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PRACTICE MOBILITY HUBS



Planning and Zoning for Mobility Hubs

By Andrew Crozier, AICP, and Lisa Nisenson

Planners need ways to incorporate new mobility, smart city technologies, and supporting infrastructure into existing models and methods of transit-oriented development. Enter the concept of mobility hubs.

Mobility hubs aim to reduce auto travel by making transit, shared-use mobility, and walking attractive, safe, and convenient. Hubs achieve this through sheltering, real-time information, safe connections, and supportive infrastructure that help people transfer from one transportation mode to another. Other goals for mobility hubs include encouraging sustainable and cost-effective solutions to expand mobility.

The purpose of this article is to introduce the idea of mobility hubs and present information on how to integrate them into plans and codes. The following sections review the history of the mobility hub concept, examine contemporary mobility hub practices, present a typology to guide planning and zoning for future mobility hubs, and highlight noteworthy trends that may affect the future of mobility hubs. The article concludes with a summary of success factors and a small set of resources for further reading.

HISTORY OF MOBILITY HUBS

Michael Glotz-Richter, the Senior Project Manager of Sustainable Mobility for the City of Bremen, Germany, is credited with developing the concept of mobility hubs in 2003. The idea was to combine multiple mobility modes in one place and make transfers between modes more seamless for the user. The end goal was to encourage people to get out of their personal vehicles and reclaim space on the street for other uses. Bremen began establishing mobility hubs near high-frequency transit stops, and by 2018, the city's transportation network was supported by 25 mobility hubs.

The concept of mobility hubs arrived in North America in 2005 when Metrolinx made a hierarchy of mobility hubs a central part of



Swiftmile

➔ Incorporating micromobility into a mobility hub can be as simple as standalone bicycle racks or parking corrals, or more complex installations that feature parking, recharging, maps, and information.

its Regional Transport Strategy for Toronto, Canada. The rise of shared-use mobility (rideshares, carshares, and shared bikes, e-bikes, and scooters) has boosted American interest in mobility hubs.

MOBILITY HUBS OF TODAY

Several cities in the United States, such as San Diego, Minneapolis, Boston, and Pittsburgh, have incorporated mobility hubs into their transportation plans.

San Diego

San Diego's APA award-winning strategy was developed by the San Diego Association of Governments to fulfill elements of the San Diego Forward Regional Plan. Eight prototype sites were developed to showcase how the

hubs can be tailored to diverse types of communities. The Mobility Hub Catalogue was created to demonstrate how the different mobility features, amenities, and technologies can be combined to design customized hubs. Equity considerations were used to determine how the different services and amenities would impact low-income residents, minorities, and senior citizens.

Minneapolis

Minneapolis established its Mobility Hub Pilot in 2019. The hub locations were chosen using 32 different criteria with a weighted emphasis on equity. Hubs were created using modular furniture, placemaking, and mode-finding, a comprehensive approach to wayfinding. The hubs evolved beyond

just a transfer point between transportation modes; they became social gathering places and contact points for human services. They evolved into true neighborhood assets beyond mobility.

Boston

Boston's GoHubs! Program was launched with the goal of ensuring all city residents were within a 10-minute walk of reliable transit. The initiative's three main objectives were to improve access, enhance place, and provide information. The program establishes a three-tiered hierarchy of hubs including gateways, squares, and points. A "Kit of Parts" was developed to allow planners to mix and match different mobility elements to tailor each hub to the community. A pre-installation community survey revealed that people were most excited about placemaking and public space aspects of a potential mobility hub. GoHubs! Launched their East Boston pilot program in 2021 with an evaluation report expected by October 2022.

Pittsburgh

Pittsburgh is a city rich in mobility options, where a quarter of households do not have access to a car. However, these mobility options are run by different entities, and it is difficult to plan a trip using multiple modes. The solution was to integrate the systems so it's easier to use different mobility services in one trip. The Pittsburgh Mobility Collective is a city-lead collaborative of multiple transportation entities, shifting the current strategy of competition to one of working together. Together they developed MovePGH, a two-year program that unifies multiple mobility services under one system. The different mobility elements are consolidated under a single app that allows users to plan and pay for their trip using multiple modes. The program is establishing 50 mobility hubs across the city that will provide access to buses, bike share, e-bikes, and e-scooters in one place.

