© Toole Design

ARLINGTON COUNTY
MOBILITY HUBS

GUIDEBOOK AND
PILOT CONCEPT DESIGN

SEPTEMBER 2021

ARLINGTON
VIRGINIA

CONTENTS

© Toole Design

INTRODUCTION

Arlington County was awarded a grant through the Metropolitan Washington Council of Governments Transportation and Land Use Connections program to develop this mobility hub guidebook and a prototype site concept design over the course of a six-month period.

What Is a Mobility Hub?

Mobility hubs are community transportation nuclei that support the ecosystem of walking, biking, shared mobility (e.g. bikes, e-bikes, and e-scooters, carshare), ridehail pick-up & drop-off, electric vehicle charging, and public transit, promoting sustainability and equity goals. As transfer points in a network, they converge at key locations of employment, housing, shopping, and recreation. Mobility Hubs are supportive infrastructure and utilize placemaking strategies near these activity centers to support a robust menu of options for first and last mile connectivity to transit. Beyond their transportation functions, they can:

- create or enhance spaces for gathering, dining, or recreation
- promote economic development
- improve tourist and visitor experiences
- reduce the need for private vehicle parking
- advance community goals for the public realm

How Do Other Communities Define Mobility Hubs?

"Mobility hubs are places of connectivity where different modes of travel – walking, biking, transit, and shared mobility – converge and where there is a concentration of employment, housing, shopping, and/or recreation."

– San Diego Association of Governments

"A place where different sustainable transportation modes are integrated seamlessly to help promote connectivity."

– TransLink, Vancouver BC

"A place where people can connect to multiple modes of transportation to make their trip as safe, convenient, and reliable as possible."

– City of Minneapolis

"Mobility Hubs are more than just transit stops. They are community focal points that seamlessly integrate various transportation modes, provide supportive multimodal infrastructure, and utilize placemaking strategies to create activity centers that maximize first-mile last-mile connections and increase the reach of transit."

– City of Denver

HUB TYPOLOGY

Mobility hubs work best when they are deployed as a seamless and connected network that creates convenient opportunities to use a variety of transportation modes. As mobility hub density increases, walking, biking, motorized electric scooter riding, and public transit become more convenient and appealing alternatives, reducing dependency on private automobiles. The type of mobility hub deployed at a specific location will depend on the surrounding context and the community's transportation needs.

The mobility hub typology, shown in Figure 1 and summarized below, defines the function of each hub type. It shows a basic network hierarchy and the role that each type of hub plays in the network. It also shows how the emphasis of transportation services, place and public life, and informational elements varies between hub types. These are described in more detail in the Element Details section of this report.
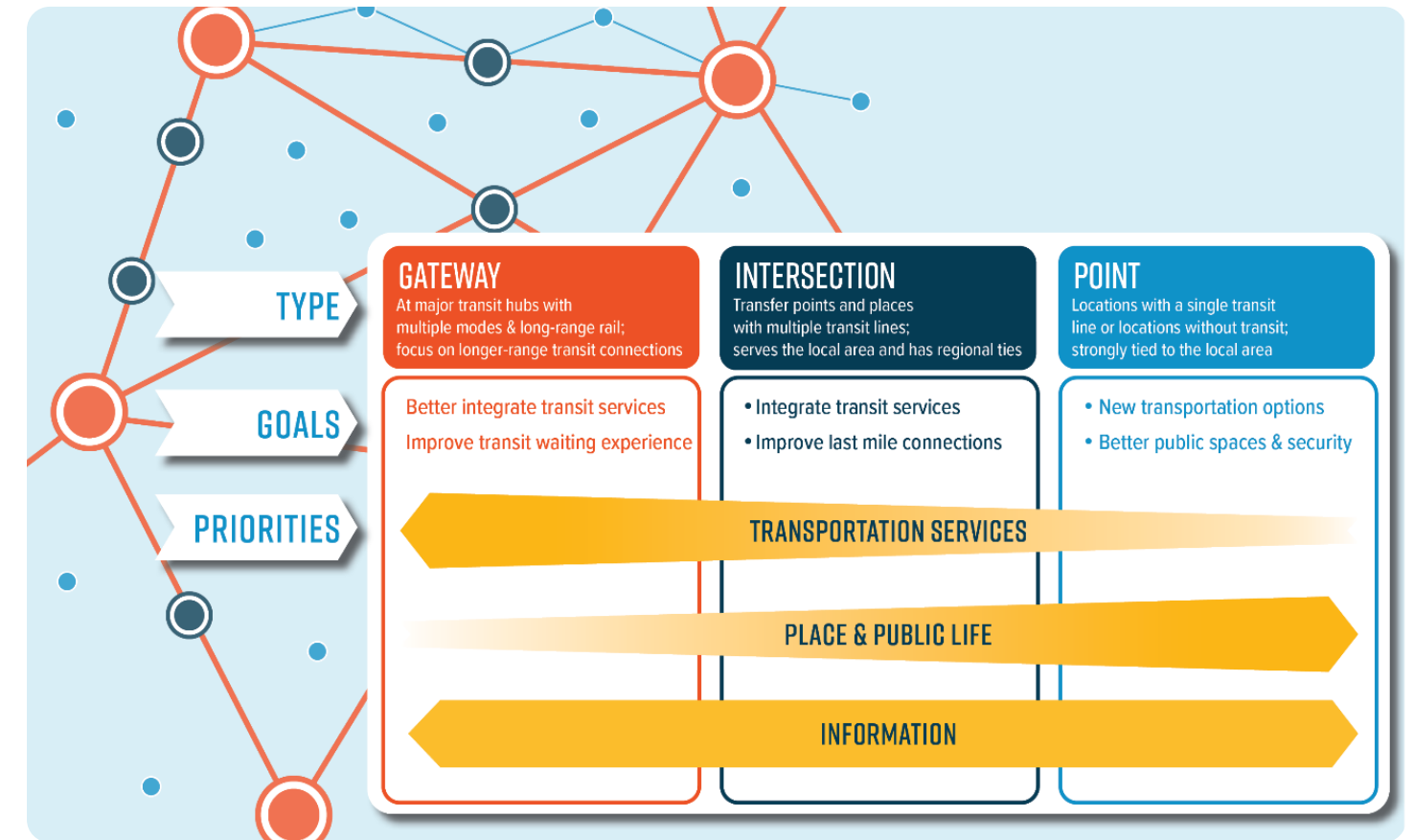
Figure 1 Mobility Hub Types

Gateway: These hubs are typically located at major public transit stations or stops. They support high volumes of long-range transportation trips and may have planned or existing higher-intensity adjacent land use development or public functions. The primary role of these hubs is to better connect users to a wide range of transportation services and enhance the passenger waiting experience.

Intersection: These hubs promote transportation and intermodal connections as well as providing high-visibility locations that can support surrounding land uses and encourage public space planning or development.

Point: These hubs are focused on connecting neighborhoods by providing reliable links to multimodal transportation options where limited options currently exist. They are opportunities to enhance public amenities and support or develop neighborhood focal points.

Figure 2 Existing site with many elements of an Intersection Mobility Hub, Arlington County, VA

CASE STUDY: GATEWAY MOBILITY HUB

- **Location:** South Waterfront Lower Tram Terminal in Portland, Oregon

- **Description:** This Gateway mobility hub in Portland, Oregon connects the lower and upper campuses of the Oregon Health & Science University and is the entry to Portland's South Waterfront District.

- **Amenities and services offered:** This mobility hub emphasizes transportation connection with the aerial tram providing the primary connectivity between OHSU's two campus locations. It is co-located with streetcar stops (NS line), bus stops for two routes with frequent service, and drop-off zones for paratransit. The site also includes docked bikeshare, short- and long-term bike parking, and space for dockless e-bikes and e-scooters. Placemaking elements and temporary commercial spaces, including a coffee shop, food trucks, and a pedestrian promenade have been integrated into the site.

Figure 3 South Waterfront Lower Tram Terminal Gateway Mobility Hub, Portland, OR
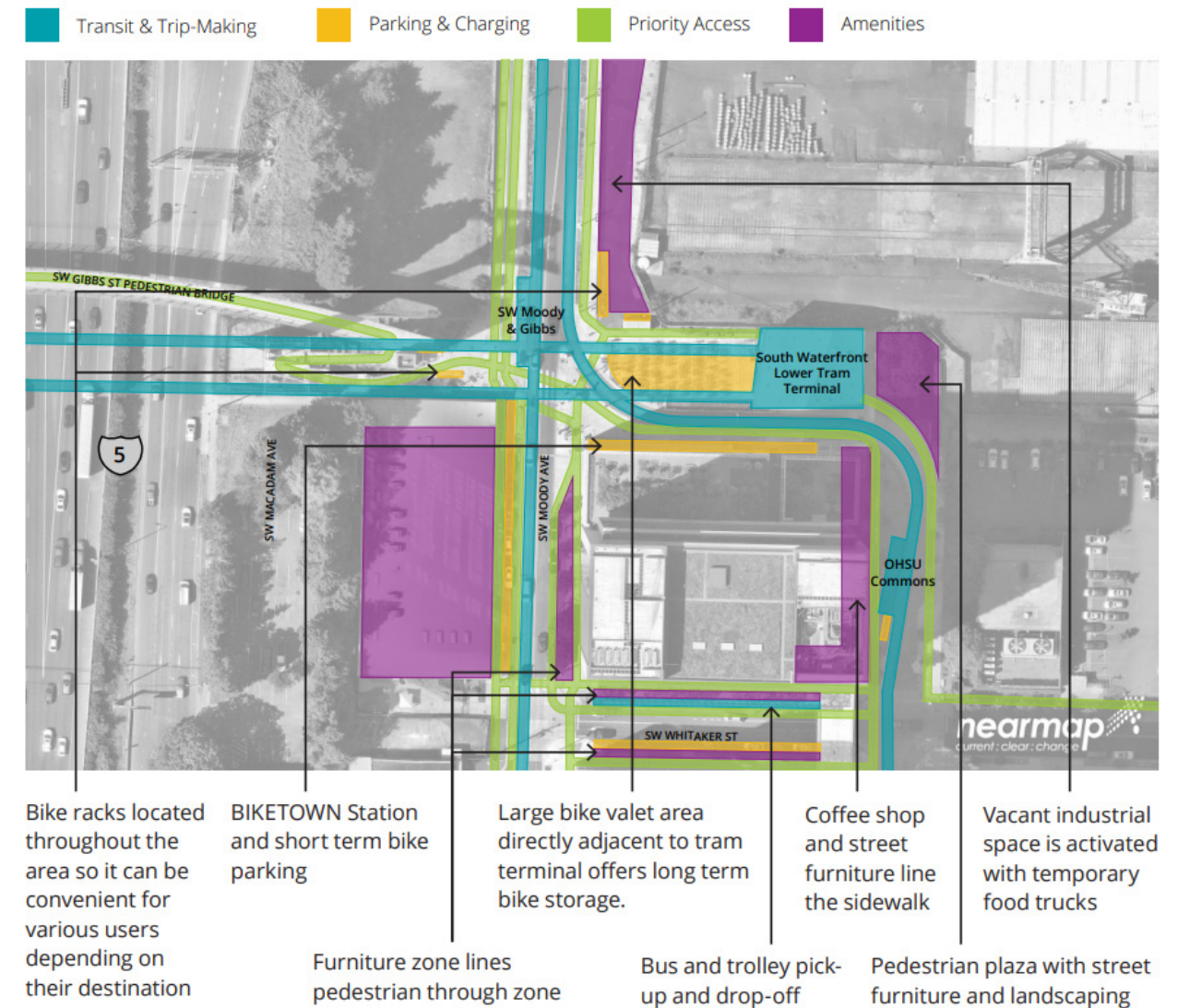

Figure 4 Portland Gateway Mobility Hub Site Diagram

CASE STUDY: INTERSECTION MOBILITY HUB

- **Location:** New Hampshire Ave NW and Georgia Ave NW, Washington, DC

- **Description:** This intersection mobility hub connects multiple crosstown and regional bus routes with bikeshare, a variety of micromobility services, bike parking, and pedestrian facilities.

- **Amenities and services offered:** Two bus stops with shelters and digital arrival displays for multiple routes with frequent service. This mobility hub also includes two pick-up and drop-off zones, docked bikeshare and parking areas for dockless e-bikes and e-scooters, and short-term bike parking. Placemaking elements include public art and a small pedestrian area to complement the site's function as a transportation node.

