvation Army,

Figure 3.6 – COAST ADA Paratransit Trip Hot Spots – System Wide

COAST ADA Paratransit Trip Origins and Destinations FY2024
Aggregated to nearest fixed route transit stop
Range 0-1,177
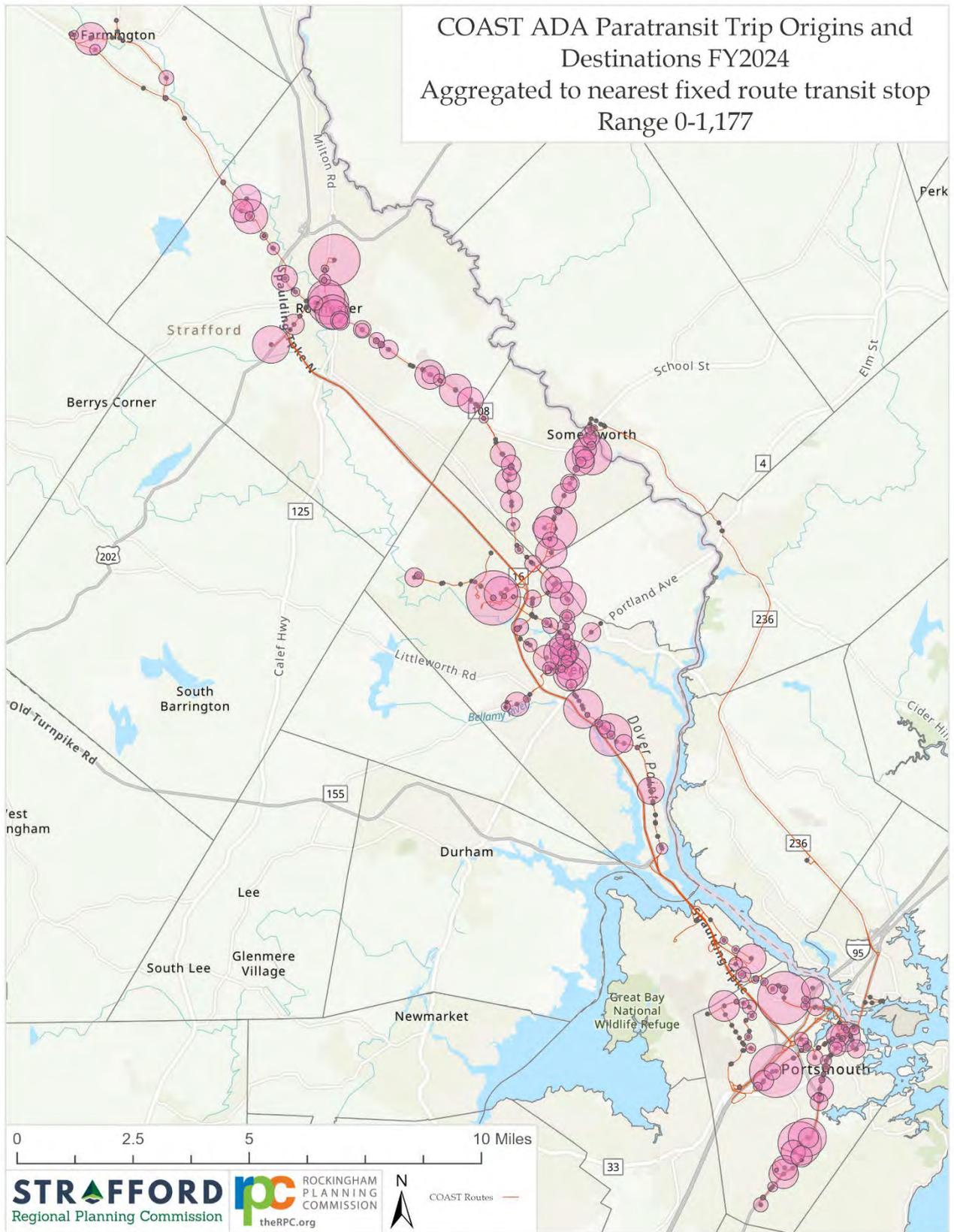
4. TRANSIT STOP ACCESS & CONNECTIVITY ANALYSIS

To build on the Pedestrian Level of Traffic Stress analysis and transit stop on/off volume data, and better prioritize investments in pedestrian access near transit stops, the project team examined several measures of connectivity between transit stops and nearby areas likely to be final trip destinations for transit riders. This involved overlaying transit stop volume data on the PLTS analysis of surrounding streets and their pedestrian facilities, and then analyzing the connectivity of high-volume transit stops to key nearby destination types using measures of Segment Centrality and Destination Scores.

### 4.1. Destination Scores for Transit Stops

 Assessing the accessibility of transit stops involves not just whether good sidewalks exist in the immediate area of the stop, but more broadly examining what destinations exist nearby within easy walking distance and whether walking trips between the transit stop and those other attractions can be made safely and by low-stress routes.

A measure for this sort of accessibility is the Destination Score, which looks at a suite of likely trip destinations (neighborhoods, community facilities) to which transit riders would walk from a transit stop; and measures the difference between the total number of those destination points and the number that can be reached by low-stress (PLTS 1& 2) routes without diversion. For this analysis neighborhoods were operationalized as centroids of Census Blocks, located within a ¼ mile radius of transit stops. The Community Facilities point data layer from NH GRANIT, including public libraries, schools, parks, community centers, and town offices, was used to capture other non-commercial destinations.

The Online Map includes three layers related to Destination Scores for each COAST transit stop:

1) Destinations Accessible by Full Network - The total number of defined destination points within a ¼ mile radius of each transit stop. The number of nearby destinations is represented by color of a circle at each transit stop, ranging from dark blue denoting over 25 nearby destination points down to pale yellow for one or fewer nearby destinations.

2) Destinations Accessible by Low Stress Network - The number of defined destinations within a ¼ mile radius that can be reached from the stop by low stress (PLTS1 & PLTS2) route. As with the previous measure of total destinations, the number of nearby destinations accessible by low stress route is represented by colored circle at each transit stop, ranging from dark blue denoting over ten accessible destinations down to pale yellow for X or fewer nearby destinations.

3) Difference in Accessible Destinations – This measure represents the difference between the number of destinations accessible on the Full Network vs the number accessible on the Low Stress Network. The higher the number of proximate destinations not accessible by the Low Stress Network, the darker the color on a scale ranging from pale yellow (no nearby destinations are inaccessible) to dark red (10 or more destinations not accessible).

Figure 4.1 – Total Nearby Attractions vs. Attractions Accessible by Low Stress Route in Dover
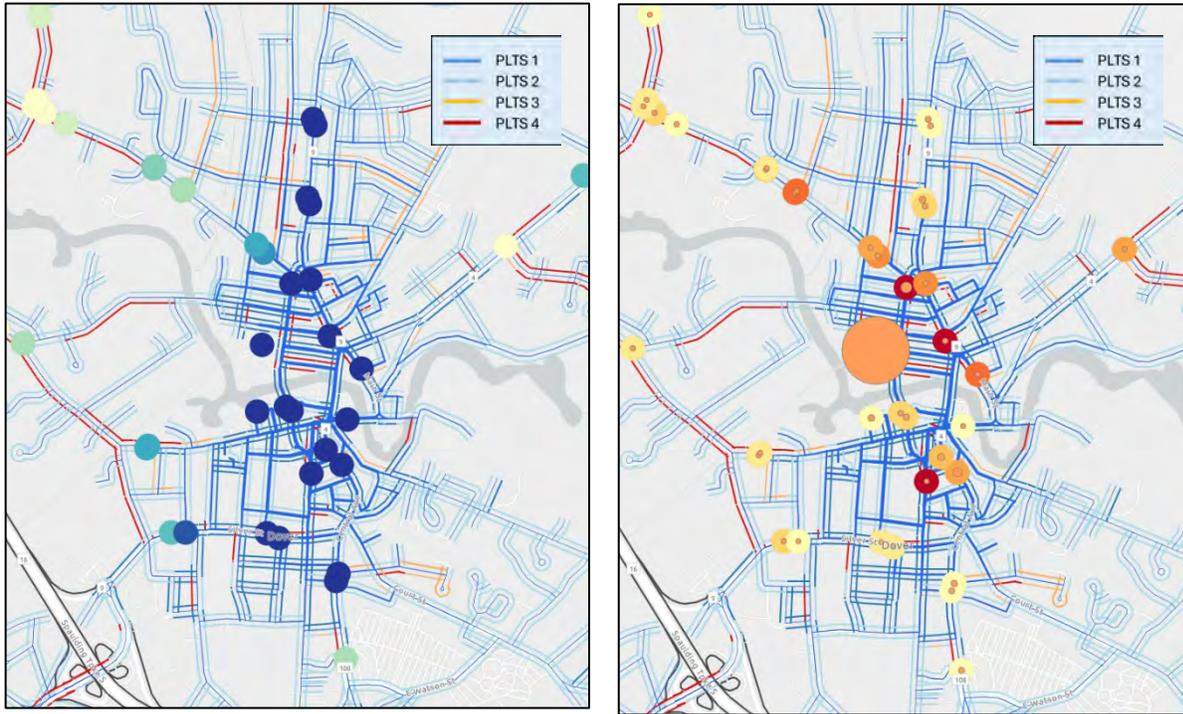
Attractions Accessible by Full Network - High numbers of nearby attractions represented by dark blue color of stop marker

Difference in Accessible Attractions – Dark red color on transit stop marker represents a relatively large raw number (though small percentage) of nearby attractions not accessible by Low Stress Network

A caveat in interpreting the Difference in Accessible Destinations measure is that it uses the raw number of inaccessible locations rather than a percentage. For example COAST's Market Square stop has 37 destinations within a quarter mile, of which 25 (67%) are accessible by low stress route, meaning 12 (33%) are not accessible. This results in a dark red color for the stop representing many inaccessible destinations. At the other end of the scale, the stop on Lafayette Road for Patriots Park Apartments has two nearby destinations, of which none (0%) are accessible by low stress route resulting in a medium yellow circle. It is important to not interpret dark red circles as an indication of general inaccessibility, but rather as an indication of multiple opportunities to make improvements to better connect multiple destinations.

4.2.   Segment Centrality

Another key measure of connectivity is Segment Centrality. This metric was developed by Furth (2017) in the context of Bicycle Level of Traffic Stress (BLTS) to enable planners to identify specific road segments that are most essential in connecting the greatest number of specified origin-

destination pairs. In the context of this study, the measure is used to identify which city streets are most likely to be traveled for trips between a transit stop and surrounding neighborhoods or community facilities.

To calculate centrality, all transit stops on the COAST and Wildcat fixed route systems were defined as origin points, while the same set of destination points used for the Destination Score analysis above was employed again. ESRI ArcMap Network Analyst was used to calculate the shortest routes on the PLTS 1-4 network between each transit stop and these centroids. These represent the ideal shortest path for any given origin-destination pair. Centrality, here defined as a count of routes which cross a given segment in the PLTS 1-4 network, can be used to identify segments likely to have high utility to pedestrians in accessing transit stops. Segments with high centrality scores that are currently high stress (PLTS 3-4) are likely to offer a high return on investment from projects that improve pedestrian accommodation and decrease traffic stress.

Figure 4.2 – Segment Centrality in Downtown Portsmouth

Figure 4.2 shows segment centrality along with transit stop alighting volume (orange circles) and PLTS ratings in the vicinity of Market Square in Portsmouth with more central road segments appearing as thicker lines. The concentration of neighborhoods and community facilities in downtown areas mean that high segment centrality scores are really only found in city centers. Note that in this figure and other centrality mapping, PLTS crossing scores are not shown, and the segment centrality score appears in the middle of each road segment with PLTS scores for each side of the road still represented.
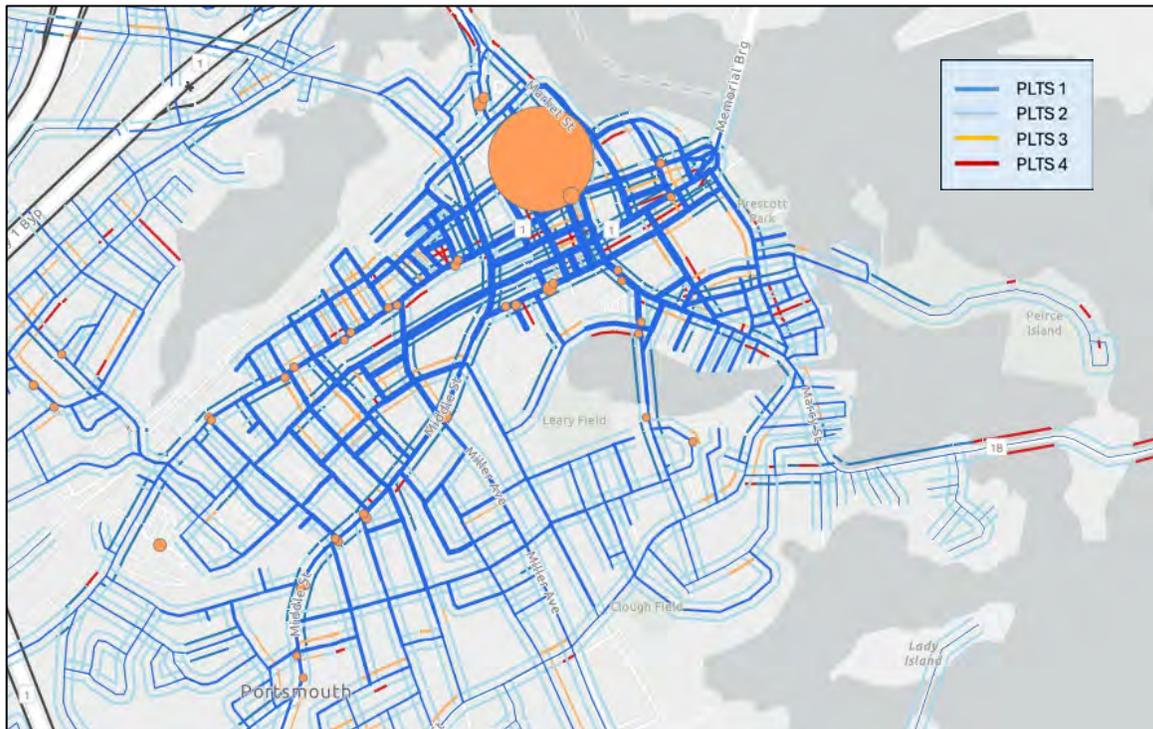
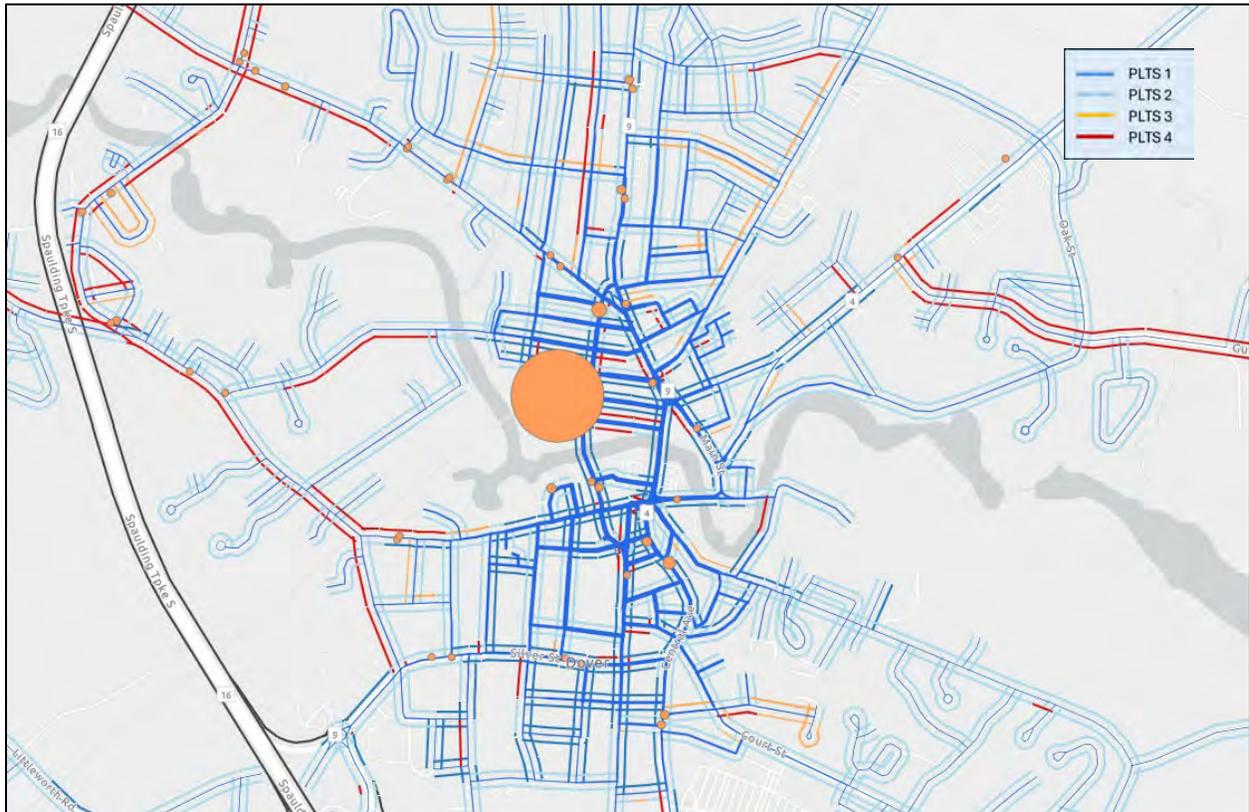*Figure 4.3 – Segment Centrality in Downtown Dover*

