Capital Region Mobility Hub

Final Report | Report Number 25-18 | March 2024

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Capital Region Mobility Hubs

Final Report

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NYSERDA Report 25-18 NYSERDA Contract 153297 March 2024

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Preferred Citation

New York State Energy and Research Development Authority (NYSERDA). 2025. "Capital Region Mobility Hubs, Final Report." NYSERDA Report Number 25-18. Prepared by CALSTART, Pasadena, CA. nyserda.ny.gov/publications

Abstract

Sponsored by the New York State Energy Research and Development Authority (NYSERDA), the Capital Region Mobility Hubs project team installed and evaluated two mobility hubs to support bus rapid transit (BRT) service in the Capital Region. The first mobility hub serves the State University of New York at Albany (University at Albany) Downtown Campus, and the second mobility hub is located in downtown Cohoes. To understand the impact of these sites, the project team developed and administered a rider survey. Combining these survey results with data provided by the Capital District Transportation Authority (CDTA), a team from New York University (NYU) produced an impact assessment report, which showed that the mobility hubs enable greater mode shift, reduce vehicle miles traveled (VMT), reduce greenhouse gas (GHG) emissions, and reduce transportation costs. These quantifiable impacts demonstrate the value of mobility hubs and the expected benefits of similar projects. The project supports scalability and replicability through a mobility hub scoring rubric, community outreach plans, and concept map designs, all of which can be applied to future mobility hubs. This report outlines the project team's process for implementing two mobility hubs and includes an appendix containing materials related to community outreach, integration of mobility service providers, mobility hub designs, survey materials, and the impact assessment report.

Keywords

mobility hubs, Capital District Transportation Authority, New York State, Capital Region, micromobility, bikes, vehicle miles traveled, greenhouse gas emissions, bus rapid transit

Acknowledgments

The project team would like to thank the New York State Energy Research and Development Authority (NYSERDA), specifically project manager Richard Mai, for their support on the project. CALSTART would like to acknowledge Jennifer Kritzler, Ilef Mezhoudi, Amir Shareak, and Jordan Stutt, as well as former CALSTART employees Al Beatty and Dirk Evenson, for their diligent work on this project.

From Arup, CALSTART would like to acknowledge Ethan Ebinger, James Fransisco, Andrew Kay (former employee), Vincent Riscica (former employee), Israel Shaw, and Varanesh Singh.

From the Capital District Transportation Authority (CDTA), CALSTART would like to acknowledge Lindsey Bradt, Megan Quirk, Jonathan Scherzer, Ethan Warren, and Michael Williams.

From the Capital District Transportation Committee (CDTC), CALSTART would like to acknowledge Jacob Beeman and Chaim Simon.

From the NYU C@SMARTER Center, CALSTART would like to acknowledge Joseph Chow and Xiyuan Ren.

From Transit (app), CALSTART would like to acknowledge Kaj Huddart, Cameron Monagle, Katie Monroe (former employee), and Kerra Shukster.

From the Tri-State Transportation Campaign, CALSTART would like to acknowledge Darwin Keung, Talia Crawford, and Jaqi Cohen.

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Acronyms and Abbreviations

BRT	bus rapid transit
CDPHP Cycle!	Capital Region Bike Share program
CDPHP	Capital District Physicians' Health Plan, Inc.
CDTA	Capital District Transportation Authority
CDTC	Capital District Transportation Committee
Climate Act	Climate Leadership and Community Protection Act
DAC	disadvantaged community
Downtown Albany BID	Downtown Albany Business Improvement District
DRIVE	electric vehicle carshare
GHG	greenhouse gas
GIS	Geographic Information System
IM	innovative mobility
MTCE	metric tons of carbon emissions
NYS Parks	New York State Parks, Recreation and Historic Preservation
NYS	New York State
NYSERDA	New York State Energy Research and Development Authority
NYU	New York University
OD	origin-destination
RFI	request for information
RFP	request for proposal
SOV	single-occupancy vehicle
TSTC	Tri-State Transportation Campaign
University at Albany	State University of New York at Albany
VMT	vehicle miles traveled
ZIP Code	Zone Improvement Plan Code

Executive Summary

The Capital Region Mobility Hubs project aimed to implement and analyze mobility hubs in New York State's Capital Region. A mobility hub serves as a central location where multiple low-carbon modes of transportation are available to residents in a community, providing alternatives to single-occupancy vehicles (SOVs) and filling gaps in first- and last-mile mobility. These forms of transportation can include transit connections and shared mobility options such as bikeshares, scootershares, and carshares. In the Capital Region, mobility hubs play a crucial role in reducing carbon emissions, alleviating congestion, and expanding mobility options for both residents and visitors.

The Capital District Transportation Authority (CDTA), a regional public transportation agency serving Albany, Schenectady, Rensselaer, and Saratoga counties in New York, served as the primary project partner. CDTA provides bus services and paratransit services, and operates the popular Capital Region bikeshare program, sponsored by Capital District Physicians' Health Plan, Inc. (CDPHP Cycle!), which contributes to the region's sustainable and interconnected transportation network. For this demonstration, the project team consisted of Arup, CALSTART, Capital District Transportation Committee (CDTC), New York University (NYU), Tri-State Transportation Campaign (TSTC), and Transit App. The project team completed a series of steps that resulted in two fully operational mobility hubs available for residents to use at the University at Albany (University at Albany) Downtown Campus and downtown Cohoes. The University at Albany Downtown Campus features a CDPHP Cycle! bikeshare station, and an informational Soofa sign, a smart, solar-powered digital display showing citywide and local content. The downtown Cohoes location includes a CDPHP Cycle! bikeshare station, a DRIVE electric vehicle carshare, a bench, an electric vehicle charger, and an informational Soofa sign.

The project team began implementation by selecting the mobility hub sites. Led by Arup, the team developed a scoring rubric to assess and rank the locations CDTA provided. The team then conducted community outreach to gauge input from residents on future mobility hubs and their transportation needs. After finalizing site selections, the team secured partnerships with the selected sites and collaborated with the software provider Transit App to integrate CDPHP Cycle! into the app. The team then oversaw construction and incremental additions to the mobility hubs, completing installation in January 2024. Finally, NYU developed a survey in collaboration with the project team and analyzed survey results and other data to produce the Capital Region Mobility Hub Impact Assessment Report, which quantifies the mobility hubs' impacts.

NYU conducted an analysis that demonstrated notable benefits from implementing two mobility hubs in the Capital Region. These hubs increased the frequency of multimodal trips, where individuals transfer between different modes of transportation, while reducing the total vehicle miles traveled (VMT) and carbon emissions. Specifically, the mobility hub at the University at Albany Downtown Campus facilitated an average of 8.83 trips per day, resulting in an annual reduction of more than 20,000 VMT and over 8 metric tons of carbon emissions. Similarly, the downtown Cohoes hub averaged 6.17 trips per day, resulting in an annual reduction of 13,000 VMT and over 5 metric tons of carbon emissions. This reduction in carbon emissions is approximately equivalent to the annual energy-related emissions from two households.

The Capital Region Mobility Hubs project provides a replicable framework for deploying mobility hubs in other locations. Specifically, transit agencies can adopt the scoring rubric, community outreach efforts, concept map designs, and Capital Region Mobility Hub Impact Assessment Report to guide future implementations.

1 Project Overview

In 2022, CALSTART received funding from the New York State Energy Research and Development Authority (NYSERDA) to plan, implement, and assess micromobility modes that complement CDTA's established public transit system. New York State (NYS) has adopted ambitious goals, including the Climate Leadership and Community Protection Act (Climate Act), which mandates an 85% reduction in greenhouse gas (GHG) emissions from 1990 levels by 2050 (New York State Climate Action Council 2022). Achieving this target requires reductions in transportation-related GHG emissions through strategies such as decreasing single-occupancy vehicle (SOV) trips and reducing the number of vehicles on the road. Mobility hubs offer one solution to meet these goals while promoting a more efficient and equitable transportation network.

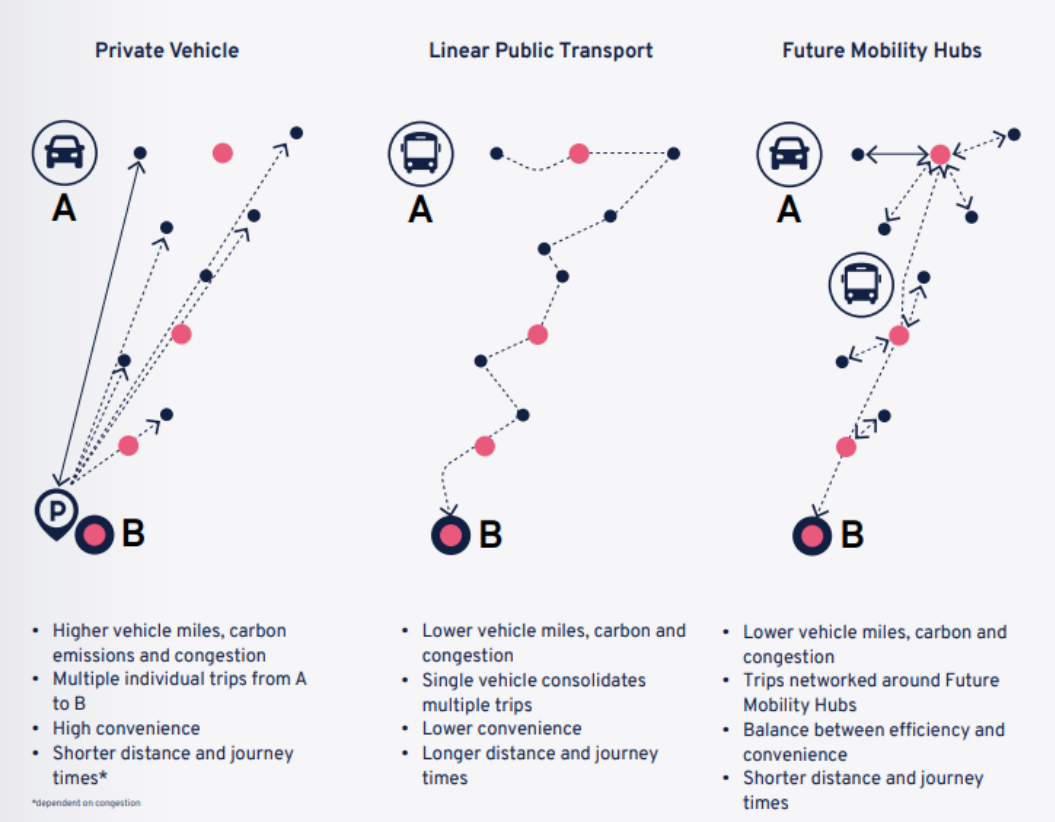
A mobility hub provides residents with access to low-carbon transportation options, serving as an alternative to SOV trips and closing first- and last-mile gaps. These hubs typically feature transit connections alongside shared mobility options such as bikeshare, scootershare, and carshare. Figure 1, adapted from Arup's *Future Mobility Hubs,* illustrates this concept.

The project team included CALSTART as the prime contractor, along with Arup, New York University (NYU), Tri-State Transportation Campaign (TSTC), and Transit App as the subcontractors. Additionally, the Capital District Transit Authority (CDTA) and Capital District Transportation Committee (CDTC) also joined through a teaming agreement.

CDTA currently offers multiple mobility options in the Capital Region, including CDPHP Cycle! (bikeshare) through Capital District Physicians' Health Plan, Inc. (CDPHP), DRIVE (electric carshare), and FLEX On Demand (an on-demand transit service). Since securing the funding, the project team has completed all assigned tasks and submitted the required deliverables, including developing mobility hubs to support bus rapid transit (BRT) services, conducting community engagement to identify stakeholder needs, reducing GHG emissions, integrating trip-planning tools, and creating a replicable template for future CDTA mobility hubs.

