alta
PLANNING + DESIGN

# Mobility Hub Typology Study

PORTLAND BUREAU OF TRANSPORTATION | JUNE 2020

PBOT
PORTLAND BUREAU OF TRANSPORTATION

# Acknowledgments

*An exploratory study led by*
**Alta Planning + Design's Innovation Lab**

*In partnership with*
**City of Portland Bureau of Transportation (PBOT)**

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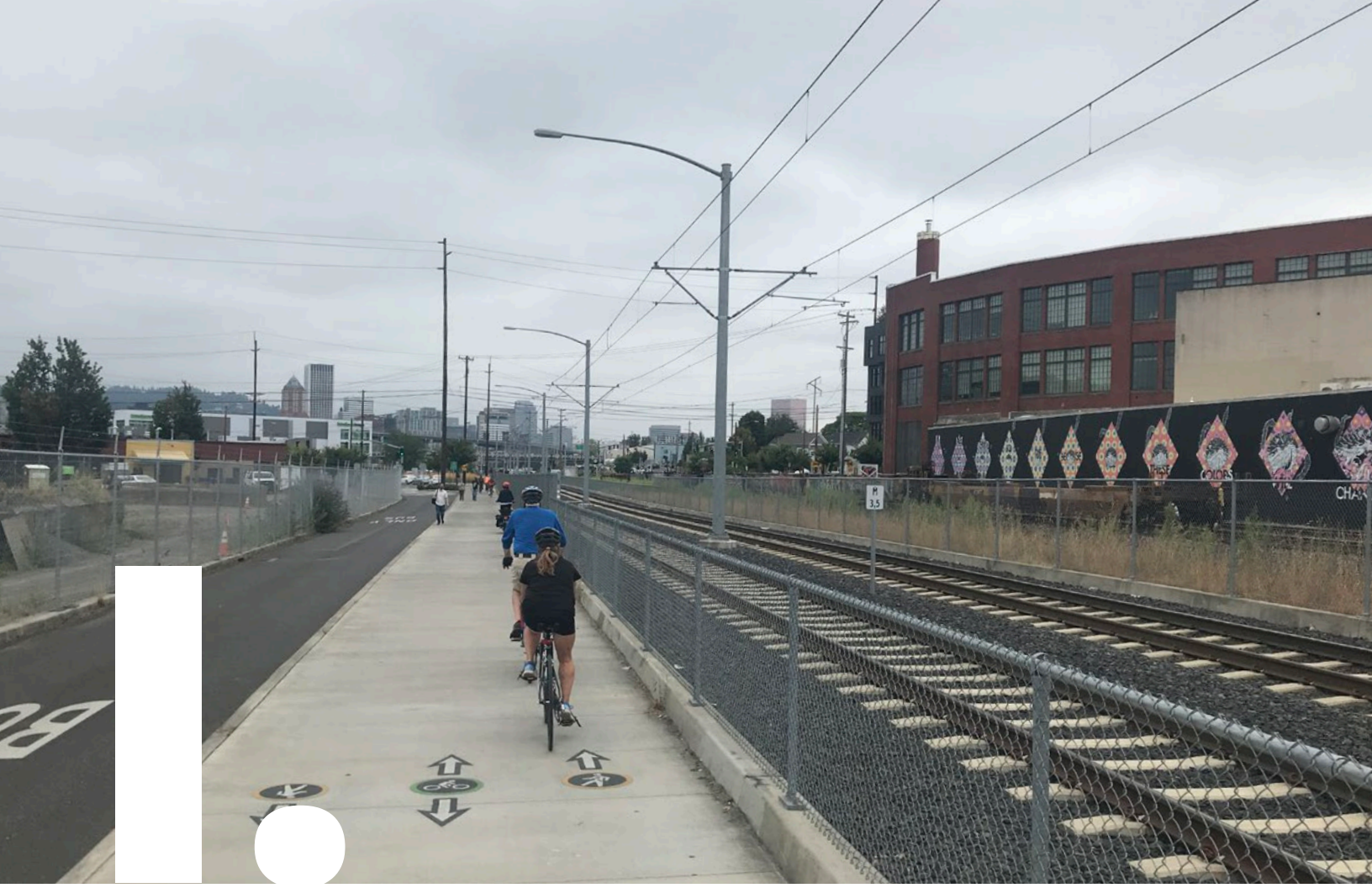


# What is the Mobility Hub Typology Study?

Over the last several years, rapid changes in technology and travel choices raised the profile of mobility hubs, suggesting that they may be an important tool for the future of urban transportation. This document explores the role that "mobility hubs" may play as a part of the City of Portland's extensive transportation system. Mobility hubs are the co-location of multiple travel options. The transportation system refers to both the infrastructure that supports the movement of people and goods - like roads and bridges, regulatory and wayfinding signs, parking meters, traffic lights, and much more - as well as the services that operate - such as paratransit, TriMet buses and the MAX, the streetcar and taxis, freight and urban delivery, Uber and Lyft, scootershare, car share, and BikeTown.

