

# MobileNR Feasibility Study

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# MobileNR Feasibility Study

*Final Report*

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## Abstract

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Informed by a process that began in 2016 to conduct a feasibility study of a free on-demand shuttle service for residents of New Rochelle, this report is a culmination of iterative analysis and recommendations. Most of this report (sections 1–7) provides a service framework that BFJ Planning shared and refined at different stages with the City of New Rochelle based on subsequent feedback and updates. The intention of such service framework recommendations was to ultimately have an operational on-demand shuttle system in New Rochelle, initially conceptualized with the name of “MobileNR.”

Informed by this report’s initial recommendations and proposed service framework, a shuttle pilot was implemented in August 2019 with the name and branding of “CircuitNR.” The report concludes with information on this pilot’s success and next steps for New Rochelle to consider.

## Keywords

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Transportation, integrated mobility, on-demand shuttle, sustainability, NYSERDA

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## Acronyms and Abbreviations

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API	Application Program Interface
AVL	automatic vehicle location
CNG	compressed natural gas
GBFS	general bikeshare feed specification
GHG	greenhouse gas emissions
GTFS	general transit feed specification
NFC Reader	near field communication reader
NFCBP	National Fuel Cell Bus Program
NYSERDA	New York State Energy Research and Development Authority
QR Code	quick response code
RFID reader	radio frequency identification reader
SMS Alert	short message system alert, aka text message
SOV	single-occupancy vehicle
TNC	Transportation Network Company
UX Design	user experience design
VMT	vehicle miles traveled

# Executive Summary

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This feasibility study was conducted in response to the New York State Energy Research and Development Authority's (NYSERDA) call for Integrated Mobility Solutions for Smarter Cities and Communities. In partnership with the City of New Rochelle, BFJ Planning led feasibility analysis for the provision of a free on-demand electric vehicle shuttle service to serve the City's downtown area. For the purposes of this feasibility study, the shuttle service is branded as "MobileNR" and has the service objective to efficiently transport users within the proposed service area while also providing important connections to other transportation services that include the Westchester Bee-Line and the New Rochelle station. Initial strategizing deemed that shuttle service should be flexible to allow for both on-demand mobile application ride requests and curbside ride hailing.

Through stakeholder engagement, demographic analysis, and analysis of key trip generators, the feasibility analysis focuses on identifying key user groups that include: Transit dependent residents in the service area, employed residents who live in the service area, and individuals who are employed in the service area but commute in from elsewhere, primarily via the Metro North station. With the consideration of potential users alongside analysis of key trip generators, two potential routes are identified that can operate simultaneously: Route 1 (North Loop) and Route 2 (Downtown Loop). Route 1 is generally bound by Lincoln Avenue to the north, Main Street to the south, North Avenue to the east, and Division Street / Memorial Highway to the west. Route 2 is generally bound by Huguenot Street to the north and Main Street to the South. It is recommended that the initial implementation of MobileNR provides a minimum of two vehicles with fixed-route service during peak hours and on-demand service during off-peak periods. During peak periods it is recommended that shuttle headway should strive to not exceed 15 minutes in order to promote ridership and shuttle reliability. The on-demand service area is recommended to be a half-mile drive shed from the fixed-route shuttle stops, allowing for a wider coverage area during off-peak times.

Along each of the proposed routes it is further recommended that a number of existing Westchester Bee-Line bus stops are utilized for shuttle access and that new stops are constructed where there is opportunity to enhance transit connections. Additionally, route recommendations emphasize additional opportunity for stops to be organized as "Mobility Hubs" which include Primary Hubs, Secondary

Hubs, and Tertiary Hubs in rank of prominence and usage. The emphasis of Mobility Hubs aims to bolster the use of placemaking techniques to enhance visibility of transit stops while also promoting the integration of different transit modes at each location when feasible.

Feasibility analysis further includes recommendations to strategize integrated mobility, mobile application functionality, shuttle procurement and branding, as well as the overall promotion of the shuttle system's user friendliness and efficacy.

While the recommendations in this report emphasize a framework to implement an initial free on-demand shuttle service, the potential of future phasing options are also included, such as route extensions to the Quaker Ridge Shopping Center and areas along New Rochelle's waterfront.

Referred to in the Abstract, research and outreach for this feasibility study began in 2016. Cumulative service framework analysis and recommendations are provided in sections 1-7. From these initial recommendations, a shuttle pilot was implemented in August 2019 with the name and branding of "CircuitNR." At this time, CircuitNR service is operating on an on-demand basis as requested through the "Ride Circuit" App or by hailing an available vehicle. CircuitNR's geo-fenced service area roughly represents a consolidation of the initially recommended MobileNR Route 1 and Route 2 service area options. Future phasing of CircuitNR can refer to the full scope of recommendations within this report for service expansion and integrated mobility approaches.

# 1 Introduction

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The MobileNR Feasibility Study aims to design and procure a free demand-responsive shuttle in the City of New Rochelle. The goal of MobileNR is to improve local mobility by connecting users to key destinations in proximity to downtown.

The purpose of this report is to provide recommendations for the MobileNR route and service design, based on research and input from the City of New Rochelle and project stakeholders. This report is a follow up to the Interim Report issued in October 2016, which identified existing and future markets for MobileNR shuttle service in the downtown area, hospital and neighborhoods along upper North Avenue. The report identified four main user groups that are expected to benefit from MobileNR services:

- **Commuters:** The shuttle will be designed to provide connecting service to and from the New Rochelle Transit Center, which serves over 5,000 commuters each day.
- **Residents:** The service area, as defined in the Interim Report, is home to 35% of the city's population, which includes a higher-than-average percentage of youths and low-income families, which are considered transit-dependent. In addition, vehicle ownership is significantly lower in the service area. Nearly 1,500 New Rochelle residents work within the service area; 900 of whom live and work in the service area.
- **Workers:** Half of the city's workforce works within the potential service area, which is home to some of the city's largest employers, such as Montefiore Hospital, the City of New Rochelle, and New Roc City.
- **Students:** The service area also contains a large university student population. The combined enrollment of Iona College and Monroe College is approximately 11,000 students.

The proposed MobileNR services are designed to improve connectivity downtown and strengthen connections to the hospital district and Rochelle Park, which are currently constricted by the physical barriers caused by the New England Thruway and Metro North rights-of-way. The route and service recommendations address the shortcomings of the existing public transportation system, which offers infrequent local service. Successful implementation of MobileNR will further encourage use of public transit; reduce vehicle miles traveled (VMT) and demand for parking; and leverage existing efforts to implement complete streets, transit-oriented development and support future development clusters in New Rochelle.

The MobileNR Feasibility Study provides recommendations in the following four areas, reflective of the NYSERDA project scope:

- **Shuttle Route and Integrated Mobility:** This section outlines recommendations for two types of MobileNR shuttle service to best serve the transportation needs of the commuting population and residents: fixed-route and on-demand services.
- **Mobile App Components:** This section outlines the goals of the MobileNR mobile app, summarizes findings from inquiries with four mobility platform developers, and provides recommendations for requirements when procuring the MobileNR platform.
- **Project Benefits:** This section contains recommendations for metrics that should be used to evaluate MobileNR's performance in the areas of sustainability, shuttle operations, and passenger experience.
- **Preliminary Procurement:** This section outlines the various goods and services that need to be procured to operate MobileNR and provides a brief overview of existing electric vehicle technologies.

## **2 Shuttle Route and Integrated Mobility**

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This section outlines recommendations for two types of MobileNR shuttle services to best serve the transportation needs of the commuting population and residents: fixed-route and on-demand services. The latter part of the section discusses opportunities for integrating MobileNR with existing and future services, with the goal of providing app users with a comprehensive set of transportation options.

### **2.1 Fixed-Route Service**

The purpose of the fixed-route service is to provide efficient high-frequency service to major trip generators located in downtown, the hospital zone, and Rochelle Park during peak hours, when demand for the service is expected to be highest. Figure 1 shows the alignment of the two recommended fixed-route shuttles that were developed in conjunction with the City of New Rochelle: Route 1, the North Loop, and Route 2, the Downtown Loop. The following provides a summary of the fixed-route service, including detailed alignment and stop information for each route.

#### **2.1.1 Shuttle Stops**

The fixed-route shuttle would pick-up and drop-off riders using a combination of existing Westchester Bee-Line bus stops and new bus stops. Conversations with Westchester County staff in April 2017 indicated that there is good potential for the county and city to enter into an agreement to share bus stops, as long as MobileNR was not designed to compete with Westchester Bee-Line service. The proposed bus stop locations are listed in the route descriptions, beginning on page five.

#### **2.1.2 Service Hours**

The fixed-route service would operate during the weekday morning rush hour (6:00 a.m. to 10:00 a.m.) and evening rush hour (4:00 p.m. to 8:00 p.m.), to provide predictable and frequent service for commuting residents, employees, and students. To make the service an attractive alternative to driving, the service should operate at headways that do not exceed 15 minutes. Additional fixed-route service should be considered for the weekday midday peak (12:00 p.m. to 2:00 p.m.) to encourage employees in the hospital and City Hall areas to spend time downtown during their lunch break. On-demand service (discussed in following section) is recommended for off-peak hours.

During the weekend, fixed-route service should initially run between 11:00 a.m. and 6:00 p.m. and should be adjusted or converted to on-demand service based on the ridership demand.





### **2.1.2.1 Service Frequency and Travel Time**

The shuttle routes were designed not to exceed a cycle time of 30 minutes, allowing each vehicle to be able to make two runs an hour. To maintain 15-minute frequencies, it is recommended that two shuttle vehicles are in service during peak periods. The run time for routes 1 and 2 were calculated for three average operating speeds (5, 7, and 10 miles per hour) to estimate the time it would take the shuttle to complete its route in free-flow and congested conditions. The operating speeds account for both travel and dwell time. The route's cycle time is the sum of the total run time from route start to finish plus the necessary layover and recovery time at the terminus. It is recommended that layover and recovery time should be no less than 10% of the total running time. However, given the short length of this route, it is recommended that drivers are given at least 5 minutes of layover and recovery time between runs.

### **2.1.2.2 Layover and Storage**

The City of New Rochelle has designated the Maple Avenue Lot, located between Main Street and Shea Place, as a potential bus layover and storage location when buses are not in operation. The lot will serve as the central location for bus battery charging if an electric vehicle is utilized, which will take place overnight and periodically during the day as needed. Additional charging needs will depend upon the battery range of the shuttle bus vehicle that is procured. If the vehicle battery has a range of 75–100 miles, shuttle vehicles will be able to operate all three of the aforementioned peak hours on one charge and not need to charge between runs. If the battery has a shorter range, the city should install an additional charging station at the route termini to allow for rapid charging during layovers.

### **2.1.2.3 User Experience**

The user experience on the fixed-route service is an enhancement to riding traditional bus services. The MobileNR app provides a comprehensive set of transportation options coupled with real-time information to allow the rider to make an informed decision about how to get from point A to B.

The following describes the steps taken by the rider to initiate and complete a trip:

- 1.** Rider opens MobileNR app or website to inquire on best mode to get from origin to destination.
  - a.** If location services are activated, app will be able to display arrival times for nearest MobileNR and Westchester Bee-Line bus stops. Otherwise, the rider will need to find the information on the map provided.
  - b.** If trip planner is available, the rider can select destination and trip planner will suggest best routes, whether by transit, bike, walking, or taxi and their respective costs. Route suggestions will be based on data availability.

2. If the rider decides to take MobileNR or Westchester Bee-Line, the app or website will direct them to the nearest bus stop. The rider will be able to view up-to-the-minute arrival times using a mobile device or inquiring at nearby Wi-Fi kiosks.
3. When shuttle vehicle is in view, the rider hails the vehicle to board.
4. When approaching destination, the rider requests a stop, the driver pulls into stop, and the rider leaves vehicle.

#### **2.1.2.4 Route 1: North Loop**

Route 1, the North Loop, is designed to improve connectivity between downtown, Rochelle Park, and the hospital district. The general alignment includes a small downtown coverage area, stops at the New Rochelle Transit Center and Montefiore Hospital, and the North Avenue commercial district. The route is walking distance to important trip generators including community facilities, high-density housing complexes, and major employers.

Route 1 is presented in two options, alternatives A and B, which are based on the location of the route terminus at the Transit Center. The preferred alignment, alternative A, terminates at the pick-up/drop-off loop at Station Plaza North. The alternate alignment, alternative B, terminates at Station Plaza South. Both alternatives A and B introduce four new stops, plus Station Plaza North, to existing Bee-Line stops for shuttle service purposes.