Figure 1. Mobility Hub Concept

Source: Arup (2021).



2 Mobility Hub Site Selection

Following the execution of subcontractor agreements, budget and schedule approvals, and other project management tasks, the team-initiated Task 1: mobility hub site selection.

Arup developed selection criteria (Table 1) for a spatial multicriteria analysis. After the project team review, the scoring rubric was finalized based on demographic, land-use, and travel behavior indicators that reflect the intended hub uses.

Table 1. Mobility Hub Scoring Rubric and Weights

Source: Arup (2022), see Appendix A.

Criteria	Description	Metric(s)	Weight
Utilization	How likely the mobility hub is to be actively used	Concentrations of non-automobile users	20%
Equity	How effectively the mobility hub serves DACs	Proximity to DACs	17.5%
		Proximity to employment centers for DACs	
Community Resources	How well the mobility hub enhances access to community resources	Proximity to places of interest	15%
Connectivity	How well the mobility hub is integrated with existing transportation networks	Density of bicycle facilities	12.5%
		Location within the FLEX program region	
Distribution	How well the mobility hub is distributed relative to other hubs	Distance from existing and planned transportation hubs	12.5%
Walkability	How walkable the local network is around the mobility hub	Walk access using a scoring tool	12.5%
Safety	How the mobility hub increases the safety of users	Proximity to crashes	10%

Using these criteria, the team scored and ranked 53 potential mobility hub sites CDTA had identified, each with a bus ridership cluster exceeding 100 daily boardings (Table 2). Arup led the effort to narrow these candidates to one or two sites per municipality, using a combination of quantitative scores, qualitative input, site feasibility, and partner feedback.

Based on the scoring rubric, partner discussions, and conversations with NYSERDA, the team further narrowed the options to three final locations for development: downtown Cohoes, the State University of New York at Albany (University at Albany) Downtown Campus, and the proposed Amsterdam site. In Albany, strong support from the University at Albany and plans to roll out the Purple Line led the

committee to select the University at Albany Downtown Campus option. In Cohoes, strong municipal support and the presence of a DRIVE location made it a strategic choice. Following final selection, city leadership, either the Mayor or Director of Community and Economic Development, signed letters of commitment, allowing the project to advance to Task 2: community outreach.

Table 2. Candidate Sites for the Mobility Hubs

Source: CDTA (2022).

Municipality	Location
Albany	Albany Bus Terminal
	Broadway & Steuben Street
	Capitol/Hawk Street Station
	Central Avenue & Ontario Street
	Clinton Square Station, North Pearl Street & Clinton Avenue
	Empire State Plaza Concourse
	Lark Street & Colonie Street
	Division/St. Luke's Station, State Street & Division Street
	Lark Street/Library Station
	Livingston Avenue & Henry Johnson Boulevard
	Livingston Avenue Station, Broadway & Livingston Avenue
	Madison Avenue Station
	Morton Avenue Station
	North Allen Street Station
	North Manning Boulevard Station
	Quail Street/WAMC Station
	Second Avenue Station
	South Pearl Street & State Street Station
	Steuben Station
	University at Albany, Downtown Campus
	University at Albany, Collins Circle
	Washington Avenue & North Allen Street
	Western Avenue & North Allen Street
	Western Avenue & Quail Street
	Western Avenue & Sprague Place
	West Mall Station, Central Avenue & Hannaford Plaza
Amsterdam	East End 1 (E Main St & Vrooman Ave)
	East End 2 (E Main St & Lark St)
	South Side (Bridge St & Erie St)
	West Side (Guy Park Ave & Swart Ln)
Cohoes	Downtown (Remsen St)

Table 2. (continued)

Municipality	Location
Colonie	Colonie Station (Central Ave)
	Wolf Road & Colonie Center
	80 Wolf Road
Defreestville	Park & Ride
Guilderland	Crossgates Commons
	Crossgates Mid Mall
Latham	Latham Farms
Rensselaer	Rensselaer Rail Station
Saratoga Springs	Congress Park
	Maple Avenue Parking Garage
Schenectady	Downtown/Train Station
	Niskayuna Station
	North Central Station
	Rivers Casino at Harborside Drive
	Veeder/Nott Terrace Station
	Woodlawn Station
Troy	Congress Street Station
	Crane Street & 7th Avenue
	Hedley District Station, King Street & River Street
	Hoosick Street & 6th Avenue
	Riverfront Station (River St & Fulton St)
Watervliet	19th Street Station

3 Community Outreach

Task 2 focused on community outreach efforts. CALSTART partnered with the nonprofit TSTC to develop a plan to solicit feedback on future mobility hub sites and modal options, with a focus on engaging disadvantaged communities (DACs). As part of the outreach, TSTC created a community engagement survey using Google Forms to understand how Capital Region residents prefer to travel and how mobility hubs could better serve their needs. Appendix B provides the survey questions.

To increase community participation, TSTC hosted two focus group meetings, organized four pop-up events, and conducted six one-on-one interviews with community leaders and key stakeholders. TSTC also produced a social media toolkit and survey distribution materials, which are also available in Appendix B.

When the survey closed on January 26, 2023, it had received 185 responses. The survey included two parts:

1. Part 1 captured transportation options and preferences, reasons for using public transit, locations inaccessible via bus, and barriers to access.
2. Part 2 asked respondents which services they would be interested in using, what would encourage their participation, and the best potential locations for a new mobility hub.

Figure 2 presents responses to "What would encourage you to use the bus more in the Capital Region?" and Figure 3 illustrates responses to "Which of the following services are you interested in using more often?"

Figure 2. Survey Responses: Factor that Would Encourage Greater Bus Use

Source: TSTC (2023), see Appendix C

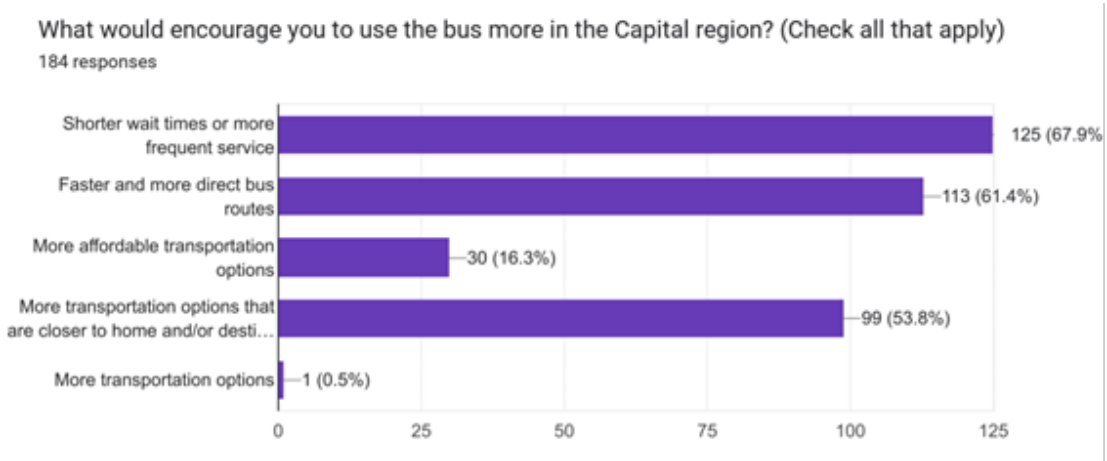
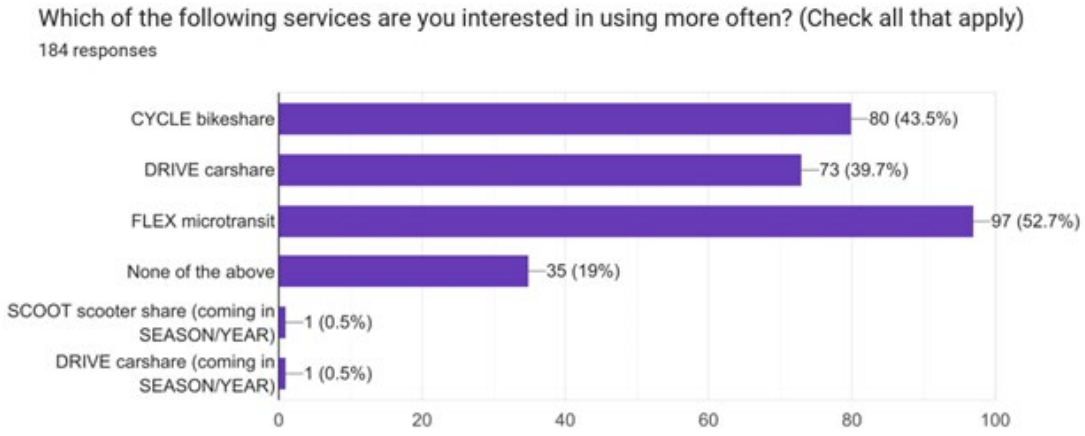


Figure 3. Survey Responses: Interest in Using Mobility Services

Source: TSTC (2023).



One-on-one interviews, guided by a set of questions (Appendix B), included participants from organizations such as Walkable Albany, the Albany Bicycle Coalition, the University at Albany, Downtown Albany Business Improvement District (BID), Amsterdam Industrial Development Agency, and the City of Cohoes. While most interviewees primarily drove, they also used other modes, including biking, walking, and taking the bus. Interviews focused on identifying system gaps, inaccessible locations, and ways to encourage greater use of bikeshare and carshare services.

The two focus group sessions, led by TSTC and CDTA in January 2023, provided project overviews and gathered input on transportation options and mobility hub design.

4 Finalize Partnerships

For Task 3, CALSTART acted as a liaison between the host site municipalities, mobility service providers, and the app provider to formalize agreements for the demonstration project. The objective was to ensure operational alignment, develop implementation strategies with each mobility service provider, and deliver a seamless user experience while maintaining compliance with local regulations and host site requirements.

Host site agreements were executed with Albany, Cohoes, and New York State Parks, Recreation and Historic Preservation (NYS Parks) for the proposed Amsterdam site. Integration of mobility service providers occurred simultaneously with the CDTA's system integration efforts. Transit (app) integrated CDPHP Cycle! into the platform and continues to maintain the connection. Appendix C includes a screenshot of the integration at the University at Albany location.

Because mobility providers were already aligned for this demonstration, the project did not require a formal request for information (RFI) or request for proposal (RFP) process, nor did it necessitate separate service provider agreements.

5 Marketing Strategy

Task 4 developed a marketing strategy for the mobility hubs to increase public awareness, attract users, and promote program utilization. In partnership with CDTA, CALSTART created a logo and brand assets and prepared a marketing campaign.

During project implementation, CDTA determined that a formal marketing strategy was unnecessary. Instead, the team prioritized on-the-ground survey efforts to directly engage with potential users and raise awareness of mobility hub services. CDPHP Cycle!, DRIVE, and BRT services were advertised individually at each hub site as part of CDTA's existing marketing campaigns.

CDTA also continued broader marketing activities for other concurrent mobility initiatives, including the Mobility Gateway in Schenectady. To support in-person outreach, the team added Soofa signs with electronic displays to both mobility hubs, which CDTA installed in January 2024. These signs provide real-time updates on local news, events, weather, and other community information, as shown in Figure 6.

CDTA prominently featured the project on its website to increase visibility and public awareness (Figure 4). Figure 5 presents the project's logo and brand assets.

Figure 4. Project Featured on the Capital District Transportation Authority Website

Source: CDTA (2022).