© Toole Design

Figure 6 New Hampshire Ave NW, looking west toward Georgia Ave NW

© Toole Design

Figure 5 Intersection mobility hub, Washington, DC

© Toole Design

Figure 7 Public art in pedestrian area

CASE STUDY: POINT MOBILITY HUB

- **Location:** Gove Street in Boston, Massachusetts

- **Description:** The dead-end at Gove Street is one of the few entry points onto the East Boston Greenway from Boston's Jeffries Point neighborhood. This Point mobility hub builds off previous placemaking initiatives at the site that included ground murals, a Little Free Library, benches, and a community bulletin board. The mobility hub closes a segment of the street to create a pedestrian promenade and is one of eight new hubs implemented in East Boston as part of the GoHubs! pilot program.

- **Amenities and services offered:** This mobility hub prioritizes placemaking and transportation safety improvements (a new stop-controlled intersection and striping improvements), but also includes a new bikeshare station and distinctive wayfinding signage to direct users to the mobility options at the location.
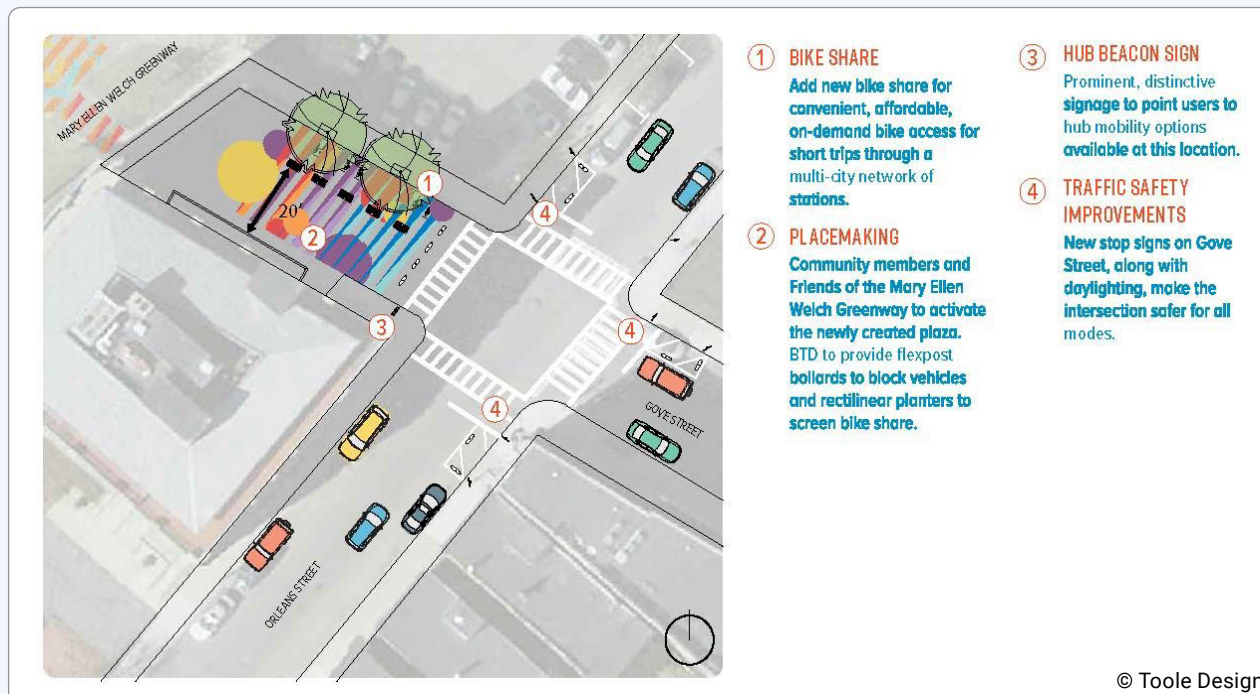

Figure 9 Pedestrian promenade with bikeshare and electric vehicle charging, wayfinding signage, and public art placemaking

Figure 8 Gove Street, Boston, MA - Mobility Hub site plan

① **BIKE SHARE**
Add new bike share for convenient, affordable, on-demand bike access for short trips through a multi-city network of stations.

② **PLACEMAKING**
Community members and Friends of the Mary Ellen Welch Greenway to activate the newly created plaza. BTD to provide flexpost bollards to block vehicles and rectilinear planters to screen bike share.

③ **HUB BEACON SIGN**
Prominent, distinctive signage to point users to hub mobility options available at this location.

④ **TRAFFIC SAFETY IMPROVEMENTS**
New stop signs on Gove Street, along with daylighting, make the intersection safer for all modes.

© Toole Design

Figure 10 Bikeshare station at a point mobility hub with sidewalk decal to facilitate wayfinding

PLAN THE NETWORK

Planning for mobility hubs should start at a high-level and consider their intended outcomes throughout the network planning, site identification, and site design processes. Planning a mobility hub network needs to consider the following steps.

Step 1. Establish goals for mobility hubs in the County

Existing County plans and policies already contain important transportation goals and objectives that mobility hubs can help to deliver. In addition, existing plans have details on current and planned mobility options across the County to integrate into site selection analyses. Plans to reference and review include:

- Arlington Master Transportation Plan
- Capital Bikeshare Development Plan
- Arlington Transit Development Plan
- Arlington County Vision Zero Action Plan
- Visualize2045: A Long-Range Transportation Plan for the National Capital Region
- Arlington Community Energy Plan (CEP)

Stakeholders should be brought together to establish the key goals for the mobility hubs and a clear emphasis on the intended outcomes. For example, these may be to promote easy links to transportation for currently underserved communities or to develop nodes that can be focal points for community investment. These goals should be carried through all subsequent steps of

Figure 11 Wayfinding signage, pavement decal, and transit vehicle

Step 2. Conduct suitability analysis to identify areas of the County that best support the program goals

A spatial analysis can highlight locations that would best support mobility hubs across the County. Based on the goals and objectives identified in the previous step, staff should identify relevant data sources to include in a detailed spatial analysis (see p. 16 for a case study example). Data sources to consider could include, but are not limited to:

- **Multimodal transfer opportunities and connections to existing or planned transit stops:** Transit variables to consider can include ridership, frequency, the number of routes, and the number of key destinations or households served. Beyond transit, the County can consider the location of bikeshare stations or bike parking and other shared mobility options like e-scooters and carshare.

- **Community resources and opportunities:** Consider zoning (whether or not a parcel would need to be rezoned), parcel ownership (city ownership or cost to acquire property), development plans, existing/potential trip generation (different types of trips served/generated by each mode in/for each location, and how that may impact the types of modes to include and what type of hub may be most appropriate.

- **Demographics and equity:** Consider population density, median household income, historically marginalized demographics, household vehicle ownership, affordable units, geographic distribution, and other data that informs and supports the County's equity goals.

Step 3. Conduct preliminary outreach to understand community needs and preferences

Outreach and engagement help build support for the mobility hub concept. Meaningful engagement can be challenging, as some education may be needed on the benefits and goals of a mobility hub, as well as emerging trends in transportation technology and services that impact the success of a specific mobility hub site in the network.

Engagement should focus on identifying general mobility needs and preferred mobility hub locations of interest to the community. Community members can participate in surveys or interactive maps that ask about key destinations and their common modes of transportation. Results can be analyzed by respondent type (i.e. the most popular locations for commuters, shopping, recreation, essential travel, etc.) or by demographics to ensure an equitable sample of respondents are representative of the general population. This information can also be used to inform site design.

Case Study: City of Oakland Mobility Hub Suitability Analysis

The City of Oakland Mobility Hub Suitability Analysis and Technical Report identified mobility hub candidate areas within the City. The analysis considered multiple demographic and equity variables to represent which parts of the city may have the greatest need or benefit the most from mobility hub implementation and use of additional low-cost, sustainable non-private-automobile transportation modes.
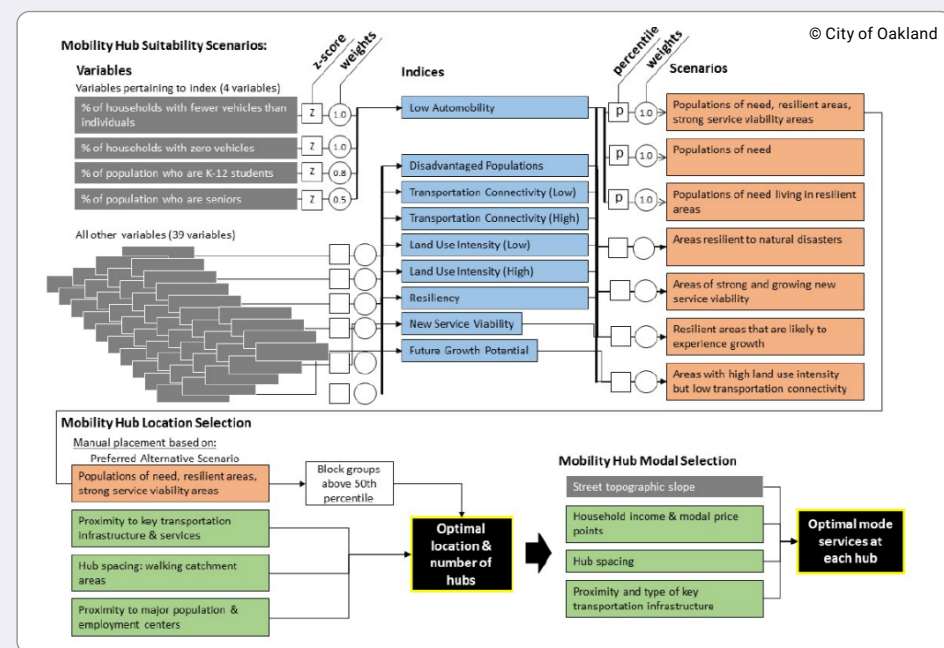

Figure 12 Methodology for determining eligible mobility hub sites

Factors considered included the existing resiliency of a given location, the expected financial viability of additional public or private mobility services in a given location, and growth potential.

The output of this analysis was a map of mobility hub candidate areas within the City for further community outreach, planning, and feasibility study to prioritize and implement the network, as described in the next steps.
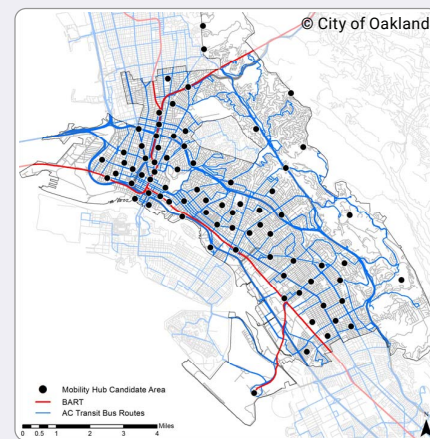

Figure 13 Oakland Mobility Hub Candidate Locations

Step 4. Plan the network and select sites for mobility hub implementation

With potential locations identified through the spatial analysis and community engagement process, the County can identify locations for a complete mobility hub network. Hubs should be distributed across the County to create first-and-last-mile connections countywide and promote mode shift out of private vehicles, while supporting other County equity and sustainability goals.

The County should decide on the most appropriate mobility hub type (see the *Hub Typology* section on page 6 for guidance on choosing hub types) for each location. When conducting hub site selection and classification:

- Use the transit network to identify gateway hubs (i.e., at major metro stops or bus interchanges with regional service) and potential intersection hubs (i.e., transfer locations for intersecting and connecting transit services).

- Identify point locations which can include: locations with single stops or infrequent service that may require more transportation options as well as "transit deserts" that currently lack service.

- Overlay other transportation networks and services including bikeshare, dockless mobility, carshare, electric vehicle infrastructure, etc. to identify where service is currently co-located, could be added, or relocated to enhance service and connection.

- Develop and follow network spacing standards to achieve a sufficient density of each hub type to support convenient and efficient first-and last-mile non-private-automobile mobility options.

- Review other inputs such as community resources, commercial nodes, other transportation needs, and community and stakeholder input to identify a preferred network of hubs that will best deliver the intended goals of the program.

- Coordinate with any County long-range studies or future site plans that are near an identified potential hub location.

A variety of different types of sites should be considered for mobility hub implementation. For example, mobility hubs can be placed in the public right-of-way, in other public spaces (e.g. plazas, parks), on private campuses (e.g., universities, hospitals), incorporated into private development, incorporated into planned public projects such as rapid-implementation street design or safety projects, or implemented with public art projects.

Preferred sites should be vetted and confirmed with stakeholders and the public to identify any concerns that may require selection of a different site. Recommended stakeholders to engage in this process include neighborhood groups, business improvement districts, area residents, businesses and employees, mobility service companies, utilities, and agency departments.

Step 5. Prioritize mobility hub sites based on community needs, safety, and equity

Once the unconstrained network has been developed, the next step is to determine which locations should be prioritized for implementation. Criteria should be established in alignment with County and community goals, taking constraints into consideration. Potential prioritization criteria could include, but are not limited to:

Equity: Consider how the hub may help [Realize Arlington's Commitment to Equity](#) including prioritizing disadvantaged communities, site accessibility for people with disabilities, addressing cultural/language barriers, and cost and payment needs for the services at the site (e.g. providing options for unbanked users or those without credit cards to utilize existing/planned services).