The route also considers the following future changes to traffic patterns:

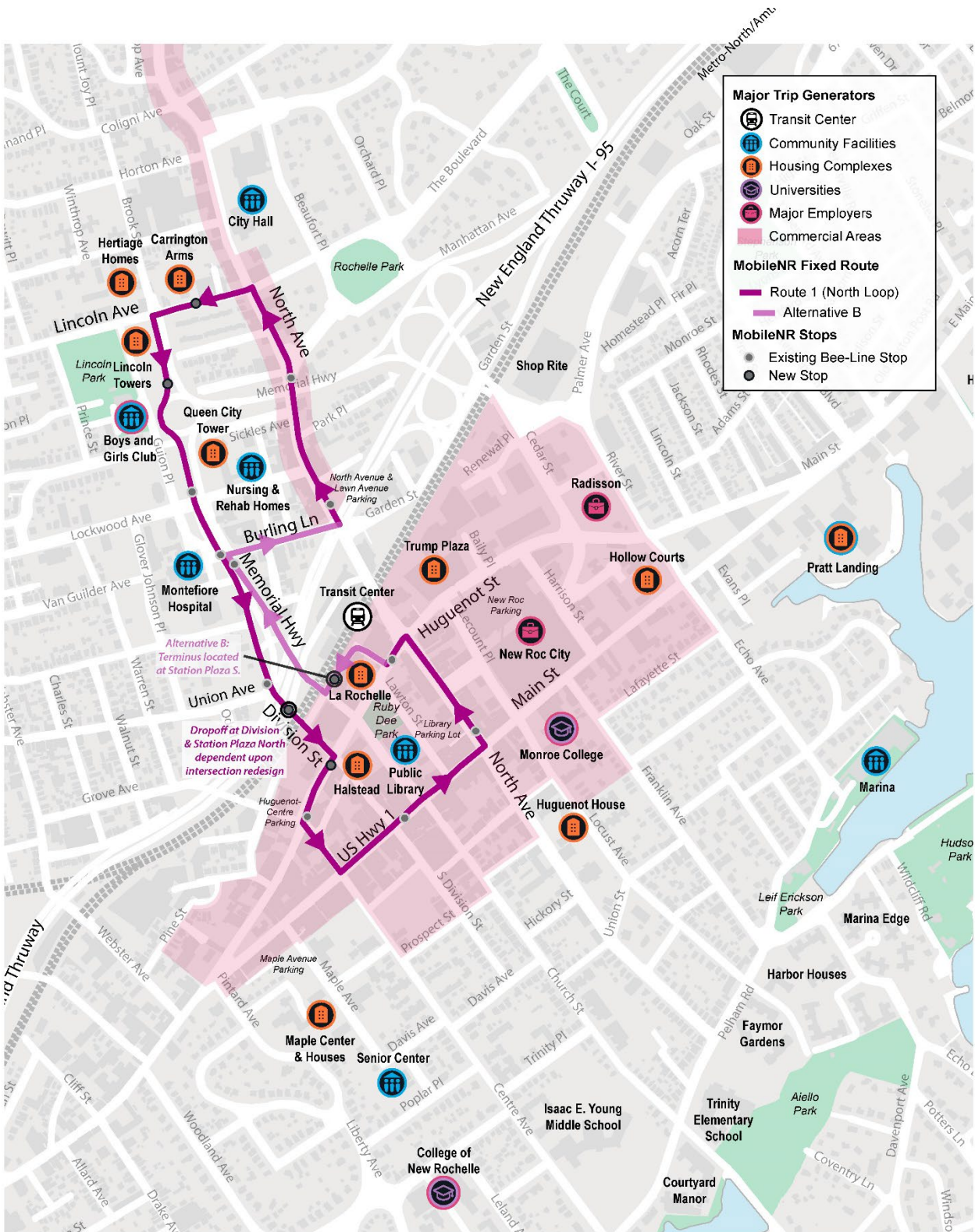
- **Replacement of North Avenue Bridge.** The North Avenue Bridge over the New England Thruway is slated to be replaced within the next few years. Alternative B was designed to by-pass North Avenue by re-locating the terminus from Station Plaza North loop to the current passenger pick-up and drop-off area along Station Plaza South.
- **Additional Pedestrian Connection to Metro-North platforms via Division Street and Station Plaza North.** This intersection is recommended as a drop-off point for riders accessing the train station. It is anticipated that the intersection will be redesigned with crosswalks that connect to a new pedestrian ramp joining the southbound platform.
- **Potential Suspension of Bus Services** along Main Street as part of the two-way conversion in 2020–2021. It is recommended that MobileNR be the only transit service allowed to stop on Main Street.

Figures 2 and 3 show the route alignments for alternatives A and B and their proposed stops.





Figure 3. MobileNR Fixed Route 1—Alternative B with Trip Generators



Tables 1 and 2 show the route length and cycle times for both alternatives A and B in three average operating speeds: 5, 7, and 10 miles per hour. The total length of the alignments for both alternatives is just over two miles. In optimal free-flow conditions, route 1 is expected to have a total run time of 13 minutes from route start to finish, leaving 17 minutes of layover and recovery time at the terminus. In congested conditions, the run time is expected to increase to 25 or 26 minutes, which would allow a short layover time of 4–5 minutes.

**Table 1. Route 1 Alternative A (Preferred Option) Route Cycle Time**

<b>Route 1—North Loop Alternative A</b>		<b>Route Mile</b>	<b>Distance (Miles)</b>	<b>Minutes per Average Operating Speed (mph)</b>		
<b>Type</b>	<b>Time Point</b>			<b>5</b>	<b>7</b>	<b>10</b>
Route Start	Station Plaza North	0.0				
	North Avenue and Burling Lane	0.1	0.1	1	1	1
	North Avenue and Lincoln Avenue	0.4	0.3	4	3	2
	Montefiore Hospital at Burling Lane	0.7	0.3	4	3	2
	Huguenot Street and Division Street	1.1	0.4	5	3	2
	Main Street and North Avenue	1.5	0.4	5	3	2
Route End	Station Plaza North	2.2	0.7	8	6	4
Total Running Time				26	19	13
Layover/Recovery Time available (goal 30-minute cycle time)				4	11	17
Cycle Time				30	30	30

**Table 2. Route 1 Alternative B Route Cycle Time**

<b>Route 1—North Loop Alternative B</b>		<b>Route Mile</b>	<b>Distance (Miles)</b>	<b>Minutes per Average Operating Speed (mph)</b>		
<b>Type</b>	<b>Time Point</b>			<b>5</b>	<b>7</b>	<b>10</b>
Route Start	Station Plaza South	0.0				
	Memorial Highway and Burling Lane	0.2	0.2	2	2	1
	North Avenue and Lincoln Avenue	0.7	0.5	6	4	3
	Montefiore Hospital at Burling Lane	1.1	0.4	5	3	2
	Huguenot Street and Division Street	1.5	0.4	5	3	2
	Main Street and North Avenue	1.8	0.3	4	3	2
Route End	Station Plaza South	2.1	0.3	4	3	2
Total Running Time				25	18	13
Layover/Recovery Time available (goal 30-minute cycle time)				5	12	17
Cycle Time				30	30	30

Tables 3 and 4 show a list of proposed stop locations for Alternatives A and B, including connecting services and nearby destinations.

**Table 3. MobileNR Route 1A—Proposed Shuttle Stops**

<b>Route 1 - North Loop Alternative A (Preferred)</b>				
Type	Stop	Location	Connecting Services	Destinations
Terminal	Station Plaza North	Pick-Up/Drop Off Loop	Metro North	New Rochelle Transit Center
Bee-Line Stop	North Avenue & Garden Street	NE Corner	Bee-Line Routes 45, 61	North Avenue and Lawn Avenue Lots
Bee-Line Stop	North Avenue & The Boulevard	SE Corner	Bee-Line Routes 45, 61	
New Stop	Lincoln Avenue (between North Avenue and Memorial Highway)	Midblock		Carrington Arms & Heritage Homes
New Stop	Memorial Highway & North Avenue (or Circle)	SW Corner (or Midblock)		Lincoln Towers, Lincoln Park, Boys and Girls Club
Bee-Line Stop	Memorial Highway & Lockwood Avenue	NW Corner	Bee-Line Routes 7, 42	Soundview Apartments
Bee-Line Stop	Montefiore Hospital at Burling Lane	NW Corner	Bee-Line Routes 7, 42	Montefiore Hospital
Bee-Line Stop	Division Street & Union Avenue	NW Corner	Bee-Line Routes 7, 42	
New Stop	Division Street & Station Plaza North	West Side, TBD	Metro North	New Rochelle Station Platforms
New Stop	Huguenot Street & Division Street	NW Corner	MobileNR Route 2	
Bee-Line Stop	Huguenot Street & Centre Avenue	NE Corner	MobileNR Route 2, Bee-Line Routes 7, 30, 42, 45, 60, 61, 62	Centre/Huguenot Lots
Bee-Line Stop	Main Street & S. Division Street	SE Corner	MobileNR Route 2, Bee-Line Routes 7, 30, 42, 45, 60, 61, 62	Prospect Street Lot
Bee-Line Stop	North Avenue & Main Street	NW Corner	Bee-Line Routes 7, 30, 42, 45, 61, 62 Bus	Library Parking Lot
Bee-Line Stop	Huguenot Street & Bridge Street	NW Corner	MobileNR Route Bee-Line Routes 2, 7, 30, 42, 45, 60, 61, 62	New Rochelle Library
Terminal	Station Plaza North	Pick-Up/Drop Off Loop	Metro North	New Rochelle Transit Center

**Table 4. MobileNR Route 1B—Proposed Shuttle Stops**

<b>Route 1 - North Loop Alternative B</b>				
Type	Stop	Location	Connecting Services	Destinations
Terminal	Station Plaza South	Midblock	Metro North	New Rochelle Station Platforms
Bee-Line Stop	Memorial Highway & Burling Lane	SE Corner	Bee-Line Routes 7, 42	
Bee-Line Stop	North Avenue & Garden Street	NE Corner	Bee-Line Routes 45, 61	North Avenue and Lawn Avenue Lots
Bee-Line Stop	North Avenue & The Boulevard	SE Corner	Bee-Line Routes 45, 61	
New Stop	Lincoln Avenue (between North Avenue and Memorial Highway)	Midblock		Carrington Arms & Heritage Homes
New Stop	Memorial Highway & North Avenue (or Circle)	SW Corner (or Midblock)		Lincoln Towers, Lincoln Park, Boys and Girls Club
Bee-Line Stop	Memorial Highway & Lockwood Avenue	NW Corner	Bee-Line Routes 7, 42	Soundview Apartments
Bee-Line Stop	Montefiore Hospital at Burling Lane	NW Corner	Bee-Line Routes 7, 42	Montefiore Hospital
Bee-Line Stop	Division Street & Union Avenue	NW Corner	Bee-Line Routes 7, 42	
New Stop	Division Street & Station Plaza North	West Side, TBD	Metro North	New Rochelle Station Platforms
New Stop	Huguenot Street & Division Street	NW Corner	MobileNR Route 2	
Bee-Line Stop	Huguenot Street & Centre Avenue	NE Corner	MobileNR Route 2, Bee-Line Routes 7, 30, 42, 45, 60, 61, 62	Centre/Huguenot Lots
Bee-Line Stop	Main Street & S. Division Street	SE Corner	MobileNR Route 2, Bee-Line Routes 7, 30, 42, 45, 60, 61, 62	Prospect Street Lot
Bee-Line Stop	North Avenue & Main Street	NW Corner	Bee-Line Routes 7, 30, 42, 45, 61, 62 Bus	Library Parking Lot
Bee-Line Stop	Huguenot Street & Bridge Street	NW Corner	MobileNR Route 2, Bee-Line Routes 7, 30, 42, 45, 60, 61, 62	New Rochelle Library
Terminal	Station Plaza South	Midblock	Metro North	New Rochelle Station Platforms

### **2.1.2.5 Route 2: Downtown Loop**

Route 2, the Downtown Loop, is designed to improve connectivity between destinations in the downtown. The shuttle would run along Huguenot and Main Streets, providing service to the city's hotels, high-density housing developments, and commercial areas between the east and west triangles. Route 2 would also provide service to several municipal parking lots and structures to encourage park-and-walk behavior. The route would terminate at Pratt Landing, a new large-scale, mixed-use development planned along the waterfront. Route 2 introduces three new stops, plus Pratt Landing, to existing Bee-Line stops for shuttle service purposes.

The study also considers the following future changes to traffic patterns:

- **Anticipated Redesign of the Intersection of the East Triangle (at Pintard Ave)** as part of the two-way conversion in 2020–2021. The exact route alignment will be determined based on the final redesigns and are currently shown in dashed lines.
- **Potential Suspension of Bus Services along Main Street** as part of the two-way conversion in 2020–2021. It is recommended that MobileNR be the only transit service allowed to stop on Main Street.

Figure 4 shows the route alignment for route B and its proposed stops.







Table 5 shows the route length and cycle times for Route 2 at three average operating speeds: 5, 7, and 10 miles per hour. The total length of the alignment is two and a half miles. In optimal free-flow conditions, Route 2 is expected to have a total run time of 15 minutes from route start to finish, leaving 15 minutes of layover and recovery time at the terminus. In congested conditions, the run time is expected to increase to 30 minutes and provide no layover and recovery time. The cycle time assumptions assume the shuttle will not be able to turn at the intersection of Pintard Avenue and Main Street and will instead need to use Pine and Webster Avenue to turn onto Main Street. If the route runs at an average operating speed of less than 7 miles per hour, the alignment will need to be adjusted to meet the 15-minute headway goals.