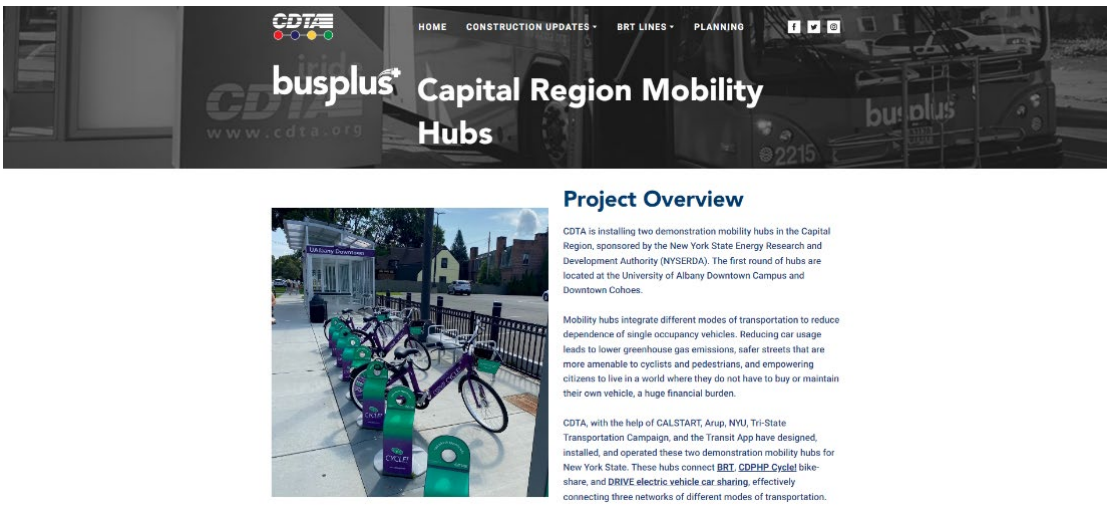


Figure 4. (continued)

Map

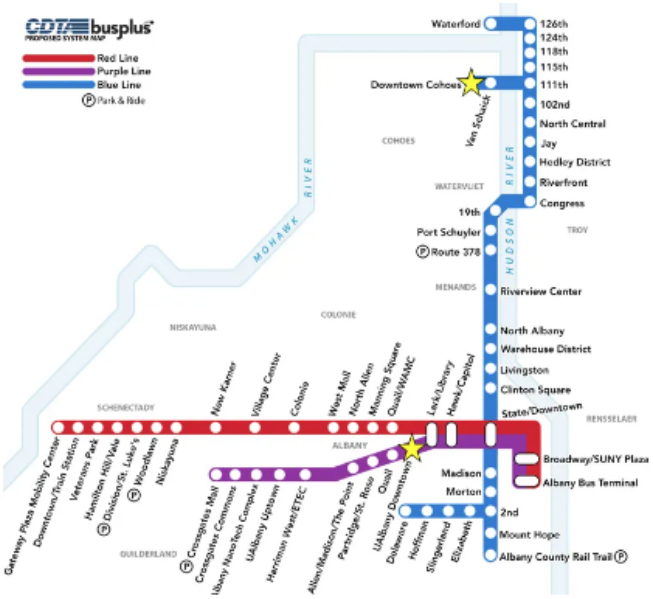


Figure 5. Project Logo and Brand Assets

Source: CDTA (2022).

Figure 6. Soofa Sign: University at Albany Downtown Campus

Source: CDTC (2022).

6 Mobility Hub Implementation

CALSTART, CDTA, and Arup collaborated to design and construct the mobility hubs at downtown Cohoes, the University at Albany Downtown Campus, and the proposed Amsterdam site. Arup led the mobility hub design process using spatial analysis results, while CALSTART and CDTA secured the necessary local permits for each location.

CDTA and host site municipality guided the designs, with Arup supporting the development of design guidelines, review, and consultation. The team developed concept layouts featuring surface-level mobility options informed by the spatial analysis, CDTA and CDTC feedback, and features identified through community outreach in Task 2. Using the Geographic Information System (GIS) mapping software and Adobe Illustrator graphics software, and leveraging existing CDTA files, the team created clear visual representations of each hub layout, components, and existing site features, such as lighting, signage, trees, bike racks, shelters, DRIVE stations. Appendix D includes concept layouts for all three mobility hubs.

The City of Cohoes applied for and obtained the permits required to complete construction, while the University at Albany Downtown Campus did not require permitting. Upon finalizing the designs, the team began constructing the mobility hub sites. CDPHP Cycle! bikes were deployed by summer 2023, and the DRIVE car launched at the downtown Cohoes location in January 2023.

By early November 2023, CDTA completed all major physical construction for the Purple Line, including bus shelters and stations. Soofa signs were installed in mid-December and wrapped in January 2024. The following list and Figures 7 through 13 summarize the mobility improvements made to each site.

- Downtown Cohoes
    - CDPHP Cycle! bikes: Four bike docks for app-controlled Capital Region bikeshare program
    - DRIVE car: One Chevy Bolt car for app-controlled carshare program
    - Electric charger: Charging station for the DRIVE car
    - Soofa sign: Smart solar-powered digital display for regionwide local content
    - Bench: Seating for passengers
- University at Albany Downtown Campus
    - CDPHP Cycle! station: Eight bike docks for app-controlled Capital Region bikeshare program
    - Soofa sign: Smart solar-powered digital display for regionwide local content

Figure 7. DRIVE Charging Station, Bus Shelter, and CDPHP Cycle! Station: Downtown Cohoes

Shown are the DRIVE charging station (far left), bus shelter (center), CDPHP Cycle! station (right).

Source: CALSTART (2023).

Figure 8. CDPHP Cycle! Station, Bus Shelter, and DRIVE Carshare: Downtown Cohoes

Shown are the CDPHP Cycle! station behind bus shelter, with the DRIVE carshare and charging station to the left.

Source: CALSTART (2023).

Figure 9. CDPHP Cycle! Station and Bus Shelter: Downtown Cohoes

Shown is the CDPHP Cycle! station behind bus shelter.

Source: CALSTART (2023).

Figure 10. DRIVE Charging Station: Downtown Cohoes

Source: CALSTART (2023).

Figure 11. Bus Shelter: University at Albany Downtown Campus

Source: CALSTART (2023).

Figure 12. Bus Shelter and CDPHP Cycle! Station: University at Albany Downtown Campus

Shown are the bus shelter (left) and CDPHP Cycle! station (right).

Source: CALSTART (2023).

Figure 13. CDPHP Cycle! Station: University at Albany Downtown Campus

Source: CALSTART (2022).

In August 2023, the project team removed the proposed Amsterdam site from the Capital Region Mobility Hubs project. NYS Parks, which owned the proposed site, requested a licensing agreement for CDTA's equipment, a process expected to cause delays. To avoid postponing the project, the team decided to proceed without the Amsterdam site. CDTA plans to pursue a mobility hub in Amsterdam independently with separate funding and a different timeframe.

7 Mobility Hub Operation

To assess the mobility hub sites' impact, CALSTART coordinated data collection and analysis efforts with CDTA and NYU. NYU led the survey development and data analysis, with support from CALSTART and CDTA, and produced the *Capital Region Mobility Hub Impact Assessment Report*, which incorporated monthly performance reports.

7.1 Performance and Impact Assessment

NYU developed the survey on Qualtrics, with input and approval from CALSTART, CDTA, and NYSERDA. The study aimed to gather real-world data on the hubs' impact and consisted of two parts: trip details and traveler information.

The trip part of the survey included eight questions covering trip purpose, frequency, origin and destination, trip mode before and after using the hub, cost, alternative transport modes, and motivations for using the mobility hub. NYU gathered people's intention to use certain means of transport available at the hub. For trip origin and destination, NYU asked respondents to enter the full address or fill in the Zone Improvement Plan (ZIP) Code to get an approximate location. For the trip monetary cost question, respondents were asked to enter a dollar amount, while multiple-choice questions were used for the rest of the survey. The traveler information part of the survey asked seven questions about demographic information, including gender, age, employment status, household size, income level, car ownership, and CDPHP Cycle! membership. Appendix E provides the complete questionnaire.

Survey collection began in fall 2023 at the University at Albany Downtown Campus and in downtown Cohoes. Outreach methods included a QR code linked to the Qualtrics survey; printed canvassing forms; posters at both locations; direct outreach by CDTA, CDTC, and CALSTART; and emails to DRIVE users. The team targeted 30 responses for a statistically significant analysis and exceeded this goal, gathering 42 surveys evenly split between the two sites. The survey remained open from October to December 2023.

In January 2024, NYU compiled the results and presented key findings in the *Capital Region Mobility Hub Impact Assessment Report.* The report addresses three objectives:

1. Designing the survey and conducting on-site data collection
2. Calibrating mobility hub-related coefficients based on the pretrained model
3. Assessing impacts using the calibrated model

NYU evaluated postpilot mobility hub demand and usage against baseline conditions, assessing increases in transit activity, reductions in VMT, environmental impacts, and gains in consumer surplus.

Table 3. Traveler Information for Mobility Hub Users

Category	Responses
Gender	52.4% female
	42.9% male
	4.7% preferred not to say.
Age	11.9% ages 19–20
	11.9% ages 21–24
	14.3% ages 25–34
	9.5% ages 35–44
	11.9% ages 45–54
	16.7% ages 55–64
	14.3% ages 65–74
	2.4% older than 75
	7.1% preferred not to say
Employment Status	42.9% working full- or part-time
	16.7% full- or part-time student
	21.4% retired
	9.5% not working
	7.1% both working and park-time student
	2.4% preferred not to say
Household Size	40.5% single-member household
	26.2% two-member household
	9.5% three-member household
	14.3% four-member household
	9.5% household with more than four members
Household Annual Income	9.5% less than $10K
	9.5% $10K–$15K
	14.3% $15K–$25K
	4.8% $25K–$35K
	11.9% $35K–$50K
	9.5% $50K–$75K
	4.8% $75K–$100K
	11.9% more than $100K
	23.8% preferred not to say
Car Ownership	47.6% did not have any private vehicle
	33.3% owned one private vehicle
	19.0% owned more than one private vehicles
Bicycle or CDPHP Cycle! Membership	63.4% had neither a bicycle nor CDPHP Cycle! membership
	22.0% had a bicycle but no CDPHP Cycle! membership
	7.3% had a CDPHP Cycle! membership but no bicycle
	7.3% had both a bicycle and a CDPHP Cycle! membership

Table 4. Trip Details Using (or Potentially Using) the Mobility Hub

Category	Responses
Motivations for Using the Hub[a]	18 responses: To decrease overall travel time
	16 responses: To decrease overall travel cost
	7 responses: To incorporate exercise into travel plans
	3 responses: To make it a more enjoyable trip
	5 responses: Ability to plan and pay for the entire trip in one app
	8 responses: Environmental choice
	7 responses: Other reasons
Trip Purpose	18.2% commuting to or from work
	25% commuting to or from school
	6.8% leisure or exercise
	34.1% shopping or errands
	15.9% other purpose
Trip Frequency	9.1% conducted such a trip for the first time
	4.5% conducted such a trip 1–5 days per year
	6.8% conducted such a trip 6–11 days per year
	13.6% conducted such a trip 1–3 days per month
	36.4% conducted such a trip 1–3 days per week
	29.5% conducted such a trip 4 or more days per week.
Trip Origin and Destination	Poor data quality: respondents provided a mix of full addresses, place names, and ZIP Codes.
Primary Trip Mode	Most respondents took a bus before or after entering the hub.
	No respondents reported using scooters or bikes (possibly due to sample bias; see Figure 13).
Trip Monetary Cost	Poor data quality: reported costs ranged from $0 to $5, with some blank values.

[a] Based on 42 responses, respondents could select multiple reasons.

As the results show, over one-half of respondents were female, 42.9% worked full-time or part-time, 40.5% came from single-family households, and 47.6% did not own a private vehicle. For trip purpose, over one-third of respondents used the mobility hub for shopping and errands and one-fourth commuted to or from school. For trip frequency, 36.9% took a trip like this 1–3 days per week, and 29.5% took a trip like this 4 or more days per week.