Prospective hub locations that are within [Equity Emphasis Areas](#), as defined by the Metropolitan Washington Council of Governments' Transportation Planning Board, could be prioritized over other locations.

Safety: Consider [Vision Zero](#) implementation at the site, including posted or prevailing motor vehicle speeds (is traffic calming needed?), the quality of surrounding bicycle and pedestrian facilities (how comfortable and low-stress are existing facilities?), and existing traffic operations (do signals and crossings require improvements?). Also consider personal safety at the site, including lighting and sight lines at night.

Costs: Consider the costs to create a successful mobility hub – for example, is land acquisition required, will traffic safety improvements be needed, lighting, internet connectivity, maintenance, etc. Costs may be offset by agreements with property owners, neighborhood associations, business improvement districts (BIDS), advertisers, or other stakeholders who may benefit from mobility hub construction.

Time-horizon: Consider the time needed to ensure the site is ready to construct a mobility hub – whether through rezoning, land acquisition, safety upgrades and technology needs.

© Arlington County

Figure 14 Arlington County has established policies to create equitable and safe community and transportation facilities

After selecting the final the mobility hub network locations, the next stage involves creating a site design for each hub.

Step 6. Engage with the public to understand desired amenities and services

This step involves outreach and engagement designed to gather feedback on people's first- and last-mile mobility needs and preferred amenities for the mobility hub. Community members can be invited to participate in collaborative design processes such as public events, design workshops, focus groups or via survey.

To promote participation, site-specific marketing tactics like posters, signage, and sidewalk decals can be deployed to reach people who typically use and frequent the area to ask for feedback. Input can be used to select and prioritize amenities for the site and discuss tradeoffs between elements in locations with constrained space or budget.
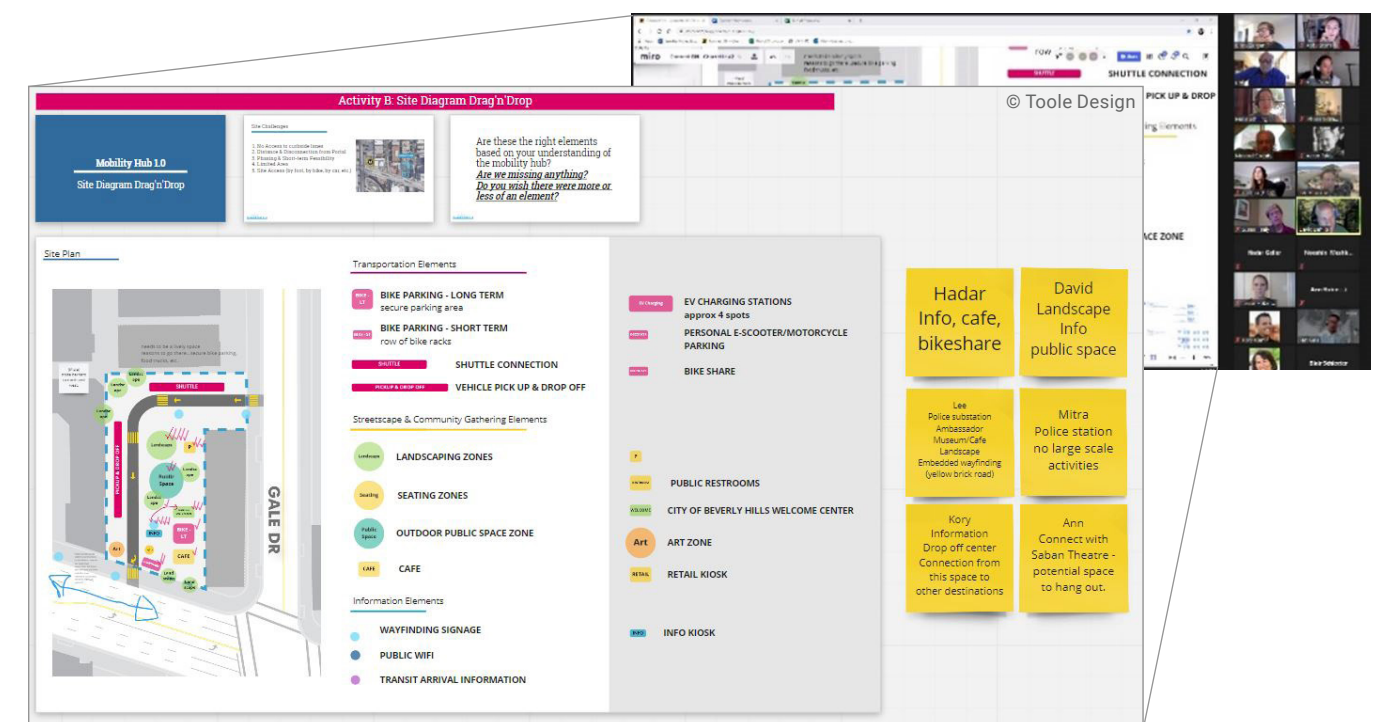

© Toole Design

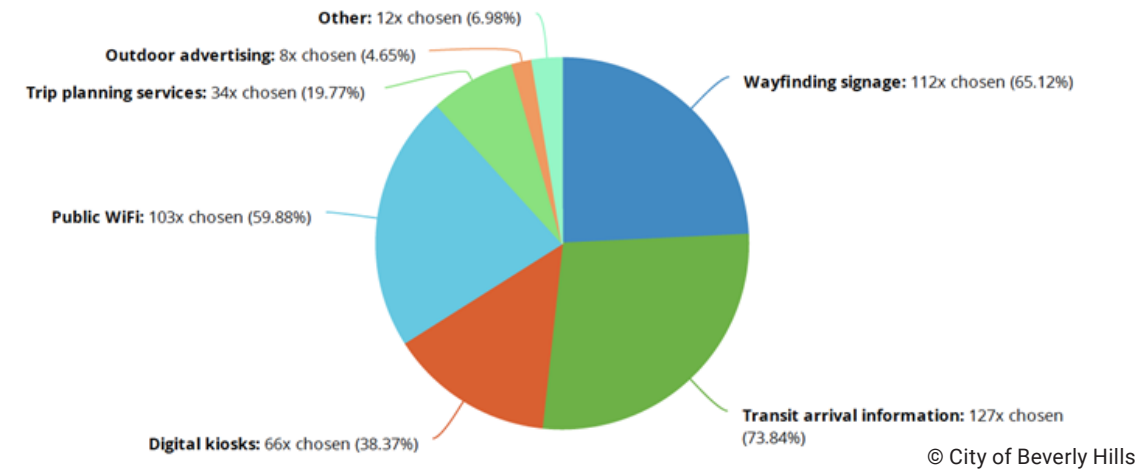**Figure 15 Virtual site design process for a mobility hub in Beverly Hills, CA**

Figure 16 Sample results from a public survey asking community members in Beverly Hills to indicate preferred mobility hub informational elements
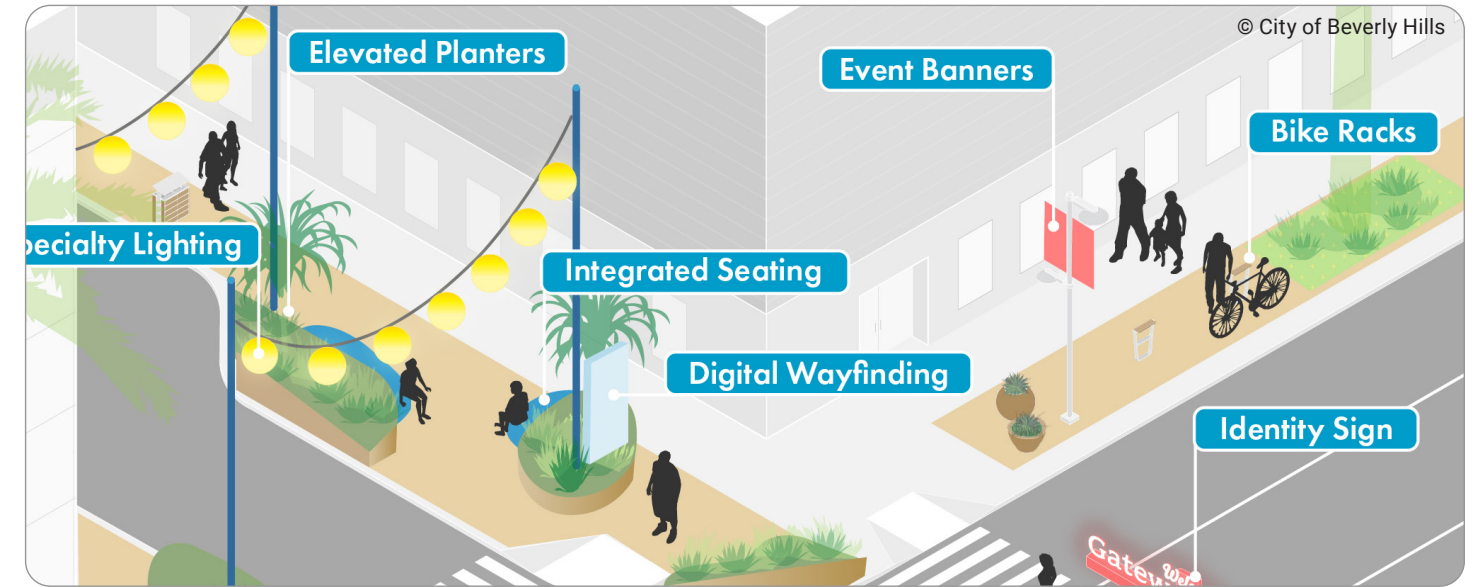
Step 7. Create concept site design

Incorporating community feedback, the County should prioritize amenities based on each site's mobility hub type, land-use context, and specific constraints.

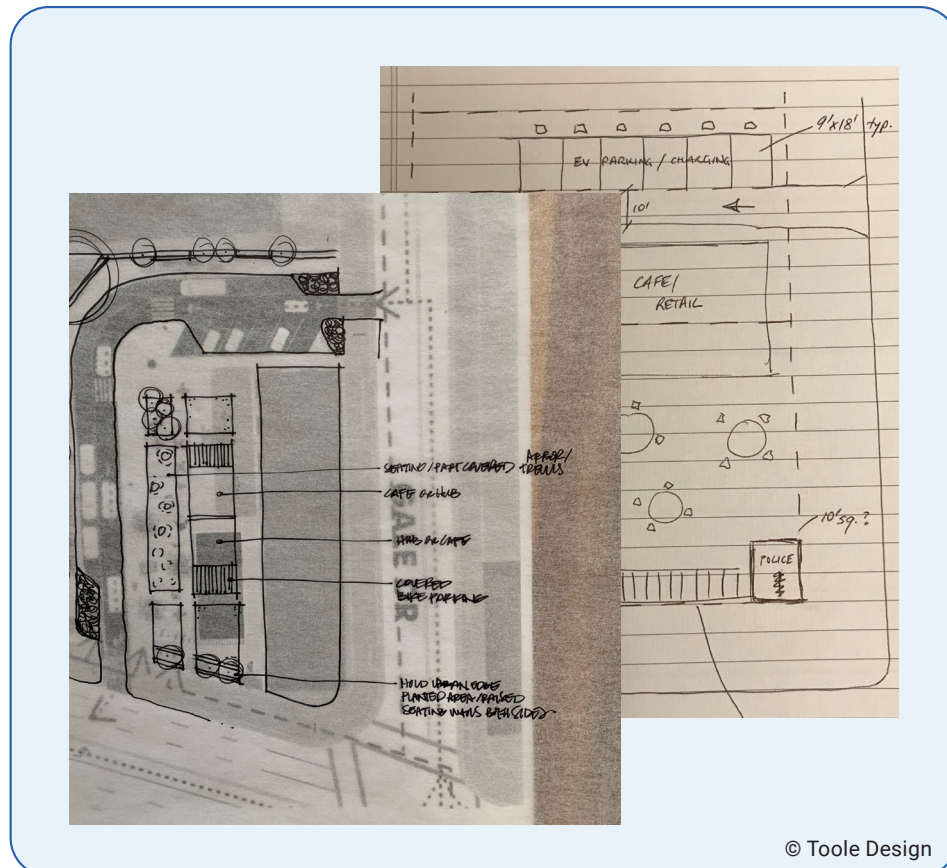Site design should prioritize safe and convenient access for people walking and biking, and mobility hubs should be intuitive, inviting, and enjoyable for all users.