Figure 4.3 shows segment centrality along with transit stop alighting volume (orange circles) and PLTS ratings for downtown Dover, with the COAST transit stop at Dover Transportation Center on Chestnut Street represented by the large orange circle. Highest centrality ratings (thickest blue lines) are concentrated on Central Avenue, Chestnut Street, Washington Street and Locust Street.

A future update to the connectivity analysis should add major employment sites and retail areas to the suite of destinations used to calculate Centrality and Destination Scores. This would markedly increase centrality scores along major arterials with concentrations of retail businesses.

5. GAP ANALYSIS

The ultimate goal of all analyses presented thus far is to enable COAST, Wildcat Transit, and the communities they serve to better identify pedestrian improvements with the highest potential to improve access to transit stops. While no single automated analysis using the PLTS model and associated connectivity measures yields a comprehensive list of high value improvements, the project team used model outputs in three specific ways to identify potential pedestrian safety improvement projects that will improve access to transit stops and benefit transit users:

1. Crossing Safety at transit stops on opposite sides of major arterials
2. Model query of high stress (PLTS3 and PLTS4) road segments in close proximity to stops with high Destination Scores
3. Manual review of PLTS scores in the vicinity of highest volume transit stops

Each of these is explained further below with aerial view illustrations.

5.1. Gap Analysis - Crossing Safety at Paired Transit Stops on Major Arterials

Many commercial and residential destinations served by COAST and Wildcat Transit are on high traffic state highways like US1/Lafayette Road and Woodbury Avenue in Portsmouth, NH108 in Dover, Somersworth and Rochester, and NH11 in Farmington. In some cases the bus diverges off the highway to stops at business entrances, such as Walmart, Market Basket or Hillcrest Estates on Lafayette Road in Portsmouth; Fox Run Mall on Woodbury Ave in Newington; Tri-City Plaza, Walmart and Target on NH9 in Somersworth; and the Lilac Mall and Great Bay Community College on NH108 in Rochester. In most cases though, stops are immediately along these roadways and are paired for inbound and outbound service. This means that riders need to cross busy arterials in either arriving or departing their destination, often without any designated pedestrian crossings nearby. Note that the Crossing Score output from the PLTS model does not consider presence or absence of crossing facilities, as those data are not associated with road segments in the NHDOT road layer.

The project team used the model to identify 100+ pairs of bus stops within 350' of one another on arterial roads, then reviewed aerial imagery to determine which had designated crosswalks nearby, and reviewed alighting volume, traffic volume, lane configuration and posted speed on the roadway. This review identified 14 locations on COAST routes and 6 locations on Wildcat Transit routes where safety concerns point to crossing improvements being appropriate – especially when bus stop alighting volumes are high. Figure 5.1.1 identifies these locations, and several examples are described individually with aerial imagery. Alighting volumes are noted in the table, and these are an important metric for setting priorities for infrastructure improvements. The order of locations in Figure 5.1.1 runs from south to north, not in order of problem magnitude or proposed priority.

Figure 5.1.1 – Paired Stops on Major Arterials Lacking Nearby Crossing Facilities

Location	City/ Town	Road	Distance to cross at nearest marked crossing	AADT	Speed	Notes
COAST STOPS						
Patriots Park	Portsmouth	US1	NA	15,904	35	1576 FR alightings. 3 lanes of traffic. Will be covered by US1 project
Crossroads House	Portsmouth	US1	1000'	15,904	35	2008 FR alightings. 5 lanes of traffic.

Figure 5.1.1 (cont'd) – Paired Stops on Major Arterials Lacking Nearby Crossing Facilities

Location	City/ Town	Road	Distance to nearest marked crossing	AADT	Speed	Notes
COAST STOPS						
Gosling Meadows	Portsmouth & Newington	Gosling Road	1400'	14,646	30	534 FR alightings. 4 lanes of traffic. No sidewalk on north.
Constitution Way/Nordic Stove Shoppe	Dover	Dover Point Road	NA	11,319	35	122 FR alightings but top 10 for ADA (707). 2 lanes traffic
Goodwin Community Health & Barclay Square	Somersworth	NH108	NA	13,076	35	727 FR alightings. 3 lanes of traffic. Will be addressed through NH108 Complete Streets project 29604
Goodwill/Dollar Tree	Somersworth	NH9	NA	24,321	35	587 FR alightings. 5 lanes of traffic.
Women's Life Imaging, VA Clinic & Terrascape Pkwy	Somersworth	NH108	NA	15,950	35	798 FR alightings. 2 lanes of traffic. Part of NH108 Complete Streets
Busters Billiards & Interstate Drive Industrial Park	Somersworth	NH108	NA	13,076	35	1121 FR alightings. 2 lanes of traffic. NH108 Complete Streets
SoField Apts & Granite State Business Park	Rochester	NH108	NA	10,893	35	411 FR alightings. PLTS4. 3 lanes of traffic. Just north of Innovation Drive, likely covered by NH108 Complete Streets
HiVue Motor Inn &	Rochester	NH108	NA	10,348	45	690 FR alightings. 2 lanes of traffic
Colonnade Apts & Nola Ave	Rochester	NH108	NA	10,348	45	674 FR alightings. 2 lanes of traffic
Pizza Hut & Dunkin Donuts	Rochester	North Main Street	650'	12,447	40	208 FR alightings. 5 lanes of traffic. 650' to crossing but no sidewalk
Greenwood Inn	Rochester	Farmington Road/NH11	NA	12,447	40	212 FR alightings. 3 lanes of traffic
Northgate Apartments & Cocheco River Estates	Rochester	Farmington Road/ NH11	NA	12,447	40	478 FR alightings. 3 lanes of traffic

Figure 5.1.1 (cont'd) – Paired Stops on Major Arterials Lacking Nearby Crossing Facilities

Location	City/ Town	Road	Distance to nearest marked crossing	AADT	Speed	Notes
Wildcat Transit Stops						
NH108 at Canney/ Riverwoods senior housing	Durham	NH108		11,378	35	363 FR alightings. 2 lanes of traffic. May be sight line challenge for crosswalk
NH108 at Freshet and Little Tree daycare, neighborhood	Madbury	NH108		9,006	35	693 FR alightings. 2 lanes of traffic.
NH108 at Grapevine Dr and Deerfield Way MHP. Hannaford, senior housing	Dover	NH108		9,006	35	831 FR alightings. 3 lanes of traffic.
NH155 at Westgate Apts and Whitecliff Apts	Dover	NH155 / Knox Marsh Road		15,105	40	1137 FR alightings. 3 lanes of traffic. Sightline issues with hill and curve
NH155 at Lilac Garden Apts, COAST, NH Roasters, Irving	Dover	NH155 / Knox Marsh Road		15,105	40	986 FR alightings. 3 lanes of traffic.
NH155 at Olde Madbury Lane Apts and Knox Marsh Apts	Dover	NH155 / Knox Marsh Road		11,771	50	754 FR alightings. 2 lanes of traffic

Eight of the stop pairs identified in this analysis will be addressed over the next five years as part of two large corridor improvement projects. The first of these is Portsmouth 26940 which will add sidewalks, crossing improvements and intersection improvements on Lafayette Road/US1 from Wilson Road to Constitution Avenue, and from White Cedar Drive to Ocean Road. The work covers approximately 1.7 miles, and construction is currently programmed for 2026-2027. The other major corridor pedestrian improvement project is Dover-Somersworth-Rochester 29604, which will add complete streets improvements on NH108 from Indian Brook Drive/NH9 in Dover to Innovation Drive in Rochester. This covers approximately 5 miles and is scheduled for construction between 2027 and 2030.

The project team identified multiple additional stop pairs where one of two scenarios existed that kept them from being included in Figure 5.1.1. The first scenario is that marked stops exist on opposite sides of an arterial with PLTS3 or PLTS4 ratings and no crossing facilities, but the alighting numbers for those stops are low enough that investing in crossing infrastructure there would have a lower return than investing at other locations. The second scenario is found less frequently, where

alighting counts are high at a pair of stops, but the location is at a single-family rental house where trip volumes are likely generated by 1-2 individuals and may vary greatly from year to year.

Figure 5.1.2 identifies appropriate pedestrian safety countermeasures based on roadway configuration, AADT and traffic speed. For each combination of lanes, volume and traffic speed the table identifies countermeasures that should always be incorporated, considered but not mandated, or may not be appropriate. The table is sourced from the Federal Highway Administration (FHWA) *Guide for Improving Pedestrian Safety at Uncontrolled Crossing Locations*, produced as part of FHWA's Safe Transportation for Every Pedestrian (STEP) program. While the full STEP process for selecting specific countermeasures was not undertaken for all the locations identified in Figure 5.1.1, the matrix in Figure 5.1.2 indicates that high visibility crosswalks should be incorporated in most of the locations. Five locations where the matrix indicates crosswalks should be considered but not necessarily mandated include the three UNH Wildcat transit stops on NH108, and the COAST stops on Dover Point Road and on NH108 at Industrial Drive in Somersworth.

***Figure 5.1.2 – Application of Pedestrian Crash Countermeasures by Roadway Feature***

Roadway Configuration	Posted Speed Limit and AADT								
	Vehicle AADT <9,000			Vehicle AADT 9,000–15,000			Vehicle AADT >15,000		
	≤30 mph	35 mph	≥40 mph	≤30 mph	35 mph	≥40 mph	≤30 mph	35 mph	≥40 mph
2 lanes (1 lane in each direction)	● 1, 2; 4 5 6; 7	● 1; 5 6; 9	○ 1; 5 6; ● 7 ● 9	● 1; 4 5 6; 7	● 1; 5 6; 9	○ 1; 5 6; ● 7 ● 9	● 1; 4 5 6; 7	○ 1; 5 6; 9	○ 1; 5 6; ● 9
3 lanes with raised median (1 lane in each direction)	● 1, 2, 3; 4 5; 7	● 1; ● 3; 5; 9	○ 1; ● 3; 5; ● 7 ● 9	○ 1; 3; 4 5; 7	○ 1; ● 3; 5; ● 7 ● 9	○ 1; ● 3; 5; ● 9	○ 1; ● 3; 4 5; ● 7	○ 1; ● 3; 5; ● 9	○ 1; ● 3; 5; ● 9
3 lanes w/o raised median (1 lane in each direction with a two-way left-turn lane)	● 1, 2, 3; 4 5 6; 7	● 1; ● 3; 5 6; 9 7	○ 1; ● 3; 5 6; ● 9	○ 1; 3; 4 5 6; 7	○ 1; ● 3; 5 6; 9 ● 7	○ 1; ● 3; 5 6; ● 9	○ 1; ● 3; 4 5 6; 7	○ 1; ● 3; 5 6; ● 9	○ 1; ● 3; 5 6; ● 9
4+ lanes with raised median (2 or more lanes in each direction)	● 1; ● 3; 5; 7 8 9	● 1; ● 3; 5; 7 8 9	○ 1; ● 3; 5; 8 ● 9	○ 1; ● 3; 5; 7 8 9	○ 1; ● 3; 5; ● 7 8 ● 9	○ 1; ● 3; 5; 8 ● 9	○ 1; ● 3; 5; ● 7 8 ● 9	○ 1; ● 3; 5; 8 ● 9	○ 1; ● 3; 5; 8 ● 9
4+ lanes w/o raised median (2 or more lanes in each direction)	● 1; ● 3; 5 6; 7 8 9	○ 1; ● 3; 5 ● 6; 7 8 9	○ 1; ● 3; 5 ● 6; 8 ● 9	○ 1; ● 3; 5 ● 6; 7 8 9	○ 1; ● 3; 5 ● 6; ● 7 8 ● 9	○ 1; ● 3; 5 ● 6; 8 ● 9	○ 1; ● 3; 5 ● 6; ● 7 8 ● 9	○ 1; ● 3; 5 ● 6; 8 ● 9	○ 1; ● 3; 5 ● 6; 8 ● 9

Given the set of conditions in a cell,

Signifies that the countermeasure is a candidate treatment at a marked uncontrolled crossing location.

●   Signifies that the countermeasure should always be considered, but not mandated or required, based upon engineering judgment at a marked uncontrolled crossing location.

○   Signifies that crosswalk visibility enhancements should always occur in conjunction with other identified countermeasures.*

The absence of a number signifies that the countermeasure is generally not an appropriate treatment, but exceptions may be considered following engineering judgment.

1. High-visibility crosswalk markings, parking restrictions on crosswalk approach, adequate nighttime lighting levels, and crossing warning signs
2. Raised crosswalk
3. Advance Yield Here To (Stop Here For) Pedestrians sign and yield (stop) line
4. In-Street Pedestrian Crossing sign
5. Curb extension
6. Pedestrian refuge island
7. Rectangular Rapid-Flashing Beacon (RRFB)**
8. Road Diet
9. Pedestrian Hybrid Beacon (PHB)**

Figure 5.1.3 – Crossing Improvements - Goodwin Community Health

This pair of stops on NH108 serves Goodwin Community Health's Somersworth clinic, as well as the Barclay Square retail area. NH108 has a three lane configuration here with no sidewalks and an AADT of 16,269. This has long been recognized as an area where a crossing is needed to allow transit riders alighting on the southbound side of NH108 to safely access the clinic. This site is anticipated to get crossing improvements as part of the NH108 Complete Streets project (29604).