Design Drivers

The case studies above, and additional research, have revealed common design drivers that planners should consider for mobility hubs:

- Minimizing the need for auto trips
- Providing first- and last-mile connectivity, supportive infrastructure (i.e., complete streets), and context-appropriate parking (for all modes)
- Facilitating multimodal integration through facility colocation
- Eliminating conflicts among modes and among travelers making transfers
- Spurring economic development
- Fostering social gathering

A TYPOLOGY OF MOBILITY HUBS

The planner's role in developing and utilizing mobility hubs rests primarily on our ability to integrate them into plans and zoning codes. With any emerging topic, it's helpful to have a framework for assessing important design drivers, hub elements, and supportive policies. In reviewing examples, two focal themes emerged for designing mobility hubs: a transit focus and a land-use focus.

This section presents a framework addressing these two focal lenses as a means for exploring and evaluating planning, zoning, and design considerations within the local context. It lists hub typologies individually, though in practice, cities and transit agencies will ultimately manage a constellation of linked hubs with varying sizes, modes served, and amenities.

Mobility Hubs with a Transit Focus

This framework conceptualizes four distinct types of transit-focused mobility hubs: urban large intermodal, urban transit station, suburban park and ride, and individual bus stops.

Urban Large Intermodal

This type of mobility hub is characterized by the confluence of regional and local transit lines within an intermodal center in urban settings.

Main Planning & Design Considerations:

Intermodal stations are typically located in high-density settings with a robust mix of jobs, housing, and civic and retail uses. The variety of high-capacity transit options and concentrated activity requires stations, buildings, and infrastructure that can accommodate heavy foot traffic and transfers. For the station and immediate surroundings, the main design driver is facilitating pedestrian

and surface transit flows while separating conflict points with private automobiles and delivery trucks. Bicycle and micromobility are considered in design to also reduce pedestrian conflict while optimizing access and parking.

Planning & Zoning Implications:

Zoning and planning is generally applied through traditional transit-oriented development (TOD) overlays and station-area master plans. Parking is typically supplied via structures, though may be limited due to the hub's transit focus. Pedestrian and placemaking needs require large sidewalks, safe crossings, street furniture and landscaping. With so much activity, curbside management and streetscape plans are important. Technology plays a major role in helping travelers navigate multiple modes and transfers through information displayed on kiosks and screens and within mobile apps. In the future, planners may need to consider access for urban air mobility, though the future of this mode in urban cores is yet to be determined.

Urban Transit Station

This type of mobility hub is a single stop along a high-capacity transit line.

Main Planning & Design Considerations:

Transit stations can be in urban or suburban locations and are typically included in a larger TOD planning effort. Like intermodal stations, planners work to identify the complement of land uses, parking, density, and amenities based on the setting and market analysis. In high-cost markets, cities are looking to increase housing options and convenience retail around stations. With new mobilities, agencies are considering access beyond the typical one-quarter mile walkshed to include first- and last-mile access. The range may be extended further if the use of e-bikes and e-bikeshare continues to grow.

Planning & Zoning Implications:

Cities are augmenting traditional TOD designs with new approaches that factor in the continued evolution of new mobility, smart city technologies, and adaptability. Within codes, cities are seeking methods for "rightsizing" off-street parking and transitioning excess spaces into shared parking facilities and facilities for multiple modes. Planners need to consider a high-quality pedestrian realm with room for programming

spaces for multiple uses. High quality bicycle infrastructure, such as secure parking, protected intersections, and separated lanes, will be key to increasing access. Planners may need to update station-area master plans and zoning regulations with design concepts and provisions that address new mobility, in particular sidewalk design, maintenance, finishings, and uses.

Suburban Park and Ride

This type of mobility hub encompasses suburban and exurban parking facilities where drivers access commuter bus and rail services.

Main Planning & Design Considerations:

Traditionally, park and ride lots have been little more than a parking facility and signage. They are popular in regions with extreme traffic congestion, tolls, and expensive parking. With COVID, ridership on commuter lines fell, leading to predictions of a “work from anywhere” workforce. To attract passengers, transit agencies are launching on-demand shuttle service (microtransit) to and from lots, as well as secure bike parking in areas with bike access. Denver’s Regional Transportation District found that park and ride facilities that provide access to multiple modes tend to be most attractive, signaling a role for park and rides facilities as mobility hubs.