Figure 17 Iterations of Beverly Hills mobility hub site concept design

Figure 18 Excerpt of sample mobility hub concept site design

© City of Beverly Hills

Site Plan: Transportation Elements
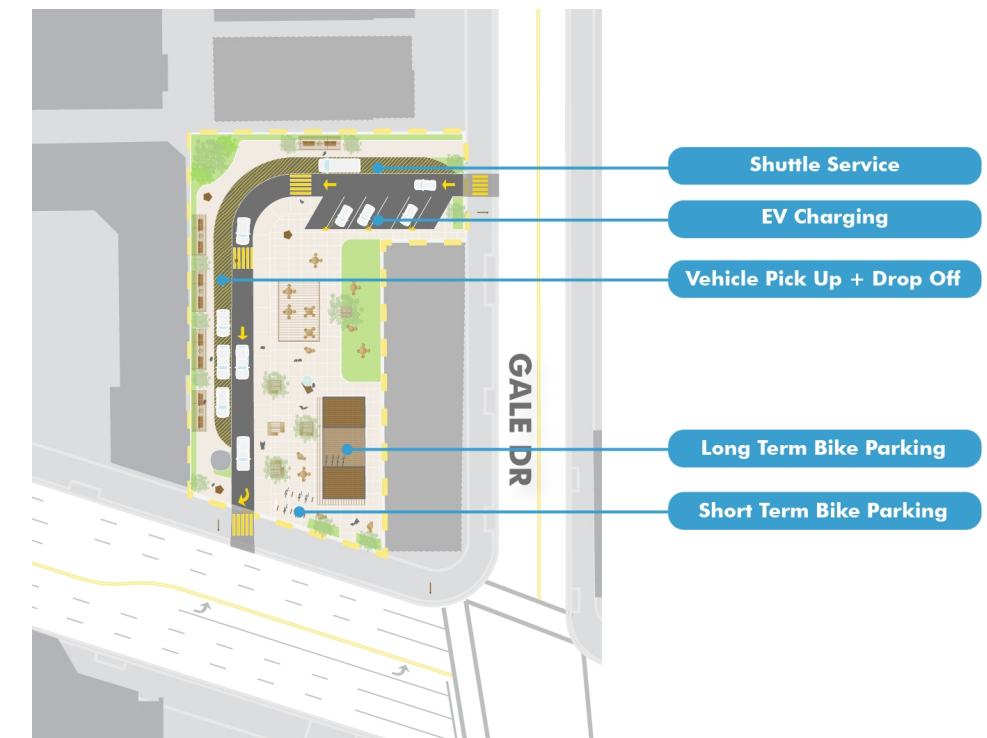

Figure 19 Sample mobility hub concept site design transportation elements

HUB ELEMENTS

Effective mobility hubs increase links between transportation services and create a cohesive sense of place. The elements of a mobility hub can be tailored to the requirements of each hub location. Depending on the context, they may consolidate or strengthen local retail and commercial nodes, or enhance community gathering spaces and destinations.

This section contains information and guidance for the context, function, and key design features of mobility hub elements. It can serve as a resource for community members, Arlington County staff, developers, community organizations, and mobility service operators as they collaborate to design and implement the mobility hub network.

The mobility choices in Arlington County will evolve with technology innovations and community preferences. Additional elements may be added or existing elements may be updated in the future to reflect such changes.

Figure 20 Existing site with several Point Mobility Hub elements, Arlington, VA

TRANSPORTATION ELEMENTS

By definition, a mobility hub must enhance transportation service by either adding service to a location that currently has no public transportation or increasing the range of services offered.

Transportation elements that could be considered at a site include:

Transit

- Metro/VRE station, or WMATA/ART bus stop presence (consider in site selection)

- Transit Station or Stop Amenities (e.g., shelters, seating, signage)

Pedestrian

- Pedestrian Facilities (including ADA-compliant paths and crossings; consider existing conditions or quick-build safety upgrade opportunities in site selection)

Bicycle

- Bike Facilities (connected and low-stress; consider existing conditions or quick-build safety upgrade opportunities in site selection)

- Bike Parking (short- and long-term, covered from elements when possible)

- Bikeshare Station

Micromobility

- Dockless or Hybrid Micromobility Parking (e.g. shared E-Bike or E-Scooters)

Curbside Motor Vehicle

- Pick-up and Drop-off Zones (including taxis and TNCs)

- Electric Vehicle (EV) Charging Stations

- Carshare

Transit Station or Bus Stop

Purpose

Public transit stations and stops link mobility hub users to regional and local public transportation services and could include Metro/VRE stations or WMATA/ART bus stops (featured here). Supporting amenities at bus stops increase their convenience, safety, and comfort and improve the transit experience.

Context & Application

Transit stations and stops serve as locational anchors for a mobility hub. Mobility hubs can improve the comfort and safety of people who use transit through enhancements to shelters, lighting or co-location of connecting modes. Work with WMATA and ART for any requests related to bus stops.

Resources

WMATA Guidelines: Transit Stop Design and Placement
WMATA Bus Stop Amenity Reference Guide
Arlington's Bus Stop Guidelines & Standards Manual
NACTO Transit Street Design Guide

© Toole Design
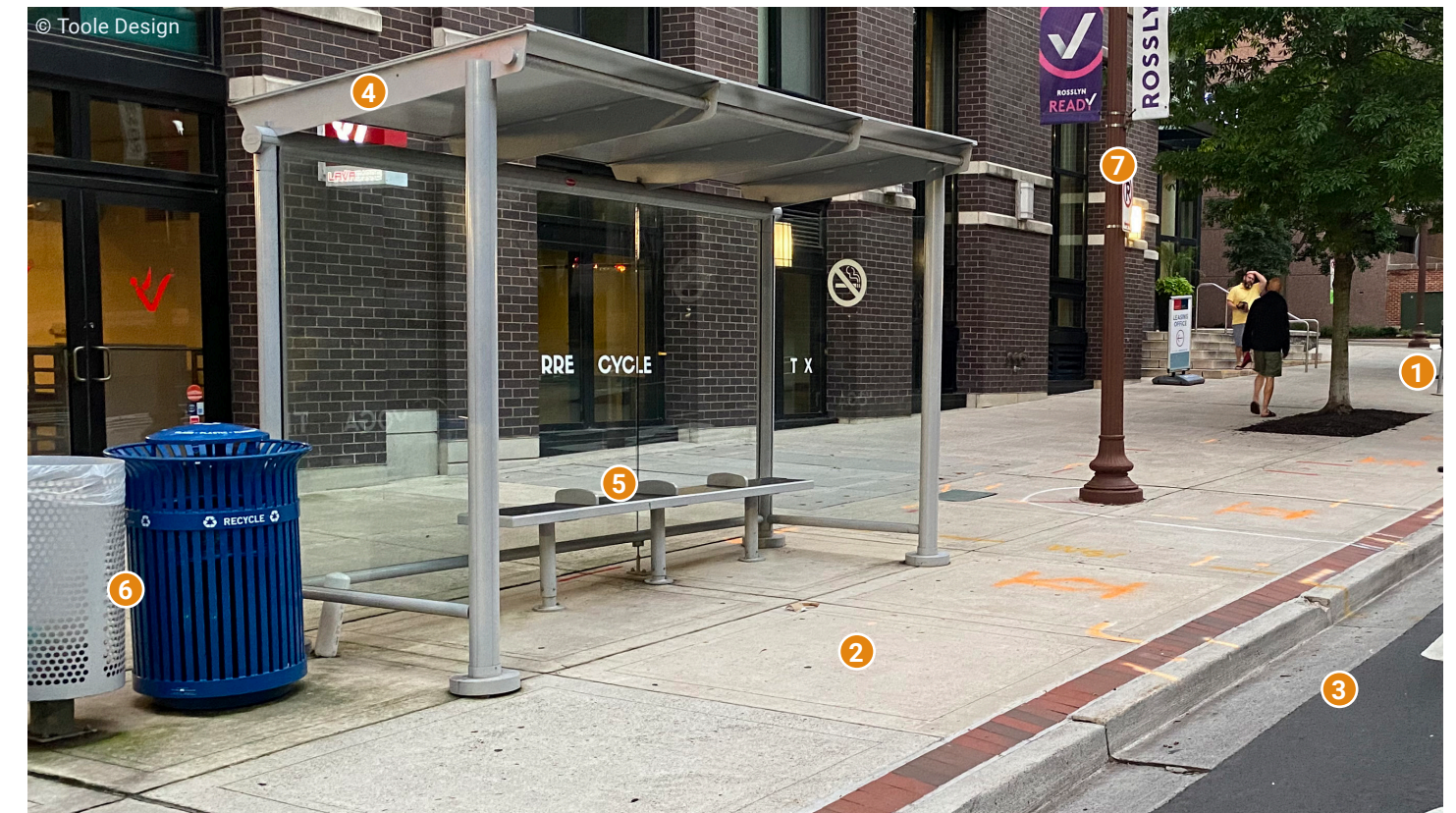
1 Bus stops are generally located on the near-side or far-side of intersections.

2 In general, far-side bus stop locations are safer for pedestrians, facilitate faster travel times, and have the least impact on parking.

3 Curb space should be kept clear to allow the bus to enter and exit the stop.

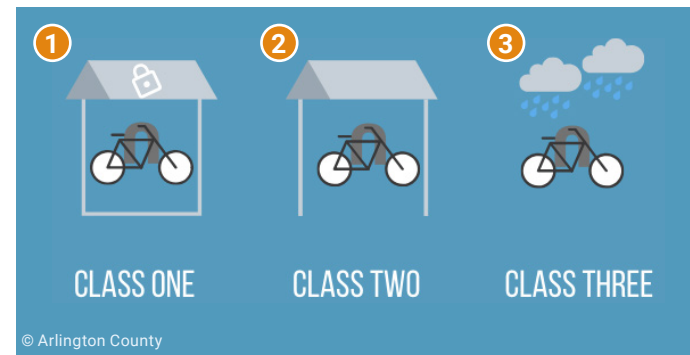**4** Covered waiting areas shelter people waiting for transit vehicles from rain, snow, and sun.

5 Seating and space for a wheelchair or personal mobility device under covered waiting areas are accessible for people with disabilities and those who cannot stand while waiting for the transit vehicle to arrive.

6 Additional street furniture and landscaping / street trees enhance comfort and function of the space.

7 Lighting increases the comfort and personal safety of public transit stops.

Bike Parking

Purpose

To complete trips by bicycle, people must have confidence that their journey will end with a safe and convenient place to park their bike. It is important that mobility hubs have high-quality bike parking to accommodate transfers between bike trips and other modes. Bikes may be left unattended for several hours and secure bike parking is appropriate to facilitate longer-distance trips.

Context & Application

Bike parking is appropriate at all mobility hubs. Class One or Class Two bike parking is especially beneficial at Gateway hubs.

Resources

Arlington County Bike Parking Standards

1 Class One bike parking is a secure location for bicycle storage. This type of parking protects bikes from both theft and inclement weather.

2 Class Two bike parking protects bicycles from inclement weather, but is open-access. It often has low utilization in locations where theft is a concern.

3 Class Three bike parking is most suitable to enable quick trips where a bike will not be left unattended for long periods, e.g. trips to errands, restaurants, parks, playgrounds, etc. Class Three parking does not protect from inclement weather and is open access. Some people may be unwilling to leave their bike unattended in Class Three bike parking, so it has more limited potential to

enable multimodal connections for commutes or longer-distance trips (e.g. mobility hub connections to rail or carshare).

4 Supplemental Class Three bike parking can be added in locations with to Class One or Two bike parking for overflow parking capacity and greater convenience for people making quick trips.

Bikeshare Station

Purpose

Bikeshare is an effective way for people to complete trips or connect to other transportation modes, without having to own a bike. Bikeshare stations are most effective when densely located in a network near to one another and near other transportation options such as bus stops, pick-up/drop-off zones, carshare, and subway stations.

Context & Application

Bikeshare stations are appropriate at all mobility hub types.

Resources

NACTO Bike Share Station Siting Guide
Capital Bikeshare Development Plan

1 Locate within walking distance (e.g. 50-100 ft when feasible) of rail station entrances and bus stops.

2 Leave a 2-3 ft min buffer from the bikeshare station front to the roadway edge, and at least a 1 ft buffer if facing a building wall or other vertical feature.

3 At least 5 ft of open space required behind bikes for docking and undocking, and to maintain a clear and accessible pedestrian path, if next to a sidewalk.