Figure 14. Transport Mode from the Mobility Hub to the Destination

Source: Chow and Ren (2024).

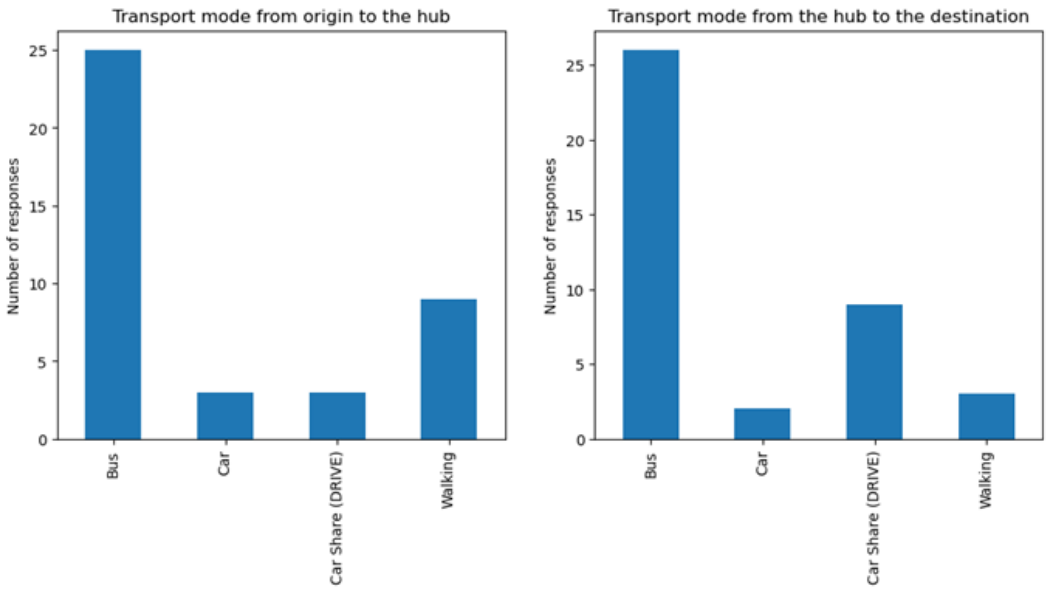


Figure 14 shows that while CDPHP Cycle! and DRIVE (available only at the downtown Cohoes location) operated at the same location as the BRT system, Capital Region residents continued to rely on the bus as their primary mode of transportation. However, because survey collection began in the fall when temperatures dropped, this may have discouraged participation in CDPHP Cycle!

Using its calibrated model, NYU measured the mobility hubs' impact on mode shift, VMT, carbon emissions, and consumer surplus. At the University at Albany Downtown Campus mobility hub, 0.043% of potential trips became multimodal with a transfer at the hub, resulting in 8.83 trips per weekday. Additionally, 5.94 trips per day shifted from private vehicle to multimodal transportation. Of the multimodal trips, NYU split the mode combination (e.g., a car-hub-bus trip counted as two half trips, one with private a vehicle and one with public transit) and calculated the mode share: 53.50% used bus, 19.47% used a private car, 17.89% used a bike or CDPHP Cycle!, and 9.14% walked. Bus ridership also increased by 4.45 trips per day. Table 3 shows these figures for the University at Albany Downtown Campus. At the downtown Cohoes mobility hub, 0.1128% of potential trips became multimodal with a transfer at the hub, resulting in 6.17 trips per day. Additionally, 3.46 trips per day shifted from private vehicle to multimodal. Of these multimodal trips, 49.41% of travelers used the bus, 14.44% used a private vehicle, 18.82% used carshare (DRIVE), 8.13% used a bike or CDPHP Cycle!, and 9.19% walked. Bus ridership increased by 2.52 trips per day at this hub. Table 4 displays these impacts.

Table 5. Impacts on the Mode Shift of Potential Trips: University at Albany Downtown Campus

Source: Chow and Ren (2024).

	Trips/day (before)	Trips/day (after)	Trips/day (changed)	Proportion (before)	Proportion (after)	Proportion (changed)
Direct trips without using the mobility hub						
Private_vehicle	13,798	13,792	-5.94	67.27%	67.24%	-0.0491%
Transit	634.8	634.5	**-0.27**	3.10%	3.09%	-0.0023%
On_demand_vehicle	481.6	481.3	-0.21	2.35%	2.35%	-0.0017%
Biking	151.0	150.9	-0.06	0.74%	0.74%	-0.0005%
Walking	1,785.5	1,784.3	-0.77	8.71%	8.70%	-0.0064%
Carpool	3,660.0	3,658.6	-1.57	17.84%	17.84%	-0.0130%
Total	20,511	20,502	8.83	100%	99.95%	-0.043%
Multimodal trips using the mobility hub						
Bus (Transit)	—	**4.72**	—	—	53.50%	—
Car (Private_vehicle)	—	1.72	—	—	19.47%	—
DRIVE (Carpool)	—		—	—		—
Bike & CDPHP Cycle!	—	1.58	—	—	17.89%	—
Walking	—	0.81	—	—	9.14%	—
Total	—	8.83	—	—	100%	—

Table 6. Impacts on the Mode Shift of Potential Trips: Downtown Cohoes

Source: Chow and Ren (2024).

	Trips/day (before)	Trips/day (after)	Trips/day (changed)	Proportion (before)	Proportion (after)	Proportion (changed)
Direct trips without using the mobility hub						
Private_vehicle	3,069.5	3,066.0	-3.46	56.12%	56.05%	-0.0633%
Transit	467.12	466.59	**-0.53**	8.54%	8.53%	-0.0096%
On_demand_vehicle	32.48	32.45	-0.04	0.59%	0.59%	-0.0007%
Biking	20.65	20.63	002	0.38%	0.38%	-0.0004%
Walking	910.59	909.57	-1.03	16.64%	16.63%	-0.0188%
Carpool	969.66	968.57	-1.09	17.73%	17.71%	-0.0200%
Total	5,470	5,464	-6.17	100%	99.89%	-0.1128%
Multimodal trips without using the mobility hub						
Bus (Transit)	—	**3.05**	—	—	49.41%	—
Car (Private_vehicle)	—	0.89	—	—	14.44%	—
DRIVE (Carpool)	—	1.16	—	—	18.82%	—
Bike & CDPHP Cycle!	—	0.50	—	—	8.13%	—
Walking	—	0.57	—	—	9.19%	—
Total	—	6.17	—	—	100%	—

As shown in Table 5, NYU found that the University at Albany Downtown Campus mobility hub reduces car VMT by 55.83 miles per day (over 20,000 miles per year) and decreases carbon emissions by 22.33 kilograms per day (8.15 metric tons per year). Table 6 shows that the downtown Cohoes mobility hub reduces car VMT by 36.06 miles per day (over 13,000 miles per year) and decreases carbon emissions by 14.45 kilograms per day (5.27 metric tons per year). Combined, the mobility hubs reduce car VMT by 92.75 miles per day, or 33,853 VMT per year. Furthermore, NYU found that the corresponding GHG emissions reduction totaled 36.78 kilograms per day, or 13.42 metric tons of carbon emissions (MTCE) per year, roughly equivalent to the annual carbon emissions from the energy use of two households. Based on these results, NYU concluded that each mobility hub installation has the potential to reduce carbon emissions equivalent to approximately one household's annual energy use.

Table 7. Impacts on Vehicle Miles Traveled and Carbon Emissions: University at Albany Downtown Campus

Source: Chow and Ren (2024).

	VMT (before)	VMT (after)	VMT (changed)	Reduced Carbon Emission
Counting per day				
Private_vehicle	100,550 miles	100,508 miles	-41.57 miles	-16.63 kilograms
Carpool	24,509 miles	24,495 miles	-14.26 miles	-5.70 kilograms
Total vehicles	125,059 miles	125,003 miles	**-55.83 miles**	**-22.33 kilograms**
Counting per year				
Private_vehicle	$3.670*10^7$ miles	$3.668*10^7$ miles	-15.17 thousand miles	-6.07 metric tons
Carpool	$8.946*10^6$ miles	$8.941*10^6$ miles	-5.20 thousand miles	-2.08 metric tons
Total vehicles	$4.565*10^7$ miles	$4.563*10^7$ miles	**-20.37 thousand miles**	**-8.15 metric tons**

Table 8. Impacts on Vehicle Miles Traveled and Carbon Emissions: Downtown Cohoes

Source: Chow and Ren (2024).

	VMT (before)	VMT (after)	VMT (changed)	Reduced Carbon Emission
Counting per day				
Private_vehicle	28,573 miles	28,536 miles	-36.92 miles	-14.79 kilograms
Carpool	7,311 miles	7,312 miles	+0.86 miles	+0.34 kilograms
Total vehicles	35,884 miles	35,848 miles	**-36.06 miles**	**-14.45 kilograms**
Counting per year				
Private_vehicle	$1.043*10^7$ miles	1.042*107 miles	-13.48 thousand miles	-5.39 metric tons
Carpool	$2.669*10^6$ miles	2.669*106 miles	+0.32 thousand miles	+0.12 metric tons
Total vehicles	$1.310*10^7$ miles	1.308*107 miles	**-13.16 thousand miles**	**-5.27 metric tons**

Table 7 illustrates the mobility hubs' effect on consumer surplus. NYU defined consumer surplus as an economic measure of consumer benefits. NYU found that the University at Albany Downtown Campus mobility hub increased consumer surplus of $0.1950 per potential trip, totaling $4,000 per day with 20,511 trips per day. At the Downtown Cohoes hub, consumer surplus increased by $0.3185 per potential trip, totaling $1,742 per day with 5.470 trips per day.

Table 9. Impacts on Consumer Surplus of Potential Trips

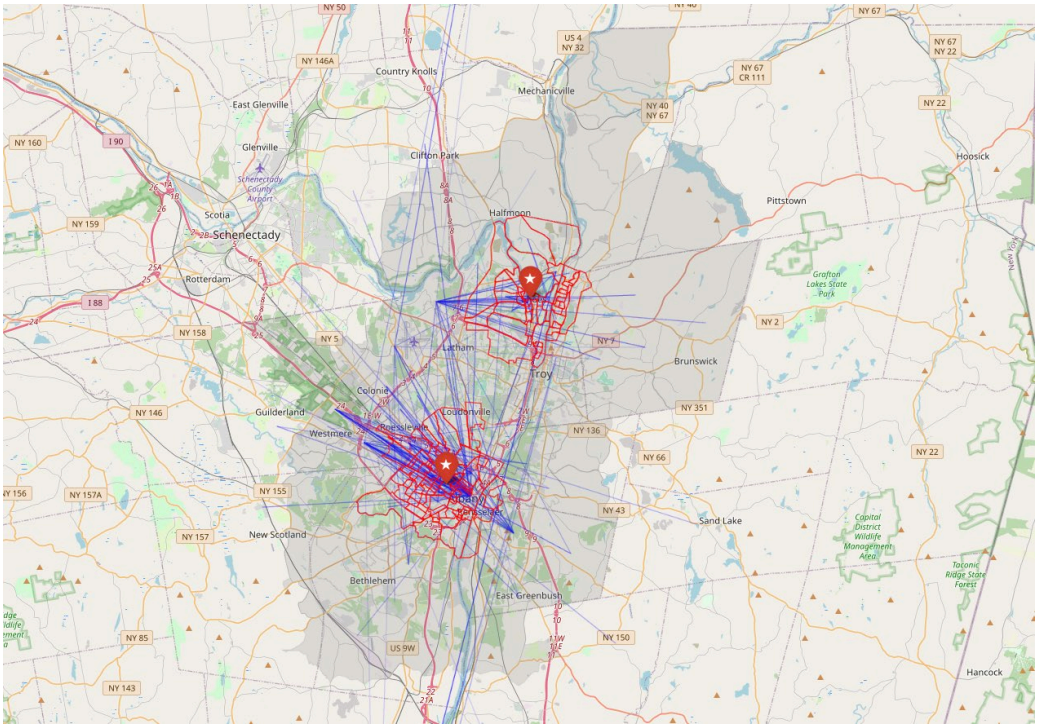
Source: Chow and Ren (2024).