Figure 5.1.4 – Crossing Improvements - North Gate Apartments & Cocheco River Estates
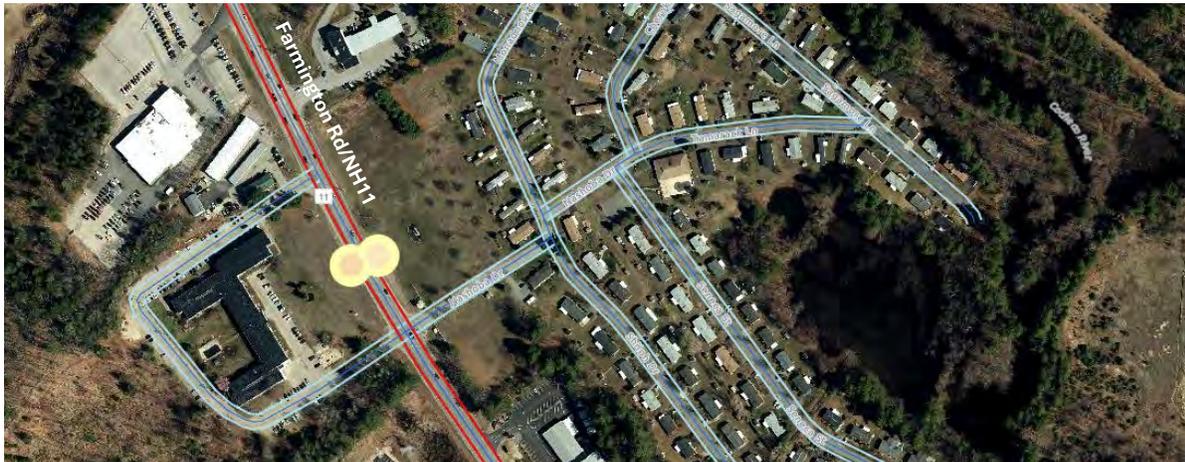
This pair of stops on NH11 in Rochester serves North Gate Apartments on the west side of the highway and the Cocheco River Estates manufactured home park on the east side. Total annual alightings are low at 478, but these are two large housing complexes, AADT is high at 26,569 (2024), posted speed limit is 40mph and the road has a three-lane profile. Both sides of the highway are rated PLTS4 with no sidewalks present. No crosswalks exist within a mile.

Figure 5.1.5 - Crossing Improvements - Gosling Meadows

The pair of stops at Gosling Meadows used by both COAST and UNH Wildcat Transit serve the Portsmouth Housing Authority's Gosling Meadows development on the south side of Gosling Road west of Woodbury Avenue. Gosling Road has two lanes in each direction with a median, and sidewalk on the south side of the road, but no crossing from the north side of the road to the development. While the PLTS model rates the north side of Gosling Road PLTS2 there is no sidewalk, no shoulder, and no lighting at the north side stop. AADT at the location was 11,535 in 2024. To cross at a crosswalk a rider needs to walk to Woodbury Avenue and double back – a distance of approximately 1600' (0.3 mile). A mid-block crossing should be considered at the location, or an extension of sidewalk along the north side of Gosling to connect to the crosswalk at Woodbury. A problem at this location is that Gosling Road marks the town line between Portsmouth and Newington such that improvements on the north side of the road would depend on engagement from Newington.

Figure 5.1.6 - Crossing Improvements – Goodwill/Dollar Tree - Somersworth
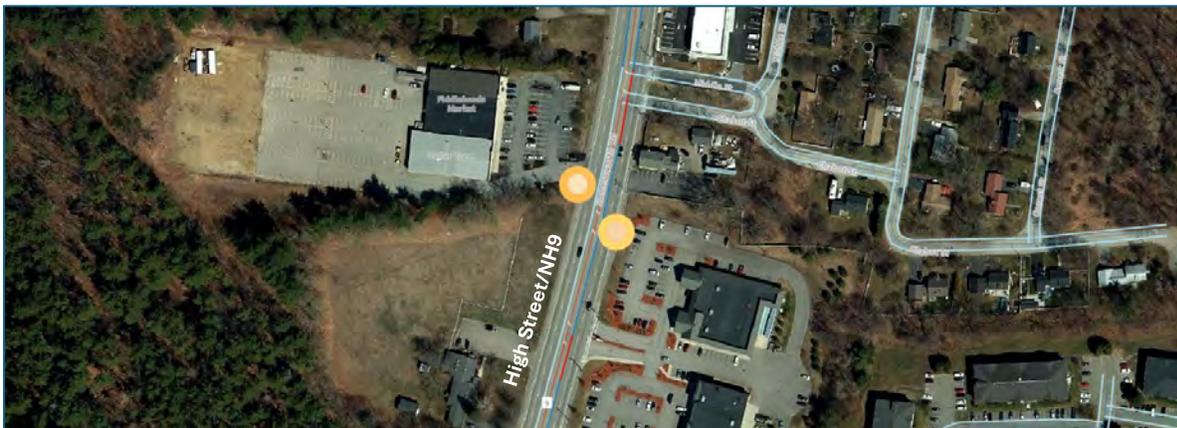
The pair of stops on NH9/Somersworth Road in Somersworth at Goodwill and Dollar Tree have total annual alightings of 587. In addition the Middle Street/Ruel Street/East Street neighborhood is on

the east side of the highway just to the north. There is sidewalk present on both sides of the highway, with ratings of PLTS1 on the east and PLTS2 on the west. This seems to be an underrating, as the sidewalk lacks a buffer so is immediately next to five lanes of traffic with an AADT of 24,971 (2024). There is no crossing present. Establishing a mid-block crossing at this location would require at least a rectangular rapid flashing beacon (RRFB) if not a pedestrian hybrid beacon (PHB) given the traffic volume.

Figure 5.1.7 - Crossing Improvements – Grapevine Drive and Deerfield Way - Dover

The Wildcat Transit Route 4 stops at Grapevine Way and Deerfield Drive together accounted for 831 annual alightings in 2023. The Farmwood Village manufactured home park to which Deerfield Drive is an entrance includes over 150 units and is located across the highway from a major regional Hannaford supermarket, an assisted living community and neighborhood of an additional 64 single family and duplex units. NH108 / Durham Road has a three lane configuration, AADT of 9,186 and posted speed limit of 35 mph at the stops. There is no marked crossing either at Grapevine Drive or at Mast Road 500' to the north.

Figure 5.1.8 - Crossing Improvements – Lilac Garden Apartments - Dover

The Wildcat Transit Route 4 stops at Lilac Gardens Apartments and Irving Gas Station on NH155/ Knox Marsh Road accounted for 986 alightings during FY2023. Lilac Gardens is a major multi-family housing complex in Dover with over 100 units, many rented by UNH students living off campus. It is across the highway from the Sumner Drive and Progress Drive industrial parks, a coffee shop and convenience store. Knox Marsh Road in this location has a three-lane configuration with AADT of 15,407 (2024) and posted speed of 50 mph. A crossing in this location would either need to be part of signalization of the Sumner Drive/Lilac Drive intersection, or could be done with a pedestrian hybrid beacon. Traffic volume and speed are not suited to RRFBs at this location.

5.2. Gap Analysis - High PLTS/High Centrality Road Segments

As a second approach to identifying priorities for pedestrian improvements that can increase transit stop accessibility, the model was queried using a combination of the PLTS, Segment Centrality and transit stop Destination Score metrics. The query sought to identify high stress (PLTS3 & PLTS4) segments with segment centrality scores of 40 and above. Segment centrality scores this high are found only in transit stop areas with a high concentration of nearby destinations. The higher the centrality score the more pedestrian trips between bus stops and nearby destinations would traverse that segment of road. Typically the higher the centrality score, the greater the utility and safety benefit gained by adding or fixing sidewalks on one of the identified segments.

*Figure 5.2 – High PLTS/High Centrality Sidewalk Segments*

City	Street	Location	PLTS Score	Centrality	Notes
Portsmouth	Church Street	W side, S of Porter	4	66	Narrow brick, peninsula b/w parking lot and street
Portsmouth	Fleet Street	W side, N of Court	3	62	Stone section rough at drive-through
Portsmouth	Court Street	N side, E of Pleasant	4	61	Narrow
Portsmouth	Sheafe Street	N side, W of Chapel	3	61	Very narrow, streetlights as impediments
Portsmouth	Penhallow Street	W side, N of Daniel	3	59	Narrow, impingements from light wells and utility poles
Portsmouth	Court Street	N side, E of Washington	4	58	Narrow brick sidewalk
Portsmouth	Fleet Street	E side, N of a Congress	4	58	Deteriorated brick
Portsmouth	Chapel Street	W side, at Sheafe	3	51	
Portsmouth	Parrott Avenue	N side, W of Junkins	2	45	No sidewalk, gravel dirt buffer between on-street and lot parking.
Dover	Broadway	N side, W of Central	3	45	Narrow, broken concrete

The query yielded a list of 96 segments with centrality scores ranging from 40 to 70. Of the segments returned by the query, 63 were in Portsmouth, 32 in Dover and one in Somersworth. This difference largely reflects the relative concentration of community facilities and density of census blocks in the three communities and the broader transit service areas. The project team reviewed each segment in Google Street View or with field visits. The top ten locations based on Centrality score are shown in Figure 5.2.

The results highlight the weight the model places on sidewalk accessibility for individuals with disabilities, particularly those with mobility devices. Many of the sidewalk segments identified in the query would likely not be high stress for a pedestrian without disabilities, but could be challenging for someone using a wheelchair, or someone with balance difficulties using a rollator or walker, due to narrowness or uneven surfaces. Particularly in older sections of downtown Portsmouth, this also highlights the challenges of updating streets build centuries before passage of the Americans with Disabilities Act (ADA).

Another element to consider for many of the sidewalk segments highlighted in Figure 5.2 is that wider sidewalk with lower stress rating sometimes exists on the opposite side of a given street. On blocks where stoops of buildings with historic designation jut into the sidewalk, or utility pole placement narrows sidewalk, the best approach to safe and accessible travel can be simply using other side of the street.

Figure 5.2 – Church Street north of State Street - Portsmouth
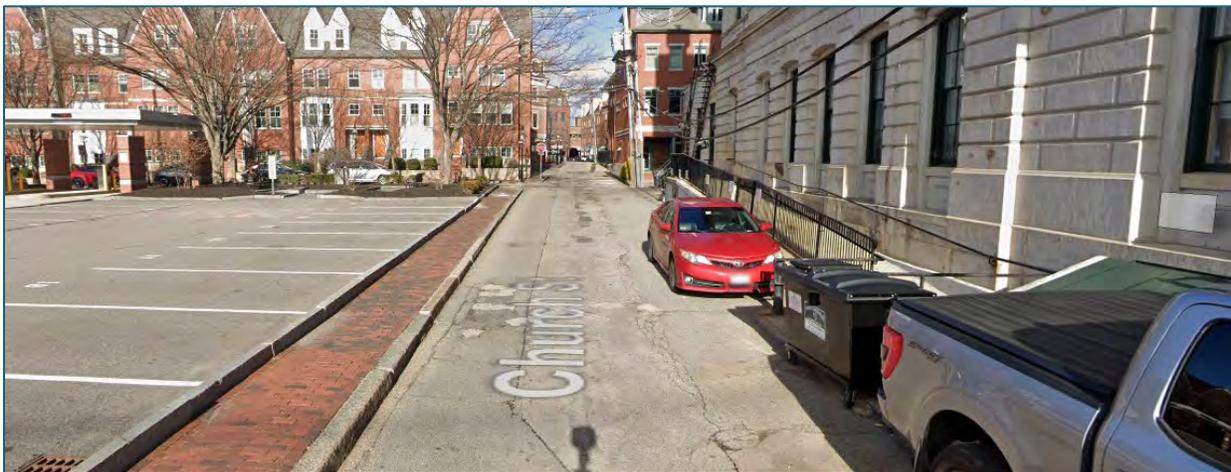
The section of Church Street between State and Porter shown in Figure 5.2 has the highest centrality score of the street segments identified by the query. The east side of Church Street has no sidewalk, while the west side has a narrow peninsula of brick sidewalk with granite curbing between the street and adjacent parking lot, rated PLTS4. The brick of the sidewalk is in fair condition with areas of subsidence. It is one of many segments of brick sidewalk in the Portsmouth's downtown, and while the look of brick has a historic appeal, it tends to settle and become uneven with time, presenting an accessibility challenge for pedestrians with balance challenges or mobility devices.

Figure 5.3 – Sheafe Street at Chapel Street - Portsmouth

Figure 5.3 shows Sheafe Street looking east toward Chapel Street in the east end of Portsmouth. Brick sidewalk on both sides of the street is narrow, while a lamp post and utility pole further narrow the North side on the left side of the photo.

Figure 5.4 – Penhallow Street at Daniel Street - Portsmouth

Figure 5.4 shows Penhallow Street looking north from Daniel Street. On the west side of the street, at the left of the image, the sidewalk is already narrow, and narrows further in multiple locations due to a combination of utility poles and light well openings in the sidewalk against the abutting building. The section of sidewalk is rated PLTS3. While this is not necessarily stressful for an ambulatory adult, the narrowing makes a wheelchair difficult to maneuver here.

Figure 5.5 – Broadway east of Central Avenue - Dover

Figure 5.5 shows Broadway/ NH4 in Dover, just east of Central Avenue heading toward Red's Shoe Barn. The sidewalk rating here is PLTS3, with a centrality score of 45. This connects Central Square to residential areas to the east. As with the Church Street sidewalk in Portsmouth discussed earlier, the sidewalk on the north side (left of photo) forms a narrow peninsula between roadway and parking lot. Sidewalk material is concrete but heavily cracked and uneven. Sidewalk on the south side is wider but with frequent, wide curb cuts for parking and business entrances.

The sidewalk segments identified in this section illustrate accessibility concerns for pedestrians with disabilities, though perhaps not for fully ambulatory individuals. The interactive online model enables city planners, COAST and Wildcat Transit staff and others to identify where deteriorated or attenuated sidewalks such as these play a greater or lesser role in access to nearby transit stops.

## 5.3. Gap Analysis – Manual Review of High Stress Segments Near High Volume Stops

While systematic queries of the PLTS model, and the connectivity analyses it allows, can produce lists of high stress road segments with missing or substandard sidewalk, the Project Team found that the most productive way to use the model is manually reviewing the areas around the highest volume stops on the COAST and Wildcat systems. A review of the top 20 stops by volume for the two fixed route services and COAST's ADA service identified the following locations where targeted pedestrian improvements will improve transit stop accessibility.

Figure 5.3.1 – Applebee's in Dover at NH108 and Willand Pond Road

The stops at Applebee's and Willand Pond Road on NH108 in Dover together account for 2162 annual alightings. While the model rates the sidewalk on either side of NH108 in this immediate area as PLTS2 the project team and COAST see this as an under-rating. At the intersection of Willand Point and Hotel Drive, NH108 has a six lane configuration and AADT of 16,969. Sidewalks are immediately on the street with <3' of shoulder and frequent curb cuts. The crosswalk across NH108 at Willand Pond Road is exceptionally long at 110' with no refuge island and wide radii allowing the turn onto the side streets to be taken at speed. No crosswalks are in place on Willand Pond or Hotel Drive.