**Table 5. Route 2 Route Cycle Time**

<b>Route 2—Downtown Loop</b>		<b>Route Mile</b>	<b>Distance (Miles)</b>	<b>Minutes per Average Operating Speed (mph)</b>		
<b>Type</b>	<b>Time Point</b>			<b>5</b>	<b>7</b>	<b>10</b>
Route Start	Pratt Landing	0.0				
	Huguenot Street and North Avenue	0.7	0.7	8	6	4
	Webster Avenue and Main Street	1.3	0.6	7	5	4
	Main Street and Main North Avenue	1.8	0.5	6	4	3
Route End	Pratt Landing	2.5	0.7	8	6	4
Total Running Time				30	21	15
Layover/Recovery Time available (goal 30-minute cycle time)				0	9	15
Cycle Time				30	30	30

Table 6 shows the proposed stop locations for Route 2, including connecting services and nearby destinations.

**Table 6. MobileNR Route 2—Proposed Shuttle Stops**

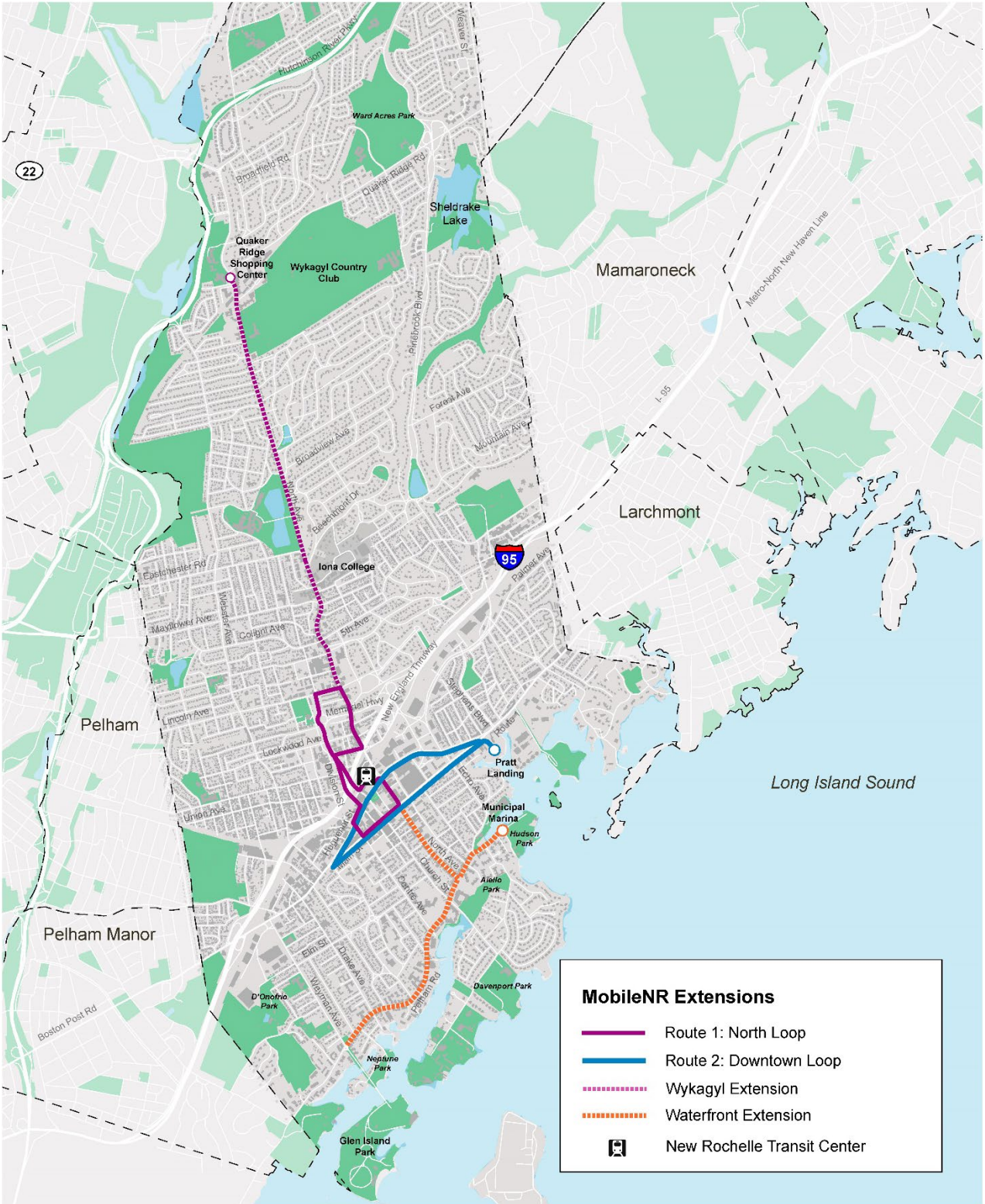
Route 2 - Downtown Loop				
Type	Stop	Location	Connecting Services	Destinations
Terminal	Pratt Landing	TBD		Pratt Landing
Bee-Line Stop	Huguenot Street & Rhodes Street	NW Corner	Bee-Line Routes 45, 60	
Bee-Line Stop	Huguenot Street & River Street	NW Corner	Bee-Line Routes 45, 60	Radisson Hotel
Bee-Line Stop	Huguenot Street & Harrison Street	NW Corner	Bee-Line Routes 60, 66	
New Stop	Huguenot Street & Lecount Place (Trump Plaza)	North Side		New Roc Garage
Bee-Line Stop	Huguenot Street & Bridge Street	NW Corner	MobileNR Route 1, Bee-Line Routes 7, 30, 42, 45, 60, 61, 62	New Rochelle Library
New Stop	Huguenot Street & Division Street	NW Corner	MobileNR Route 1	
Bee-Line Stop	Huguenot Street & Centre Avenue	NE Corner	MobileNR Route 1, Bee-Line Routes 7, 30, 42, 45, 60, 61, 62	Centre/Huguenot Lots
New Stop	Webster Avenue & Boston Post Road	NW Corner		
Bee-Line Stop	Main Street & Maple Avenue	SE Corner	Bee-Line Routes 7, 30, 42, 45, 60, 61, 62	Maple Avenue Lot
Bee-Line Stop	Main Street & Division Street	SE Corner	MobileNR Route 1, Bee-Line Routes 7, 30, 42, 45, 60, 61, 62 Bus	Prospect Street Lot
Bee-Line Stop	Main Street & North Avenue	SE Corner	Bee-Line Routes 45, 60, 66	
Bee-Line Stop	Main Street & Franklin Avenue	SE Corner	Bee-Line Routes 60, 66	Monroe College
Bee-Line Stop	Main Street & Echo Avenue	SE Corner	Bee-Line Routes 45, 60	Hollow Courts
Terminal	Pratt Landing	TBD		Pratt Landing

### 2.1.2.6 Potential Route Expansions

Figure 5 suggests two potential additional routes for MobileNR should a service extension be considered.

- The Wykagyl Extension would provide service to residents in the North End, who would likely use the shuttle to commute to and from the transit center. This extension would provide service to the current location of City Hall and Iona College. Wykagyl is also the site of several shopping centers and medical offices.
- The Waterfront Extension would provide service to the Municipal Marina and Hudson Park as well as service along Pelham Road, which is lined with high density residential buildings. This route would serve the dual purpose of connecting downtown with waterfront parks and encouraging the residents of Pelham Road to use alternative modes of transportation.

**Figure 5. MobileNR Fixed-Route Extensions**



## **2.2 On-Demand Service**

MobileNR on-demand service is designed to provide direct shared-rides between two points without having to book far in advance. Riders will have the ability to hail rides within a designated service area. It is recommended that the on-demand service operate outside of the commuter rush when ridership is projected to be lower and travel patterns are typically more dispersed. MobileNR on-demand services would use the same vehicle fleet as the fixed-route service.

### **2.2.1 Service Area**

The service would operate in a pre-defined geo-fenced area from which it can accept pick-ups and make drop-offs. Initially, the service area should not exceed a half-mile drive shed from the fixed-route shuttle stops. Figure 6 shows the proposed on-demand service area based on this recommended distance, adjusted to keep the shuttle operating on an efficient route. It is also recommended that this area is scanned to identify areas unsuitable for pick-ups and drop-offs—such as curbs that have designated zones with “No Standing” or “No Stopping” signs—and have these locations removed from the service area.

### **2.2.2 Service Hours**

On-demand service should run during off-peak hours when fixed-route services provided by routes 1 and 2 are not running. Off-peak periods generally occur during late-morning, mid-afternoon, and night on weekdays and early morning and night on weekends.

### **2.2.3 Service Frequency and Travel Time**

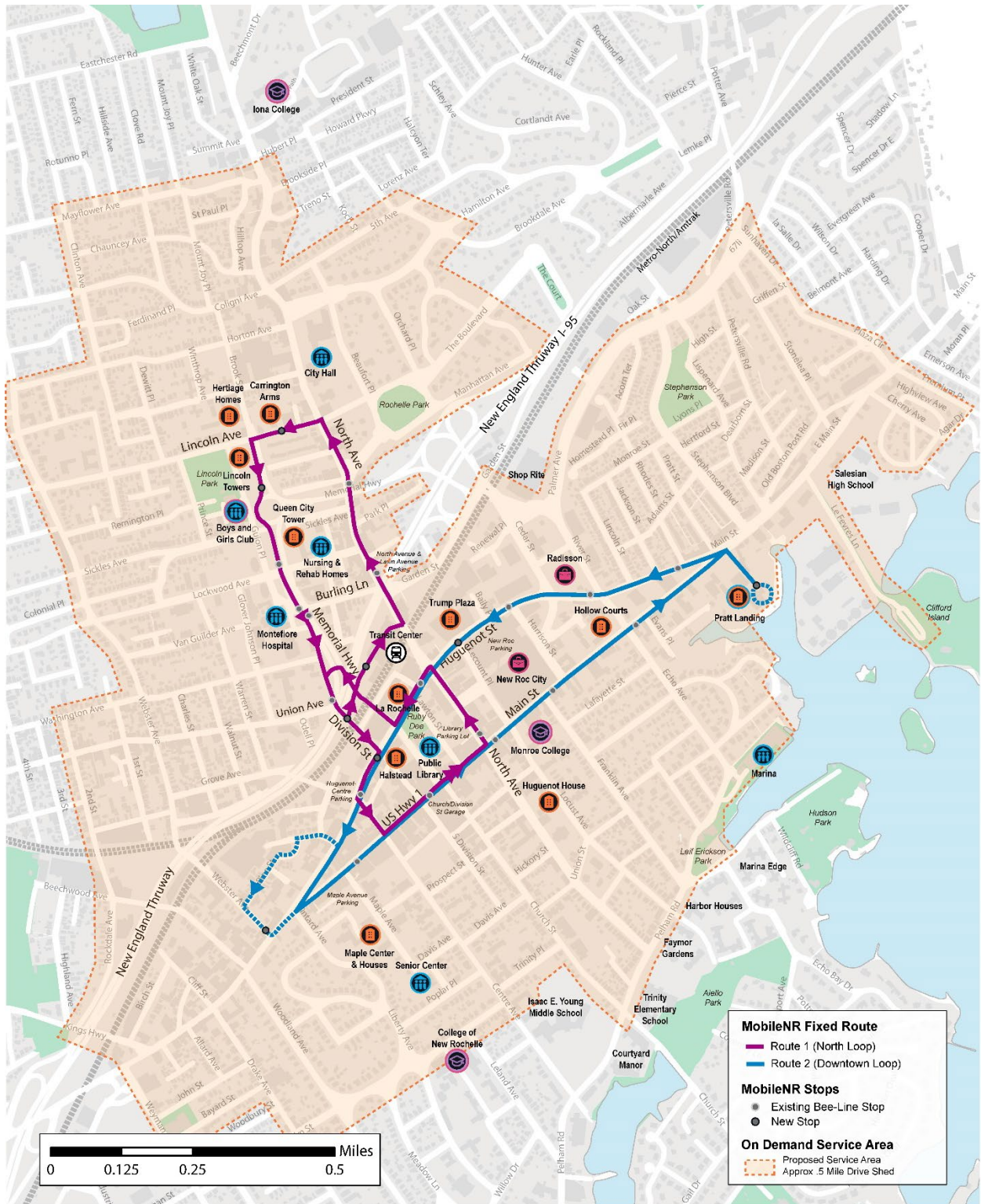
The on-demand service’s frequency is dependent upon the number of vehicles serving the area and the number of riders. It is recommended the service begin with at least two vehicles and adjusted according to ridership demand. It is critical that a balance is struck between supply and demand to minimized wait times and ensure the service is a reliable alternative to driving or taking a taxi. The MobileNR platform should be calibrated to set a maximum ride time for passengers to ensure they are getting to their destination efficiently.

### **2.2.4 Layover and Storage**

The shuttle vehicles should use the Maple Avenue Lot as an initial base station until ridership patterns dictate a more optimal layover location. In the case that trips originate or end at the terminus of either Route 1 or Route 2, the shuttle vehicle may be better suited to layover at their respective bus stop.



**Figure 6. MobileNR On-Demand Service Area**



## **2.2.5 User Experience**

The MobileNR app and website are an integral component of the on-demand service experience because the rider must request the service to use it. The request, whether received by the app or through a dispatcher, will be assigned to a vehicle through the dispatcher interface. The app's real-time route maps and arrival notifications are key to ensuring a successful pick-up and comfortable ride.