	University at Albany Downtown Campus	Downtown Cohoes
Change of consumer surplus	+$0.1950/trip	+$0.3185/trip
Total number of trips	20,511 trips/day	5,470 trips/day
Total dollar amount	$4,000/day	$1,742/day

NYU interpreted that the mobility hub created economic value for travelers within the vicinity of the hubs shown in Figure 14, equivalent to the dollar amount per trip, regardless of whether they used the hub.

Figure 15. Study Area and Potential Trip Origin-Destination Pairs for Impact Assessment

Source: Chow and Ren (2024).



In addition to evaluating current pricing policies, NYU applied its calibrated model to new scenarios. It assessed a situation where bus service was free for trips using the mobility hub. Table 8 shows the resulting changes in mode share, VMT, carbon dioxide emissions, consumer surplus, and total hub revenue. NYU projected a total increase of 4.93 bus trips per day at the mobility hubs, a 63% increase in daily ridership, a further annual reduction of 9,656 VMT per year, carbon emission reductions of 3.99 tons per year, and a $0.06 per trip increase in consumer surplus. However, this came at the cost of $30.75 per day in lost bus fare revenue.

Table 10. Change of Impacts if Bus Is Free at the Mobility Hub

Source: Chow and Ren (2024).

	Trips/day (before)	Trips/day (after)	Trips/day (changed)	Proportion (before)	Proportion (after)	Proportion (changed)
Multimodal trips using the mobility hub (UAlbany Downtown Campus)						
Bus (Transit)	4.72	7.98	+3.26	53.50%	71.51%	+18.01%
Car (Private_vehicle)	1.72	1.40	-0.32	19.47%	12.57%	-6.90%
DRIVE (Carpool)	0	0	0	0	0	0%
Bike & CDPHP Cycle!	1.58	1.15	-0.43	17.89%	10.26%	-7.63%
Walking	0.81	0.63	-0.18	9.14%	5.66%	-3.48%
Total	8.83	11.16	+2.33	100%	100%	0%
Impact assessment (UAlbany Downtown Campus)						
	Before			**After**		
Reduced VMT	20,377 vehicle-miles/year			23,542 vehicle-miles/year		
Reduced $C0_2$ emission	8.15 tons/year			9.42 tons/year		
Increased consumer surplus	$0.1950/trip			$0.2503/trip		
Total hub revenue	$34.49/day			$15.73/day		
Multimodal trips without using the mobility hub (Downtown Cohoes)						
Bus (Transit)	3.05	4.72	+1.67	49.41%	67.87%	+18.46
Car (Private_vehicle)	0.89	0.56	-0.33	14.44%	7.98%	-6.46%
DRIVE (Carpool)	1.16	0.86	-0.30	18.82%	12.31%	-6.51%
Bike & CDPHP Cycle!	0.50	0.34	-0.16	8.13%	4.96%	-3.17%
Walking	0.57	0.48	-0.09	9.19%	6.89%	-2.30%
Total	6.17	6.96	+0.79	100%	100%	0%
Impact assessment (Downtown Cohoes)						
	Before			**After**		
Reduced VMT	13,475 vehicle-miles/year			19,966 vehicle-miles/year		
Reduced $C0_2$ emission	5.27 tons/year			7.99 tons/year		
Increased consumer surplus	$0.3185/trip			$0.3746/trip		
Total hub revenue	$24.44/day			$12.45/day		

NYU's calibrated model results showed that the University at Albany hub generated 8.83 multimodal trips per day (0.0430% of potential trips) and the Cohoes hub generated 6.17 multimodal trips per day (0.1003% of potential trips). On weekdays, the University at Albany hub increased bus trips by 4.45, reduced VMT by 55.83 miles, lowered carbon emissions by 22.33 kilograms, and raised consumer surplus by $0.1950 per trip. On weekdays, the Cohoes hub increased bus trips by 2.52, reduced VMT by 36.06 miles, lowered carbon emissions by 14.45 kilograms, and raised consumer surplus by $0.3185 per trip. Appendix E contains the full *Capital Region Mobility Hub Impact and Assessment Report*.

7.2 Lessons Learned and Scalability

As the Capital Region Mobility Hubs project concluded, the project team gained valuable lessons and considerations for mobility hub implementation and analysis. Despite challenges, the team met the project's goals.

As mentioned, the proposed Amsterdam site was not selected due to licensing agreements. CDTA is determining how to potentially implement a mobility hub in Amsterdam. This taught the team the importance of confirming site control and permitting for non-city-owned property well in advance. Conservative permitting timelines proved critical for project success.

Another lesson learned involved the time and staff power needed to collect a statistically significant number of survey responses. Although the team reached its goal, NYU estimated that about 100 surveys would be required for a stable, separate mode choice model. For future demonstrations, a longer collection period, higher budget, and additional survey staff would better support the response target. On-the-ground survey collection was crucial to achieving the required number of responses.

The project team faced challenges and adjustments throughout the timeline. One issue CDTA encountered involved securing charging infrastructure and carshare agreements for a DRIVE station within the demonstration's timeframe. Future locations should develop vehicle procurement and rollout plans early to avoid similar issues.

The process to implement and evaluate two mobility hubs, combined with the lessons learned, can inform a replicable framework. The site selection criteria, scoring rubric, and weights that Arup had developed can help other transportation agencies and organizations identify and rank potential mobility hub locations in their service areas.

To secure community participation, early outreach is crucial for gathering input and incorporating feedback in a meaningful way. The community engagement efforts completed by TSTC, with CDTA's support, can also be replicated. The survey, one-on-one meetings, pop-up events, and focus groups were necessary to understand community needs and mobility preferences throughout the Capital Region. After completing site selection and outreach, Arup developed concept layout maps for all three mobility hubs based on community input. These layouts can serve as templates for visualizing future mobility hubs and depicting site changes. Lastly, the *Capital Region Mobility Hub Impact Assessment Report* can guide future mobility hub impact analysis.

CDTA plans to implement mobility hubs using a similar approach to this demonstration. The analysis will identify candidate sites by evaluating transit ridership, transfer opportunities, proximity to bike facilities, and the walkability and bikeability of the surrounding area.

8 Conclusion

This report summarizes the steps the project team took to successfully implement and analyze two mobility hubs in the Capital Region. The goals of this project included supporting BRT service, identifying stakeholder needs, lowering GHG emissions, enhancing the usability of innovative mobility solutions, and providing a template for replication. The project team accomplished these goals, and the steps taken offer a model for other transit agencies.

Mobility hubs offer significant benefits in terms of climate, equity, and mobility, as demonstrated in NYU's Capital Region Mobility Hub Impact Assessment Report. By expanding multimodal transportation options at both hub locations, the project reduced VMT, decreased GHG emissions, and increased consumer surplus. Specifically, NYU concluded that the University at Albany Downtown Campus mobility hub reduced carbon emissions by 22.33 kilograms per weekday and the downtown Cohoes mobility hub decreased carbon emissions by 14.45 kilograms each weekday, for a combined annual reduction of 12 metric tons. The University at Albany hub also led to an annual decrease of 20,000 VMT and the downtown Cohoes hub achieved a reduction of 13,000 VMT. The Capital Region Mobility Hub Impact Assessment Report quantifies the benefits of mobility hubs in a manner that supports future project development.

9 References

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Appendix A. Site Selection Materials

A.1 Site Selection Data Request

ARUP

File Note

Project title	Capital District Mobility Hubs
Job number	288040
File reference	04-05
cc	
Prepared by	Vincent Riscica
Date	June 21, 2022
Subject	Site Selection Data Request

77 Water Street New York, NY 10005 USA
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As part of the site selection process Arup will develop a list of prioritized criteria to utilize in the spatial multi-criteria analysis. This list will be developed based on the availability and applicability of the following data sets. Further, some data (i.e. sidewalk furniture) may be applied qualitatively, following the spatial analysis.

The following data sets may be utilized (if available) for the site selection study. The table includes the title of the dataset, its potential applicability, its source, if known, and whether Arup can access it directly:

	Data Set	Applicability	Source	Access
Mobility Services	Bus infrastructure (routes & stops)	Proximity – mobility hubs will ideally be located at or near existing stops	CDTA	Accessible
	Bus frequency & ridership	Utilization – mobility hubs may experience higher utilization in high-frequency / high-ridership areas	CDTA	Frequency can be determined from schedule data available here – need confirmation of accuracy Ridership – requested
	Bikeshare stations & utilization	Impact – mobility hubs will better serve users if they connect fixed and flexible mobility services (i.e. buses and bike share)	CDTA/CDP HP Cycle!	Stations - Confirm accuracy Ridership – requested
	Ride-hailing & car-sharing services and infrastructure	Impact – mobility hubs will better serve users if they connect fixed and flexible mobility services (i.e. buses and ride-haling / car-sharing).	TNCs, Car-sharing companies, CDTA	Requested

ARUP

Job number 288040

Date June 21, 2022

	Data Set	Applicability	Source	Access
Existing Infrastructure	Streets, curbs, bike lanes (existing & planned), sidewalks, & plazas	Accessibility – ability to map proximity by travel time depends on an accurate existing spatial network Proximity – potential sites closer to bike lanes will be more favorable	CDTA	Requested
	Previously identified: excess ROW, mobility hub sites	Distribution – ensure mobility hubs sites are distributed and not duplicative Analysis – rank/score previously identified locations	CDTA	Requested
	Curb regulations	Feasibility – ensure mobility hubs avoid immovable dedicated curb space (ADA, emergency, etc.)	CDTC	Requested
Urban Design	Tree canopy, land coverage, streetlights, benches, amenities/furniture, land use	Impact – understanding how potential mobility hubs enhance or improve the existing public realm	CDTA	Requested
Demographics	Disadvantaged Communities (DACs)	Equity – location within and/or proximity to DACs will be advantageous as they spread benefits to historically underserved areas	NYSERDA	Accessible
	Mode share	Accessibility – coupled with bus infrastructure and ridership, mode share data can inform where transit use is feasible but limited, providing mobility hubs in these areas may help bridge first/last-mile gaps.	Census	Accessible
	Vehicle ownership	Equity – as an additional layer to NYS's DACs, vehicle ownership can help identify where people may be reliant on other people or modes for mobility, providing mobility hubs in these areas may help bridge first/last-mile gaps.	Census	Accessible

A.2 Site Evaluation

ARUP

Memorandum

To	Al Beatty (CALSTART)
Date	September 9, 2022
Copies	
Reference number	
From	Ethan Ebinger, Andrew Kay, James Francisco, Varanesh Singh
File reference	
Subject	Task 1.2: Site Evaluation with Host Municipalities - Refined Scoring Rubric and Criteria Weighting

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Executive Summary

The Capital Region Mobility Hubs Demonstration Project aims to plan, design, implement, and evaluate two to three demonstration hubs supporting Bus Rapid Transit (BRT) (or high-frequency bus) service in the Capital Region. In support of Task 1.2: Site Evaluation with Host Municipalities, Arup conducted a high-level analysis to determine which sites are well-suited for Mobility Hub interventions.

A scoring rubric was generated based on demographic, land use, and travel characteristics that reflect the intended characteristics and uses of the Mobility Hub. The rubric, with weights for each criterion, is displayed in Table 1. The criteria and weighting in this rubric were agreed upon with the project team following five meetings during July, August, and September 2022 that involved review and discussion.