Planning & Zoning Implications: Park and ride lots are mostly owned and operated by transit agencies, though there are examples of shared-use arrangements that can be used to create a mobility hub with food, retail, and space for shared modes. For improvements beyond typical signage, vanpool staging, and parking, planners can add sheltered waiting areas, restrooms, electric charging stations, digital signage, and vending machines. Over time, planners and agency partners can investigate the potential for mixed-use development that includes housing, childcare, and convenience retail. Planners should also investigate where drivers are forming informal park and rides to see if enhanced facilities can help boost ridership and traveler comfort.

Individual Bus Stop

This type of mobility hub encompasses stops for local bus service (in all contexts).

Main Planning & Design Considerations:

Since local bus service is often regarded as

the workhorse of local transit, enhancing stops with amenities and new mobility can increase service on a modest budget.

Planning & Zoning Implications:

Convening nearby residents and other stakeholders needs to be the first step to ascertain desire for a hub and to identify components and locations. Some communities are finding that hubs are not just valuable as mobility amenities but also community hubs as well. Common upgrades include seating, enhanced sheltering, secure bike racks, and digital signage. Infrastructure improvements will be focused on sidewalk and biking access at the neighborhood scale.

One of the biggest design challenges is finding space along sidewalks and curbsides to safely fit bike racks, micro-mobility parking, pick-up and drop-off zones, and other amenities. The public works department (or streets division) and transit agency are key partners for feasibility assessments, design, installation, and maintenance.

For the most part, hubs will be built around existing bus stops. There are varying levels of regulations. In Florida, bus stop design is encoded in state statute, though in other states design is governed by cities or transit agencies. For bus stops, quick-build (or modular) infrastructure is a good option for low cost and ease of implementation. Low-cost materials can also be used for demonstration purposes to secure feedback from the community. For bus-stop-centric mobility hubs, the public works department, in conjunction with the transit agency, is typically the lead agency.

Mobility Hubs with a Land-Use Focus

This framework conceptualizes four distinct types of land-use-focused mobility hubs: mixed-use district, campus, structured garage, and individual building.

Mixed-Use District

This type of mobility hub encompasses sub-areas and districts that contain a mix of uses (at multiple scales and in various contexts).

DESIRABLE AMENITIES FOR TRANSIT-FOCUSED MOBILITY HUBS

Amenities	Urban Large Intermodal	Urban Transit Station	Suburban Park and Ride	Individual Bus Stop
Lighting	Yes	Yes	Yes	Yes
Real time information	Interurban bus and rail arrivals and departures, transit arrivals	Transit arrivals	Transit arrivals, parking availability	Transit arrivals
Wi-Fi	Yes	Yes	Yes	Yes
Carshare space	Yes	Yes	Yes	Yes
Bikeshare docks or space	Yes	Yes	No	Yes
Parking	Maintenance vehicles, public safety vehicles, transit vehicles, bikes	Maintenance vehicles, public safety vehicles, transit vehicles, bikes	Automobiles, vanpool vehicles, bikes	Bikes
Vehicle charging	Public vehicles, transit	Public vehicles, transit	Automobiles, transit	No
Bus shelter	Yes	Yes	Yes	Yes
Package lockers	No	Yes	No	No
Retail	Yes	Yes	Yes	No
Pick-up and drop-off zone	Yes	Yes	Yes	Yes

Main Planning & Design Considerations:

Cities will have a variety of motivations for hub design that can include mobility, community-building, economic development, housing variety, transit access, resilience, and the retrofit of single-use districts. In general, walkability is the district's design foundation, and hubs will serve to leverage multimodal travel options to and within the district. With hubs, a district has a chance to successfully replace short auto trips with low-impact modes. Depending on goals and priorities, hubs may also be designed as convening and event spaces, as well as test beds for new transit technologies.

Planning & Zoning Implications:

Unlike the other typologies, with districts planners can design hubs and supportive infrastructure at a larger, coordinated scale. Like the other typologies, it is important to first convene residents and other stakeholders to determine the need, location, and design elements for hubs. For shared-use mobility, planners will need to work with companies since they have expertise in locating stations and vehicles, and with regulators since shared micromobility rules vary and can change often. For convening spaces, seating and shade are important elements.

One of the most significant success factors for mobility hub use is the quality of the multimodal infrastructure network. Be prepared to chart a network of mobility hubs and identify gaps in the vicinity of current and potential hub locations. Similarly, planners can locate hubs along high quality infrastructure first, and build more hubs as segments are improved. Like any transit project, consistent branding and signage are essential. A city may want to include inclusion of mobility hubs (with specified components) within planning and zoning code regulations.