*Figure 5.3.2 – Franklin/Green/Silver - Somersworth*
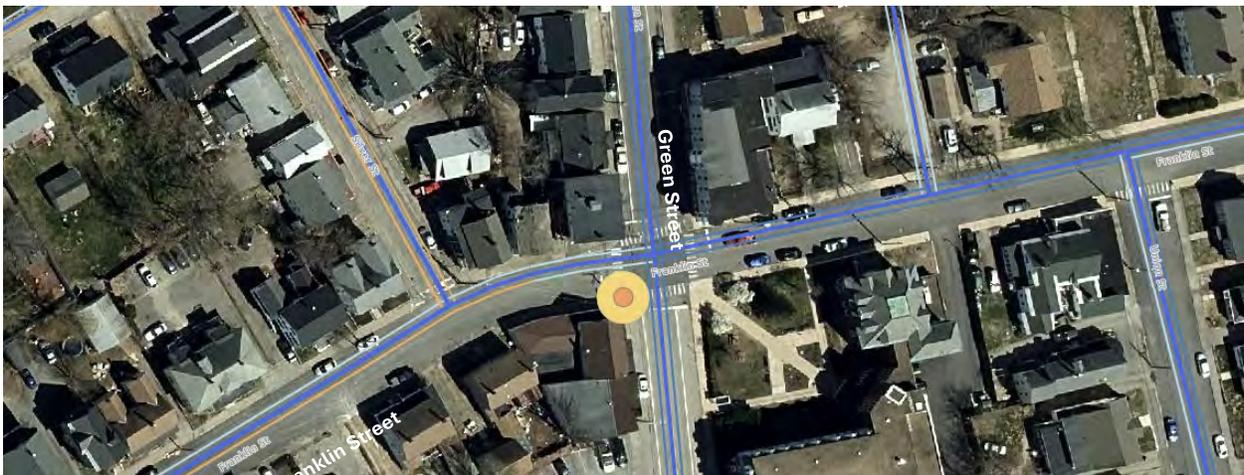
COAST's stop at Franklin and Green Streets in Somersworth serves the Somersworth Housing Authority's Charpentier Apartments. It has the 14th highest annual alightings on the COAST fixed route system at 1975, and 10th highest nearby ADA trips at 628. AADT on Green Street just to the south of Frankline is 3500 (2024). The Destination Score analysis identified six nearby destinations of which two are not accessible. This appears to be related to narrow and deteriorated sidewalks on Franklin Street and Silver Street connecting to stop to adjacent neighborhoods.

Figure 5.3.2 – Crossroads House & Lens Doctor – Portsmouth

The stops at Crossroads House and Lens Doctor on Lafayette Road in Portsmouth together account for 2839 annual alightings. The Ledgewood Drive stop at the top of the image accounts for an additional 338 alightings. Lafayette Road in this area is a divided highway with a 5 and 6 lane configuration depending on the intersection and AADT of >20,000. Sidewalk is directly on the highway with no buffer and multiple wide curb cuts. The crosswalk at the intersection of Lafayette Road and the US1 Bypass is 95' wide with no refuge island and wide radii allowing northbound turns onto Lafayette at speed. A mid-block crossing is not practical here, but crossing improvements at Greenleaf Avenue and the entrance to the Harbor Freight/Colonial Bicycle plaza should be pursued. A crosswalk exists here but is long, lacks refuge islands and as of November 2024 has deteriorated markings.

Figure 5.3.3 – Rochester City Hall - Rochester
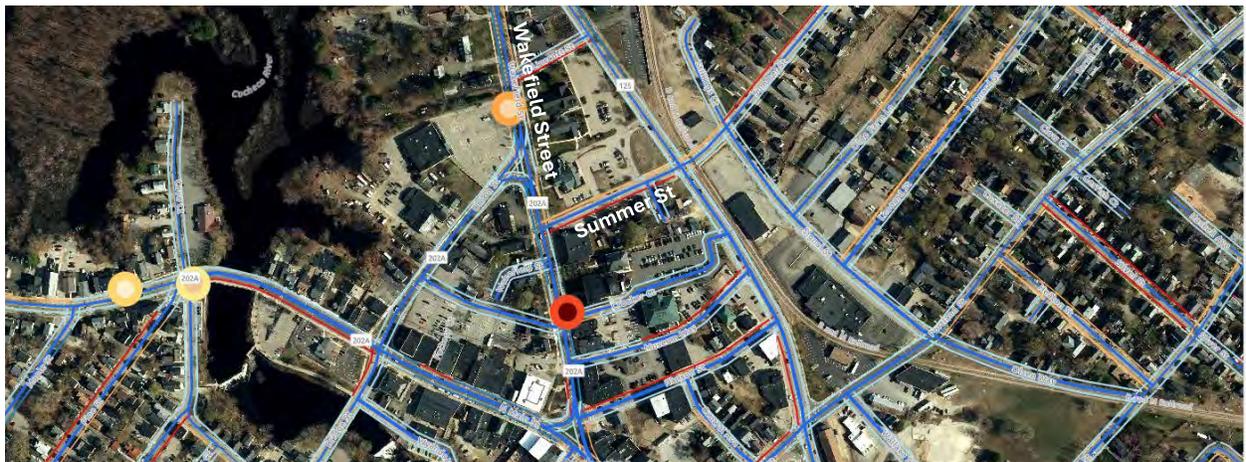
The bus stop at Rochester City Hall has the eighth highest alightings on COAST's fixed route system at 5816, and the third highest number of nearby ADA trips at 660. Wakefield Street (NH202A) has good sidewalks, with ratings of PLTS1 and PLTS2 on the immediately surrounding blocks. The Destination Score analysis identified 16 nearby destinations of which seven were not accessible by low stress route. This appears to be a function of high stress ratings on Summer Street which connects across NH125 and the B&M railroad tracks to the large residential area east of the tracks. Summer Street has sidewalk on both sides of the street, though it has lost its vertical separation from the roadway and is in deteriorated condition. Sections of South Main Street south of Hansen Street also have a rating of PLTS3 and connect to the Public Library. While sidewalks exist here they narrow substantially based on street trees and streetlights. Further analysis by COAST and the City would be useful to determine potential specific modifications in the area that could enable more ADA riders to use the fixed route system.

Figure 5.3.4 – Central & Union – Dover

Union Street connects Central Avenue to the Wadleigh House assisted living facility and Dover Housing Authority's Union Court apartment complex. While this COAST stop is located on Central Avenue which has good sidewalks, Union Street between Central and Court has heavily deteriorated sidewalks on its north side and no sidewalks to the south. Fixed route alightings are relatively modest at 524, but the stop is in the top 20 (#16) for ADA trips in the vicinity. Sidewalk upgrades on Union Street could allow ADA riders to safely access the fixed route system.

**Figure 5.3.5 – Rochester Park & Ride – Rochester**

The COAST fixed route stop at the Rochester Park and Ride is located just off US202/Washington Street at Fillmore Blvd and serves the Fillmore Blvd neighborhood. Annual fixed route alightings totaled 1979 in 2023. This is also the nearest stop for the Homeless Center of Strafford County approx. 1000' to the southwest and across the street on US202.

*Figure 5.3.5 – Rochester Park & Ride – Rochester*

No sidewalks connect the stop to the Homeless Center, or to the Rochester Crossing Plaza (Kohl's, Lowe's, Dental offices) 800' to the northeast, for which this is also the nearest stop. US202 has an AADT of 8120 (2024) and PLTS4 rating on both sides, with no sidewalks. At the Plaza entrance there is a four lane configuration, narrowing to two lanes at the park and ride and continues that way to the homeless center.

Figure 5.3.6 – Hillcrest Estates & Ocean Road – Portsmouth
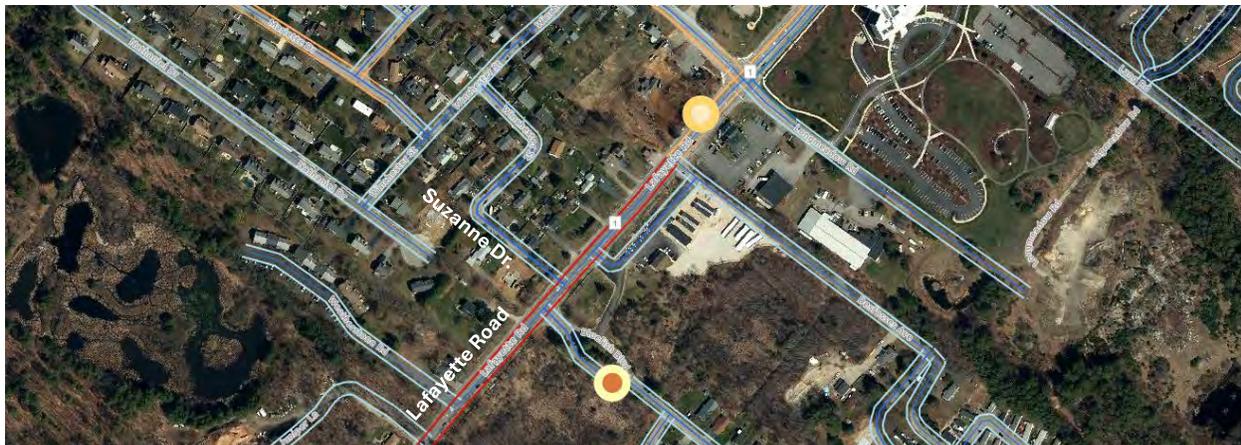
COAST's Route 41 extends down Lafayette Road/US1 and turns around at Hillcrest Estates across the street from the Suzanne Drive neighborhoods. Annual alightings totaled 1316 in 2023 between paired stops on opposite sides of the highway. While the stop at Hillcrest Estates is off of the highway, riders from Suzanne Drive need to either cross the highway without a crosswalk or walk up and back to the crossing at Ocean Road – approximately 1600'. Lafayette Road has a three lane configuration here with an AADT of 15,110 (2024) and no sidewalks, with PLTS4 ratings on both sides of the highway. This area is beyond the southern terminus of Portsmouth 26940.

Figure 5.3.7 – Frisbie Memorial Hospital
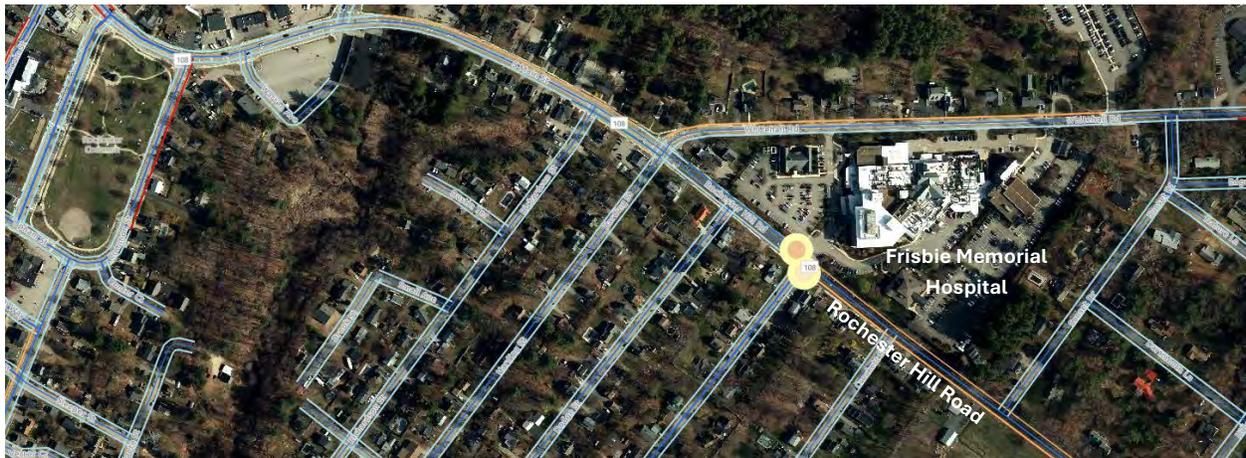
Rochester Hill Road has sidewalks on both sides of the street immediately across from and to the west of the main driveway for Frisbie Hospital. The AADT for this location is 9268 (2024) with a four lane configuration at the crossing. However sidewalks are absent on the north side of Rochester Hill Road between the driveway and the Sunset Drive neighborhood, and while a sidewalk exists from Crockett Street on the south side of the road there are gaps. The annual alighting count of 678 is relatively low, but as one of the region's major hospitals attention seems warranted here.

Figure 5.3.8 – Portsmouth Hospital and Borthwick Avenue
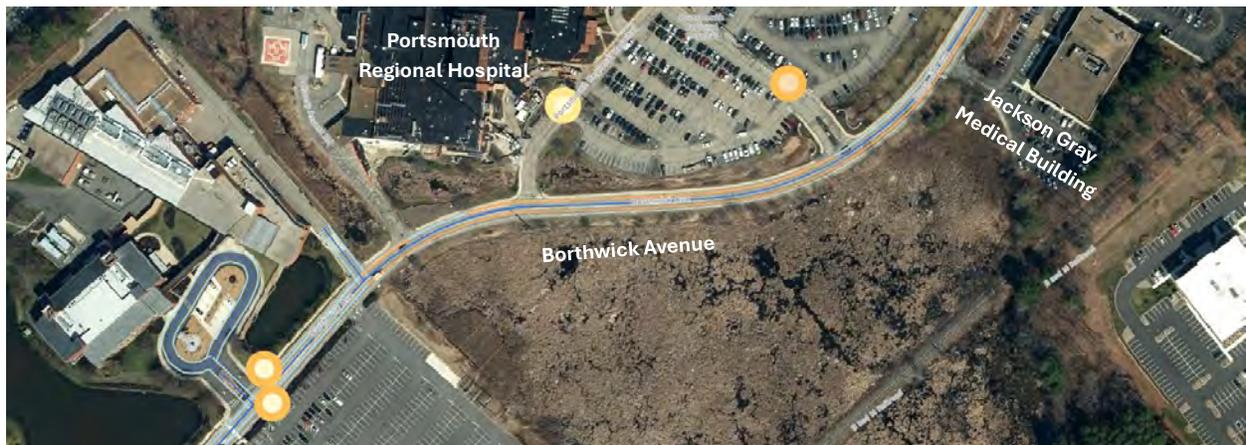
COAST's fixed route stop for Portsmouth Hospital has relatively modest annual alightings at 273, but it is the stop with the third highest count of nearby ADA trips at 1104. AADT for the Borthwick Avenue is 4,479. Sidewalk exists on the north side of Borthwick, though not the south side, and there is a crosswalk from the south side sidewalk to the Jackson Gray Building medical offices down the street. While there is well marked pedestrian access through the hospital parking lot

between the COAST stop and the hospital entrance, there is no pedestrian access through the parking lot at the Jackson Gray building.

6. RECOMMENDATIONS

6.1. Site-Specific Improvements

The previous section identifies 38 specific locations where sidewalk and crossing improvements can significantly improve access and safety for current and future riders of COAST and UNH Wildcat Transit. Making it less stressful to get between home and the stop where you board the bus, and between the stop you get off the bus and your final destination, is a key step in supporting continued growth in ridership. This supports the residents who live in the communities served by the two transit systems, the businesses whose employees depend on the bus to get to work, and people who may not ride the bus but patronize local businesses whose employees depend on the bus to get to work.