Table 1: Scoring Rubric and Weights

Criteria	Description	Metric(s)	Weight
Utilization	How likely the Mobility Hub is to be utilized	Concentrations of non-auto users	20%
Equity	How well the Mobility Hub serves disadvantaged communities	Proximity to disadvantaged communities (DACs)	17.5%
		Proximity to employment centers for disadvantaged communities (DACs)	
Community Resources	How likely the Mobility Hub is to enhance access to community resources	Proximity to places of interest	15%
Connectivity	How integrated the Mobility Hub is with existing transportation networks	Density of bicycle facilities	12.5%
		Location within FLEX program region	

Criteria	Description	Metric(s)	Weight
Distribution	How well distributed the Mobility Hub is with respect to other hubs	Distance from existing and planned transportation hubs	12.5%
Walkability	What percent of the local network is walkable	Walk access using scoring tool	12.5%
Safety	How the Mobility Hub increases safety of users	Proximity to crashes	10%

This technical memorandum describes each criterion in the scoring rubric, including the data and resources used, the scoring process, and weighting.

Criteria Scoring

The scoring rubric outlined in Table 1 was developed in concert with CALSTART and Capital District Transit Authority (CDTA) to rank prospective locations for mobility hubs. Each candidate site is scored based on the criteria in Table 1. To derive the final score, component scores are combined by normalizing them to a value between zero and one and weighted to reflect each criterion's relative importance in the planning process.

These seven criteria were developed based on the availability of data and applicability to the site selection study. Up to nine criteria were considered but ultimately two were removed due to lack of applicability to project goals. The criteria and weights were agreed upon with the project team following five meetings during July, August, and September 2022.

A screening list of 50 candidate sites (defined as locations that have clusters of bus ridership over 100 people per day) was identified by CDTA and shared with Arup on August 30, 2022. These candidate site locations can be scored based on the criteria in Table 1 to develop a short list of locations for further consideration as a Mobility Hub.

This section describes the rationale, data sources, data processing, and scoring methodology for each of the seven selected criteria in more detail. Additional information on the criteria and scores is provided in the Appendix.

Utilization

The utilization criterion is designed to give preference to locations with higher concentrations of zero-car households. These areas are likely to be good candidates for improved connectivity to public and shared transportation resources.

Data was downloaded from Table B08201 (Household Size by Vehicles Available) of the 2014-2019 Census American Community Survey (ACS) at the block-group level for all counties with a candidate site (Albany, Rensselaer, Schenectady, Saratoga, Montgomery). These counties are defined as the study region.

The scoring was developed following a methodology used by the Delaware Valley Regional Planning Commission (DVRPC).[1] Numerical scoring is determined by number standard deviations relative to an indicator's regional average. The data is split and assigned the following scores:

- well below average (score of 0);
- below average (score of 1);
- average (score of 2);
- above average (score of 3); and
- well above average (score of 4)

Block groups within one-half standard deviation of the regional mean value are considered average and receive a score of two. Block groups with a value up to 1.5 standard deviations below the regional mean are considered below average and receive a score of one, and those with values up to 1.5 standard deviations above the mean fall are considered above average and receive a score of three. The remaining block groups falling more than 1.5 standard deviations below or above the mean are assigned scores of zero to four, respectively.[2] See the Appendix for detailed distributions developed for the utilization criterion.

All block groups in the region were assigned a score based on the above criteria. Mobility Hubs were scored based on the score assigned to the block group that they are within. This score was then normalized to fall within a range from zero to one.

Potential for utilization was determined to be of high importance for siting Mobility Hubs and is therefore weighted highest among the criteria, contributing to 20% of each site's final score.

Equity

The equity criterion is designed to give preference to locations that serve disadvantaged communities (DACs). These areas are likely to be good candidate sites because they can benefit communities that reply on connectivity to public and shared transportation resources.

The equity criterion is comprised of two metrics. The first metric is home equity, where there is increased home-based equity if the Mobility Hub is within a DAC. The second is work equity, where there is increased work-based equity if the Mobility Hub is in block group with above average share of jobs originating in DAC.

[1] https://dvrpc.org/webmaps/IPD/#page2

[2] In cases where the regional average value for an indicator is low in relation to a large standard deviation such that "below average" locations contain block groups with 0% of an indicator's designated population, the block group with estimates of zero are manually assigned to "well below average", instead of "below average". Tracts with no population are also assigned to "well below average".

Data for this criterion came from NYSERDA's DAC map and from the 2019 Longitudinal Employer-Household Dynamics (LEHD) Origin-Destination Employment Statistics (LODES).[3,4]

The home equity metric identified the location of the Mobility Hub with respect to the location of DACs. If within a DAC, a score of one was assigned, otherwise a score of zero.

The work equity metric followed a methodology similar to the utilization metric. The Origin-Destination table of LODES data was used to identify the number of jobs in each block group within the study region (Albany, Rensselaer, Schenectady, Saratoga, and Montgomery County) and the origin block groups for those jobs. For each block group, the number of jobs originating in a DAC was divided by the total number of jobs. This value, or the percentage of jobs that originate in a DAC, was then split into the following five scores, as determined by standard deviations relative to the regional average:

- well below average (score of 0);
- below average (score of 1);
- average (score of 2);
- above average (score of 3); and
- well above average (score of 4)

See the Appendix for detailed distributions developed for the equity criterion.

All block groups in the region were assigned a score based on the above criteria. Mobility Hubs were scored based on the score assigned to the block group that they are within. This score was then normalized to fall within a range from zero to one.

The home equity and work equity scores were added together (equal weight) and normalized again to fall within a range from zero to one. Incorporating home and work equity into the siting of the Mobility Hub was determined to be of high importance and is therefore weighted high among the criteria, contributing to 17.5% of each site's final score.

Community Resources

The community resources criterion is designed to give preference to locations with access to a range from places of interest. These areas have existing community resources and places of interest and are likely to be enhanced by improved connectivity to public and shared transportation resources.

Seven types of places of interest were identified and downloaded from publicly accessible datasets. Places of interest identified from OpenStreetMap include commercial and retail locations, parks and open spaces, community centers, libraries, schools, post-secondary schools, and places of worship.[5] Places of interest identified from the National Center for Educational Statistics (NCES) include schools

[3] https://www.nyserda.ny.gov/ny/disadvantaged-communities

[4] https://lehd.ces.census.gov/data/

[5] https://wiki.openstreetmap.org/wiki/Map_features

(public and private) and post-secondary schools.[6] Places of interest were saved as Point geospatial data, except for parks and open spaces, which were saved as Polygons.

This criterion measures the proximity to multiple places of interest, so the scoring is based on spatial distance between the Mobility Hub and the places of interest. For each Mobility Hub, all the places of interest between a half-mile and one mile were selected, and score of one was assigned for each type of place of interest (maximum seven) within that region. Candidate sites could therefore receive a score between zero and seven, which was normalized to fall within a range from zero to one. The half-mile to one-mile buffer region around each Mobility Hub was determined because this area is beyond a short walking distance (half-mile) but within the first- or last-mile and can be better served by access to multiple modes at a Mobility Hub.

The impact of access to community resources was determined to be of medium to high importance, and therefore contributes 15% towards each site's final score.

Connectivity

The connectivity criterion is designed to give preference to locations that have existing connections to transportation infrastructure in the region. Areas that have connections to bicycle infrastructure and additional transit services are likely to be good candidate sites for a Mobility Hub and will benefit from additional public and shared transportation resources.

This criterion is comprised of two metrics. The first is the density of bicycle facilities, where increased bicycle facility density increases connectivity. Data on existing regional trails (off-road), cycle tracks, bike lanes, sparrows, and other bicycle facilities was provided by CDTA. For each Mobility Hub, all bicycle facilities within a half-mile were selected and used to assign the following scores:

- +4 for every off-road bicycle facility;
- +3 for every protected bicycle facility;
- +2 for every signed bicycle lane; and
- +1 for every other bicycle facility

The total score was then normalized to a range from zero to one, with respect to the maximum observed value.

The second metric considers access to additional transit services. All candidate Mobility Hub locations are existing or planned bus stops on the CDTA or Montgomery County Fixed Bus service. Therefore, all Mobility Hub locations are also served by STAR, the region's paratransit service that serves riders on-demand within a half-mile of any bus route.[7] This metric incorporates the FLEX program service regions, data for which were provided by CDTA.[8] Mobility Hubs were assigned a score of one if they are within the FLEX program region, otherwise they were assigned a score of zero.

[6] https://nces.ed.gov/programs/edge/geographic/schoollocations

[7] https://www.cdta.org/star-program

[8] https://www.cdta.org/flex

The bicycle density and FLEX program location scores were added together (equal weight) and normalized again to fall within a range from zero to one. Increased connectivity was determined to be of medium importance, and therefore contributes 12.5% towards each site's final score.

Distribution

The distribution criterion is designed to give preference to locations that are not near other Mobility Hubs. The goal of this criteria is to encourage increased distribution of facilities and resources, so the metric used for this criteria measures distance from existing and planned hubs.

There is only one hub currently planned, but the criteria will enable distribution of future sites when building out the network. The location of the currently planned hub, Gateway Plaza in Schenectady, was provided by CDTA.

Mobility Hubs are assigned a score of zero if they are within one mile of an existing or planned hub, otherwise they are assigned a score of zero. This distance was selected based on the distribution of bus stops within the region. The distribution criterion was determined to be of medium importance, and therefore contributes 12.5% towards each site's final score.

Walkability

The walkability criterion assesses pedestrian connectivity around each potential site. It is envisaged that the Mobility Hubs will be designed as multi-modal connection points, and walk access remains an important factor among other micro-mobility opportunities.

This criterion uses a methodology previously developed by Arup which measures the proportion of the street network within a half-mile radius of the site can be traversed by pedestrians. The methodology was developed using the isochrone mapping capabilities of the OSMnx Python package.[9] This package enables the user to download geospatial data from OpenStreetMap, such as the walkable street network within the study region and use that data to perform network analyses.[10]

The walkability criterion scores each Mobility Hub from zero to one, where zero is unwalkable (no access on network) and one is perfectly walkable (can reach all destinations within a half-mile). Pedestrian connectivity and walk access were determined to be of medium importance, and therefore contributes 12.5% towards each site's final score.

Safety

The safety criterion is designed to give preference to locations that can benefit from additional physical and visual safety improvements. These additions are desirable integrations in the design phase that may be included within development of the Mobility Hub. Siting the Mobility Hub near a location that is currently unsafe may encourage increased transit ridership and Mobility Hub utilization.

The safety criterion identifies high crash locations, data for which was provided by DMV/NYS Open Data and the City of Amsterdam Police Department. Processing, cleaning, and additional geocoding

[9] https://github.com/gboeing/osmnx-examples/blob/main/notebooks/13-isolines-isochrones.ipynb

[10] Boeing, G. 2017. OSMnx: New Methods for Acquiring, Constructing, Analyzing, and Visualizing Complex Street Networks. *Computers, Environment and Urban Systems* 65, 126-139. doi:10.1016/j.compenvurbsys.2017.05.004

was required. All bicyclist and pedestrian crashes involving a death, severe injury, or injury were selected.

For each candidate site location, a score of one was assigned for each crash within a half-mile. This distance was determined because it is the distance covered in 10 minutes at a typical three miles-per-hour (mph) walking pace. The safety score was normalized to fall within a range from zero to one. Integration of physical and visual safety improvements is a desired but not required characteristic of a Mobility Hub, and is therefore weighted lowest among the criteria, contributing to 10% of each site's final score.