The following describes the steps taken by the rider and driver to initiate and complete a trip:

1. Rider requests MobileNR from mobile app, website, or contact dispatcher. Rider indicates number of seats, and any special needs (such as handicapped services).
2. Service replies with approximate pick-up time and arrival time. If possible, the app will suggest most efficient pick-up and drop-off point within a short walk to reduce trip time.
3. Rider accepts offer (if wait and arrival times are acceptable) and makes way to pick-up point.
4. Driver is alerted and pick-up and drop-off is automatically added in calculated route. Trip route map is updated for all involved: driver, riders on board waiting for drop-off, and riders waiting for pick-up.
5. Rider receives a confirmation message and additional notifications when vehicle is approaching pick-up location.
6. Rider boards vehicle and driver marks pick-up as complete.
7. Driver follows calculated route, making pick-ups and drop-offs as instructed. Dispatch system will prevent additional trips from being added to trip routes that have exceeded a travel time threshold of, say, 15 minutes.
8. Rider exits vehicle at designated drop-off point. Driver marks drop-off as complete and proceeds.

## **2.2.6 Integrated Mobility**

MobileNR service should be designed to integrate with four categories of existing service: Train Service, bus services, taxi and paratransit services, and community shuttles. The service should also support the incoming bike share program and use the full potential of incoming Wi-Fi kiosks and Transit Screens. The following recommendations suggest strategies in how MobileNR can work with existing and future services.

### **2.2.6.1 Train Service**

New Rochelle is the fifth busiest station in the Metro North system, averaging 5,301 boarding riders per weekday in 2015. This represents the largest potential that MobileNR can serve by providing first and last mile connections to the transit center. MobileNR is designed to integrate existing train service by including the following:

- A shuttle stop on Station Plaza South, which will serve as the downtown terminus.
- The proposed MobileNR drop-off point on Division Street and Station Plaza North, further giving commuters the option to skip downtown area stops prior to the Station Plaza South stop. This is dependent upon the future traffic circulation plans, which propose reconfiguration of Station Plaza North. If intersection of Division Street and Station Plaza North is redesigned to include pedestrian crossings, this drop-off point is recommended.
- Design fixed-route schedule, recommended to run during commuter rush hour, to consider the current MetroNorth schedule. In 2015, the majority of MetroNorth commuters (85%) travel between New York City and New Rochelle. The schedule, however, should not be designed to wait for late trains, as this may cause the bunching of vehicles.
- The MobileNR app should provide information on MetroNorth services, such as real-time information on train arrivals and links to printed schedules.

### **2.2.6.2 Bus Services**

Westchester Bee-Line serves as the local transit provider in New Rochelle. All the bus routes that service New Rochelle stop within the MobileNR service area and most stop at the transit center (with the exception of Route 60 and 63). The bulk of service may be targeted to downtown, but they are designed to provide regional connections. MobileNR integrates existing bus service in the following ways:

- The fixed-route service is designed to complement Westchester Bee-Line service by providing additional service along sections of routes 7, 42, and 45 to bring people to and from downtown.
- MobileNR will pick-up and drop-off from existing Westchester Bee-Line bus stops (pending agreement).
- The MobileNR app should provide real-time information on Westchester Bee-Line services, especially those that run concurrent with the fixed-route service, such as Routes 45 on North Avenue and Routes 7 and 42 to the hospital. The app should encourage riders to take Westchester Bee-Line if their buses are estimated to arrive first or provide a more direct route the destination.

### **2.2.6.3 Taxi and RideShare Services**

New Rochelle licenses taxi companies that can be requested by phone or through a dispatcher at the transit center. TNC (transportation network companies) services such as Uber and Lyft have increased their presence in the city since the services were legalized in summer 2017. MobileNR should consider integrating these services into the mobile app, in the following ways:

- The MobileNR app should provide information on local taxi and rideshare services.
- The MobileNR app should refer users to use other services when MobileNR or other transportation options are not preferable.

#### **2.2.6.4 Paratransit Services**

Westchester County provides paratransit services within New Rochelle through the Bee-Line Taxi program, which directs riders to use a taxi instead of a Bee-Line ParaTransit vans. This service is eligible for origins and destinations within three-quarters of a mile of a Westchester Bee-Line bus stop. MobileNR vehicles will provide a similar service through its on-demand services but within a smaller service area and service window. The upside is that paratransit users will not have to go through a lengthy registration process to use MobileNR. The MobileNR app should provide information on the county's paratransit services in addition to community shuttle services geared towards senior citizens and people with limited mobility.

#### **2.2.6.5 Campus Shuttles**

New Rochelle is home to several colleges that offer various shuttle services between downtown and their respective campuses. The city should engage with these institutions to discuss the opportunity for collaboration to avoid the creation of redundant fixed-route service.

#### **2.2.6.6 New Rochelle Bike Share**

In 2018, the city launched Westchester's first bike-share program. While operations with the original vendor have come to an end, the program had 11 stations with bicycle docks placed in the downtown area, the transit center, select locations along North Avenue, Montefiore Hospital, and Leif Erickson Park.

Future New Rochelle Bike Share should be integrated with MobileNR service because it could provide a first and last mile connection to shuttle stops. The bike-share system can work to publish real-time data via a live General Bikeshare Feed Specification (GBFS) feed, which will allow developers to integrate station location and status into web-based applications. The MobileNR app should include information from this GBFS feed in its maps and potential trip planning functions.

Note that a new bike-share vendor has recently been selected and an agreement is currently being finalized that will aim to have bike-share bicycles back on the road as soon as possible.



### **2.2.6.7 Wi-Fi Kiosks**

In 2018, the city began installing Wi-Fi kiosks on sidewalks and in plazas. These kiosks will serve as high-speed internet hotspots, charging stations, and community information portals. The LQD “Palo” kiosks feature large interactive screens that can display area maps, wayfinding, and community announcements. The kiosks also allow users to contact emergency services.

The kiosks have the potential of being an important component to MobileNR service. All efforts should be made to integrate service information, such as arrival times and vehicle position, into the display and allow users to hail the on-demand service from the kiosk. Should MobileNR become a paid service, the kiosk is equipped with NFC and RFID readers that can accept mobile payments.

The initial launch will consist of 25 stations distributed around the Downtown Loop, hospital district, and along North Avenue. At the conclusion of the project’s first phase, over 100 kiosks will be installed.

### **2.2.6.8 Mobility Hubs**

MobileNR’s most important integration is with the built environment. The city has gone through great strides to continue to support multimodal transportation through its downtown re-zonings and the selection of a master developer to execute placemaking techniques that are critical in encouraging more active and sustainable use of the public realm. An important supplement to this will be the integration of transportation facilities, services, and technologies into streetscape design to support these initiatives and gain competitive advantage over automobiles. It is recommended that the city create a three-tier mobility hub system to create a robust network of alternative transportation services that provide users with options.

The objectives of a mobility hub are as follows:

- Seamless integration of modes that allows for convenient transfers between services. This includes strategic placement of facilities and branding that encourages users to consider multiple modes.

Prioritization of pedestrians through the expansion and maintenance of sidewalks, paths, and plazas as well as a commitment to providing safe and convenient crossings. Walking is the start and the end of most multimodal trips.

Figure 7 shows the location proposed for mobility hubs, considering the location of incoming bike-share and Wi-Fi kiosks. The following describes the proposed three-tiered system:

**Primary Hubs.** The city’s primary transportation hub is the New Rochelle Transit Center, a linchpin for regional and local services. The transit center provides a central point of access to MetroNorth, Amtrak, and Westchester Bee-Line transit services and also serves as a meeting point for taxis, limousine services, and airport shuttles. In addition to transit services, the transit center features a 2,300-vehicle parking garage. The transit center will serve as an important destination along MobileNR route and could serve as the downtown terminus and charging location.

**Secondary Hubs** are situated around major employment centers within New Rochelle. These satellite hubs provide access to bus services, New Rochelle Bike Share, and Wi-Fi kiosks. Transportation services offered from these hubs gravitate towards the primary hub and other secondary hubs. Secondary hubs are located along the MobileNR fixed-route service route and are located within the MobileNR on-demand service area. The following locations should be established as secondary hubs:

- Montefiore Hospital
- Main Street and Pratt Street (East Triangle)
- Pintard Avenue and Main Street (West Triangle)
- City Hall (Wykagyl Extension)
- Iona College (Wykagyl Extension)

**Tertiary Hubs** are the smallest of the transportation hubs and provide support to primary and secondary hubs. They are located within a quarter mile (short walk) from a hub that offers more services. Tertiary hubs provide access to fixed-route bus services and Wi-fi kiosks. Tertiary hubs are located at Wi-fi kiosks within the MobileNR on-demand service area. The following are examples of locations that fit this profile:

- Main Street and Division Street
- Burling Lane and North Avenue
- Huguenot Street and Harrison Street (New Roc City)
- Main Street and Franklin (Monroe College)



## 3 Mobile App Components

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### 3.1 Goals

This section outlines the goals of the MobileNR mobile app, summarizes findings from inquiries with four mobility platform developers, and provides recommendations for the MobileNR platform.

The overall goals of the MobileNR app are as follows:

- The MobileNR app should provide users with real-time vehicle position and expected arrival times of MobileNR and nearby Westchester Bee-Line routes, so users can make an informed choice. Users should have the option to view information in map or list form.
- The MobileNR platform should have the ability to dispatch on-demand rideshare services.
- The MobileNR platform should embody the principles of user-centric design. Any app, whether for riders or administrators, should be useful, usable, attractive, findable, accessible, and creditable (adapted from the principles of UX design).
- The MobileNR app should be designed to serve as a gateway to transportation in New Rochelle. The app should achieve the integrated mobility goals stated in the previous section.
- Support mobile payment should the city choose to charge fares.
- The MobileNR platform should publish service information to allow MobileNR services to be integrated with other apps that users commonly consult for trip routing, such as Google Maps and Transit.
- The MobileNR platform should be designed to easily extract metrics on service performance and sustainability goals.

### 3.2 Mobility Platform Developers

The MobileNR project team scheduled conversations with four transportation technology companies that specialize in the development of mobile apps that primarily serve transit and rideshare operations. The four companies that were interviewed are considered to be industry leaders in the development of transportation apps and provide a suite of products that can be customized to a client's specific service needs. The following provides a brief summary of each company:

- DoubleMap
- DoubleMap offers a comprehensive approach to improving transit operations, for both the customer and administrators. Features include real-time vehicle location tracking, passenger counting, and dispatching tools. DoubleMap has developed its products to work with third party devices, such as on-board cameras, fareboxes, signage, and automated voice announcement systems. TapRide, is DoubleMap's on-demand dispatching platform, which integrates DoubleMap features.
- RideCell

- RideCell’s primary focus is developing applications for ridesharing and carsharing services. The company’s on-demand ridesharing app has a user interface similar to that of Uber and Lyft. RideCell is currently developing technology to operate low-speed autonomous vehicles on college campuses, office parks, and other private environments.
- Transloc
- Transloc has developed platforms for on-demand service dispatching, real-time vehicle tracking, and passenger data collection and customer surveys. The company’s transit app is able to integrate these various platforms for a simplified user experience.
- Trip Shot
- Similar to Transloc, Tripshot has developed a comprehensive transportation management system for fixed-route and on-demand services that was built to easily accommodate integrations. Tripshot’s driver and administrative apps allow operators to track vehicle and service performance in real time by integrating data from devices like passenger counters and electric vehicle batteries.

This list is not meant to be exhaustive and new companies are expected to join the forefront of the industry at any time.

### **3.3 Mobile App Products**

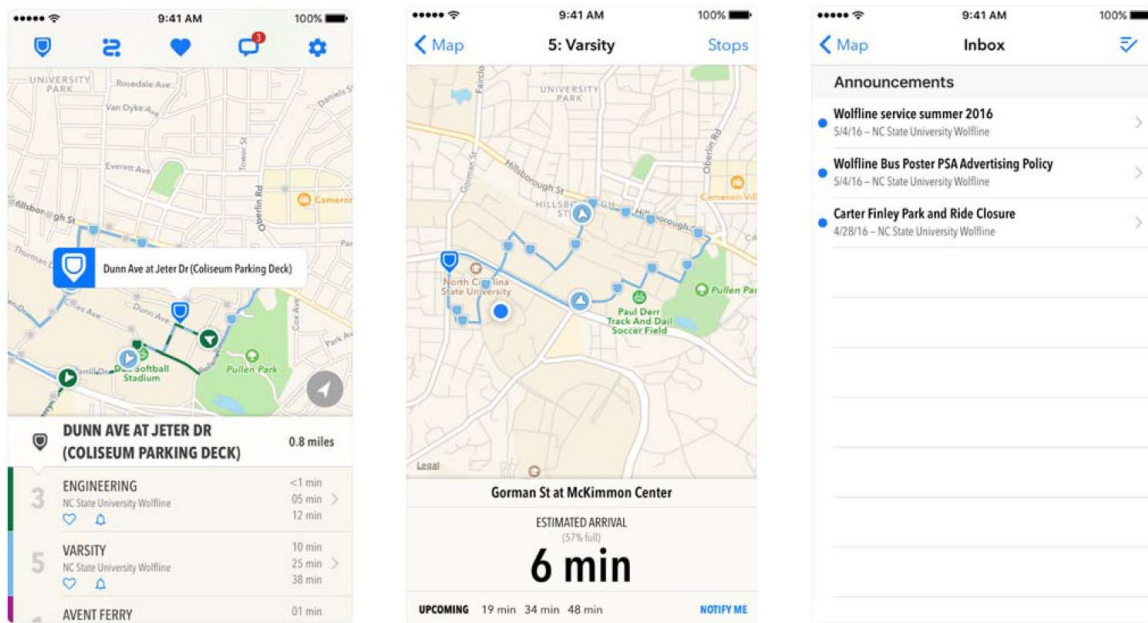
The following pages provide examples of various mobility app products that are offered from the four application platforms that were interviewed. These examples offer a glimpse of the types of services that are currently being used by smaller transit agencies and campus environments to improve transit service usability and reliability.