4 Locate where solar panels receive sufficient sun during the day to charge the station.

5 A standard docking station has capacity for 19 bikes, in an area that is 6' wide by 52' in length.

Dockless or Hybrid Micromobility Parking

Purpose

This element is a designated location to park dockless or hybrid micromobility services, such as shared e-bikes and e-scooters. This parking may be located on the sidewalk (clear of the pedestrian pathway) or on-street and can organize the parking of dockless vehicles. Electric charging stations, if implemented, would reduce motor vehicle trips made by bikeshare and e-scooter company operators and their carbon footprint.

Context & Application

Appropriate at all mobility hub locations.

Resources
NACTO Urban Street Design Guide
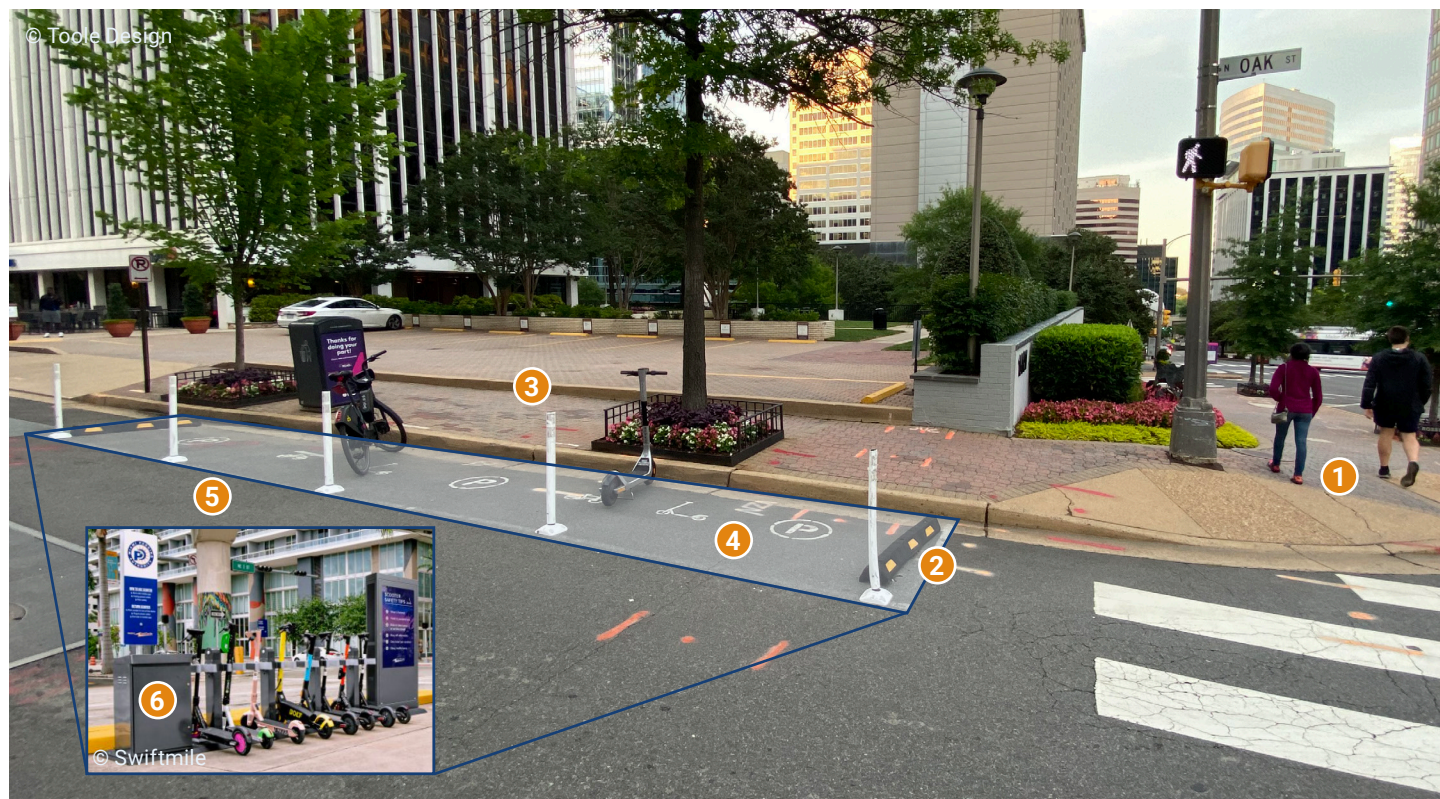
1 Locate within close walking distance (e.g. 25-50 ft when feasible) of mobility hub central node (e.g. intersection, bus stop, metro station entrance).

2 Parking stops can be incorporated at each end of an in-street parking corral.

3 Flexposts should be spaced at 10 ft maximum across the parking area to deter encroachment by motor vehicles.

4 Pavement markings designate the edges of the parking area and indicate use for scooter, bike, or other micromobility vehicle parking.

5 Minimum dimensions 4 ft x 5 ft. Can scale up in either dimension as needed, and as space allows, to accommodate higher micomobility vehicle volumes.

6 Electric docks can be implemented to charge e-bikes, e-scooters or other electric micromobility devices in place.

Pick-Up and Drop-Off Zones

Purpose

Pick-up and Drop-Off (PUDO) zones are dedicated curbside spaces to help facilitate the loading and unloading of passengers. These zones are typically targeted towards taxi and ride-hailing companies, but can also be open for brief private vehicle use. PUDO Zones are time-limited, typically five minutes, and require that the driver remain with the vehicle. PUDO zones help avoid unsafe behaviors such as loading or unloading of passengers in a travel lane ("double-parking") or blocking bike lanes and crosswalks.

Context & Application

Most applicable at gateway and intersection hubs. Essential where passengers load frequently.

Resources

Arlington Master Transportation Plan: Parking and Curb Space Management Element
ITE Curbside Management Practitioner's Guide
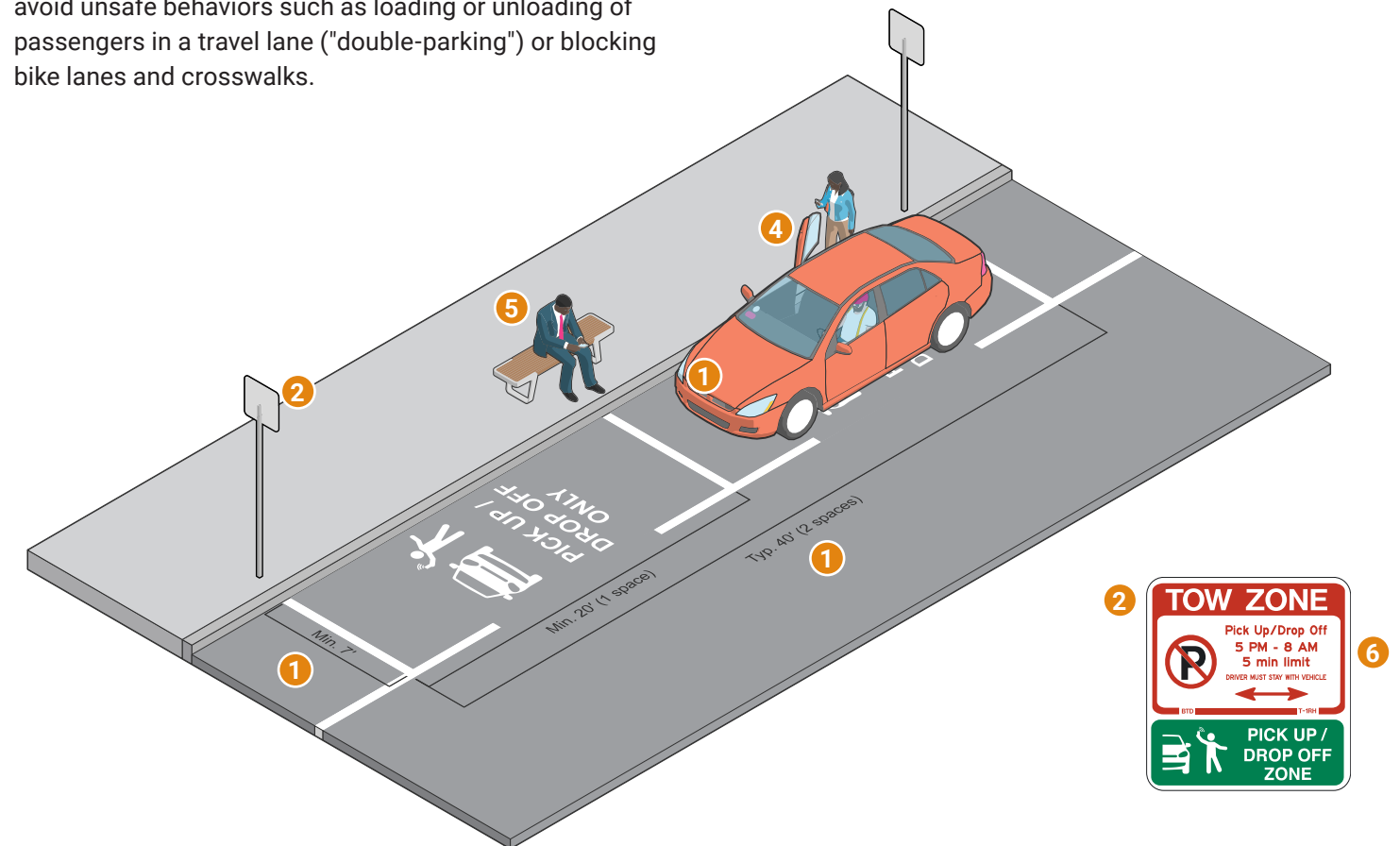
1 The PUDO zone should be at least 40 ft in length to serve two vehicles; mid-block zones should be longer. The minimum width is 7 ft.

2 Use the Arlington County regulatory signage, requiring drivers to remain with the vehicle and stating time and use limitations.

3 Coordinate with Arlington Transportation Services on the design and implementation of PUDO zones.

4 PUDO zones should be accessible, and the curb should be free from excessive clutter such as parking meters, bike racks, and other potential obstacles.

5 Coordinate with ride-hail companies to geofence the PUDO zone for drivers and users.

6 The time limits of the PUDO zone should reflect the demand and types of users expected at the site.

Electric Vehicle Charging Stations

Purpose

Electric motor vehicles (EVs) are powered completely, or in part, by electricity. Electric vehicle charging stations dispense electricity to fuel EVs. It is expected the number of EVs on the road will increase dramatically in the coming years, and with that the need for more EV charging stations.

Context & Application

Curbside EV parking is appropriate at any mobility hub location, particularly intersection or point hubs with fewer competing demands for curb space. EV charging can also be deployed as part of a hub within adjacent parking structures.

Resources

Arlington Electric Vehicle Charging Station Policy

© Toole Design

1 EV charging parking spaces should be 20' in length by 7' in width.

2 The charging station should be 12-18" from the curb edge, and allow 5'- 8' of unobstructed sidewalk.

3 Spaces should be marked with the standard regulatory signage and pavement markings.

4 EV charging requires significant electrical infrastructure. Coordinate with the local utility in site selection.

5 A single charging station can accommodate one or two vehicles, if two spaces and plugs are present.

6 Curbside charging is best suited for residential areas with limited off-street parking or mixed-use commercial and residential areas. It should be planned in coordination with neighborhood groups or nearby businesses.

7 Consider regulatory time limits, with associated signs and pavement markings, for spaces with high anticipated demand or where limited nearby public EV charging spaces are available.

8 Consider implementing near other mobility hub elements, e.g. bike, shared e-bike, or shared e-scooter parking or bus stops at intersection hubs to facilitate transfers between modes.

Carshare

Purpose

Carshare is a service of shared cars (or light trucks) among members. Car Sharing compliments other transportation modes by providing use of a vehicle for longer distance trips without the cost and burden of owning and maintaining a vehicle. Some carshare programs use electric vehicles and may be implemented in conjunction with EV charging stations.

Context & Application

Carshare is appropriate at any hub type and should be located based on anticipated service demand.

Resources

Arlington County Car-Sharing
Shared-Use Mobility Reference Guide

© WikiMedia: Deanlaw

1 The minimum size parking space per carshare vehicle is 20' in length by 7' in width.

2 Each dedicated carshare space must be identified with regulatory signage and may include a sign identifying specific carshare operator(s).

3 Carshare vehicles may be deployed in 'pods' of two or more vehicles.

4 Carshare operators can help identify where demand warrants locating additional carshare vehicles. Operators may not want to locate a carshare vehicle at a location if there is low demand.

PLACEMAKING ELEMENTS

Placemaking and public space elements are important components of a mobility hub to create active and vibrant spaces that are safe, comfortable, and attractive for mobility hub users. Increased site use from co-locatino of transportation services can also enhance public spaces and help to support local businesses and new development.