The project team used model outputs in three specific ways to identify potential pedestrian safety improvement projects that will improve access to transit stops and benefit transit users. The site specific improvement recommendations based on these analyses are presented in Section 5.1 through Section 5.3. The three analyses and associated list of improvement recommendations include:

1. Crossing Safety at transit stops on opposite sides of major arterials (20 projects)
2. Model query of high stress (PLTS3 and PLTS4) road segments in close proximity to stops with high Destination Scores (10 projects)
3. Manual review of PLTS scores in the vicinity of transit stops with highest fixed route alightings or highest nearby ADA alightings (8 highlighted projects)

The 38 locations are identified in Figure 6.1 below

Figure 6.1 - Locations for Recommended Access Improvements

Location Description	City/Town	System	Road/ Street	Improvement Type
Paired Stops on Arterials				
Patriots Park	Portsmouth	COAST	US1	Crossing Facilities
Crossroads House	Portsmouth	COAST	US1	Crossing Facilities
Gosling Meadows	Portsmouth & Newington	COAST & UNH	Gosling Rd	Crossing Facilities

Figure 6.1 (cont'd) - Locations for Recommended Access Improvements

Location Description	City/Town	System	Road/ Street	Improvement Type
Constitution Way/Nordic Stove Shoppe	Dover	COAST	Dover Pt Rd	Crossing Facilities
Goodwin Community Health & Barclay Square	Somersworth	COAST	NH108	Crossing Facilities
Goodwill/Dollar Tree	Somersworth	COAST	NH9	Crossing Facilities
Women's Life Imaging, VA Clinic & Terrascape Pkwy	Somersworth	COAST	NH108	Crossing Facilities
Busters Billiards & Interstate Drive Industrial Park	Somersworth	COAST	NH108	Crossing Facilities
SoField Apts & Granite State Business Park	Rochester	COAST	NH108	Crossing Facilities
HiVue Motor Inn &	Rochester	COAST	NH108	Crossing Facilities
Colonnade Apts & Nola Ave	Rochester	COAST	NH108	Crossing Facilities
Pizza Hut & Dunkin Donuts	Rochester	COAST	North Main	Crossing Facilities
Greenwood Inn	Rochester	COAST	NH11	Crossing Facilities
Northgate Apartments & Cocheco River Estates	Rochester	COAST	NH11	Crossing Facilities
NH108 at Canney/ Riverwoods senior housing	Durham	UNH	NH108	Crossing Facilities
NH108 at Freshet and Little Tree Education	Madbury	UNH	NH108	Crossing Facilities
NH108 at Grapevine Dr and Deerfield Way MHP. Hannaford, senior housing	Dover	UNH	NH108	Crossing Facilities
NH155 at Westgate Apts and Whitecliff Apts	Dover	UNH	NH155	Crossing Facilities
NH155 at Lilac Garden Apts, COAST, NH Roasters, Irving	Dover	UNH	NH155	Crossing Facilities
NH155 at Olde Madbury Lane Apts and Knox Marsh Apts	Dover	UNH	NH155	Crossing Facilities
High Stress/High Centrality Segments				
Narrow brick, peninsula b/w parking lot and Church Street, north of State Street. PLTS4, Connectivity Score 70.	Portsmouth	COAST	Church St	Sidewalk widen, resurface or remove obstacles
Stone section rough at drive-through between State and Court Streets. PLTS3, Connectivity Score 62.	Portsmouth	COAST	Fleet St	Sidewalk widen, resurface or remove obstacles
Narrow segment east of Pleasant Street. PLTS4, Connectivity Score 61.	Portsmouth	COAST	Court St	Sidewalk widen, resurface or remove obstacles

Figure 6.1 (cont'd) - Locations for Recommended Access Improvements

Location Description	City/Town	System	Road/ Street	Improvement Type
Very narrow, streetlights as impediments on Sheafe Street west of Chapel Street. PLTS3, Connectivity Score 61.	Portsmouth	COAST	Sheafe St	Sidewalk widen, resurface or remove obstacles
Narrow, impingements from light wells and utility poles on west side of Penhallow north of Daniel. PLTS3, Connectivity Score 59.	Portsmouth	COAST	Penhallow St	Sidewalk widen, resurface or remove obstacles
Narrow, deteriorated brick sidewalk on north side, east of Washington Street. PLTS4, Connectivity Score 59.	Portsmouth	COAST	Court St	Sidewalk widen, resurface or remove obstacles
Deteriorated brick on east side north of Congress St. PLTS4, Connectivity Score 58.	Portsmouth	COAST	Fleet St	Sidewalk widen, resurface or remove obstacles
Narrow with utility pole significantly narrowing sidewalk. PLTS3, Connectivity Score 51.	Portsmouth	COAST	Chapel St	Sidewalk widen, resurface or remove obstacles
No sidewalk, gravel dirt buffer between on-street parking and public parking lot. PLTS2, Connectivity Score 45.	Portsmouth	COAST	Parrott Avenue	Sidewalk widen, resurface or remove obstacles
Narrow, broken concrete on north side of Broadway east of Central Avenue. PLTS3, Connectivity Score 45.	Dover	COAST	Broadway	Sidewalk widen, resurface or remove obstacles
High Volume Stops (Fixed Route or ADA)				
Applebee's at NH108 and Willand Pond Road	Dover	COAST	NH108	Crossing safety, sidewalks, turning radii
Franklin/ Green/ Silver Streets	Somersworth	COAST	Franklin / Green Sts.	Sidewalk
Crossroads House & Lens Doctor	Portsmouth	COAST	Lafayette Road/ US1	Crossing safety, sidewalks, turn radii
Rochester City Hall	Rochester	COAST	Wakefield and Summer Sts.	Sidewalk improvements to adjoining neighborhoods
Rochester Park & Ride	Rochester	COAST	US202	Crossing safety, sidewalks
Hillcrest Estates & Ocean Road	Portsmouth	COAST	Lafayette Road/ US1	Crossing safety, sidewalks
Frisbie Memorial Hospital	Rochester	COAST		Crossing safety, sidewalks
Portsmouth Hospital and Borthwick Avenue	Portsmouth	COAST		Sidewalks

6.2.   Maintenance

While this report has thus far focused on infrastructure improvements in the vicinity of transit stops, how transit stops and the sidewalks that lead to them are operated and maintained is equally important in terms of safe access.

In New Hampshire transit stop operations and maintenance varies greatly by season. In the summer months, maintenance could include sidewalk and pavement repairs as well as mowing. Wintertime maintenance involves de-icing and snow removal.

Winter maintenance in particular is crucial for ensuring safe, reliable, and equitable access to public transit, especially for riders who rely on it as their primary mode of transportation. Snow and ice accumulation at transit stops, sidewalks, and access routes can create hazardous conditions, making it difficult or even impossible for people—particularly those with mobility challenges, older adults, or parents with strollers—to reach or wait safely at transit stops. Without consistent and thorough winter maintenance, transit systems risk excluding vulnerable populations and reducing overall ridership due to safety concerns and accessibility barriers.

COAST's typical License Agreement clarifies that it owns the bus stop shelter, while the property owner or entity named in the agreement is responsible for maintaining sidewalks to, from, around, and inside the bus shelter, including landscaping, trash removal, and snow and ice removal.

6.3.   Site Plan Review Modifications to Ensure Developer Engagement

The analysis in this report is one element of a four-part endeavor which also included review of Dover and Portsmouth's site plan review regulations and how they address transit access, and a companion guide with best practices and model language for site plan review to ensure planning boards and developers consider transit access on new commercial and multi-family resident projects. A summary of key recommendations from that companion report includes:

- Review of new developments should include consideration of vehicular and pedestrian circulation. They both have different safety and access needs.
- Local regulations and reviews should pay careful attention to roadway configurations for transit access. Reducing number of times transit vehicles must re-enter the main flow of traffic from a site is important for efficient service. When in doubt, request feedback from transit providers.
- The design of parking areas can be reconsidered to improve safety for pedestrians and access for transit vehicles. Large parking lots can be a hazardous "no-mans-land" for pedestrians, and require extensive detours by transit vehicles from the main corridor.

- For residential developments and other sites where seniors may be present (such as healthcare centers, assisted living, etc.) ensure there are short, protected, and comfortable access points for transit vehicles.
- A well maintained network of sidewalks or other separate paths is essential for increasing the safety and activity of pedestrians.
- Covered, lit, and well-maintained shelters at transit stops make taking the bus more comfortable and promote ridership. The installation and maintenance of shelters must be coordinated with transit providers.
- Traffic impact analysis as part of the development process should consider more than just vehicular traffic, regardless of the size of the municipality. In urban communities, it should consider pedestrian routes and nearby destinations.
- Communities without a Technical Review Committee (TRC) should consider forming one to review applications in consideration of potential opportunities to improve safety and access for pedestrians and transit riders. Transit providers should be included as stakeholders where appropriate.

The interactive online mapping tool produced for the study includes the PLTS analysis, transit stops with volumes, and various connectivity analyses, with either map or aerial photo base. This mapping tool will remain online and available to municipalities for staff or planning board use:

> **Transit Access/PLTS Mapping Tool**

6.4. Future Refinements to Model and Analysis

The tools developed for this project should be highly useful going forward for the two MPOs, COAST and it's member municipalities. Through the process of working with these tools the project team has also identified several further modifications that will add value to the model.

- Refine Connectivity Analysis and Destination Score Model – While the connectivity analysis used here included residential destinations and public facilities, a future iteration of the connectivity analysis should include certain commercial facilities such as major employment centers and medical offices. Large multi-family resident complexes, particularly those operated by municipal housing authorities, are captured to some degree through Census block centroids, but specific point data for these should be incorporated into a future model iteration as well. Additionally, a metric of percent of destinations accessible by low stress route can be added to the destination score analysis. This may be helpful in more intuitively interpreting the Difference in Accessible Locations measure that currently uses the raw number of inaccessible locations rather than a percentage.

- Refine PLTS Ratings – The PLTS model and the data collection process that shaped it included a particular emphasis on sidewalk accessibility for individuals with disabilities, whether users of wheelchairs or other mobility devices for whom uneven surfaces can be a particular problem. This is a useful feature for helping planners and public works staff identify sidewalk segments in need of upgrade from an ADA standpoint. This emphasis has a side effect of somewhat overestimating pedestrian level of stress for walkers without disabilities on older sidewalks narrower than four feet, and brick sidewalks where any degree of settlement has occurred.

7. CONCLUSION

Public transportation benefits the economy and quality of life in the communities it serves and the broader Seacoast region by connecting people to employment, education, medical care and other basic life needs. This is particularly the case as housing prices rise in communities where employment is concentrated and many employees need to look to neighboring cities and towns for housing they can afford. Whether taking transit works for them is sometimes a function of schedules and route destinations, but it can also be a function of whether they can safely get to the bus stop.

This study started with development of a tool new to New Hampshire for assessing pedestrian level of traffic stress on roadways, and then using that tool to evaluate accessibility of transit stops on COAST and UNH Wildcat Transit's fixed route networks. The study identifies more than 50 specific opportunities for facility improvement, and was conducted by a project team with a combined several decades of transit planning experience in the Seacoast. Still, we anticipate that the most effective use of the model and connectivity analyses will be by COAST, Wildcat, and municipal staff with even greater knowledge of specific stop areas and new development projects that present opportunities for improvements to local pedestrian networks. This is particularly the case where COAST staff with knowledge of exact ADA trip origins and destinations can use the model to pinpoint improvements that could allow ADA paratransit clients to take more trips by fixed route bus, thus allowing the client greater flexibility and creating potential for cost savings for COAST and its member communities.

Getting pedestrian improvements of the sorts recommended here will require funding and will be an incremental process. Many stop improvements will be made as part of the complete streets projects for Lafayette Road/US1 in Portsmouth, and NH108 in Dover, Somersworth and Rochester described earlier. Securing new federal funding for pedestrian projects will be more challenging in the immediate future given changing funding priorities at USDOT and the move to cut and delay projects in the New Hampshire Ten Year Transportation Plan due to cost inflation outstripping available state revenues. Downshifting of costs from federal government to states, and from the state to municipalities, creates a strain on municipal resources.

However, while there may be fewer future opportunities to accomplish work with federal and state funding, most COAST communities continue to see economic growth and new development. Portsmouth and Dover have parking revenues dedicated to transportation system improvements.

Most new development projects in a community also present an important opportunity for planning boards to work with developers to ensure that new commercial and multi-family residential projects development projects connect to their local pedestrian networks and in some cases fill existing network gaps. The project team hopes the combination of the PLTS analysis tool and companion Land Use Guide give municipalities tools they need to both identify needed access improvements, get them constructed and ensure they are maintained – for the benefit of their residents and businesses.

APPENDICES

Appendix A. Pedestrian Level of Traffic Stress Scoring Model Methodology

Appendix B. Supplementary Mapping

Appendix A. Pedestrian Level of Traffic Stress Scoring Model Methodology

Contents

Overview

The Rockingham Planning Commission (RPC), Strafford Regional Planning Commission (SRPC), Cooperative Alliance for Seacoast Transportation (COAST), and transportation services of the University of New Hampshire (UNH Wildcat) applied for Federal Transit Administration (FTA) 5305 State Planning & Research funding to address pedestrian access at each bus stop. The two planning commissions conducted a Pedestrian Level of Traffic Stress (PLTS) analysis for more than 500 bus stops in 14 municipalities. This included analyses of the high-level sidewalk or walkability of each stop, common origins and destinations of the fixed-route network and ADA paratransit destinations, and a gap analysis of stops with poor access.

This is the documentation for the PLTS analysis and scoring model. This process was completed using a series of models in ArcGIS Pro version 3.4.3. The model is broken into steps that make it easy to do basic validation checks and make it so that the model does not take days to run.

This analysis uses a combination of Linear Reference Systems and the Proximity tools Near and Generate Near Table to merge the road and sidewalk data into one layer, then uses field calculations to score the road segments.

Originally, this was going to be one massive model that does everything after data gathering, but it was too complex, took a long time to run, and failed every time. Breaking into smaller steps to make it run better. Each step is numbered below and should be run in order. Further descriptions of the analysis and the logic and math that occurs are outlined in the rest of the document.

0. Gather assorted input data into a geodatabase.
1. Create the LRS system and use it to merge 2 transit agencies, the BLTS data, and the road attributes into one modified Roads layer.
2. Prepare Sidewalk and Road data for merging
   a. Create a cardinality/compass direction field and a normalized Direction field in the sidewalk data
   b. Create a cardinality/compass direction field and a normalized Direction field in the Road data
3. Merge the Sidewalk and Road data by
   a. Using Generate Near Table to link the sidewalk data to their respective roads and eliminating records where the cardinality is significantly different (perpendicular).
   b. Determine the side of the road that each sidewalk is on
   c. Merge the layers with LRS
   d. Dissolve data so that there is only one line segment per linear foot of road
4. Now with all data in place by side of road, calculate PLTS for each side of road and in total (similar to BLTS model)

Reading this Guide

The following steps outline the process. The first part of each section describes what the step accomplishes and details the logical or mathematical approach for each step. Then there is a list of Input data layers, Outputs where the **bolded output names** are used in future steps, and Process details that list each tool used in order for the model.