#### **3.3.1 Real-Time Vehicle Positioning**

Information about North Carolina State’s Wolfline Bus can be viewed through an app that was developed by Transloc. The interface shows users the vehicle location, estimated arrival times, passenger load information, and system announcements.

**Figure 8. Example On-Demand Mobile App Interface: Real-Time Vehicle Positioning**

Source: Transloc Rider App



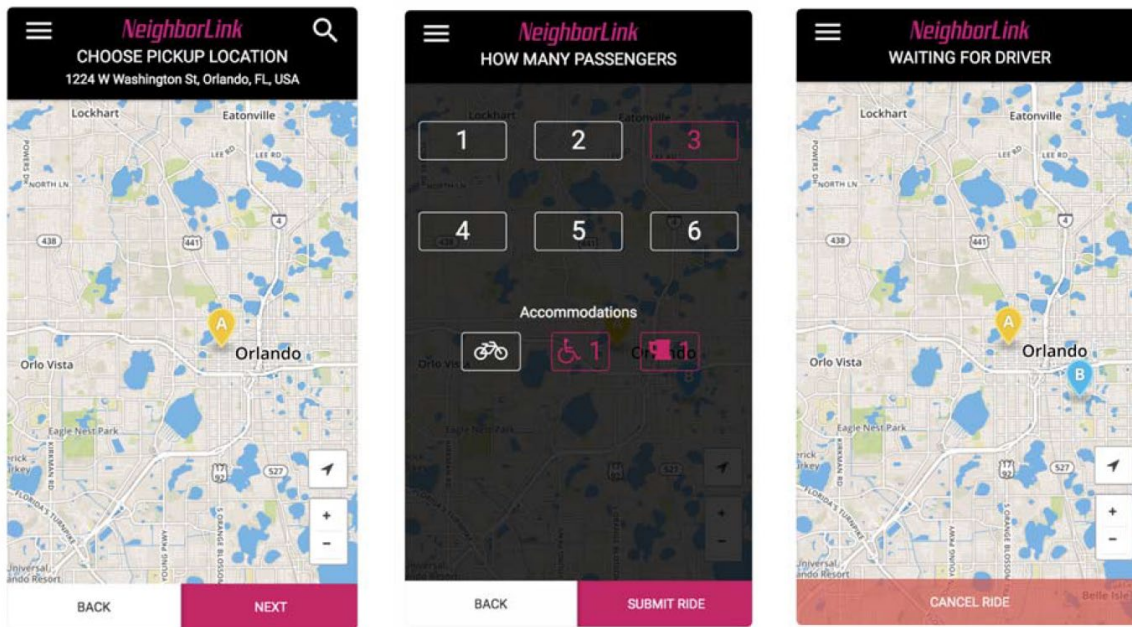
### 3.3.2 On-Demand Services

Lynx Transit in Orlando, Florida, operates an on-demand shuttle called Neighborhood Link. The app, developed by DoubleMap's TapRide, allows users to specify number of passengers and special accommodations before requesting the ride.



**Figure 9. Example On-Demand Mobile App Interface: Trip Accommodation Request**

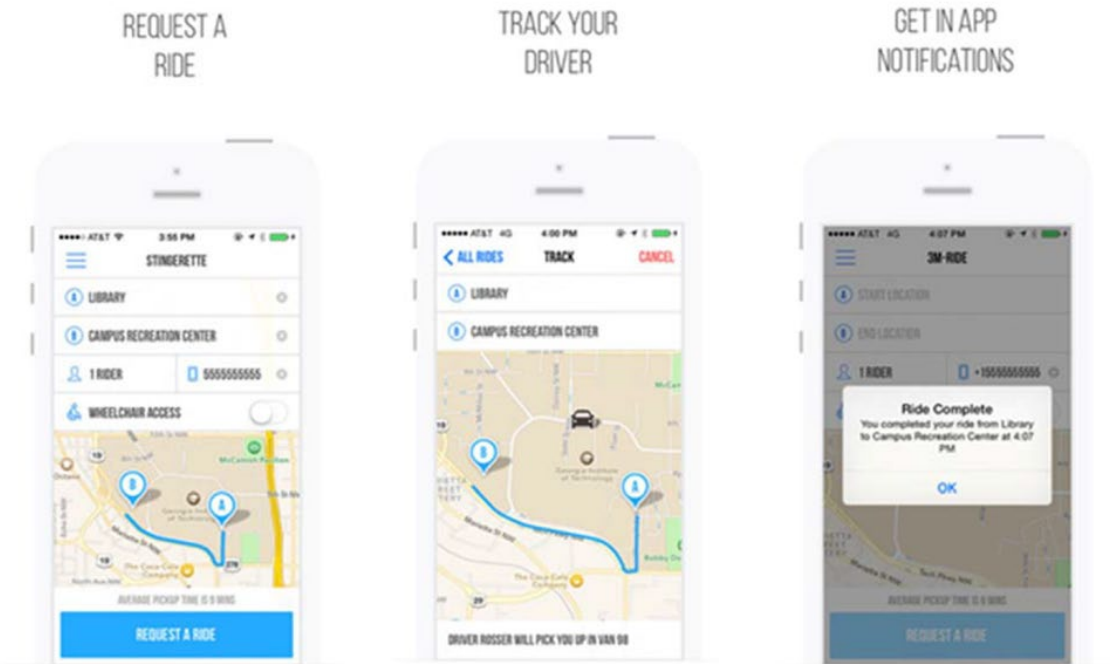
Source: DoubleMap's TapRide App (Apple App Store)



RideCell's on-demand rideshare app has an interface similar to apps offered by TNC services like Uber and Lyft.

**Figure 10. Example On-Demand Mobile App Interface: Ride Request and Tracking**

*Source: RideCell (Apple App Store)*



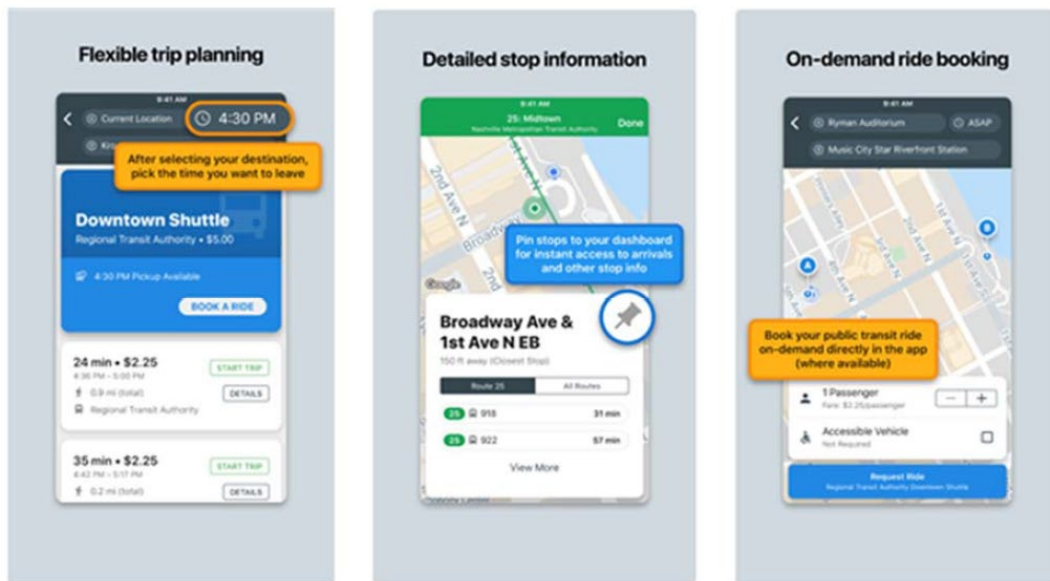
### 3.3.3 Transit Dashboards

Transloc's MicroTransit app shows the user service information from several providers and uses this data to recommend the best route. The app also allows users to book on-demand rides.



**Figure 11. Example Transit Dashboard: Integrated Mobility Information Sharing**

Source: Transloc's Microtransit App (Apple App Store)

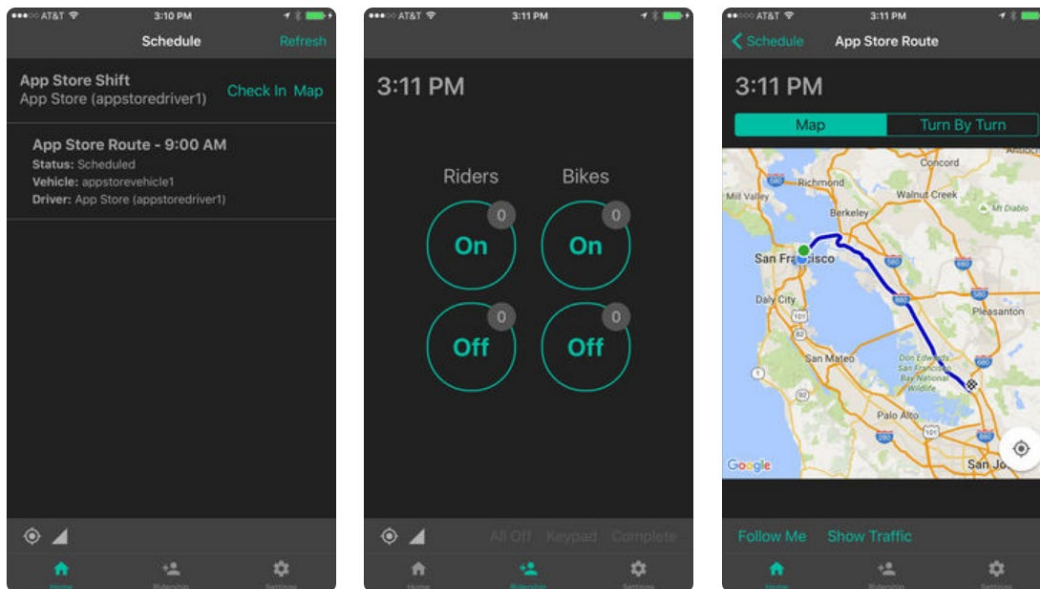


### 3.3.4 Driver-Facing Apps

All four platform developers provide non-public facing applications for drivers and dispatchers. Tripshot's driver facing-app provides drivers with route instructions and passenger count inputs. Vehicle location and passenger load is shown in the public-facing app.

**Figure 12. Example Mobile App Interface for Drivers**

Source: Transloc's Microtransit App (Apple App Store)



### 3.4 Mobile App Procurement

The following is a list of technical requirements that should be sought during the mobile app procurement process. These recommendations have been informed by the conversations with the four companies and additional product research.

#### 3.4.1 User Experience

- Real-Time Vehicle Positioning: The developer must design MobileNR app to integrate data from AVL equipment, or the like, installed in vehicles. The refresh rate should not exceed a few seconds.
- Notifications: The MobileNR app should have the ability to send notifications to users, such as trip announcements (“MobileNR is 5 minutes away”) or system-wide announcements (“MobileNR has been rerouted due to a roadway condition”).
- Rider Surveys: The MobileNR app should have the ability to administer rider surveys, asking them about their experience and why they decided to use the service.
- SMS Alerts: The MobileNR platform should have the ability to communicate via SMS (text message) for users without smart phones.
- Adaptive/Responsive Design: The developer should produce native and web-based versions of the MobileNR app. The web-based version should be responsive (adjust to any screen resolutions) so it can be used on all devices.
- One Public-Facing App: The developer should produce only one MobileNR app that includes both fixed-route and on-demand service features.

### **3.4.2 Integration**

- **Open Transit Data:** The developer should publish real-time shuttle information using industry data standards, such as an API using General Transit Feed Specification (GTFS), to allow for app developers to integrate MobileNR service into transit apps.
- **Import Transit Data:** MobileNR app should have the ability integrate data from other transportation service providers, such as Metro North and Westchester Bee-Line.
- **Digital Displays:** The developer should collaborate with city and Wi-Fi kiosk provider to display MobileNR service information on kiosk screen and incorporate the ability to request on-demand service from kiosks.

### **3.4.3 Design Process**

- **User-Testing:** Contract should include a phase for user testing for the public-facing, driver, and administrator application. The user testing group for the public-facing application should include representation from a large spectrum of potential users: senior citizens, young adults, and non-English speakers. The vendor should be expected to make necessary revisions to the mobile app.