Campus

This type of mobility hub is defined by public and private institutions composed of multiple buildings with internal, networked circulation.

Main Planning & Design Considerations:

This type of hub will vary by campus type, though all campuses will face the same challenge of being spatially constrained and reliant on effective internal circulation.

In facing growth, campus managers typically seek ways to reduce the number of cars entering campus while simultaneously relocating parking to redevelop valuable properties. Several technology companies are developing platforms that let campuses create and operate their own shared fleets. This would streamline and consolidate the suite of shared-use mobility offerings, allowing seamless operations.

Planning & Zoning Implications: Both new and redeveloped campuses will feature buildings devoted to student life, administrative functions, and core programs. Within a campus, individual buildings can serve as hubs that supply their own bike parking, showers, and lockers, pick-up and drop-off zones, parcel lockers, and skateboard racks. College campuses will likely design hubs around micromobility and campus transit, while a medical campus will have nodes based on patient care, visitors, and deliveries.

Where congestion and campus parking are a problem, mobility managers will need to adopt transportation and parking demand management strategies, as well as complete streets designs that accommodate the growing number of low-speed electric options. This includes campus vehicles for tasks related to security, parking enforcement, grounds maintenance, and internal transit. Finally, campus planners and city counterparts should collaborate to create off-campus hubs to support more non-automotive trips.

Structured Garage

This type of mobility hub is integrated into larger garage structures (above ground or underground) dedicated to parking.

Main Planning & Design Considerations:

Reduced demand due to COVID gave the parking industry a chance to review business models and develop future scenarios. Currently, parking operators are investing in improved digital wayfinding and mobile parking apps. In anticipation of emerging technologies, operators are developing pilot projects to create small delivery hubs (micrologistics), rooftop landing for urban air mobility, and self-parking vehicle testing. Self-parking vehicles require less space to open doors and navigate drive aisles, which could free spaces for other uses.

Planning & Zoning Implications:

Most mobility hub activity will occur on the first floor, likely in the form of valet service, carshare spaces, and recharging for cars and low-speed electric shuttles in spaces best positioned for electric service. Land-use and transportation planners will need to assess the nature and degree of change, which could entail new street design and traffic patterns. With adaptability in mind, plans and code updates increasingly include features such as flat floors, higher ceilings, and design for heavier loads for additional floors. Cities may need to establish public-private partnerships for mobility hubs given the larger set of stakeholders and novel arrangements for shared space. Garage structures are typically governed under building, instead of zoning, codes. Issues in converting space can include recalculating loads, new requirements if enclosing space within the garage, and changes in traffic patterns.

Individual Building

This type of mobility hub is on the site of large residential, commercial, or mixed-use buildings.

Main Planning & Design Considerations:

Individual buildings can also be designed to serve as mobility hubs. Front curbs can host bikeshare racks and carshare spaces, as well as pick up and drop off points for transit and on-demand ridesharing. First-floor space can be used for bike parking and repair, or as logistics hubs for packages or e-commerce stations that stock popular items ordered by the building tenants.

Planning & Zoning Implications:

Cities can craft zoning code language for various mobility hub components. Many cities already have language addressing the placement, amount, and quality of bicycle parking and, in some cases, lockers and showers. Given the competition for space on sidewalks and along curbsides, planners may need to update codes and design standards to optimize space and facilitate multimodal travel options. Zoning codes could easily include provisions that require buildings over a certain size (or on lots of a certain size in specific locations) to include specific mobility-hub-supportive features (either for all new land-use permits or as a prerequisite for a density bonus).

DESIRABLE AMENITIES FOR LAND-USE-FOCUSED MOBILITY HUBS

Amenities	Mixed-Use District	Campus	Structured Garage	Individual Building
Lighting	Yes	Yes	Yes	Yes
Real time information	Transit arrivals	Transit arrivals, campus events	Parking availability	Parking availability
Wi-Fi	Yes	Yes	Yes	Yes
Carshare space	Yes	Yes	Yes	Yes
Bikeshare docks or space	Yes	Yes	Yes	Yes
Parking	Bikes	Short-term automobiles, low-speed electric vehicles, low-speed electric shuttles, bikes	Automobiles, transit vehicles, public safety vehicles, low-speed electric shuttles, bikes	Automobiles, bikes
Vehicle charging	Automobiles, low-speed electric vehicles, low-speed electric shuttles, transit	Automobiles, low-speed electric vehicles, low-speed electric shuttles	Automobiles, low-speed electric vehicles	Automobiles
Bus shelter	Yes	Yes	Yes	Yes
Package lockers	Yes	Yes	Yes	Yes
Retail	Yes	Yes	Yes	Yes
Pick-up and drop-off zone	Yes	Yes	Yes	Yes