Summary

The seven criteria detailed above (Utilization, Equity, Community Resources, Connectivity, Distribution, Walkability, Safety) comprise the Mobility Hub site selection scoring rubric. This rubric is to be used on a list of candidate sites, where the highest scoring Mobility Hub locations after weighting should be considered for further discussion and qualitative analysis.

Appendix

ARUP

Site Selection Criteria

Overview

Criteria	Description	Metric(s)
Connectivity	How integrated the Mobility Hub is with existing transportation networks	Density of bicycle facilities
		Location within FLEX program region
Equity	How well the Mobility Hub serves disadvantaged communities	Proximity to disadvantaged communities (DACs)
		Proximity to employment centers for disadvantaged communities (DACs)
Utilization	How likely the Mobility Hub is to be utilized	Concentrations of nonauto users
Walkability	What percent of the local network is walkable	Walk access using scoring tool
Community Resources	How likely the Mobility Hub is to enhance access to community resources	Proximity to places of interest
Distribution	How well distributed the Mobility Hub is with respect to other hubs	Distance from existing and planned transportation hubs
Safety	What opportunity is there for the Mobility Hub to increase the safety of users	Proximity to crashes

5

ARUP

Connectivity

How integrated is the Mobility Hub with existing transportation networks?

Metric	Measurement	Scoring
Density of bicycle facilities	Bicycle facility density increases connectivity	• Select all bicycle facilities within a ½ mile • +4 for every off -road bicycle facility; +3 for every protected bicycle facility; +2 for every signed bicycle lane; +1 for every other bicycle facility • Total score normalized to 0 -1 range
Location within FLEX program region	Presence within service region increases connectivity	• 1 if within FLEX program region • 0 otherwise

Data: Existing regional trails (off- road), cycle tracks, bike lanes, sharrows;
STAR and FLEX program service regions.

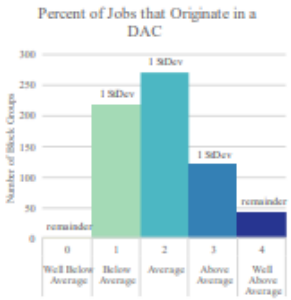
6

ARUP

Equity

How well does the Mobility Hub serve disadvantaged communities (DACs)?

Metric	Measurement	Scoring
Location within DAC	Increased home-based equity if Mobility Hub is within a DAC	1 = within DAC, 0 = not within DAC
Location within employment center for DACs	Increased work-based equity if Mobility Hub is in block group with above average share of jobs originating in DAC	4 = Well Above Average 3 = Above Average 2 = Average 1 = Below Average 0 = Well Below Average (see graph on right)



Data: NYSERDA, LEHD LODES 2019

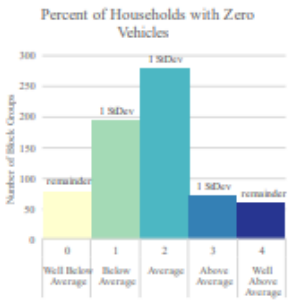
7

ARUP

Utilization

How likely is the Mobility Hub to be utilized?

Metric	Measurement	Scoring
Concentration of non-auto users	Increased Mobility Hub utilization with decreased vehicle access	4 = Well Above Average 3 = Above Average 2 = Average 1 = Below Average 0 = Well Below Average (see graph on right)



Data: Census ACS 2014 -2019

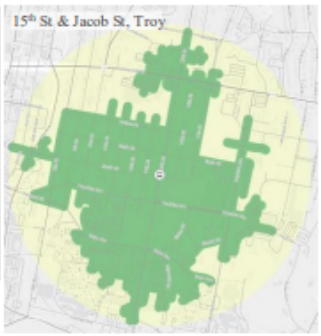
8

ARUP

Walkability

What percent of the local network is walkable?

Metric	Measurement	Scoring
Walk access within ½ mile of Mobility Hub	For the Mobility Hub to be successful it should be in a walkable location Measuring the proportion of walkable street network within ½ mile of the Mobility Hub	Scored from 0 to 1, where 0 is unwalkable (no access) and 1 is perfectly walkable (can reach all destinations within a ½ mile)



About 50% of the maximum walk radius (½-mile, in yellow) is accessible if following the street network (in green)

Data: OpenStreetMap, network graph analysis

9

ARUP

Community Resources

How likely is the Mobility Hub to enhance access to community resources?

Metric	Measurement	Scoring
Proximity to places of interest	Increased impact with increased access to multiple places of interest	• Select all places of interest between a ½ mile and 1 mile • 1 for each category of place of interest (maximum 7), 0 otherwise

Data: Places of interest identified from OpenStreetMaps and National Center for Educational Statistics (NCES). Places of interest include: commercial and retail, parks and open space, community centers, libraries, schools, post-secondary schools, places of worship.

10

ARUP

Distribution

How well distributed is the Mobility Hub with respect to existing Mobility hubs?

Metric	Measurement	Scoring
Distance from existing and planned Mobility Hubs	Goal is to encourage increased distribution of facilities. Only 1 hub current planned (Gateway Plaza). Criteria will enable distribution of future sites when building out network.	1 = not near a hub 0 = within 1 mile of a hub

Data: CYCLE stations

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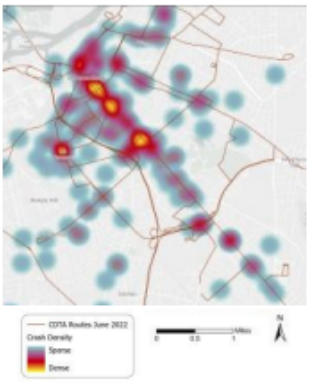
ARUP

Safety

What opportunity is there for the Mobility Hub to increase the safety of users?

Metric	Measurement	Scoring
Density of crashes	Interest in using the location of the Mobility Hub to develop safer intersection. Higher score for sites near high-crash intersections.	• Select all bicyclist and pedestrian crashes involving a death, severe injury, or injury within a ½ mile • +1 for every crash • Total score normalized to 0-1 range



Data: DMV/NYS Open Data, City of Amsterdam Police Department

12

ARUP

Site Selection Criteria

Weighting

Criteria	Description	Weight
Utilization	How likely the Mobility Hub is to be utilized	20%
Equity	How well the Mobility Hub serves disadvantaged communities	17.5%
Community Resources	How likely the Mobility Hub is to enhance access to community resources	15%
Connectivity	How integrated the Mobility Hub is with existing transportation networks	12.5%
Distribution	How well distributed the Mobility Hub is with respect to other hubs	12.5%
Walkability	What percent of the local network is walkable	12.5%
Safety	How the Mobility Hub increases safety of users	10%

- Normalize each criteria score to fall between 0 and 1
- Weight normalized scores by criteria importance
- Highest scoring Mobility Hub locations after weighting should be considered for further discussion

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Appendix B. Outreach Materials

This appendix provides the outreach materials developed for the Capital Region Mobility Hubs project. These materials, which supported efforts to gather community input on travel needs, mobility preferences, and potential hub locations, with a focus on engaging disadvantaged communities, include the community survey, social media toolkit, outreach flyers, and one-on-one interview questions.

B.1 Capital Region Mobility Hub Survey Questions

To support community outreach for the Capital Region Mobility Hubs project, CALSTART and TSTC developed a survey to gather input on travel preferences, mobility needs, and potential hub locations. The survey prioritized feedback from disadvantaged communities. Following are the survey questions.

1. What is your home ZIP Code?
2. Do you work or attend school in the Capital Region?
3. How do you typically get around the Capital Region?
4. What are the primary reasons you use the bus?
5. What would encourage you to use the bus more in the Capital Region?
6. Do you have any difficulties accessing the bus?
7. Are there locations that are currently inaccessible to you by the public transportation system that you would like to be connected to? (Please enter the names of both the origin point and destination.)
8. Which of the following services are you interested in using more often?
9. Which of the following services are you interested in using to connect to bus service?
10. What would encourage you to use bikeshare and carshare services more often in the Capital Region?
11. What future locations would you like to see mobility hubs developed?
12. Is there anything else you would like us to know?
13. What is your age?
14. Do you identify as Hispanic/Latino?
15. What is your employment status?
16. What is your household's annual income?
17. Do you have any long-term disabilities that affect how you get around the Capital Region?
18. How many personal vehicles does your household own?
19. By submitting this survey, you will automatically receive email updates related to the Capital Region Mobility Hubs project. Click here if you do not wish to receive email updates.

B.2 Social Media Toolkit

To promote the survey and encourage community participation, the project team created a social media toolkit for use by partner organizations, community groups, and advocates. The toolkit includes sample posts, suggested images, and outreach emails to help raise awareness about the Capital Region Mobility Hubs project.

1. For Instagram or X (formerly Twitter)
   CLICK TO TWEET: https://ctt.ac/qfbM2:
   To accompany Figure B.1: Calling all Capital Region transit customers! CDTA is working to expand mobility hubs across the region to provide transportation options that meet needs throughout our communities. Make your voice heard and take the survey https://tstc.org/capital-region-mobility-hub-survey/

2. For Instagram or X
   CLICK TO TWEET: https://ctt.ac/Ha9i0
   To accompany Figure B.2: ATTN CAPITAL REGION TRANSIT CUSTOMERS: CDTA is working to expand mobility hubs across the region to provide more transportation options to meet your needs. Take this survey for a chance to win a 2023 CDPHP Cycle! Season Pass https://tstc.org/capital-region-mobility-hub-survey/

3. For Instagram or text
   Calling all Capital Region transit customers! CDTA is working to expand mobility hubs across the region. Mobility hubs are places of transit connectivity where different travel options like walking, biking, bus service, and shared mobility come together. Make your voice heard by filling out the survey: https://tstc.org/capital-region-mobility-hub-survey/

4. For email (feel free to customize this message before sending)
   Subject: Help Shape the Future of Transportation in the Capital Region
   Hi, Friend!
   CDTA is working to establish mobility hubs in the Capital Region, including Albany, Troy, Schenectady, Colonie, Amsterdam, Saratoga Springs, and Cohoes. Mobility hubs are places of transit connectivity where different travel options like walking, biking, bus service, and shared mobility come together.

   They have created a 5-minute survey to learn more about how mobility hubs can work for you. Your participation will help make mobility hubs a reality in the Capital Region.

Take the survey here: https://tstc.org/capital-region-mobility-hub-survey/
Or scan this QR code to take the survey now!

If you have any questions, please reach out to:

Talia Crawford
Advocacy and Organizing Manager
Tri-State Transportation Campaign
talia@tstc.org
609-300-4211

Best,
YOUR NAME

B.3 One-on-One Interview Questions

To gather additional community input, the project team conducted one-on-one interviews with local partners, service providers, and community organizations. These conversations helped identify transportation needs, barriers, and opportunities related to the Capital Region mobility hubs. The following questions guided these interviews.

1. **Part I: Introductions and Public Transportation Impressions**
    - Tell me about your organization and its connections to the community.
    - How do your [employees/clients/constituents] currently get around the Capital Region?
    - Have you ever used public transportation in the Capital Region? If so, what are your general impressions? If no, why not?
    - What gaps or challenges in the current system prevent people from using public transportation? For example. what transportation issues have your [employees/customers/constituents] raised in the past?
    - Are there specific places where people have trouble accessing public transportation? (Name intersections or locations.)

2. **Part II: Capital Region Mobility Hubs and How They Could Work**
   CDTA is working to establish mobility hubs in the Capital Region, including Albany, Troy, Schenectady, Colonie, Amsterdam, Saratoga Springs, and Cohoes. Mobility hubs bring different travel options together in one place, enhancing connections and choices for riders. These hubs will expand access to the bus network, CDPHP Cycle! bikeshare, CDTA's DRIVE carshare program, and other travel services.