### **3.4.4 Operations**

- **Driver and Administrator Apps:** The MobileNR platform should provide a driver and administrator application that is separate from the public-facing app.
- **Automatic Dispatching:** The MobileNR platform should be able to run independently of a dispatcher. However, the dispatching functions should allow for human overrides.
- **Third-Party Device Integration:** The MobileNR platform should integrate real-time data from remote sensors into the application whenever possible and appropriate. An example of this is showing the current battery charge of an electric vehicle and the current passenger count on the driver and administrator app.
- **Metric Reporting:** The MobileNR application should provide reporting on the metrics of operations and passenger experience, as recommended in the following section. Vendor should provide methodologies on how to report on metrics not accommodated within current reporting offerings, such as sustainability metrics.
- **Customer Feedback:** MobileNR app to include customer feedback mechanism.
- **Training:** Provide on-site training for dispatchers to operate MobileNR platform.

### **3.4.5 Maintenance**

- **App Updates:** The developer should include MobileNR app in routine platform updates. The developer should provide periodic, but timely updates, to keep app up-to-date with operating system upgrades and include recent features, such as password autofill, as they become commonplace.

### 3.4.6 Data

- **Data Ownership:** The city should have rights to all of the data that are collected and produced by the MobileNR app. Contract agreements should not infringe on the city's ability to release data to the public.
- **Data Privacy and Security:** All data collected should be anonymized and any sensitive information, such as contact information or payment details, should be kept secure. The city should require the developer to disclose how user data are used, so the city can remain transparent with constituents.

It is important that the city procure a platform that offers flexibility, should the scope of MobileNR change given the unforeseen impact of future transportation trends. An example of this is the ability to adjust the geofence boundaries of the on-demand service, should a service radius of a half-mile need to change. In addition, the city will become a competitor to powerful Transportation Networking Companies (TNC) that offer shared rides as well as emerging micro-transit services such as Charriot and Via. As a result, the city may find a need to pivot its service offerings.

## 4 Service Metrics

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This section contains recommendations for metrics that should be used to evaluate MobileNR's performance in the areas of sustainability, shuttle operations, and passenger experience. The metrics should be calculated using data collected from the MobileNR platform, that is, data on vehicle operations and data from rider surveys.

### 4.1 Sustainability

- **Reduced Vehicle Miles Traveled (VMT):** Reduction in the number of miles traveled by motor vehicle-based passenger counts, vehicle miles, and rider surveys. Responses from the rider surveys (pushed through the app) will help develop factors to estimate the reduction in vehicle, carpool, and taxi trips.
- **Gasoline Saving:** Measure of the gallons of gasoline saved due to shift in trips from vehicle to transit, bicycle, and/or walking-based reduced VMT.
- **Reduced Greenhouse Gas (GHG):** Reduction in greenhouse gases based on reduced VMT and the shuttle bus fleet.

### 4.2 Transit Oriented Development and Travel Behavior

- **Number of People Served by Transit:** A measurement of transit access that calculates the number of people living and working within a quarter mile walkshed of pick-up and drop-off points.
- **Modal Split:** Percentage change in the number of commuters using alternative transportation as their primary mode when traveling to and from work.
- **Household Automobile Ownership:** Change in the number of households that have zero or one vehicle.

### 4.3 Shuttle Operations

- **Service Regularity:** The percentage of headways that exceed a predetermined threshold.
- **Passenger Load:** The number of passengers per seats to evaluate vehicle capacity.
- **Hardware and Technical Reliability:** the number of service disruptions caused by failure in hardware or application bugs.
- **Accident Rate:** Number of crashes per vehicle miles driven.

## 4.4 Passenger Experience

- Ridership: Number of passengers boarding on fixed-route service and number of trips booked with the on-demand service.
- On-time Performance: The percentage of trips that were on time, late, and departed early.
- No-show Rate: the percentage of trips where the rider(s) did not board assigned vehicle. For use to evaluate on-demand service only.
- Maximum Ride Time: The percentage of on-demand service trips that exceed the maximum ride time programmed into the trip software.
- Complaint Rate: The number of passenger complaints (or compliments) per week, month, and year.

## 5 Projected Benefits

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The benefits derived from the operation of the MobileNR shuttle service include positive social, economic, and environmental impacts. The social and economic benefits are related primarily to the new mobility service provided to the transit dependent population: the young, the elderly, the low-income residents, and the physically impaired persons. The MobileNR service will improve access to jobs, education, shopping, social services, and recreational opportunities. The improved accessibility to downtown New Rochelle will have a positive impact on the economic well-being of the businesses. Environmental benefits are largely derived from the shift of commuters from the single-occupancy vehicle (SOV) to the transit system thus reducing the number of vehicle trips and vehicle miles of travel (VMT). In this case the Mobile NR service will offer a high-quality and dependable last-mile connection to the New Rochelle train station and will thereby make transit more competitive with the automobile. The user groups benefitting from this service are both employed residents living in the service area and commuters.

The MobileNR benefits can be quantified by estimating the number of trips made by each user group on the MobileNR service, and then estimating whether these trips are diverted from the automobile mode or not. The following sections describe the various markets for the service based on the demographics presented in the interim report, project potential users for each market, and estimate the benefits for each user group.

### 5.1 User Group 1: Transit Dependent Residents in the Service Area

The Interim Report for MobileNR showed a significant number of transit-dependent residents in the service area:

- Population under 18 years: 1,112
- Population over 65 years: 741
- Estimated population with a potential mobility impairment: 556
- Population below the poverty line: 927

Twenty-seven percent (27%) of the households in the service area do not own a car. This demographic group (estimated at a total of maybe 2,000 to 2,500 individuals) is expected to use the MobileNR shuttle service as it will connect them to work, shopping, and recreational destinations. Whereas this

user group will experience social and economic benefits derived from the shuttle service, it is not expected to generate any significant vehicle miles of travel (VMT) benefits. A small percentage of trips generated by these user groups may shift from being driven by car by a friend or family member to using the MobileNR shuttle.

The transit-dependent residents (that are not employed) are projected to generate about 50 person trips per day on MobileNR and given that the percentage of trips shifted from the automobile is low and the trip lengths are short, the savings is between two and three VMT per day. Please note that the detailed calculation spreadsheet is included in the appendix.

## **5.2 User Group 2: Employed Residents Living in the Service Area**

There is an estimated total of 6,179 employed residents living in the service area today. The major subgroup of this market is the 52% who today commute via a SOV, a total of 6,426 auto trips a day. If 2% of these trips can be shifted to transit because of the improved connection, about 130 daily person trips would be added to the MobileNR. Assuming an average trip length of 15 miles, this shift would reduce daily VMT by about 1,900. Residents shifting from the taxi would generate a very small VMT benefit, whereas those shifting from the walk or transit mode will not yield any VMT benefits. These resident commuters may generate a total of about 360 person trips on the shuttle buses and the VMT reduction is about 1,900.

## **5.3 User Group 3: Persons Employed in the Service Area**

There is an estimated total of about 10,371 persons employed in the service area today. About 63% of these commuters travel via SOV representing a total of about 13,000 trips. And if 2% of these trips can shift to the transit mode, it would add about 260 daily trips to the MobileNR, reducing daily VMT by 3,900.

In summary, it is projected that there will be between 900 and 1,000 daily trips on MobileNR. The bulk of these trips would shift from the SOV commute mode (almost 400 person trips by 200 persons who either live or work in the service area and decided to shift from the SOV mode to transit because of the improved shuttle connection to the train station) and an equal number would shift from the walk mode. Traffic volumes in downtown would thus decrease by about 300 to 400 vehicle trips per weekday. The VMT savings produced by the SOV commuters shifting to transit are estimated at 5,500 to 6,000 per weekday.



The above benefits are based on current demographic data and travel behavior. The presence of the MobileNR shuttle service will also have a positive impact on future new developments projected for downtown. It will help to attract new residents or employees that may not own a car or households who don't want to own more than one vehicle. MobileNR will become a mitigation measure for future traffic and parking impacts.

In addition to the transportation benefits described above, MobileNR will bring positive social and economic benefits to the residents in the area served by MobileNR as well as economic benefits to businesses in the area. Local businesses will benefit from greater access to labor and potential shoppers/patrons.

## 6 Preliminary Procurement

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To operate MobileNR service, the city will need to procure three types of services:

- **Mobile App:** This includes app development, an annual subscription to use the app, and the capital costs for hardware to run the app on vehicles. Recommendations for procurement requirements are discussed in previous section.
- **Shuttle Operators:** This includes shuttle drivers, maintenance personnel responsible for vehicle upkeep, and a dispatcher to operate backend of mobile app and assist with phone requests. The city should contract MobileNR's operations to a transit provider.
- **Shuttle Vehicles:** This includes capital cost for shuttle vehicle, electric motor and battery technology, a depot with charging stations, and maintenance supplies. This section of the report contains an overview of existing zero-emission bus technologies that should be considered for procurement. In the initial deployment of this service, it is recommended that the city procure the electric vehicles through the service provider contractor on either a lease or lease-to-buy basis.

### 6.1 Shuttle Vehicle Procurement

It is recommended that the MobileNR fleet consist of closed, weatherproof utility shuttle buses that are less than 30 feet in length. These vehicles will function well for both fixed and demand-responsive services and will be able to travel down narrow local streets. A typical vehicle of this size can seat up to 25 passengers and can be configured for wheelchair accessibility. Shuttle buses can be outfitted with amenities such as Wi-Fi and charging outlets. The image below shows an example of an all-electric utility shuttle bus:

**Figure 13. Example Retrofitted Electric Shuttle Bus**

*Source: Mountain View Community Shuttle Vehicle (City of Mountain View).*



Electric shuttle buses can be procured from electric vehicle manufacturers or by electrifying existing models by installing an electric battery and motors, as was done to create the fleet for the Mountain View Community Shuttle. The benefit of the later is greater choice in vehicle models.

An important goal of MobileNR service design is to procure a reduced or zero-emission electric vehicle fleet. The following provides an overview of electric vehicle technologies that should be considered for the MobileNR fleet. The most common electric bus types are Hybrid, Fuel Cell, and All Electric.

### **6.1.1 Hybrid Electric Bus**

Hybrid electric buses are powered using a combination of an internal combustion engine and a battery. The bus battery does not require roadside charging because the battery can be recharged as needed by the combustion engine. Hybrid electric buses consume diesel oil but produce up to 75% less emissions than conventional buses and produce less emissions than compressed natural gas (CNG) powered buses.

Westchester Bee-Line, New Rochelle's primary local transit provider, currently uses diesel-electric hybrid vehicles on some of its routes. Similar to the hybrid electric bus models, roadside charging is not required.

### **6.1.2 Fuel Cell Electric Bus**

Fuel cell electric buses are powered using a hybrid of bus batteries and hydrogen fuel cells. Similar to hybrid electric buses, bus batteries are able to store energy and recharge when the bus is in operation. Hydrogen fuel cells must be refueled, using pressurized hydrogen. However, the scarcity of hydrogen fueling stations makes refueling a challenge. The range on these vehicles is similar to convention and hybrid electric buses. It is important to note that while the bus is zero-emission, carbon and other greenhouse gases are released in the production of hydrogen power.

This technology is currently in the process of being further commercialized. Fuel cell electric buses are currently operated by 15 transit agencies in California, as part of a pilot organized by the National Fuel Cell Bus Program (NFCBP). In late 2018, fuel cell electric buses were deployed by the Stark Area Regional Transit Authority (SARTA) based in Canton, Ohio and the Champaign-Urbana Mass Transit District (MTD).

### **6.1.3 All-Electric Bus**

All-electric buses do not have internal combustion engines and run exclusively on large batteries, which are charged from plugged or contactless electric power sources. The main concerns of implementing electric bus technology is the high vehicle cost (and related equipment program) as well as low-battery range. As a result, electric buses are not common in the United States. The first transit agency to adopt the technology was Foothill Transit in Southern California in 2014, which employs 40-foot Proterra electric buses on their Route 291 service. The buses have a range of 30 miles and the agency has included a 10-minute charging period at the Pomona Transit Center into the route schedule. Vehicles are charged via contactless overhead chargers. In recent years, Proterra has been able to increase their range by nearly three-fold.

In 2017, the Central Contra Costa Transit Authority began running an Electric Trolley between downtown Walnut Creek and the regional BART train station. The agency initially purchased four 29-foot Gilig buses, which can be inductively charged from pads installed in the ground at points along the route and in the bus yards.

It is important to note that while this technology is zero-emission, carbon and other greenhouse gases are released in the production of electricity.

Potential vendors for electric buses in the U.S. market include Proterra and New Flyer. Proterra currently has the greatest market share and their buses serve on transit fleets across the country. Current customers include MTA New York City Transit, Dallas Area Rapid Transit (DART), and South East Pennsylvania Transportation Authority (SEPTA). New buses typically cost around \$750,000. The MTA is currently leasing both Proterra and New Flyers buses as well as depot and en route charging stations that will allow buses to charge during storage, maintenance, and dwell time.

Proterra and New Flyer's line of vehicles are larger than the recommended vehicle for MobileNR. It is therefore recommended that the city pursue vendors such as GreenPower Motor Company and Moto Electric Vehicles, which offer a greater variety of smaller electric vehicles. Moto Electric Vehicles offers an inexpensive alternative to a full bus in the form of street legal electric shuttle vehicles. The vehicle pictured below seats 15 people, has a range of 50 miles per charge, and retails for about \$32,000.