Placemaking and public space elements that could be considered at a site include:

- Lighting
- Landscaping and Street Trees
- Public Art
- Street Furniture (e.g. benches, waste receptacles, etc.)
- Parklets

Lighting

Purpose
Ample lighting can enhance personal safety perceptions among mobility hub users of all ages, genders, and abilities. It also allows for safer operation of any mode, including bicycles, e-scooters, or motor vehicles.

Context & Application
Adequate lighting is important at any mobility hub location.

Resources
Arlington County Lighting Standards & Specifications

© Toole Design
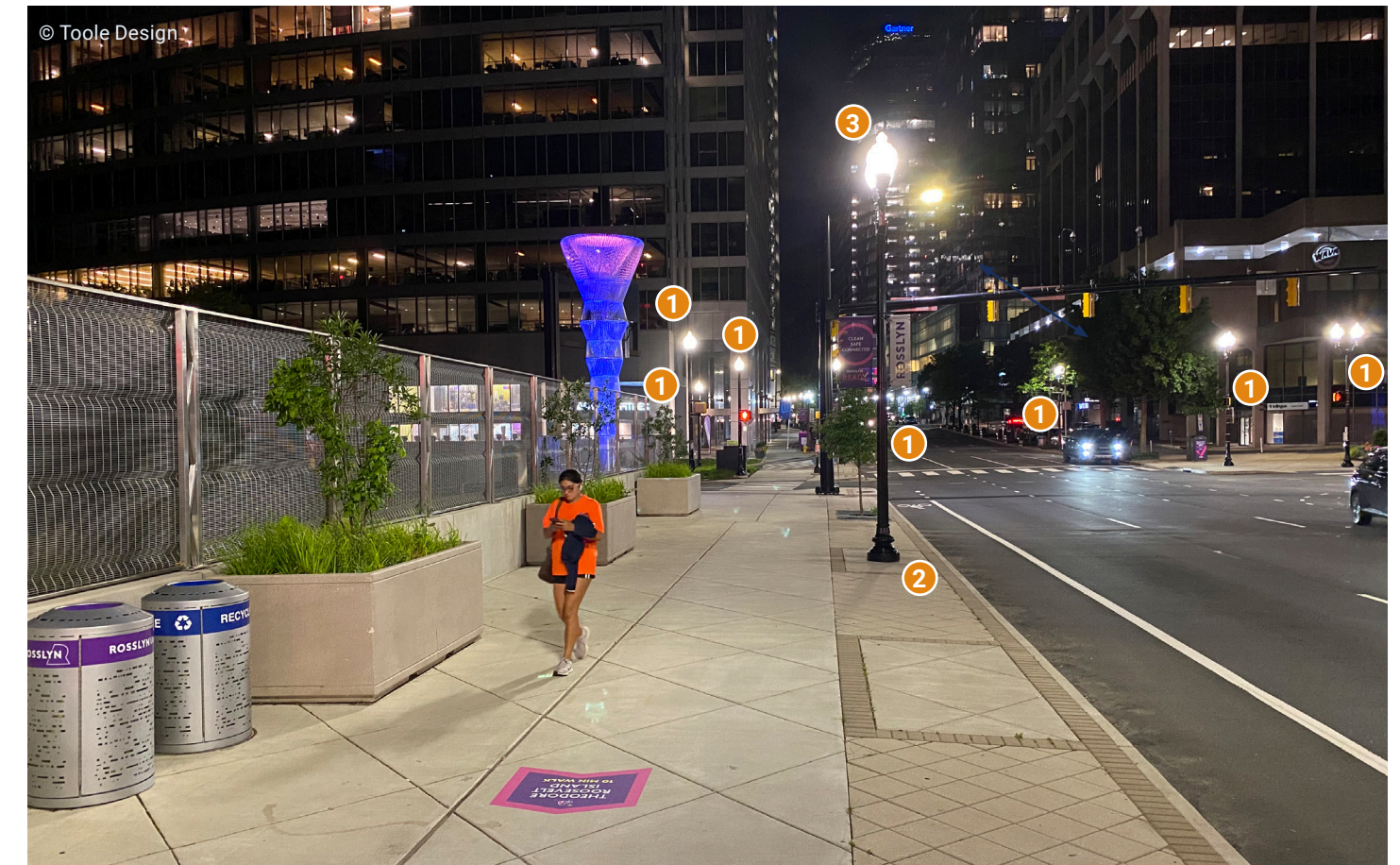
1 Multiple pedestrian-scale lighting fixtures throughout a mobility hub creates a well-lit area.

2 Set back from the curb and other objects in the right-of-way per Arlington County Lighting Standards and Specifications.

3 Consider LED fixtures for reduced maintenance and electricity usage.

Landscaping and Street Trees

Purpose

Landscaping and street trees beautify mobility hubs and enhance the environment for users. Mature street trees can calm traffic and improve roadway safety. They can also improve air quality and have climate benefits.

Context & Application

Landscaping and street trees are appropriate at all mobility hub locations.

Resources

[Arlington County Parks and Recreation Design Standards](#)
[Arlington County Landscape Standards](#)
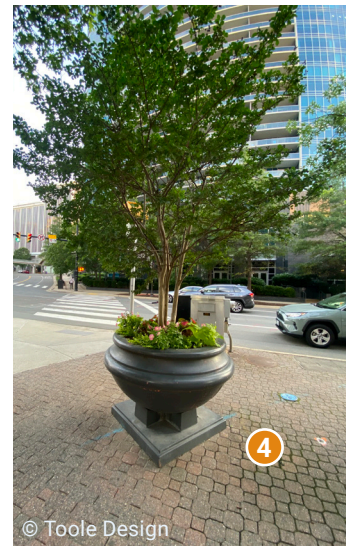
1   Mature street trees protect mobility hub users from the sun, wind, rain, and snow while outside enclosed vehicles or station areas (e.g. while renting, waiting for, or using many hub services).

2   Follow the Arlington County Parks and Recreation Design Standards for preferred types of trees and tree pit design, dimensions, spacing, and location in the right-of-way.

3   Landscaping in private developments can enhance the beauty of a mobility hub and must follow the Arlington County Landscape Standards.

4   Street trees can be planted in above-ground planters, either in the sidewalk area or in parking spaces adjacent to parallel parking or mobility hub elements.

4   Planters can be planted with evergreen, annual, or perennial plantings. Native plantings may help local pollinators.

Public Art

Purpose

Public art can enhance the beauty of a mobility hub and help to create a sense of place.

Context & Application

Public art is appropriate at any mobility hub location and helps to draw potential users' attention to the mobility hub.

Resources

[NACTO Urban Street Design Guide](#)

1   Sculptures can be landmarks and serve as a meeting point at mobility hubs.

2   Public art at mobility hubs can also serve a utilitarian function, such as this decorative light fixture.
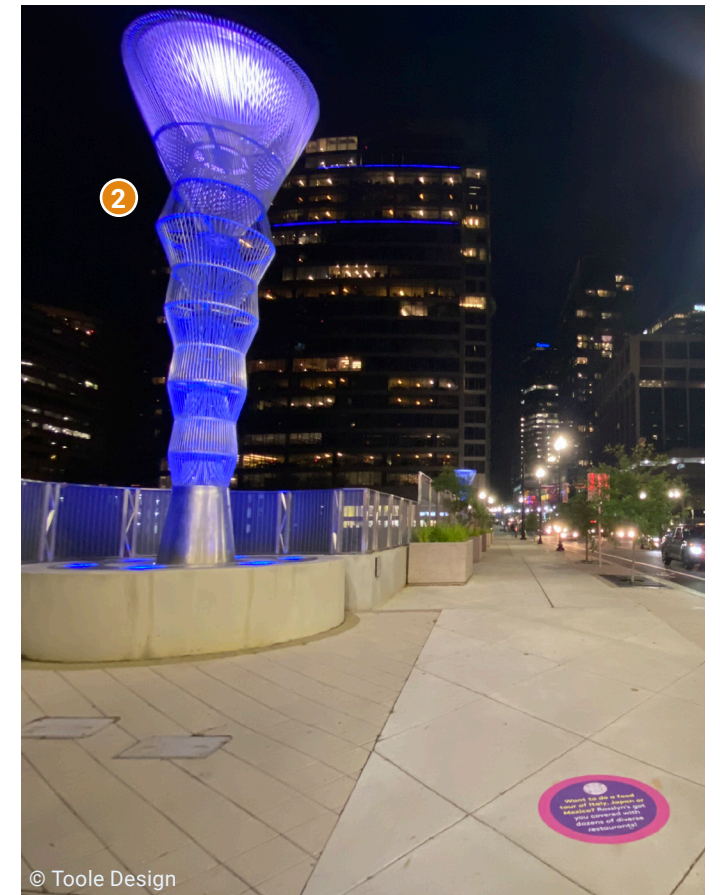
Street Furniture

Purpose

Street furniture creates a more welcoming and functional environment for mobility hub users. Examples of street furniture include benches and waste receptacles.

Context & Application

Street furniture is appropriate at all mobility hub locations and essential at gateway hub locations.

Resources

NACTO Urban Street Design Guide

1 Many people, including young children, older adults, and people with disabilities, cannot stand for long periods and need benches available to rest while waiting for public transit or transferring between different modes. Benches also enable flexible use of mobility hub spaces by the public and facilitate social interaction.

2 Trash and recycling bins help maintain cleanliness of mobility hub locations.

3 Bus shelters enhance the comfort and utility of multimodal connections at mobility hubs.

Parklets

Purpose

Parklets can help activate an urban street by extending the sidewalk into the Curbside Zone of the street. Providing seating or other amenities can support local businesses and mobile vending.
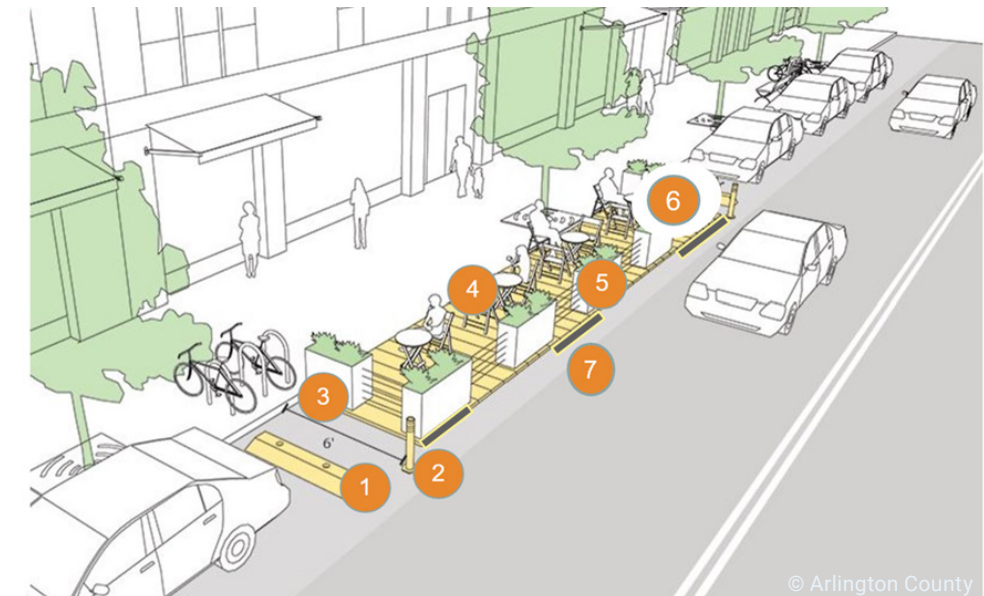
Context & Application

Parklets may be public space or designated as outdoor dining space for restaurants.

Parklets enhance mobility hubs in locations where there is limited public space or a need for outdoor seating. They are particularly useful when located near restaurants, cafes, or transit stops.

Resources

NACTO Urban Street Design Guide

1 Buffer using wheel stops at a desired distance of 4 feet from the parklet.

2 Vertical elements that make them visible to traffic, such as flexible posts or bollards.

3 Maximum width of 7 feet *or the width of the parking lane.

4 Seating, movable furniture, and other elements within the parklet.

5 Open guardrail to define the space.

6 Turnaround area of at least 4' radius within the parklet in compliance with ADA.

7 Wheel stops with reflective striping parallel to the curb to protect from adjacent traffic.

INFORMATION ELEMENTS

Informational elements are critical to allow mobility hub users to know where they are, what services are present at the hub, and how to use them. Basic informational elements can include maps of the immediate area and the broader mobility hub network, transit arrival and other transportation service information, wayfinding signage to find different mobility hub elements, and communications infrastructure (such as public WiFi) to use trip planning and fare payment services. A common branding for these elements will help to strengthen the mobility hub network concept.

Informational elements that could be considered at a site include:

- Wayfinding Signage

- Digital Kiosks or Transit Screens

Wayfinding Signage

Purpose
Wayfinding signage and pavement decals show information for mobility hub users about where they are and the relative location of nearby destinations or mobility hub features. They also add context to a mobility hub and connect it with the surrounding neighborhood.