Important notes or QA/QC steps are documented in this font throughout the document.

Step 0: Preparing Data

Before we begin, find the geodatabase "PLTS_Inputs", and copy the following data into it:

1. Transit Routes
2. BLTS data including speed limits, variables used for the BLTS calculations, and the end result BLTS score.
3. Sidewalks exported from AGOL
4. NHDOT Roads layer clipped to the planning commissions, and with the route ID field renamed to SRI if needed.
5. Land Use Data

Create or empty the geodatabase "PLTS_ModelOutputs"

Step 1: Create a LRS System

Linear referencing is not a frequently used process among RPCs in New Hampshire, so one may ask "**Why use Linear Referencing for this project?**". This is a great question, and in short, it will make the project more replicable. A major issue with the data collected in the 2019 BLTS project is that the bike lane and parking data is tied to the 2019 road data. As these attributes are changed over time, it is a big lift to update the data, and the OBJECTID in the annual Roads data from NHDOT is an annually generated OBJECTID from NHDOT's linear referenced road layer (the SRI, MP_START, and MP_END attributes are the LRS fields in the Roads layer). In order to pull the old BLTS data to a new roads layer, you must use spatial joins or LRS. Since this analysis requires data from the BLTS data, transit routes, roads layer, and sidewalks, LRS is a simple way to merge these layers.

Furthermore, it will allow us to split road segments wherever the sidewalk attributes change, rather than just at intersections, which will allow for a much more granular analysis. "While linear features contain some static characteristics, often they contain characteristics that are more dynamic in nature. A linear referencing system can be used to model these dynamically changing characteristics of a single linear feature, without requiring the underlying line to be segmented each time an attribute value changes."[1]

In this project, we use the 2024 roads layer as the LRS network and then identify the locations of the 2023 bus routes, 2019 BLTS, and 2024 sidewalk features along the routes. Then we can use LRS to re-segment the road data any time that the PLTS attributes change, lending a significant deal more precision to this analysis than the BLTS analysis.

Inputs
- Roads (From PLTS_InputLayers.gdb)
- COAST routes (From PLTS_InputLayers.gdb)
- Wildcat routes (From PLTS_InputLayers.gdb)
- BLTS data (From PLTS_InputLayers.gdb)

Outputs
- **LRS_Routes** – a line layer of LRS routes based on the roads layer
- **LRS_BLTS** – an event table of the BLTS layer
- **LRS_COAST** – an event table of the COAST layer
- **LRS_Wildcat** – an event table of the Wildcat layer
- LRS_Overlay1 – an overlayed event table merging
- LRS_Overlay2 – an overlayed event table merging
- LRS_Overlay3 – an overlayed event table merging
- LRS_Dissolve – a dissolved event table that dissolves LRS_Overlay3

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[1] https://pro.arcgis.com/en/pro-app/latest/help/data/linear-referencing/introduction-to-linear-referencing.htm

- **Roads_AllData** – a line layer generated from the events in LRS_Dissolve

Process

This tool accepts the following parameters (data layers): Roads, COAST Bus Routes, UNH Bus Routes, BLTS

1. Create Routes using the Roads layer
2. Locate Events on Routes for Roads, COAST, Wildcat, and BLTS
3. Overlay Route Events[2]
4. Calculate one transit field that lists presence of each provider
5. Dissolve the routes
6. Make Route Layer
7. Export the new Road layer as a feature layer

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[2] https://desktop.arcgis.com/en/arcmap/latest/manage-data/linear-referencing/about-overlaying-event-data.htm

Step 2: Prepare Sidewalk and Road data for merging

If we were to use LRS on the sidewalk data at this step, we would get a confusing layer that does not tell us which side of the road each sidewalk is on. This process allows us to calculate the side of the road before we run LRS, so that we can join the sidewalk attribute data to the road layer by side of the road.

To do this, we will calculate the Linear Directional Mean[3] of both the sidewalks and roads, and then calculate a "Direction" field that adjusts the cardinal direction from the Linear Directional Mean to exist in this plane:
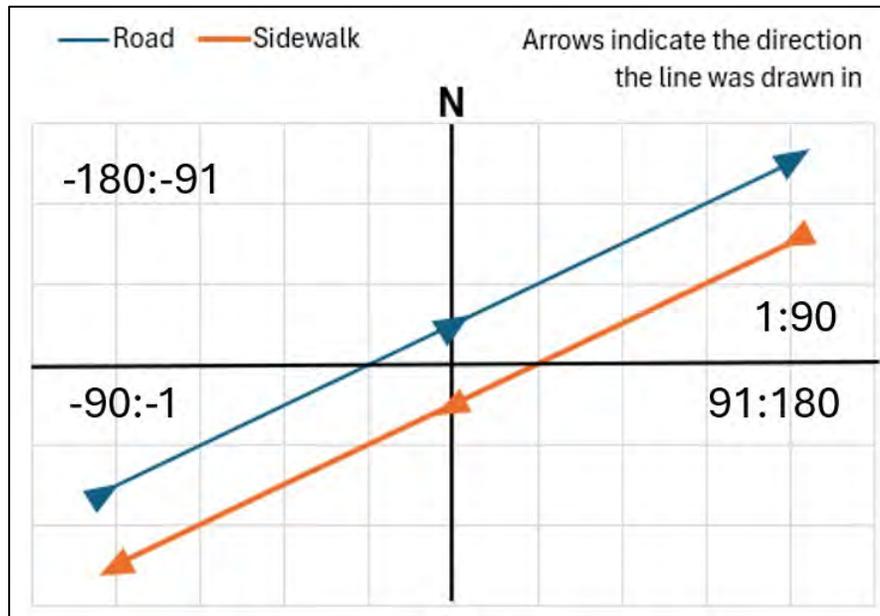
Using this plane allows us to assume that if the road segment is +/- 60 and the sidewalk is +/- 65, they are generally headed in the same direction, but if one is +/- 80 and the other +/-120, they are more perpendicular, and the sidewalk is along a different road. This comparison will be calculated in Step 3.

Inputs
- Sidewalks (From PLTS_InputLayers.gdb)
- Roads_AllData (From Step 1)

Outputs
a. Sidewalk tool outputs:
  1. **Sidewalks_Modified** – a copy of the sidewalk data with some field calculations – This layer is used in step 3
  2. **Sidewalks_DirectionalMean** – the linear directional mean table for sidewalks

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[3] https://pro.arcgis.com/en/pro-app/latest/tool-reference/spatial-statistics/h-how-linear-directional-mean-spatial-statistics-w.htm

b. Road tool outputs:
   1. **Roads_AllData2** – a copy of Roads_AllData with some field calculations
   2. **Roads_AllData3** – a copy of Roads_AllData2 with some field calculations – This layer is used in step 3
   3. **LRS_Output_DirectionalMean**– the linear directional mean table for roads

Process

This process uses a tool called "Linear Directional Mean". It requires a case field unique to each record. The case field must be a string.

1. For both the Sidewalk data and the LRS generated road data:
   a. Add field "groups_", a string
   b. Calculate that field "groups_ == UNIQUEID"
   c. Run Linear Directional Mean with case = "groups_"
   d. Add a field to the output layer called "id", a short integer
   e. Calculate that field id==groups_
   f. Add a Join. Join the original data to the Linear Directional Mean layer on UNIQUEID==id
   g. Export feature class
   h. Add field "SideDir" or "RoadDir", a double
   i. Calculate it using Reclassify("CompassA"):
      if(compassA<=180): return compassA
      Elif(compassA>180): return 180-compassA

After step 1.i. there are errors in both output layers where the lines are odd shapes and the directional mean could not be calculated for approximately 23 sidewalk segments and some roads, although none of the roads are adjacent to sidewalks so it is unlikely that this will present an issue.

The Roads half of this step takes 30-50 minutes to complete. It is exactly the same process as the sidewalk step, but takes much longer. Do not be alarmed and do not cancel it. Just let it run.

Step 3: Merge the Sidewalk and Road data

Part A: Generate a Near Table

In this step, we generate a Near table, which basically takes each sidewalk and lists each road segment that is within the search radius. Then we join the sidewalk and road data to this table to get the compass and direction data from Step 2. Then a Dir_Variance calculation is done to determine the variance between directions that can be used to eliminate sidewalk-road pairs where the pair is perpendicular.

However, we also must consider situations like the below area in Portsmouth where sidewalk 1839 is along roads 31406, 29171, 32760, 28769, and 32707. The road curves as well, so the directions in the plane above vary as much as 20 degrees.
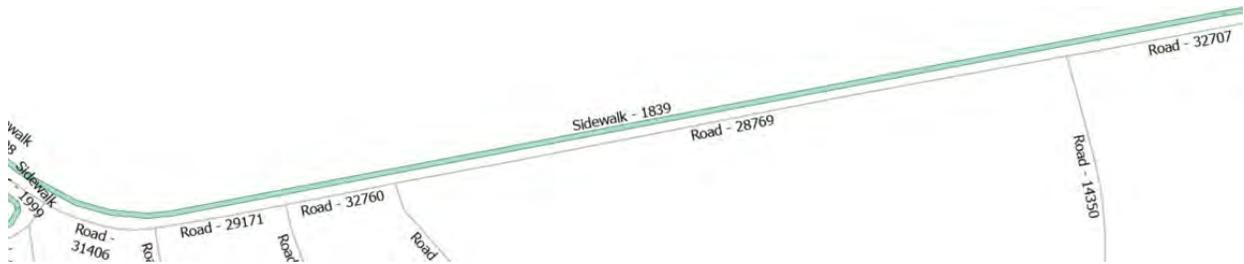

As a result, this tool considers sidewalks with a general direction within 20 degrees of the road to be "Along" that road.

Part B: Determine Side of the Road

Using the results of the Near Table, we can draw lines from the road to the sidewalk in each pair in the near table. Then we can calculate the bearing of these lines to compare the compass direction of the road and determine the side of the road that the sidewalk is on. Assuming the following plane and quadrants:

Quadrant I: 0 to 90
Quadrant II: 271 to 360
Quadrant III: 181 to 270
Quadrant IV: 91 to 180
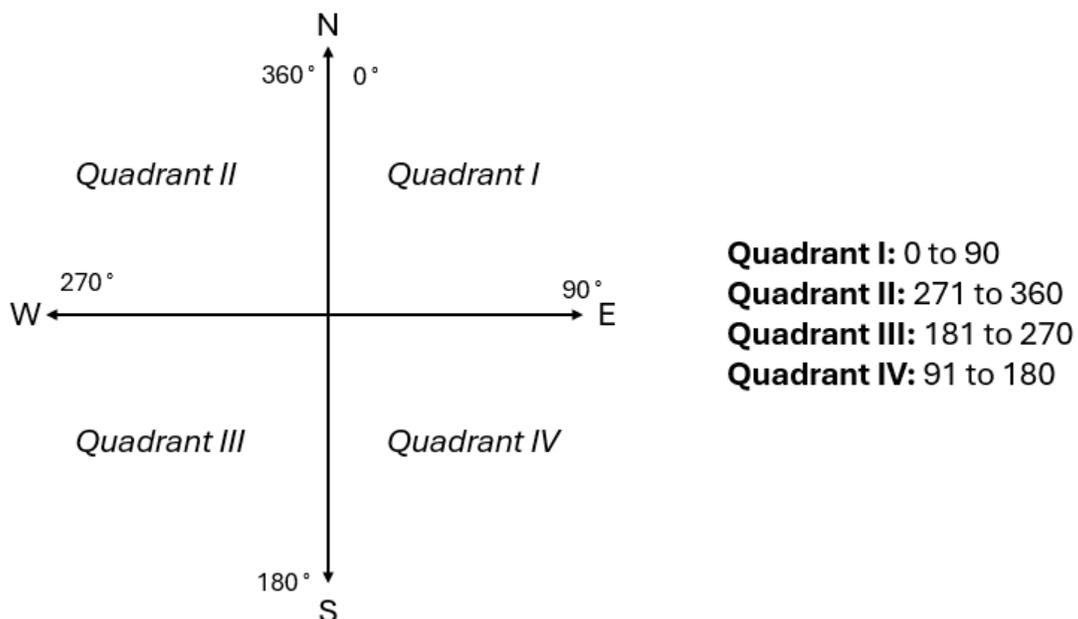
And the following Road and Sidewalk scenarios:
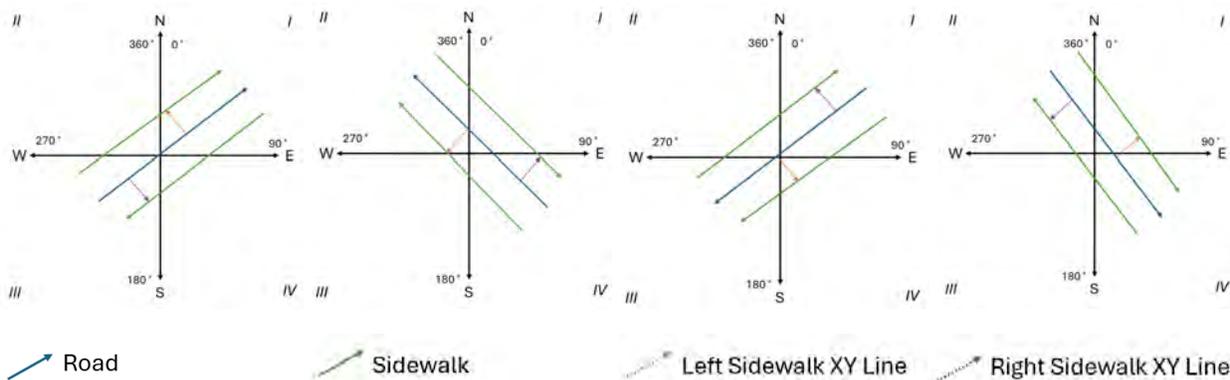
Road Bearing	Left XY Bearing	Right XY Bearing
I	II	IV
II	III	I
III	IV	II
IV	I	III

The calculation of the Side field assumes that these generalizations hold true for all roads, and in the instances that these quadrant combinations are not present, the Side field will say "Unknown".

In testing this tool, most of the sidewalk-road pairs fit into these generalizations. QAQC by checking that the RoadToSidewalk_NearLines layer has lines for all sidewalks and that the Side field is filled in.

Part C: Merge using LRS

In this step, we locate the sidewalks along the LRS routes from Step 1 and then join the data from Step 3B to assign sidewalk IDs to the left or right or unknown sides of the road.

Step 3c needs to be run twice. The first time it runs, it only does the first half. The second time, it will do the whole analysis. This is some issue with a field name that doesn't exist until halfway through. The first half only takes a couple of minutes to run, so it is only a small inconvenience.

Part D: Dissolve

This step simply dissolves the data from steps 3a-3c into one layer with one line per linear foot of the road layer. For some unknown reason, this one tool will not run if included in the model for Part C, and I could not justify spending any more time convincing it to do so, so here it is, alone in its own model where it runs without issue every time.