#### **Figure 14. Example All-Electric Shuttle Bus**

*MotoEV Electro Transit Buddy 15 Passenger LE Hard Door Shuttle.*



Despite the great potential of electric vehicle buses within the foreseeable future, the market’s offerings are narrow for the type of vehicle best suited for MobileNR. As a result, an alternative to purchasing electric vehicles “out of the box” is electrifying existing vehicles. In the case of the Mountain View shuttle, regular gas-powered shuttled vehicles were retrofitted with electric technology from Motiv Power Systems. The shuttle bus was created in partnership with ABC Companies, a distributor of new and pre-owned vehicles, who directly worked with Motiv to electrify an existing gas-powered vehicle.

## 7 Preliminary Branding Strategy

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The branding and marketing of MobileNR should strategize around the following two priorities:

1. To publicize and promote MobileNR ridership, focusing on spreading awareness of the new reliable service provisions (e.g., on-demand services versus the loop routes).
2. To align MobileNR with broader, ongoing strategic initiatives in New Rochelle that focus on reconnecting the downtown area to neighborhoods to the north and also increasing public transit use.

The free and user-friendly nature of MobileNR are significant assets that should be leveraged to encourage ridership. Given that ridership will not be deterred by fares and user costs, branding and marketing should focus on the service's convenience for both visitors and commuters. The MobileNR shuttle will serve three main types of users, including people that:

- Live in the MobileNR service area and travel to the New Rochelle Transit Center.
- Live outside New Rochelle and travel to the service area via the New Rochelle Transit Center.
- Live in New Rochelle and use the shuttle as a means to travel within the service area (locations within a five-to-ten minute walk from a bus stop), potentially to avoid the headache of driving through traffic and paying to park downtown.

MobileNR will encourage people who live or work in the downtown and adjacent northern district of New Rochelle to take public transit, thus reducing stress to the roadway network in the form of parking and congestion during peak commuting periods. Two routes are planned to connect users to key destinations in downtown New Rochelle and its proximities. MobileNR will help to make the downtown more accessible, encouraging people to experience the city's culture, community and creativity.

In order to draw "choice" riders onto the shuttle, a priority will be placed on ensuring that services are convenient in terms of travel time, comfort, and cost. Other users will be residents or commuters that are unable to drive due to economic or accessibility restrictions. MobileNR will serve both populations by being free, clean, safe, reliable, and Americans with Disabilities Act (ADA) compliant.

## 7.1 Importance of Branding MobileNR

While safety, frequency of routes, comfort, and convenience are all critical to the success of the downtown shuttle, there are still perception issues that MobileNR must address. In order to attract a “choice” rider, MobileNR must overcome generally pervasive negative attitudes towards city bus travel (i.e., it is slow, unreliable, inconvenient, hot, uncomfortable, and confusing). Branded bus services are especially important to increase the profile of bus services when routes are not immediately evident, as is the case with commuter rail (with tracks and stations). Marketing and branding the MobileNR service will be a key strategy to improve the image of bus transit, increase the awareness of bus services, and make the bus network more legible.

### 7.1.1 The Branding Image

An effective branding strategy utilizes a similar visual vocabulary, which when applied consistently can build a sense of recognition and identity. In this case, an effective brand can help the MobileNR service to establish itself in the public’s eye as different from a standard shuttle bus. A critical element for success is to keep the branding concept simple to make it easy to recognize and understand.



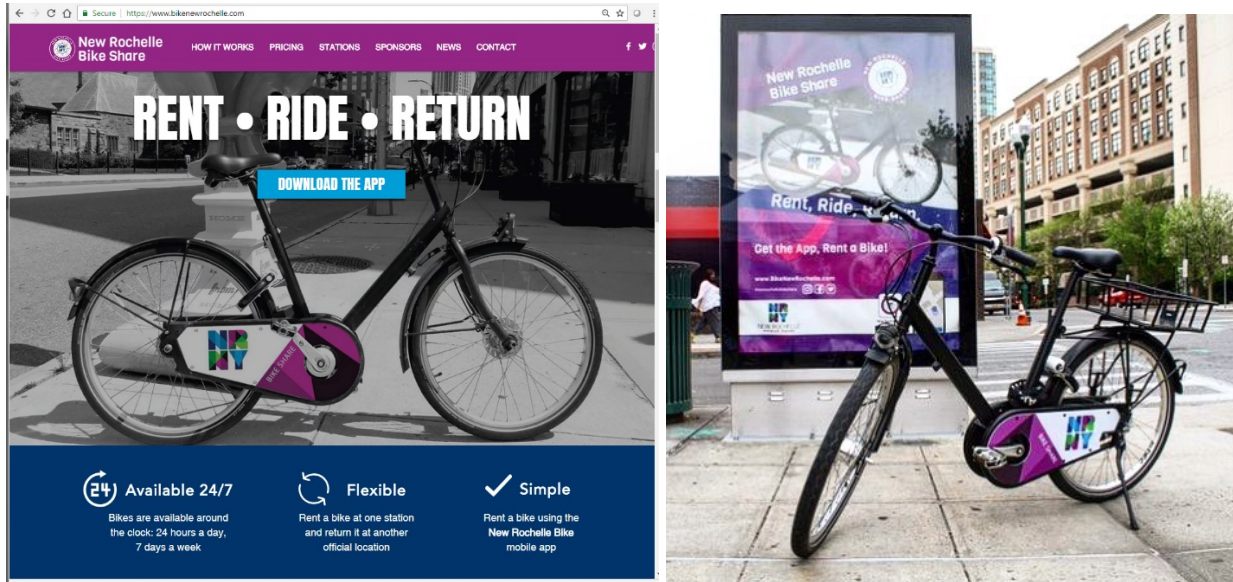
New Rochelle has already launched a citywide branding campaign, titled Ideally Yours. The branding process included a series of public and visioning meetings to learn as much as possible about the city from its businesses and residents. The project was developed by North Star Destination Strategies and was funded in partnership with the New Rochelle Industrial Development Agency (IDA). The MobileNR brand should piggyback off this branding effort which has already been implemented in a number of city-sponsored projects. If a complementary visual vocabulary is developed for MobileNR, it would help to reinforce the city’s brand (Ideally Yours), would help users understand the myriad of connected services the city provides, and would provide cross-promotional opportunities. Generally speaking, reinforcing New Rochelle’s brand will foster understanding, even pride among those who live, work, and enjoy themselves in downtown New Rochelle.

A similar branding approach was used for the New Rochelle Bike Share. Images of the bike share’s various elements are shown below. In addition to reinforcing the city’s brand, having a MobileNR brand that is complementary to the New Rochelle Bike Share reinforces the idea of transportation connectivity

within the city. There may be other opportunities to cross promote the two related services, such as on signage, websites, advertisements, and on vehicles (bicycles and buses). The city should make the MobileNR service seamlessly integrated into the city’s website and should be featured with a prominent link on the homepage.<sup>1</sup>

### Figure 15. New Rochelle Bike Share Branding

Website Home Page (left) Bicycles and Signage (right).



### 7.1.2 Conceptual Logo Design

A conceptual logo design for MobileNR is shown below. The intent of the logo design was to provide an opportunity to complement New Rochelle’s brand by using a modern geometric design that could incorporate the same color scheme. The arrows both above and below the text symbolize the two interconnected loop routes. The font choice was intended to convey that the service is modern, elegant, and of high quality. This logo template can easily be modified to fit a variety of applications.

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<sup>1</sup> Visit New Rochelle Ideally Yours at <http://newrochelleny.com/>



**Figure 16. MobileNR Logo Concept**



### **7.1.3 Vehicle Branding**

#### **7.1.3.1 Exterior of Vehicle**

The MobileNR branding should set it apart from other non-city-controlled transportation services in the area, such as the Westchester Bee (which may share bus stops with MobileNR), and private shuttle services. A distinctive branding scheme will distinguish MobileNR from other transit services, and make it more inviting to potential riders. The Ideally Yours branding scheme colors could lend themselves to create a unique design for the shuttle.

**Figure 17. Downtown Alliance Bus in Lower Manhattan**



In addition to its eye-catching color which signifies MobileNR as a unique transit service, the exterior of the shuttle should advertise the name and location of the service, its free cost, and high-tech features. The name and location advertisement should incorporate the three neighborhoods that the shuttle serves. The language for the advertisement could be “MobileNR: Connecting uptown, downtown, and the hospital district of New Rochelle.”

**Figure 18. Conceptual Graphic Showing the “Ideally Yours” Color/Design Scheme on a MobileNR Bus**



The outside should also promote features of the shuttle, advertising that (1) it is an electric vehicle, (2) there is on-board Wi-Fi, and that the accompanying smartphone app has real-time location data and service updates. A symbol should be placed near the door which signifies the service’s accessibility to riders in wheelchairs. The name of the route served by the specific bus should be visible on the outside, as the two routes overlap in certain areas.

#### **7.1.4 Interior of Vehicle**

The interior of the bus should be clean and modern. In addition to stop requesting mechanisms (pull-cord, push-button, etc.), the inside of the bus should show the stops that are served by the bus, in order of the route, and a map of the bus routes including the service area. A screen inside the bus

should show the closest stop to the bus as it travels, so passengers know when to request their desired stop. A recorded message should be linked with the screen to alert visually impaired passengers to the location of the bus along its route and when a stop has been requested.

#### ***7.1.4.1 Reinforcing Branding at Bus Stops and Mobility Hubs***

It is recommended that MobileNR's branding and marketing efforts strategize mobility hubs and bus stops. As stated previously, MobileNR's most important integration will be with the built environment: streetscape design and the design of bus stop facilities is a key element to public messaging and building service reputation.

Branding and marketing potential at these locations can be conceived of in two main ways:

- **Information sharing:** there is opportunity to enhance and streamline the way that MobileNR service information is displayed and made accessible. Digital Wi-Fi kiosks and signage will be core elements to this.
- **Placemaking:** There is also opportunity to consider the design of bus stop facilities as a means to enhance rider experience. At mobility hubs with larger sidewalk area footprints, there is potential to weave bus stops into larger public space areas. Facility and amenity capital investments can further create a sense of place and provide an enjoyable environment (e.g., seating options, sidewalk design, bus shelter provisions, etc.) for both users and the broader public.

Working in tandem, these two approaches can catalyze and reinforce public awareness of the new service and its brand. Opportunities for placemaking and public realm interventions will vary based on the different scales of bus stops: Primary hubs, secondary hubs, tertiary hubs, and bus stops outside of Mobility Hub areas. The following should be considered:

- All bus stops must be informative. Information should include maps and real-time information where feasible. Instructions on how to check real-time information via the mobile app should also be provided; this could be picture and text instructions accompanied by a quick response (QR) code, which links users to the MobileNR app and website. The integration of Wi-Fi kiosks will be an essential component of information sharing that should be provided where possible.
- Bus stops should be built to be consistent with vehicle and route branding to promote a stronger identity for the bus, similar to train stations on railway lines. Stops should be thought of as opportunities to increase brand awareness and to advertise the service to potential riders. The design of any new or renovated shelters should be unique and distinctive while also practical and safe to provide passengers sufficient cover.
- Signage at the mobility hubs and bus stops should be the same distinctive colors as the shuttle and New Rochelle brand, and should include the name of the stop, information on which route serves the stop, and which stops come after that stop.

#### **7.1.4.2 Mobility Hub Branding**

As detailed in the Integrated Mobility section and Figure 7, primary, secondary and tertiary mobility hubs have been identified as locations of opportune connectivity where convenient transfer between transit services can occur. Mobility hubs include the MobileNR stop and other transportation providers, such as bike share or existing Westchester Bee-Line service. It is recommended that all mobility hubs have Wi-Fi kiosks, bus shelters, and seating. Heated shelters should be considered as an amenity provision for winter months. Where possible, the spaces created by mobility hub features should be reinforced by expanding public space opportunities such as additional seating and space for pedestrian gathering.

Each mobility hub should have a distinct name that gives context to the area around it. Examples include “Montefiore Hospital,” “New Roc City,” “City Hall,” and “New Rochelle Transit Center.” Beyond the provision of transit, these hub areas should improve the public realm by prioritizing pedestrians through the expansion and maintenance of sidewalks, paths, and plaza areas. To best inform visitors to the area, mobility hubs could have a wayfinding map for the area nearby the Hub, which shows points of interest within a five-to-ten-minute walk and a five-to-ten-minute bicycle ride.

The primary station should have the most branding and information, and the tertiary should be the most minimal. The only primary station is the New Rochelle Transit Center. This station should feature large signage with bright colors, maps of both routes and the service area, and detailed information about how to use the MobileNR app. It should also feature user education materials including how to board, ride, and request stops on the shuttle. A countdown clock which shows when the next bus will arrive and depart from the transit center will grab the attention of potential riders who might not have a smart device or may be unfamiliar with the MobileNR app. The New Rochelle Transit Center will be a critical shuttle station because it is expected that many riders will use MobileNR as a means to commute from their home to the transit center, or from the transit center to their job in New Rochelle.