Context & Application
Wayfinding maps, signage, or decals may be implemented at any mobility hub location. These elements are critical to create a cohesive mobility hub brand and orient hub users.

Resources
Global Designing Cities Initiative Street Design Guide

© Toole Design

© Arlington County

© Arlington County

© Arlington County

© Arlington County

❶ Maps help mobility hub users orient themselves and navigate to nearby destinations.

❷ Pavement decals guide mobility hub users between destinations or to the location of mobility hub elements within a larger hub site. Can vary in size from 1 foot by 1 foot to 5 feet by 5 feet, or larger, depending on the decal design and contents.

Digital Kiosks or Transit Screens

Purpose

Digital kiosks and transit screens show details about transit services and arrival times, the hub elements and layout, and how to use other transportation options (e.g. bikeshare, shared scooters, etc.). Digital kiosks can be updated in real-time and share information about neighborhood events, meetings, emergency notices, and other important announcements. They can also provide a connection to free Public WiFi, thereby promoting equity.

Digital kiosks and transit screens can have text in multiple languages and use dynamic audiovisual formats to improve access for people with disabilities.

Context & Application

Applicable at any mobility hub, especially gateway hubs.

Resources
NACTO Transit Street Design Guide
NYCDOT Street Design Manual

© Toole Design

© WikiMedia: Jim.henderson

1 Digital transit screens show route information as well as estimated arrival times.

2 Digital kiosks can display multilingual community event, emergency alert, transit arrival, and other dynamic information. Can include information about County services, interactive maps, and directions. Digital kiosks with free Public WiFi allow connection of personal devices to get directions, pay transit fares or use transportation apps, without a data plan. Devices can charge over a power-only USB port or wirelessly via inductive charging.

© Toole Design

PILOT CONCEPT DESIGN

The Project Team evaluated multiple locations for a prototype mobility hub. The Courthouse Metro Station and adjacent Uhle St and Courthouse Plaza was selected for the pilot because it fit the following core criteria:
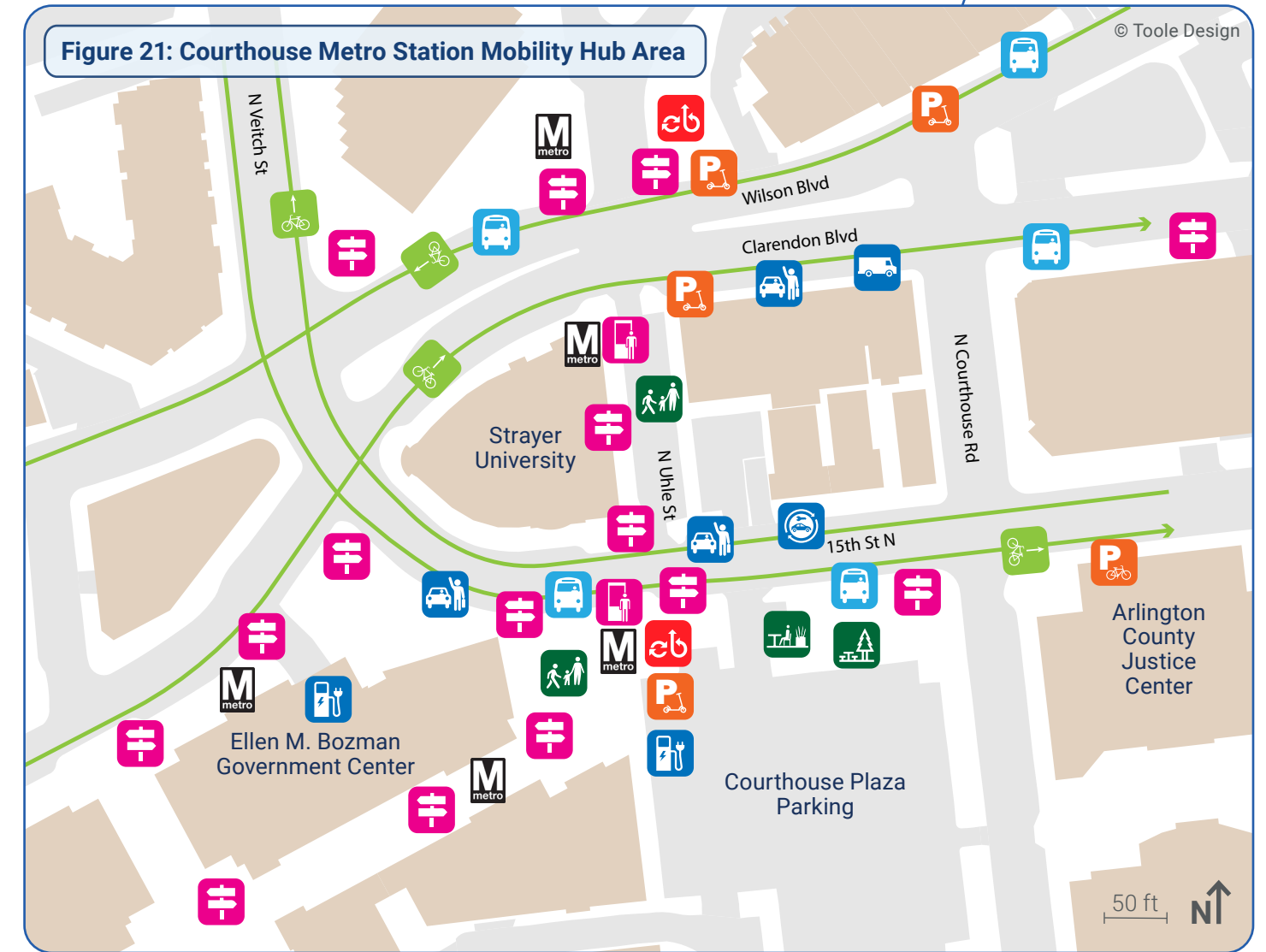
- Safe, comfortable, and ADA compliant pedestrian facilities (sidewalks and crossings)
- Existing bicycle facilities and bikeshare station
- Located at a major transit center (Metro station and several bus stops)
- Other existing mobility hub and placemaking elements already present (bicycle parking, public space/plazas, pick-up/drop-off, taxi stands and carshare)

This is an example of a Gateway mobility hub. Many of the core mobility hub elements are already present at this site and it was selected to tie these elements together through wayfinding and "branding," to add new supporting services, and to showcase the potential benefits of a mobility hub in an area with high multimodal transportation use during this pilot phase. Subsequent phases of the program should plan out the network of mobility hubs in the County, identify specific sites for mobility hub implementation, and develop mobility hub concept plans for build-out of the full network.

The Courthouse Plaza mobility hub is spread over several hundred feet and more than one block. Therefore, the inclusion of informational elements that can connect the different existing and new mobility services is an important feature of the site. The following additional mobility hub elements were recommended for the mobility hub prototype:

- New pedestrian promenade
- Scooter parking and charging station
- Electric vehicle charging spaces
- Digital kiosk
- Wayfinding signs and pavement markings / decals

Figure 21 is a location diagram that shows the context of the site in the broader transportation network, including all existing and proposed features. Figure 22 is a concept design that shows the existing and new mobility hub elements proposed new elements for the Courthouse Plaza gateway mobility hub.

Figure 21: Courthouse Metro Station Mobility Hub Area

© Toole Design

Hub Elements

Ⓜ	Metro Station Entrance	🚲	Bike Lane
🚌	Bus Stop	🚶	Pedestrian Promenade
P	Bike Parking	⛺	Picnic Area
P	Scooter Parking & Charging	🏛	Parklet
🚗	Curbside Pick-up & Drop-off	cb	Bikeshare Station
🚘	Carshare Parking	📱	Digital Kiosk
⛽	Electric Vehicle Charging Spaces		Wayfinding Sign or Pavement Decal
🚚	Food Truck		

COURTHOUSE METRO STATION MOBILITY HUB

Pilot Concept Design

Existing Hub Elements

1. Metro Station Entrance
2. Bus Stop
3. Bike Lane
4. Bikeshare Station
5. Bike Parking
6. Scooter Parking
7. Public Plaza or Picnic Area
8. Parklet
9. Mid-Block Pedestrian Crossing

Proposed Hub Elements

1. Pedestrian Promenade*
2. Scooter Parking & Charging Station
3. Curbside Pick-up & Drop-off (or Taxi)
4. Carshare Parking
5. Electric Vehicle Charging Spaces
6. Digital Kiosk
7. Wayfinding Sign or Pavement Decal
8. Enhanced Pedestrian Crossing*

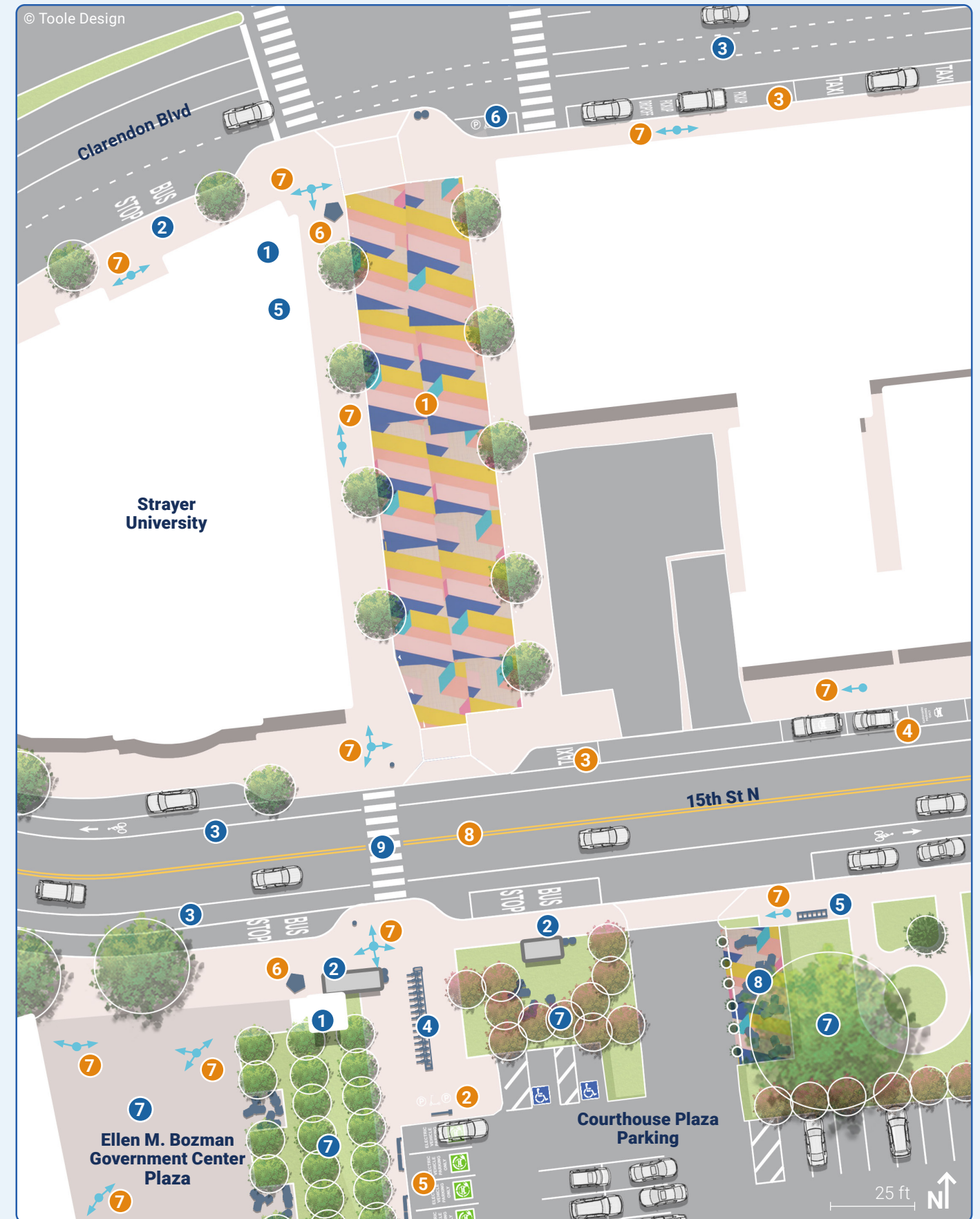*Currently under construction; see Courthouse Sector Plan and Landmark Block Redevelopment Project streetscape design for details.

Figure 22: Courthouse Station Micromobility Hub Concept Plan

IMPLEMENTATION

Select Vendors and Pilot Concept Design

Piloting the mobility hub concept design will require selecting vendors and additional field and design work for some hub elements. High-level cost estimates and other implementation considerations are noted here.