TRENDS AND NEW TECHNOLOGIES

There are several trends affecting future design and policy for transit-oriented developments and mobility hubs. These trends are poised to reshape mobility patterns, building amenities, and urban design.

Retail Space Innovation: Trends in pop-up retail space can bring convenience retail to mobility hubs of all sizes.

Transit Apps and Mobility-as-a-Service (MaaS): Displays of real time transit information, weather, and available bike share all help residents quickly make or change travel plans.

Low Speed Electric Shuttles: Low speed shuttles (or microtransit), with and without drivers, offer on-demand and usually door-to-door services. Electric shuttles can travel within indoor spaces since there is no tail-pipe exhaust, which poses implications for hub design and transfer stations.

Vehicle Electrification: Hubs can offer publicly available charging but will also be needed for transit and other public vehicles. In the future, inductive charging (in which a charging pad replaces the plug-in cord) will further redefine mobility hub design.

Fifteen-Minute City Design: In this community design format, the goal is that everyone has everyday uses within a 15-minute walk, bike, or transit ride. Mobility hubs can provide missing uses such as social services, groceries, and childcare.

Quantifying Climate Action: Cities are increasingly expected to report progress on climate action, including transportation emission reductions. Counting technology in hubs can automatically quantify non-automotive trips.

SUMMARY

Mobility hubs are emerging as an important planning element to coordinate land use, infrastructure, and multimodal transportation within a variety of contexts. Cities are also finding secondary benefits by creating economic development and community gathering spaces. Finally, support for non-automotive travel helps cities meet climate, equity, and affordability goals.

Based on early mobility hub pilots and installations, there are several common success factors:

Hold listening sessions with neighborhoods to determine modes and design



A rendering of an individual-building hub.

parameters, as well as siting considerations.

This first step is critical to not only get neighborhood buy in, but to also glean information on travel patterns, transit and mobility issues, mobility hub design, and amenities.

Gather key stakeholders. In most instances, the key stakeholder, in addition to neighborhoods, will be the public works, planning and transportation departments, the transit agency, and local businesses. Depending on the location and modes served, you may also want to include social services, law enforcement, and the parks department.

Develop siting criteria based on GIS and map layers to determine locations. Once stakeholders develop priorities and site selection criteria, it is helpful to develop maps that show locations that meet transit, traveler, and neighborhood needs.

Communicate about transit service. Mobility hubs are a welcome addition; however, travelers in most case studies reviewed prioritized reliable transportation above all other benefits. While hubs are not a tool for improving vehicle travel times, research shows that providing real time arrival reduces anxiety over wait times and raises the perception of service quality (Watkins et al. 2011).

Design for safe access and transfers. Given the need to accommodate travelers

using multiple modes, from walking to large scale transit, designing for safe access and transfers is paramount. Pay special attention to pedestrian walkways and potential conflict points such as bus transfer zones, bicycle rack placement, and high volume pick-up and drop-off zones for people and deliveries.

Get creative on the use mix. Many cities seek benefits beyond mobility to host parklets, small-scale markets, and services such as public health appointments. Larger cities with mixed use around stations can audit station areas through a mobility hub lens to help identify gaps and investments.

When getting started, comprehensive plan updates are the most likely first steps for goals, objectives, and policies for incorporating mobility hubs. In larger cities with transit-oriented development, the next step is to review existing plans and codes (including small area plans and overlay zones) to see if they adequately support new mobility and trending technologies. Smaller cities can use applicable typologies for park and rides, campuses, mixed-use communities, and individual bus stops.

Planners are uniquely skilled in developing plans that integrate land use, transportation, and infrastructure. These traditional skills, coupled with knowledge

of new mobility, will be needed to facilitate greater access, travel connections, and neighborhood places through mobility hubs.

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Cover: City of Minneapolis

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HOW CAN ZONING PROMOTE MOBILITY HUBS?

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