Secondary mobility hubs include Montefiore Hospital, and the eastern and western points of the Downtown Loop, and in the long-term potential hubs at City Hall and Iona College. Tertiary hubs include Main Street and Division Street, Burling Lane and North Avenue, New Roc City, and Monroe College. Signage at these hubs should still be distinct and informative but will not be as extensive as the signage at the New Rochelle Transit Center.

### 7.1.4.3 Bus Stops Outside of Hub Areas

Other bus stops outside of mobility hub areas will look more like traditional bus stops. The signage at these stop locations should have a location-name and state which mobility hubs follow the stop along the route. Further, they should advertise the free cost of the service, include information as to when the service runs, and provide a QR code which links riders to the MobileNR website. Although bus stops outside of hub areas should not be a major focus in terms of capital investments, the stops remain important in the context of increasing brand awareness and advertising.

**Figure 19. Example Integrated Mobility Information Sharing**

Example: WalkNYC Map showing 5-minute walking radius (left). Example: Signage for New Rochelle Bike Share (right).

Source: PentaCityGroup.

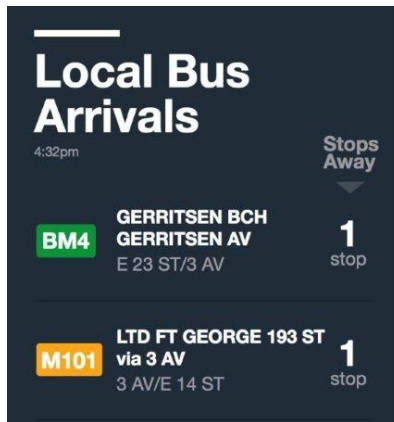


### 7.1.5 Digital Wi-Fi Kiosks

Branding and the attractiveness of the MobileNR system could be bolstered through strategic use of New Rochelle’s digital Wi-Fi kiosks. While Wi-Fi kiosks have begun to be installed around the city, continued coordination could ensure that they are located at all mobility hubs and as many bus stops as possible.

**Figure 20. Example Kiosk Interface Showing Bus Arrivals**

Source: LinkNYC.



Digital Wi-Fi kiosks can provide a dual service of advertising the MobileNR service with real-time location information for when the next shuttle will arrive, as well as providing the service of free public Wi-Fi. Additional information could be provided on the kiosk, such as Bee-Line and MetroNorth schedules at the transit center. Marketing information displayed on the kiosks should expand awareness of the service and promote its free cost, rapid service, and show the routes and service area. This information will be presented on the large screens on the side of the kiosk.

The Wi-Fi kiosks will also have an interactive interface which will connect the user to the MobileNR app and/or website, and allow the user to request a pickup during on-demand service hours. While Wi-Fi kiosks should be located at each mobility hub, their provision at other key bus stop locations should also be considered.

Digital kiosks often integrate other advertisements for revenue opportunity. It should be noted that the display time allotted to such non-service advertisements should not dominate the display time and legibility of service information.



## Figure 21. Example Bus Shelter Integration of Digital Kiosks

Bus shelter integration of digital kiosks: Real-time bus arrival information and route information provided—Kansas City Area Transportation Authority (KCATA) case study (left). Bus stop design should consider the specific Wi-Fi kiosks that New Rochelle has procured and installed in initial key locations (right).

Source: REDYREF; Source: lohud.com



### 7.1.6 Targeted Outreach

#### 7.1.6.1 Target Groups

Outreach Efforts should strategically approach different user groups in an effort to recognize varying transit patterns and user needs. In addition to the three main user groups previously identified (users who live in the MobileNR service area and travel to the New Rochelle Transit Center; users who live outside New Rochelle and travel to the service area via the New Rochelle Transit Center; and users who Live in New Rochelle and use the shuttle as a means to travel within the service area), outreach can target more specific user groups, including the following:

- **Montefiore Workers and Visitors.** As the site of a secondary hub, the high-traffic volumes flow to and from Montefiore should be strategized in order to capitalize MobileNR’s user pool. It is recommended that New Rochelle partner with Montefiore to increase MobileNR advertising and messaging. Daily commuters to Montefiore should be a focus: both employees arriving by MetroNorth as well as those who live near the route loop.
- **Senior Citizens and Students Who Visit Downtown Areas for Entertainment and Shopping.** Local universities and senior housing developments provide concentrated populations that can be targeted for advertising outreach. Such advertising of MobileNR should provide these demographics with information on the service, with a focus on the opportunity for connections to downtown.
- **The Workforce of Downtown New Rochelle.** Parking and congestion challenges in downtown could be alleviated by new parking opportunities that MobileNR might introduce for certain commuters. For example, commuters who drive daily might seek parking facilities in a broader area of downtown and take the shuttle from such locations to their place of employment.

- **Residents Living in Neighborhoods North of Downtown.** Neighborhood residents living directly north of downtown will have a newfound convenience in the MobileNR service. Many of these residents will be able to integrate the shuttle into their commuting patterns and visits to downtown.
- **MobileNR's On-Demand Service Users.** It is recommended that on-demand services are available during off-peak hours. Consequently, commuters who travel during peak times would not have access to this service. On-demand services should target outreach to residential clusters and developments that fall within the service area but are further from the established loop routes. As previously discussed, Westchester County provides paratransit options for the area, but MobileNR will also have the capacity to function as paratransit for individuals in the service area. Outreach should include sharing information and advertising materials with local social services and clinics.

### ***7.1.6.2 Incentives to Encourage MobileNR Ridership***

As a form of initial service promotion, it is recommended that incentives are offered to encourage increased ridership of MobileNR by users who might not be prone to use the service. A primary goal of such incentives would be to gain new frequent users who are attracted by the convenience of the service. Potential incentives that could be offered include the following:

- Free or reduced parking vouchers in targeted lot areas around downtown. This incentive would target users who drive into the area but could also integrate the shuttle into their commute.
- In conjunction with an event such as a health fair, free health screenings could be provided by an institution like Montefiore for users who integrate the shuttle in their commute or visit during a designated time frame.



## 8 Service Implementation: CircuitNR

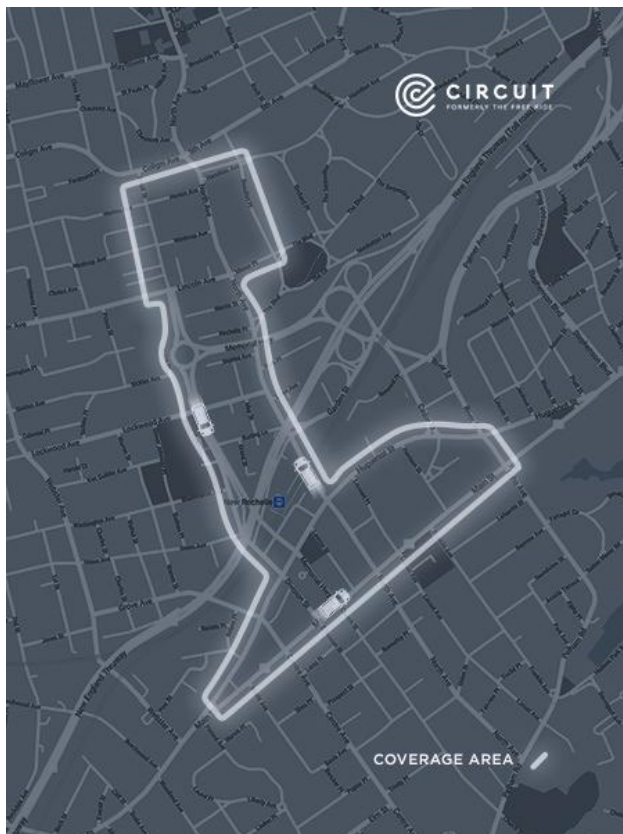
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### 8.1 Initial Pilot

In August 2019 the City of New Rochelle implemented an on-demand electric shuttle service pilot within the downtown area highlighted in the service area map shown below. Informed by prior MobileNR drafts and recommendations provided by BFJ Planning, New Rochelle termed the new service “CircuitNR,” gesturing to the contracted service provider, Circuit.

The CircuitNR pilot was implemented with three electric shuttle vehicles operating within a geo-fenced area consisting of the Downtown Loop area, Memorial Drive, and the North Avenue corridor between Main Street and Coligni Avenue. This represents most of the fixed-route service area proposed in an earlier section of this study. While Circuit could include fixed-route service, it has operated on an on-demand basis to date.

**Figure 22. CircuitNR Coverage Area**



Users can request a ride within the service area using the Ride Circuit app that can be downloaded for free from both the Google Android and Apple app stores. The vehicles can also be hailed by waving down an approaching vehicle. CircuitNR service hours are Monday to Thursday between 7:00 a.m. and 7:00 p.m., Friday from 7:00 a.m. and 10:00 p.m., Saturday between noon and 10 p.m., and Sunday between noon and 7:00 p.m. The later hours on Friday and Saturday encourage use by residents and visitors frequenting the dining and entertainment options downtown.

**Figure 23. CircuitNR Advertisement**



Circuit’s fleet consists of micro-transit vehicles that are similar in size to large electric golf carts. The vehicles are not open air but are hard-doored to provide protection from weather and elements. CircuitNR uses six-seaters made by Polaris Global Electric Motorcarts (GEM). These vehicles are a fraction of a cost of a bus, allowing them to easily be deployed.

The pilot cost a total of \$164,000, which was funded by the city’s Industrial Development Agency (IDA). The drivers and brand ambassadors that work directly for Circuit are paid \$15/hour. The vehicles are currently branded with the city’s Ideally Your Campaign livery and have the option of displaying ads as a way of generating revenue to reduce the overall operating cost of the service.

## 9 Initial CircuitNR Takeaways

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The initial pilot of CircuitNR concluded on January 31st, 2020 and New Rochelle is now in a five-year service agreement with Circuit. Circuit continues to provide support with the shuttle fleet as well as the mobile application system for ride requests. Although funding is secured through the end of 2020, there is a need to identify and confirm future funding sources beyond this.

New Rochelle identifies that the service has been met with high utilization and positive feedback.

Details on service and feedback to date include the following:

- Although the CircuitNR service has been minimally advertised, utilization has been high. With ridership frequently at or near capacity, the city does not identify a need for further advertising initiatives.
- Community response indicates the desire for more shuttle vehicles and expanded geographic coverage. The city believes a balanced service coverage is necessary, given that the service does not produce revenue.
- CircuitNR intentionally does not utilize existing bus stops for shuttle boarding/unloading and service today continues solely with an on-demand approach with no fixed routes set. Shuttles more informally utilize accessible curb space to pick up passengers where they request the service. Despite BFJ's previous recommendation to create "transit hubs" around Westchester Bee-Line stops and the provision of new stops, this element is not a service feature at this time.
- Due to its downtown focus, CircuitNR has not appeared to operate in competition with Westchester Bee-Line services.
- The flexibility of CircuitNR was a key transit resource during the height of the COVID-19 pandemic in New Rochelle. The service played a critical role in transporting healthcare workers to and from Montefiore hospital as well as residents to testing sites, with the highest demand during March–May 2020. During this time, service was coordinated between Circuit, Montefiore Hospital, and New York State's 511 Rideshare program.
- Feedback on the size and compact nature of Circuit shuttles has been positive. Although the shuttles in use only have six seats, a major benefit is the ability to load and unload passengers quickly. The small shuttle size is reported as a benefit for convenience rather than a hindrance to service.

## 10 Study Conclusions and Next Steps

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The scale of service introduced and tested in the pilot stage of CircuitNR has continued as the operational standard for CircuitNR. The scope of recommendations that BFJ shared with New Rochelle throughout drafts of this report informed the request for proposal (RFP) process to secure a vendor to ultimately operate an electric on-demand shuttle service in the downtown area of New Rochelle. Although BFJ recommendations and service suggestions cited earlier in this report include details and provisions that have not been integrated into CircuitNR's operations, the service is currently the right size based on resources available for the shuttle service. Next step considerations include the following:

- **Increase Access to Various User Groups:** The current fleet of three CircuitNR shuttles does not include an ADA accessible vehicle. Future shuttle acquisition and operations should explore options to provide greater ADA accessibility. Additionally, despite current constraints with meeting demand, future service expansion could be guided by outreach efforts that target user groups such as senior citizens and public housing residents in neighborhoods within and adjacent to the service area.
- **CircuitNR Growth and Expansion Should Be Done Strategically:** The growth and potential expansion of the CircuitNR service can be iterative, based on funding. Currently, funding is needed to secure services beyond 2020. Future expansion of the coverage area can extend the current service area boundaries on a block-by-block basis or provide specific route destinations to areas that BFJ previously recommended. Such destination extensions could include the Quaker Ridge Shopping Center to the north, key waterfront access points such as Hudson Park, as well as the future Pratt Landing development. While there is not a current fixed-route service provision, New Rochelle can continue to monitor and weigh the benefits that this approach would have.
- **Capital Investment and Transit Hubs:** Although New Rochelle is not currently prioritizing a place-based "transit-hub" approach to CircuitNR, future expansion efforts could re-engage this idea in the interest of linking to other transit modes and placemaking efforts. Notably, this investment would be appropriate if a fixed-route service were implemented in the future.

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