Inputs

A. Generate Near Table
   a. Sidewalks_Modified (Output of step 2A)
   b. Roads_AllData3 (Output of step 2B)
B. Determine Side of Road
   a. SidewalkNearRoads (Output of 3A)
C. Merge Layers with LRS
   a. LRS_Routes (Output of 1)
   b. Sidewalks_Modified (Output of 2A)
   c. Roads_AllData3 (Output of 2B)
   d. SidewalksNearRoads (Output of 3A)
D. Clean Table
   a. LRS_Overlay7 (Output of 3C)
E. Dissolve
   a. LRS_RoadsAndSidewalks2 (Output of 3D)

Outputs

A. Generate Near Table
   a. SidewalkNearRoads
B. Determine Side of Road
   a. RoadToSidewalk_NearLines
C. Merge Layers with LRS
   a. LRS_Sidewalks
   b. LRS_RoadsUpdated
   c. LRS_Overlay4
   d. LRS_Sidewalks_Left
   e. LRS_Sidewalks_Right
   f. LRS_Sidewalks_Unknown
   g. LRS_Overlay5
   h. LRS_Overlay6
   i. LRS_Overlay7
D. Clean Table
   a. LRS_RoadsAndSidewalks
   b. LRS_RoadsAndSidewalks2
E. Dissolve
   a. LRS_RoadsAndSidewalks3

Process

A. Using the above modified layers, Generate Near Table and
   a. Add fields Side_Dir, Road_Dir, Dir_Variance, Along, Side, and R_ID
   b. Join Sidewalk data to the Near Table to calculate Side_Dir and remove the join
   c. Join Road data to the Near Table to calculate Road_Dir and R_ID and then remove join

d. Calculate Dir_variance == Road_Dir – Side_Dir
e. Calculate Along as

    |Dir_Variance| > 20: No
    |Dir_Variance| <=20 and >10: Likely
    |Dir_Variance| <=10 and >5: More Likely
    |Dir_Variance| <=5: Very Likely
    Else: UNK

f. Select and delete the rows where "Along == No"

B. Determine the side of the road that each sidewalk is on
  a. Generate XY Lines using the Near table starting at the road (Near_X, Near_Y) and ending at the sidewalk (From_X, From_Y) and keep the attributes
  b. Calculate these XY Lines' line bearing (compass direction)
  c. Calculate Quadrants for each

C. Use LRS to merge sidewalks into the road layer
  a. Locate sidewalks and roads along the LRS Routes
  b. Make a route event layer for sidewalks
  c. Overlay this and the road locate features table (it doesn't like both to be tables)
  d. Add fields: Left_Sidewalk, Right_Sidewalk, Unknown_Sidewalk
  e. Join the Near table
  f. For each Left, Right, Unknown:
    i. Make table view of join from e filtering on Side
    ii. Make a route event table
    iii. Locate the features on LRS Routes
  g. Overlay Left and Right
  h. Overlay the above with Unknown
  i. Overlay the above with Roads

D. Clean the table
  a. For each Left, Right, Unknown
    i. Create field "Filter_[side]" and calculate:

```
def checkroad(joinid, road):
 if joinid=='':
   return 'Clear'
 else:
   if joinid.split(' - ')[1] == str(road):
     return 'Keep'
   else:
     return 'Clear'
```

    ii. Make a table view with the filter=Clear
    iii. Calculate side's sidewalkID to null
    iv. Calculate side's join id to null
  b. Export table
  c. Calculate summary statistics to clear out null rows

d. Alter field names and delete extra fields
    E. Dissolve

Step 4: Compile Data

The model produces a table full of nulls, so this step requires some manual effort.

Run the model to

    a. Make a route event layer
    b. Export a feature layer to manipulate

In a map, pull in the LRS_RoadsWithSidewalkIDs, Roads_AllData3, and final Sidewalks_Modified layers. Manually:

    a. Filter LRS_RoadsWithSidewalkIDs UnkSidewalkFID not NULL
    b. Symbolize:
        a. LRS_RoadsWithSidewalkIDs to a bright color
        b. Roads_AllData3 to Arrow Right Middle
        c. Sidewalks_Modified to a neutral color
    c. Add labels for Sidewalks_Modified using OBJECTID
    d. Review each segment in LRS_RoadsWithSidewalkIDs and assign side of the road
    e. Join LRS_RoadsAndSidewalks and Roads_AllData
    f. Export
    g. Rename fields (see appendix)
    h. Join Sidewalks on LSidewalkFID
    i. Export
    j. Rename fields (see appendix)
    k. Join Sidewalks on RSidewalkFID
    l. Export
    m. Rename fields (see appendix)

Inputs
- LRS_Routes (Output of 1)
- LRS_RoadsAndSidewalks3 (Output of 3E)
- LandUse_SRPC_2022 (From PLTS_InputLayers.gdb)

Outputs
- **LRS_RoadsWithSidewalkIDs**

Process
1. Make a feature layer of the land use data where the land is developed.
2. Make a buffer around the developed lands.
3. Make a route event layer of LRS_RoadsAndSidewalks3 along LRS_Routes.
4. Spatial join the route event layer and the buffered land uses.
5. Make a Table View of records with length == 0.
6. Delete those rows.

Manual QA/QC Between Steps 4 and 5

Step 4 creates a shapefile of the LRS routes segmented by changes in road layer attributes or sidewalk changes. It contains only the join IDs for the road and sidewalk layers. We will manually review errors at this step.

1. Create a map. Load into it the LRS_RoadsWithSidewalkIDs, Roads_AllData3, and Sidewalks_Modified layers.
2. Label the sidewalks by OBJECTID
3. Symbolize the Roads_AllData3 layer to use the Arrow in Middle style
4. Use a definition query on LRS_RoadsWithSidewalkIDs:
    a. UnknownID is not null and UnknownID >0
5. Zoom to each segment and reassign the sidewalk IDs to making sure that Left and Right is the road segment's left and right as illustrated in the documentation of step 3b.
6. Save the edits.
7. Remove the definition query. Add a new query
    a. LeftID is not null or RightID is not null
8. Spot check to ensure that sidewalks are being detected as expected.
    a. If not, review outputs of 2a, 3a-3e, and 4 until you find where the analysis failed to assign data appropriately and fix it. This could be as simple as a field name issue in one of the steps.

Manual Data Compilation

After verifying all of the sidewalk IDs are assigned to the correct sides of the roads, it is time to merge attributes into the layer. This is done manually.

Load the LRS_RoadsWithSidewalkIDs, Roads_AllData3, and Sidewalks_Modified layers into a map and have Appendix B: PLTS Data Field Names handy.

1. Join Roads_AllData3 (b) to LRS_RoadsWithSidewalkIDs (a) on a.RoadFID = b.ROAD_FID
2. Join Sidewalks_Modified (c) to LRS_RoadsWithSidewalkIDs (a) on a.LSidewalkFID = c.OBJECTID
3. Export Features of LRS_RoadsWithSidewalkIDs to PLTSData1
4. Edit fields. Rename, reorder, and re-alias fields to match all but the RSW_ fields in Appendix B. Save edits
5. Join Sidewalks_Modified (d) to PLTSData1 (a) on a.RSidewalkFID = d.OBJECTID
6. Export Features of PLTSData1 to PLTSData
7. Edit fields. Rename, reorder, and re-alias fields to match all fields in Appendix B. Save Edits.
8. The data is now ready to run Step 5 of the model

Step 5: Scoring

a. Create feature layer for scoring (for easy refresh to unscored data)
b. Convert SADES widths to feet for each side (Make table view filters on Source = SADES, calculate field "width/12")
c. Convert SPEEDLTS to a SpeedLimitScore field where
  a. <=25mph = 1
  b. 30mph = 2
  c. 35mph = 3
  d. >=40mph = 4
  e. Missing data = 0
d. Fill null conditions with "No Sidewalk" (Make table view filters on condition is null, calculate field "No Sidewalk")
e. Calculate Effective Widths
  a. Fill in null sidewalk widths with 0 (Make table view on width is null, calc to 0)
  b. If sidewalk widths>0: sidewalk width, else shoulder width
f. Calculate Buffer Widths
  a. Populate null buffer widths with 0
  b. If buffer type is parking, fill buffer width=0 with whatever is in the BLTS parking width data. If that is 0, use 8.
  c. Total Buffer width = shoulder width + bike lane width + buffer width
g. Add fields:
  a. PLTS_Condition – Left and right
  b. PLTS_BufferType – Left and right
  c. PLTS_BufferWidth – Left and right
  d. PLTS_Crossing – just one for the segment

Attachment A: PLTS Score Summary Tables

PLTS Scores: Condition

The condition score is calculated for each side of the road and based on the condition of the sidewalk, the effective width, and the material of the sidewalk.

Width	Condition				
	Good	Fair	Poor	Very Poor	No Sidewalk (or No Condition Rating)
<4	PLTS 4	PLTS 4	PLTS 4	PLTS 4	PLTS 4
>=4 to <5	PLTS 3	PLTS 3	PLTS 3	PLTS 4	PLTS 4
>=5 to <6	PLTS 2	PLTS 2	PLTS 3	PLTS 4	PLTS 4
>=6	PLTS 1	PLTS 1	PLTS 2	PLTS 3	PLTS 4

Effective Widths: This is the width of the sidewalk or if no sidewalk is present, it is the width of the shoulder.

Materials: Are not listed in the table, but any brick sidewalk with a condition worse than "Good" is bumped up one point. For example, a 5ft brick sidewalk in Fair condition would be PLTS 2 + 1 = 3.

Consider adjustments for speed limit and volume to this scoring of "No Sidewalk". First draft mapping with the table above results in nearly all of the regions being PLTS 4.

PLTS Score: Buffer Type

The Buffer Type score is calculated for each side of the road and based on the speed limit and the type of buffer.

Buffer Type	Posted Speed Limit			
	<=25 mph	30 mph	35 mph	>=40 mph
No Buffer	PLTS 2	PLTS 3	PLTS 3	PLTS 4
Grass, Gravel, Dirt, Other	PLTS 1	PLTS 2	PLTS 2	PLTS 3
Parking	PLTS 1	PLTS 1	PLTS 1	PLTS 2

PLTS Score: Buffer Width

The Buffer Width score is calculated for each side of the road and based on the number of travel lanes and the total width of all buffers.

Travel Lanes	Total Buffering Width (ft)				
	<5	>=5 to <10	>=10 to <15	>= 15 to <25	>=25
1-2	PLTS 2	PLTS 2	PLTS 1	PLTS 1	PLTS 1
3	PLTS 3	PLTS 2	PLTS 2	PLTS 1	PLTS 1
4-5	PLTS 4	PLTS 3	PLTS 2	PLTS 1	PLTS 1
6+	PLTS 4	PLTS 4	PLTS 3	PLTS 2	PLTS 2

PLTS Score: Crossing

The crossing score takes into account how stressful it is to cross a given road segment assuming that there is no crossing control (crosswalk, signalized intersection, etc). This score considers speed limits, distance to cross, and daily traffic. The Crossing Score +1 is used as the condition score if there is no sidewalk present on a road.

Speed Limit	Total Lanes Crossed and Volumes							
	1-2 Lanes				3 Lanes			4 Lanes
	<2,000 AADT	2,000-4,999 AADT	5,000-9,000 AADT	>9,000 AADT	<8,000 AADT	8,000-12,000 AADT	>12,000 AADT	Any
<=25	PLTS 1	PLTS 2	PLTS 2	PLTS 3	PLTS 3	PLTS 3	PLTS 4	PLTS 4
30	PLTS 1	PLTS 2	PLTS 3	PLTS 3	PLTS 3	PLTS 3	PLTS 4	PLTS 4
35	PLTS 2	PLTS 3	PLTS 3	PLTS 4	PLTS 3	PLTS 4	PLTS 4	PLTS 4
>=40	PLTS 3	PLTS 3	PLTS 4	PLTS 4	PLTS 4	PLTS 4	PLTS 4	PLTS 4

Attachment B: PLTS Data Field Names

The table below has the field names and aliases for the final list of fields in the compiled PLTS Data table before running the final scoring step of the model.

Field Name	Alias	Data Type
OBJECTID	OBJECTID	Object ID
Shape		Geometry
RID_Unk	RID_Unk	Text
fMEAS	fMEAS	Double
tMEAS	tMEAS	Double
RoadFID	RoadFID	Long
LSidewalkFID	LSidewalkFID	Double
RSidewalkFID	RSidewalkFID	Double
UnkSidewalkFID	UnkSidewalkFID	Double
Street	STREET	Text
Municipality	Municipality	Text
SRI	SRI	Text
FUNCT_SYSTEM	FUNCT_SYSTEM	Long
FUNCT_SYSTEM_DESCR	FUNCT_SYSTEM_DESCR	Text
SURF_TYPE	SURF_TYPE	Text
ROADWAY_WIDTH	ROADWAY_WIDTH	Long
NUM_LANES	NUM_LANES	Long
LANE_WIDTH	LANE_WIDTH	Long
DIRECTION_WAY	DIRECTION_WAY	Text
AADT	AADT	Long
AADT_new	AADT_new	Double
SECT_LENGTH	SECT_LENGTH	Double
BLTS	BLTS	Long
SPEEDLTS	SPEEDLTS	Long
SHLDR_TYPE_LEFT	Left Road Shoulder Type	Text
SHLDR_WIDTH_LEFT	Left Road Shoulder Width	Long
ParkWidthL	Left Parking Width	Long
BikeWidthL	Left Bike Lane Width	Long
SHLDR_TYPE_RIGHT	Right Road Shoulder Type	Text
SHLDR_WIDTH_RIGHT	Right Road Shoulder Width	Long
ParkWidthR	Right Parking Width	Long
BikeWidthR	Right Bike Lane Width	Long
LSW_Source	Left Sidewalk Source	Text
LSW_Material	Left Sidewalk Material	Text
LSW_Condition	Left Sidewalk Condition	Text
LSW_Width	Left Sidewalk Width	Double
LSW_BufferPresence	Left Sidewalk Buffer Presence	Text
LSW_BufferType	Left Sidewalk Buffer Type	Text

Field Name	Alias	Data Type
LSW_BufferWidth	Left Sidewalk Buffer Width	Long
RSW_Source	Right Sidewalk Source	Text
RSW_Material	Right Sidewalk Material	Text
RSW_Condition	Right Sidewalk Condition	Text
RSW_Width	Right Sidewalk Width	Double
RSW_BufferPresence	Right Sidewalk Buffer Presence	Text
RSW_BufferType	Right Sidewalk Buffer Type	Text
RSW_BufferWidth	Right Sidewalk Buffer Width	Long