   - Which services do you think your [employees/clients/constituents] would be interested in using? (CDPHP Cycle!, DRIVE, FLEX, etc.)
   - What do you think would encourage people to use bikeshare and carshare services more often in the Capital Region?
   - Where would you like to see a Capital Mobility Hub developed in the future?
   - Is there anything else you would like us to know?
   - Who else would you recommend we speak to for additional feedback?

Appendix C. Mobility Hub Design

The following concept designs illustrate the proposed layouts for the Capital Region mobility hubs. These visualizations reflect input gathered through community engagement, stakeholder interviews, and site assessments. Each design highlights the planned locations for bus stops, bikeshare stations, carshare spaces, and pedestrian amenities at the proposed mobility hub sites in Albany, Cohoes, and Amsterdam.

Figure C-1. Mobility Hub Concept Design: University at Albany Downtown Campus

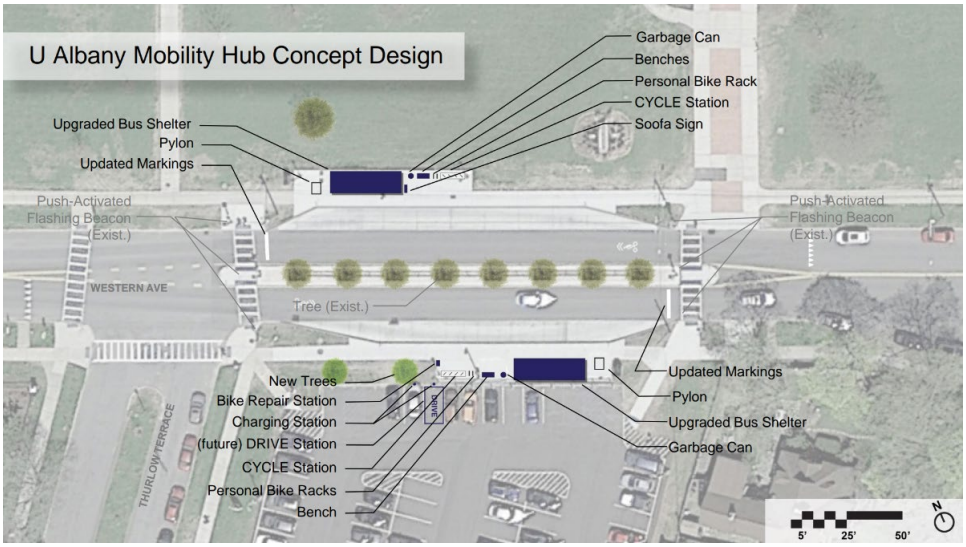


Figure C-2. Mobility Hub Concept Design: Downtown Cohoes

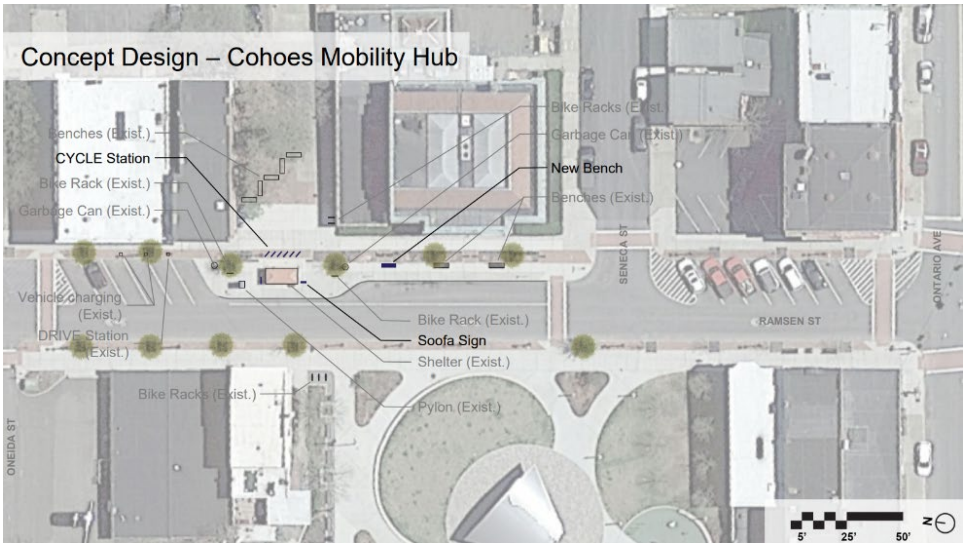
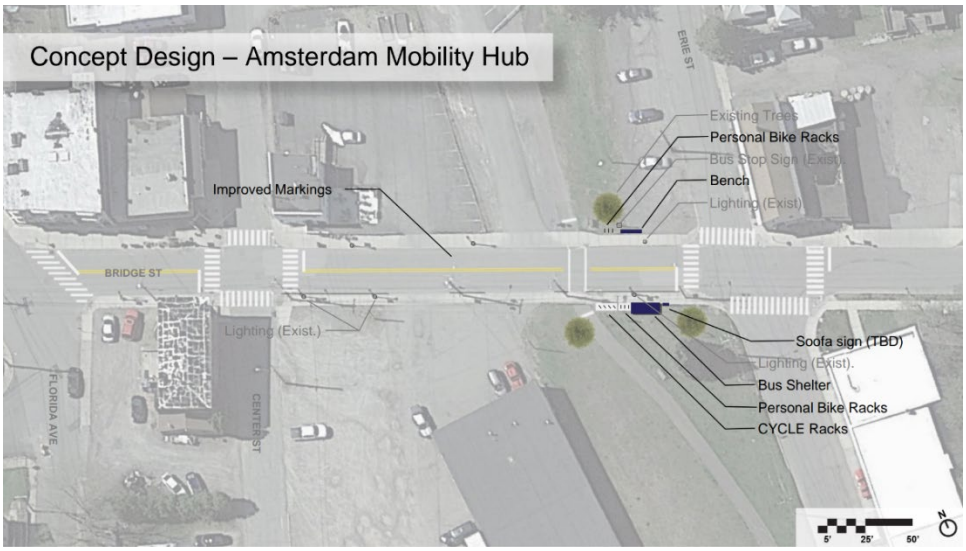


Figure C-3. Mobility Hub Concept Design: Proposed Amsterdam Site



Appendix D. Operation, Performance, and Impact

This appendix includes supporting materials that evaluate the implementation, performance, and user impact of the mobility hub demonstration sites.

D.1 Survey Questionnaire

This section presents the full survey questionnaire used to collect rider feedback at the two mobility hub demonstration sites. The responses informed key findings in the impact assessment and helped evaluate the effectiveness of the mobility hub interventions.

Capital Region Mobility Hub Survey

Mobility hubs are places of transit connectivity where different travel options such as walking, biking, bus service, and shared mobility come together. Please help us by taking 4 minutes to answer the following questions to improve mobility hubs across the Capital Region.

Part 1. Today's Trip Using the Mobility Hub

The following questions apply to one of your trips using the mobility hub. The trip can be a completed trip that you have conducted before, or a planned trip that will be conducted in the future.

Q1. Which of the mobility hubs are you currently traveling through? If multiple, please pick one.

Downtown Cohoes

UAlbany Downtown Campus

A. Downtown Cohoes

B. UAlbany Downtown Campus

Q2. What encouraged you to use this mobility hub on your trip? [choose all that apply]

A. To decrease my overall travel time

B. To decrease my overall travel cost

C. I wanted to incorporate exercise into my travel plans

D. It is a more enjoyable trip

E. My ability to plan and pay for the entire trip in one app

F. It was an environmental choice

G. Other (specify)_____

Q3. What is the purpose of your trip today?

A. Commuting to or from work	B. Commuting to or from school	C. Shopping or errands	D. Leisure/Exercise
E. Delivery or other work	F. Other (specify)_____		

Q4. How often do you visit this mobility hub for a similar purpose as your trip today?

A. 4 or more days a week	B. 1-3 days a week	C. 1-3 days a month	D. 6-11 days a year
E. 1 to 5 days a year	F. This is my first time		

Q5. Please enter the address of the starting origin of this trip, the primary transport mode you use from the origin to the mobility hub, and the monetary cost.

Note 1: The address will not be shared with the public. If you are not willing to enter the full address, please enter the zip code or approximate area.
Note 2: Trip monetary cost includes all kinds of out-of-pocket costs (e.g., parking fee, transit fare, taxi fare, tolls, and any fares to use shared mobility modes).

Address of the starting origin: _____
Monetary cost: _____
Primary transport mode:

A. Car	B. Taxi/Uber/Lyft	C. Personal scooter/bike	D. Bus
E. Walking	F. Car Share (DRIVE)	G. CYCLE! Bike Share	H. Other

Q6. Please enter the address of the final destination of this trip, the primary transport mode you use from the mobility hub to the destination, and the monetary cost.

Note 1: The address will not be shared with the public. If you are not willing to enter the full address, please at least enter the zip code.
Note 2: Trip monetary cost includes all kinds of out-of-pocket costs (e.g., parking fee, transit fare, taxi fare, tolls, and any fares to use shared mobility modes).

Address of the final destination: _____
Monetary cost: _____
Primary transport mode:

A. Car	B. Taxi/Uber/Lyft	C. Personal scooter/bike	D. Bus
E. Walking	F. Car Share (DRIVE)	G. CYCLE! Bike Share	H. Other

Q7. Did you make a similar trip before the construction of this mobility hub? If you did, please enter the primary mode and monetary cost of your previous trips.

Note: Please remember that your previous trip should share the same origin and destination of today's trip.

A. No, I did not make a similar trip before the construction of this mobility hub.

B. Yes, I made a similar trip before the construction of this mobility hub.

If you choose "Yes", please let us know the monetary cost and primary mode:

Monetary cost: _____

Primary transport mode:

A. Car	B. Taxi/Uber/Lyft	C. Personal scooter/bike	D. Bus
E. Walking	F. Car Share (DRIVE)	G. CYCLE! Bike Share	H. Other

Q8. Please let us know if there should be any improvements to the hubs.

Part 2. Personal Information

Q9. How do you identify?

A. Female	B. Male	C. Gender non-binary	D. Other
E. Prefer not to say			

Q10. What is your age?

A. Under 18	B. 19-20	C. 21-24	D. 25-34
E. 35-44	F. 45-54	G. 55-64	H. 65-74
I. 75+	J. Prefer not to say		

Q11. What is your employment status? [check all that apply]

A. Working full time or part time	B. Full-time or part-time student	C. Looking after family/home	D. Not working
E. Looking for work	F. Retired	G. Other	

Q12. How many people are in your household living together (including yourself)?

Note: A household is considered to be all persons living within one housing unit, including apartments, houses or single rooms, and consists of both related and unrelated people living together.

A. 1	B. 2	C. 3	D. 4
E. 5	F. 6	G. 7	H. 8 and more

Q13. What is your household's annual income?

Note: If you are not working full time or part time, please provide your family's annual income.

A. Less than $10K	B. $10K to $14.99K	C. $15K to $24.99K	D. $25K to $34.99K
E. $35K to $49.99K	F. $50K to $74.99K	G. $75K to $99.99K	H. $100K to $124.99K
I. $125K to $149.9K	J. $150K to $199.9K	K. More than $200K	L. Prefer not to say

Q14. How many personal cars does your household own?

A. 0	B. 1	C. 2	D. 3
E. 4 or more			

Q15. How many personal bicycles does your household own?

A. 0	B. 1	C. 2	D. 3
E. 4 or more			

We thank you for your time spent taking this survey!

D.2 Capital Region Mobility Hub Impact Assessment Report

This section presents the complete text of the *Capital Region Mobility Hub Impact Assessment Report*, which evaluates the outcomes of the two mobility hub demonstration sites at the University at Albany Downtown Campus and downtown Cohoes. The findings provide a data-driven framework to inform future mobility hub planning and implementation in the Capital Region and other communities.

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