Pedestrian Promenade and Enhanced Pedestrian Crossing

The pedestrian promenade and enhanced pedestrian crossing included in the Courthouse Metro Station mobility hub pilot concept design reflect the changes being made as part of a concurrent Arlington County project. These elements underwent extensive planning and engineering and are presently under construction. Costs for pedestrian promenades and enhanced pedestrian crossings can vary substantially, depending on the design and materials selected. Refer to the Courthouse Sector Plan and Landmark Block Redevelopment Project streetscape design for additional details.

Scooter Parking & Charging Station

Existing dockless scooter and bicycle parking designs use paint, flexposts, and parking stops. Implementation costs using these materials are low, typically less than $5,000 per location. Refer to the design of existing mircomobility parking corrals for cost information (e.g. the cost of

materials and labor for existing designs).

A scooter charging station, if implemented, would require more extensive coordination to determine costs. Multiple vendors are available (e.g. SwiftMile, which has installations in Washington D.C. on public and private property, Charge, or Kuhmute), and their specifications vary. Additional study would be necessary, in partnership with the selected vendor, to determine the cost and needed connections to the electricity grid.

Curbside Pick-Up & Drop-Off and Carshare Parking

The cost of curbside pick-up and drop-off and carshare parking is typically low. In locations with existing on-street parallel parking, these elements would require changes only to parking signs and pavement markings. Estimated costs are $250-$1,000 per location, depending on sign fabrication, paint, and labor costs for installation.

Electric Vehicle Charging

There are a variety of vendors and designs available for electric vehicle chargers. Costs and electricity grid wiring requirements vary substantially, depending on the type of charger selected:

- **Level 1 (L1):** L1 chargers take all day or

overnight charge an EV and plug directly into a standard 120 volt (V) alternating current (AC) outlet. They supply an average power output of 1.3 kilowatts (kW) to 2.4 kW, or about 3-5 miles of typical EV range per hour.

- **Level 2 (L2):** These chargers plug into a standard 200-240 V AC outlet (same as an electric home oven or clothes dryer). L2 chargers output 3 - 19 kW, or about 12 - 60 miles of EV range, per hour. They charge a typical (20-100 kW) EV battery in a few hours.

- **Level 3 (L3):** L3 chargers use high-voltage direct current (DC) for fast-charging and require up to an 800 V grid connection. Tesla Supercharges are an example of an L3 charger. L3 chargers supply up to 350 kW/hour per charger and can charge a typical EV battery to 80% in 20-45 minutes.

Long-term costs also vary depending on if the charging stations are County owned and operated or implemented in partnership with a commercial EV charging network (e.g. Electrify America or Flo).

Digital Kiosks

There are a variety of digital kiosk vendors and designs with varying installation requirements and costs. Similar to both scooter charging and EV charging, this element can be purchased and implemented directly by the County, or in partnership with a network company. Smart City Media is a digital kiosk network, whose kiosk, CItyPost, has a multi-lingual digital display with transit service provider integration and public WiFi. New York City's on-street network (LinkNYC) is another digital kiosk example. Link NYC is implemented in partnership with a digital display network (Intersection) and wireless infrastructure

company (ZenFi), and the costs of installation and maintenance are defrayed by advertising.

Wayfinding Signs and Pavement Decals

Wayfinding signs and pavement decals vary in complexity and cost depending on their design, size, and materials. Typically, signs can vary from $250-500 per sign for post-mounted aluminum signs, or up to $1,000 or more if custom sign panels and mounts are made using premium materials. Vinyl wayfinding pavement decals typically cost under $100 per decal, depending on the quantity. Preformed thermoplasitc pavement marking decals are another option. Thermoplastic is more durable, slightly higher cost, and affixes more permanently than vinyl decals.

A full mobility hub branding and wayfinding strategy, including development of a customized Arlington County Mobility Hub logo for users to easily recognize the hubs, a sign and pavement decal typology, and detailed sign engineering designs, would be beneficial for the long-term program. This would foster cohesion and strong user familiarity when navigating between hub locations across the network or encountering a new hub.

© Toole Design

Figure 23 Bikeshare station and bus stop at a Gateway Hub location, Arlington, VA

Identify program oversight

There are a number of additional implementation considerations that must be taken into account during the planning, development, and implementation phases. Consider establishing a Mobility Hub Coordinator within the County's Transportation Division to manage the development of the mobility hub network. This role would include:

- Helping to develop the program's vision and goals
- Overseeing the planning and outreach processes
- Seeking funding or coordinating with third-party vendors
- Collaborating with other departments,

agencies, and stakeholders
- Managing procurement and contracts with third-party vendors
- Providing reports and recommendations to decision-makers
- Reviewing and evaluating site designs and already approved nearby site plans with the appropriate department(s) or stakeholders to prevent conflicts.
- Evaluating maintenance needs, software and hardware recommendations, and
- Evaluating the progress towards achieving its intended objectives

A dedicated staff role can ensure that the program

receives the support and resources needed to be successful, can identify opportunities to leverage resources within the agency, and ensure there is a champion for the program within the organization.

Communicate with the public

Public support for the mobility hub program is critical to build program buy-in, enthusiasm, and awareness. Emerging mobility trends are complex and new transportation technologies are constantly evolving. The County could use an easy-to-understand marketing campaign to explain the benefits of mobility hubs to deliver a more integrated and convenient transportation experience.

Explore tie-ins to existing transportation demand management programs or other ongoing outreach and marketing campaigns, e.g. those associated with long-range studies and site development processes.

Establish (or grow) partnerships

Mobility hubs are multidisciplinary efforts that are typically delivered through public-private partnership. They require coordination between multiple departments, other public agencies, and private services. For example, mobility hubs can leverage new private development opportunities, and/or be integrated into broader transportation demand management programs. This coordination will influence:

- Site selection and permitting
- Provision of mobility hub services
- Ongoing maintenance agreements for different mobility hub elements

A dedicated staff coordinator may help establish or grow partnerships between the organizations and departments involved in permitting, procuring, and maintaining elements of the mobility hub network.

Pursue Funding

Funding for capital and ongoing operations of the mobility hub network will need to be accounted for. The mobility hub coordinator should seek out multiple sources of funding including federal and state grants, County funds, funding or low-cost service provision through public-private partnerships, infrastructure and service usage fees, and advertising and sponsorship revenues.

Beyond direct County funding, there may also be opportunities to incorporate mobility hub improvements into planned future capital improvement projects or add mobility hubs as expenditures under existing funding streams.
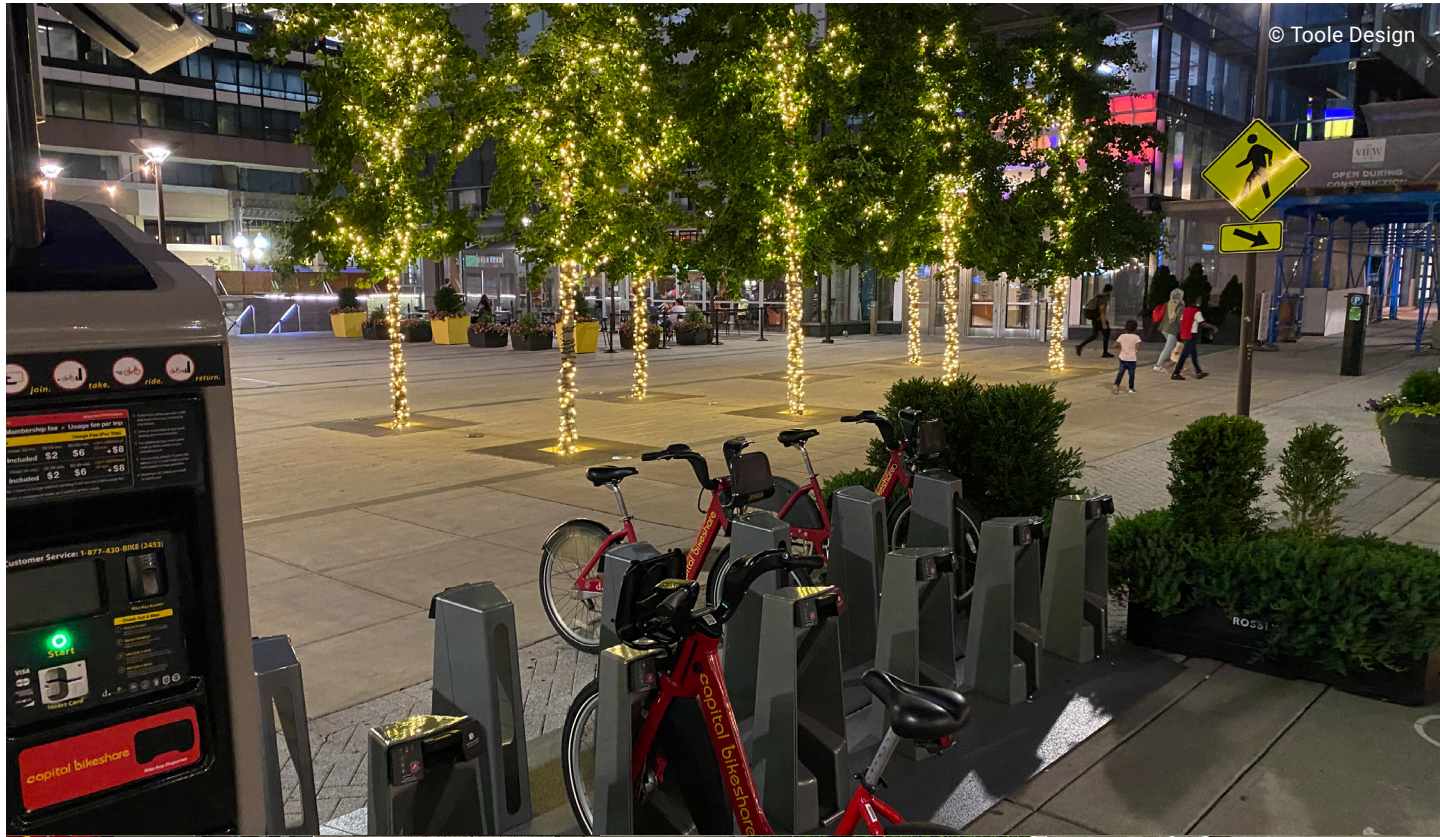
© Toole Design

Figure 24 Pedestrian promenade and bikeshare mobility hub elements at a Gateway Hub location, Arlington, VA

Public-private partnerships can defray costs and leverage the private sector's ability to innovate and adapt to emerging technologies. This may require some updates to existing policies, procurement methods, and other internal County processes. The San Diego Association of Governments recommends creating a "Mobility Sandbox" – giving the private sector a space to develop proposals to demonstrate technology and services that solve mobility challenges and implement the mobility hub concept on an ongoing basis.

Advertising and sponsorship on different mobility hub elements like the digital kiosks could generate additional revenue but would need to be consistent with the County's public signage policies and any existing street furniture advertising agreements.

Update Policy

County regulations and policies should be updated to align with and enable the mobility hub network concept and allow for flexible funding streams that can take advantage of public private partnership opportunities (e.g. advertising or sponsorship by mobility operators, businesses, or business improvement districts). Ideally, mobility hubs should be integrated into the entitlement process in land development and building codes, and mobility hub features can be added as requirements or incentives for future development projects.

Policies and design guidelines germane to specific mobility hub elements, such as dockless bikes and scooters, taxis, or TNCs (e.g. Uber and Lyft ride hailing services) should also be reviewed to ensure they support mobility hub operation and use.

The County should also consider policies around "Big Data" and data-sharing for the mobility hub network. If private mobility services are operating within the network, the data they gather can be critical to understanding mobility hubs'

performance and success. Internally, the County can develop open data policies for increased transparency over the services managed by public agencies. Externally, the County can work to establish data-sharing agreements with private operators and partners to ensure that evaluation efforts have a complete picture of the data generated by the mobility hub network.

Measure Impact

As transportation needs change and technology evolves, it is important to monitor the activity and use of the mobility hub network to measure its impact and success on an ongoing basis. The County should establish a baseline of pre-mobility hub data to measure trends.

Utilizing available data as well as surveys of users at the site and field observation, the County should consider analyzing the following types of metrics for each hub or the overall network:

- Bicyclist and pedestrian volumes to and from the site
- Boardings/alightings and trip data from public and private transportation services
- Dwell time, arrival mode, and frequency of visits for users of the site
- Mode shift (e.g. reduced private vehicle ownership or increased use of non-drive-alone modes for journeys to work)

- Fossil fuel use/greenhouse gas emissions
- General perceptions (responses to questions like "Does the mobility hub meet your transportation needs?" or "What could be improved or added to this site?")