APPENDIX B. SUPPLEMENTAL MAPPING

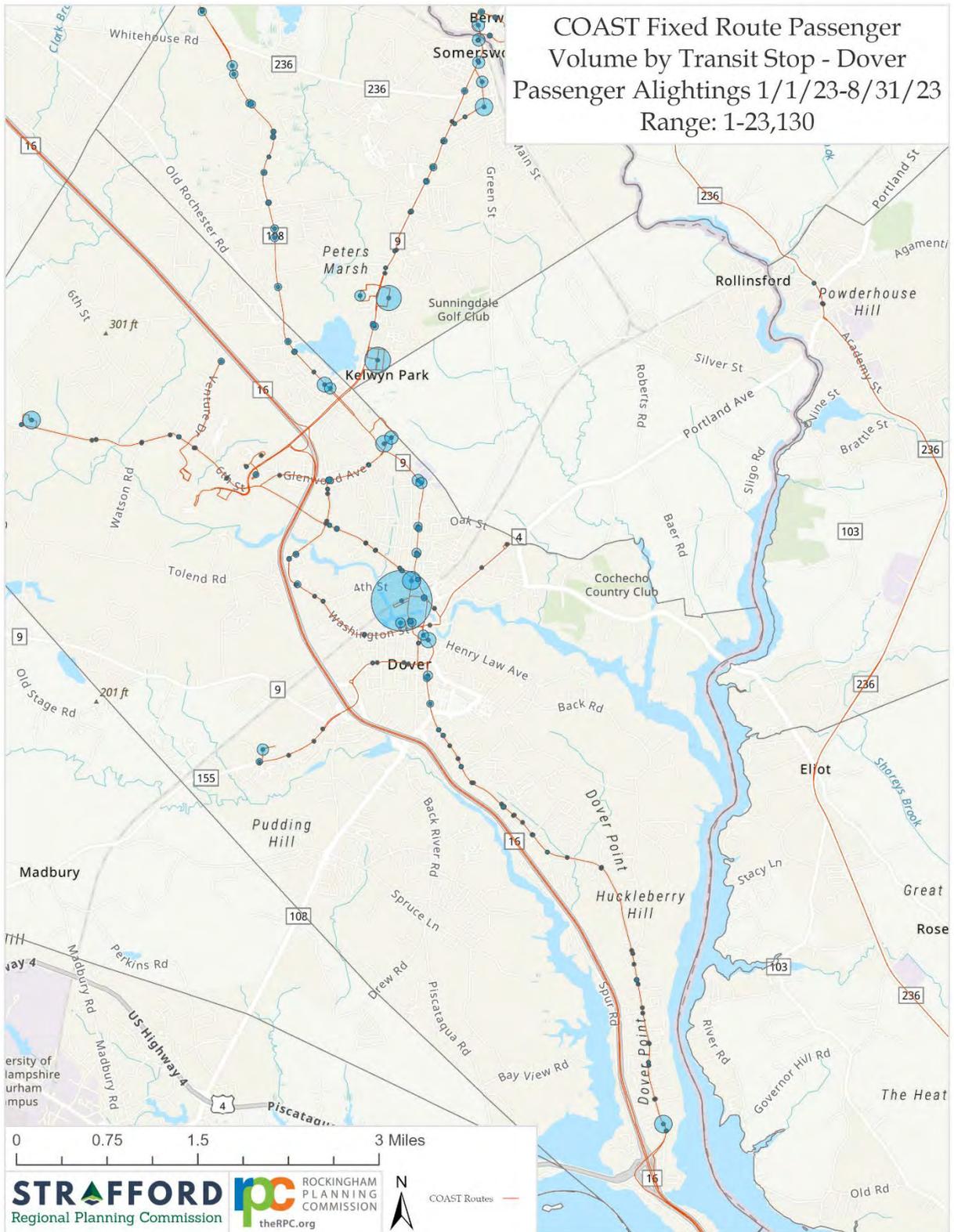**Figure B1 – Alighting Volume by COAST Bus Stop in Dover**

COAST Fixed Route Passenger Volume by Transit Stop - Dover Passenger Alightings 1/1/23-8/31/23 Range: 1-23,130

Figure B2 – Alighting Volume by COAST Bus Stop in Portsmouth

COAST Fixed Route Passenger Volume by Transit Stop - Portsmouth
Passenger Alightings 1/1/23-8/31/23
Range: 1-23,130
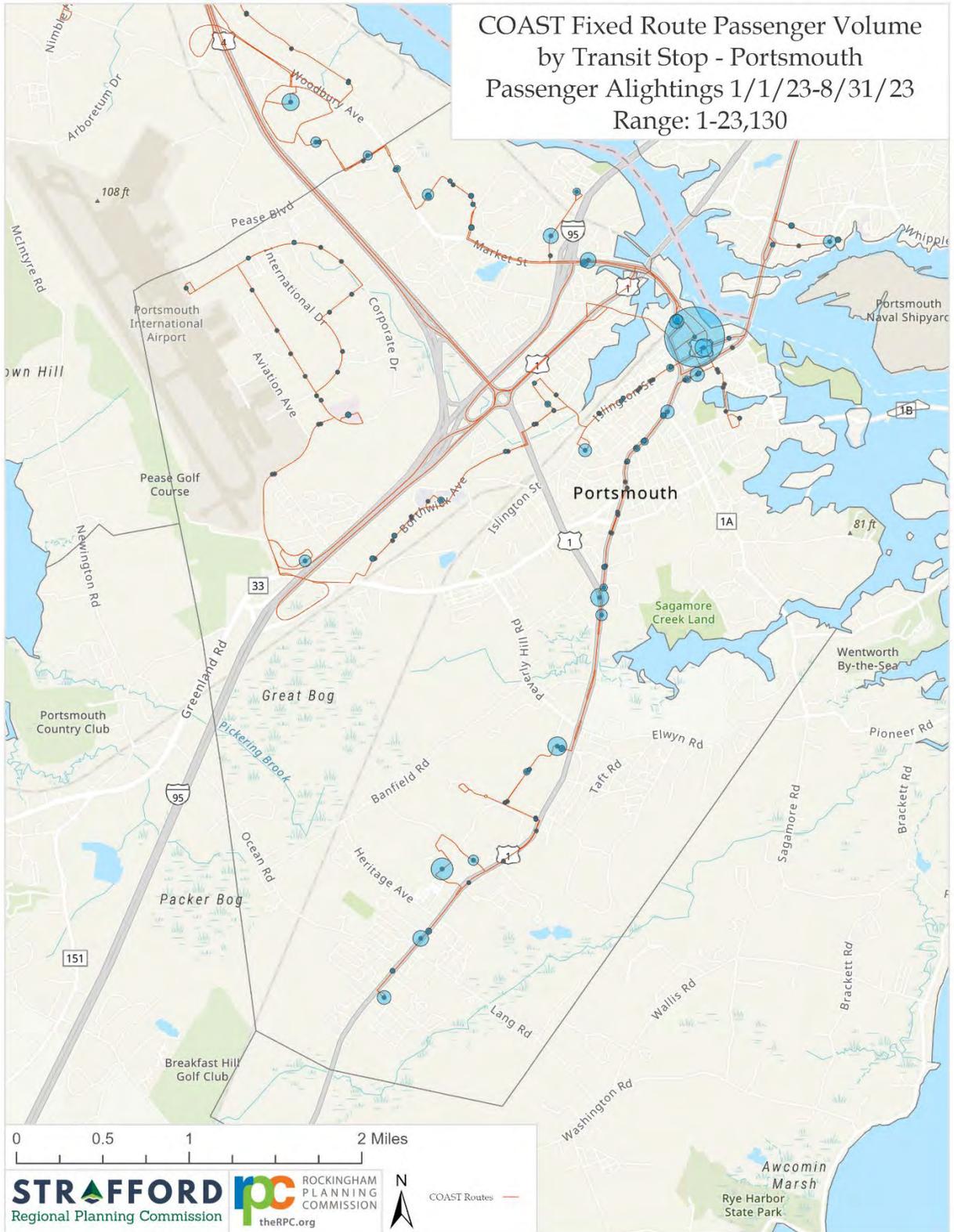
Figure B3 – UNH Wildcat Transit Alighting Volume by Stop – Dover

Wildcat Fixed Route Passenger Volume
by Transit Stop - Dover
Passenger Alightings 7/1/22-6/30/23
Range: 248-25,969
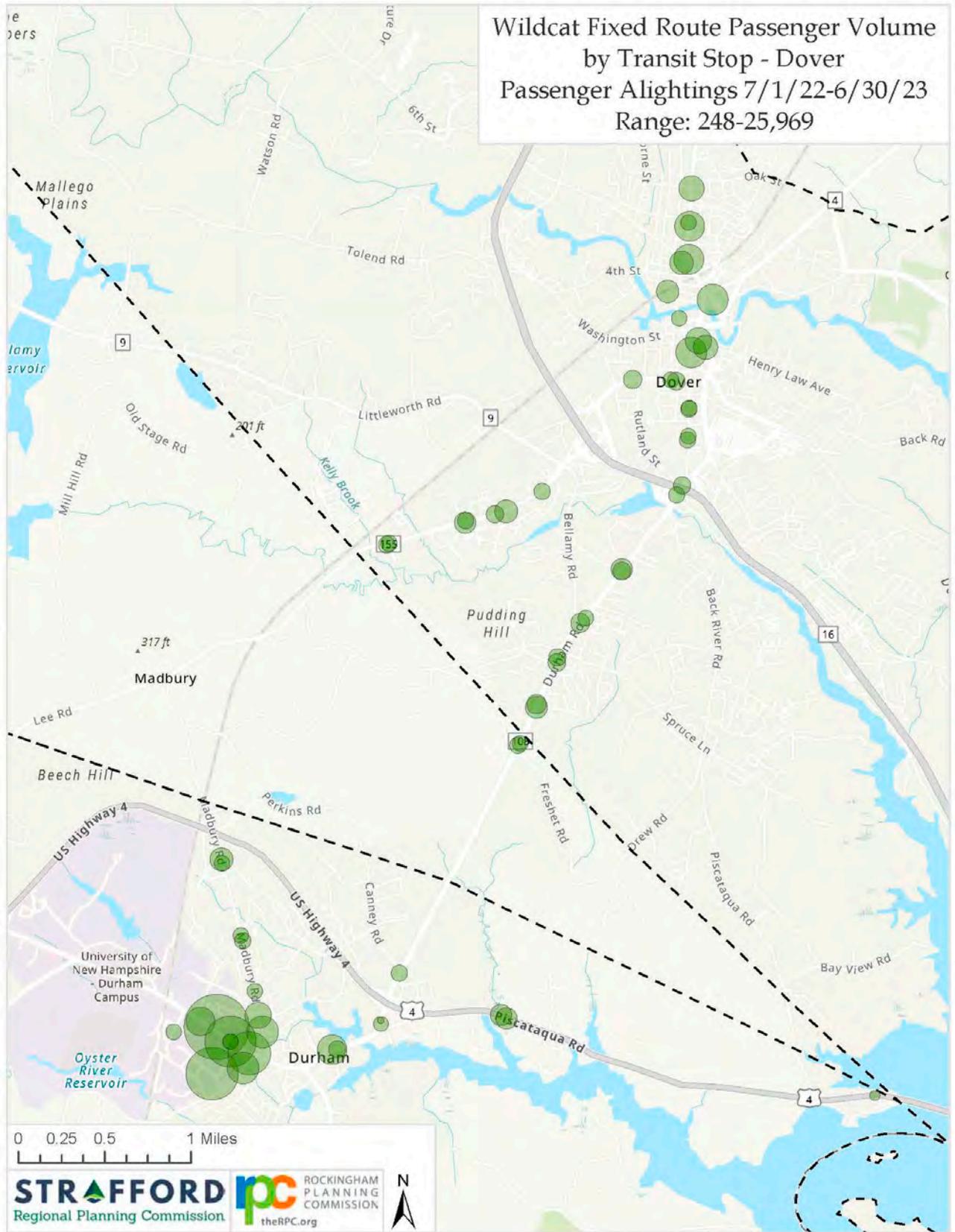
Figure B4 – UNH Wildcat Transit Alighting Volume by Stop – Portsmouth

Wildcat Fixed Route Passenger Volume by Transit Stop- Portsmouth
Passenger Alightings 7/1/22-6/30/23
Range: 248-5,973

Figure B5 – COAST ADA Paratransit Trip Hot Spots – Portsmouth

COAST ADA Paratransit Trip Origins and Destinations FY2024
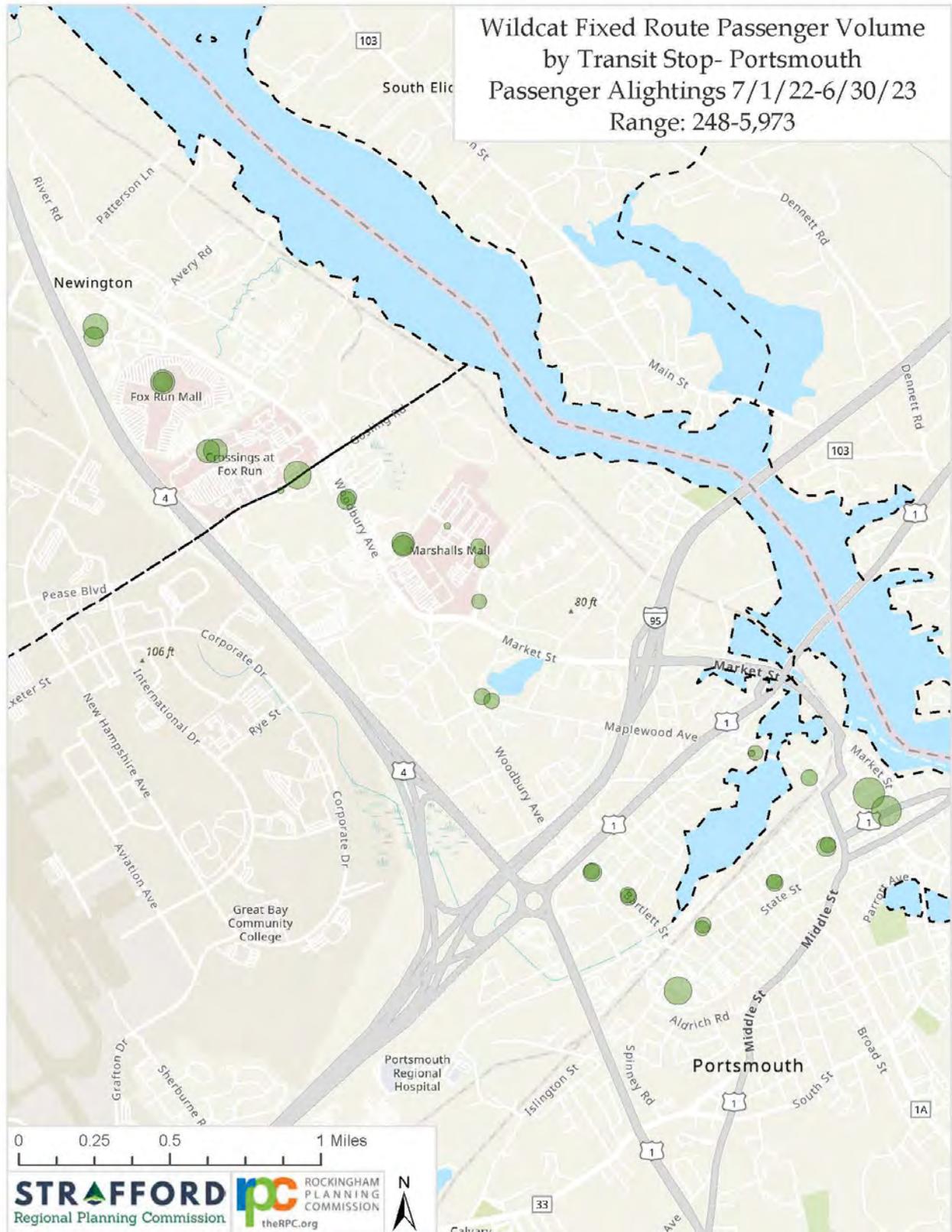Aggregated to nearest fixed route transit stop
Range 0-1,177

Figure B6 – COAST ADA Paratransit Trip Hot Spots – Dover

COAST ADA Paratransit Trip Origins and Destinations FY2024 Aggregated to nearest fixed route transit stop Range 0-1,177