This report is an exploratory study jointly initiated by the City of Portland's Bureau of Transportation (PBOT) and Alta Planning + Design, a multinational transportation-focused firm headquartered in Portland. The purpose of the report is to articulate the role of mobility hubs within the specific context of the City of Portland and define likely applications of hubs now and in the future. While it is not a policy document, the report provides an important foundation for policy, regulatory and program development across multiple critical areas,

including electric vehicle charging infrastructure, transportation equity investments, shared mobility and micromobility management, first and last mile access to transit, and right-of-way management.

The Study was completed over six months (late 2019 to early 2020), and included:

- meetings with PBOT technical team members
- a multi-agency, half-day workshop to explore and refine draft concepts
- multiple rounds of review, discussion, and consideration by PBOT and partners, such as BPS

The framework introduced here offers a platform for elevating fundamental questions and considerations. With acknowledgment of the climate crisis, PBOT and the Portland Bureau of Planning & Sustainability (BPS) continue to collaborate and advance urgently important projects. BPS' work on the EV Ready Code Project will help formalize the definitions and concepts introduced here as mobility hubs and electrification are addressed in the code development context. PBOT will work with BPS to jointly establish the City's position and strategy for accelerating the availability of Public Charging.

**THANK YOU TO OUR WORKSHOP PARTICIPANTS**

Metro

Office of Commissioner Chloe Eudaly

Portland Bureau of Development Services

Portland Bureau of Planning and Sustainability

Portland Bureau of Transportation

Portland General Electric

TriMet

# Mobility Hubs for Portland

In Portland and in cities around the world, transportation is undergoing a rapid evolution. Technology-enabled services have expanded the suite of options available for getting from point A to B. Six key trends are shaping urban transportation systems:

## 1 MORE CHOICES

In addition to biking, walking, driving, and taking transit, many people have **access to on-demand services such as private-for-hire rides** (like taxis, Uber, and Lyft), scooter share, bike share, carsharing, and micro-transit shuttles.

## 2 NEW PLAYERS

New business models have increased the role of the **private sector in transportation and changed the nature of services operating in the public right-of-way**.

## 3 BEHAVIOR CHANGE

**Trip-planning services** are changing the way people make decisions about routes, mode, and cost to travel.

## 4 ELECTRIFICATION

Global trends toward electrification of vehicles, combined with locally-adopted goals for reduced greenhouse gas emissions, has **increased demand for electric charging options** as part of public infrastructure.

## 5 E-COMMERCE

**E-commerce is reducing personal trips** to retail stores and restaurants and exponentially **increasing the volume of urban delivery and courier trips** occurring.

## 6 CURB SPACE DEMAND

There is **increasing demand for curb space** for elements like transit services, rideshare, pick-up and drop off, walkways, bikeways, and freight delivery.

As a result of these converging trends, cities and transit agencies around the country are identifying new ways to connect the expanded suite of mobility options to one another and to manage use of the right-of-way. The goal is to harness the benefits of emerging technology while minimizing risks. By creating a physical platform for integrating public and private, shared and individual, transportation services, mobility hubs offer one such strategy. How a mobility hub is defined, however, can vary significantly.

For the purpose of developing a mobility hub typology, the City of Portland defines a mobility hub as:

*"A location where mobility options are intentionally linked to one another and to amenities to make getting around Portland more convenient, seamless, and enjoyable for the purpose of advancing mobility, climate, and equity goals."*

The definition is descriptive and not intended to be limiting. Mobility hubs can do and offer much more than what is specified. The definition establishes a baseline expectation that is helpful for planning. Using PBOT's definition, mobility hubs are a specific location – whether within the public right-of-way or adjacent to it - and the immediately surrounding area that should offer:

- Access to two or more transportation services
- Biking and walking access to the site
- A sense of place and human-centered design
- Locally-relevant and context sensitive programming and amenities
- Fair and equitable access, including universal design
- Cohesive, intentional design that is flexible/adaptable to evolving needs

Other elements that may be considered in mobility hub programming include:

- Designated pick-up and drop-off areas
- Parking for shared micromobility devices (like e-scooters or bike share)
- Prioritized parking for personal or shared electric vehicles, carshare vehicles, or permitted carpools/vanpools
- Multi-modal and multi-service payment/fare integration
- Digital information, such as dynamic wayfinding and real-time data feeds of transportation options
- Sustainable urban delivery options, such as parcel lockers and last-mile exchange package hand-offs
- Electric charging infrastructure, for public transit vehicles and/or personal or shared mobility fleet vehicles, including cars, bikes, scooters, and electric wheelchairs.
- Data collection technology, including real time air quality monitoring or curbside activity counts
- Community resources, such as Neighborhood Emergency Team Kits, publicly accessible Wifi hotspots, and phone charging docking stations

**FOR THE PURPOSE OF DEVELOPING A MOBILITY HUB TYPOLOGY, THE CITY OF PORTLAND DEFINES A MOBILITY HUB AS:**

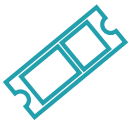
"A location where mobility options are intentionally linked to one another and to amenities to make getting around Portland more convenient, seamless, and enjoyable for the purpose of advancing mobility, climate, and equity goals."

## Mobility Hub Elements

In practice, mobility hubs are the sum of their parts. The services and amenities commonly considered in mobility hub planning include the following:

### TRANSIT AND TRIP-MAKING SERVICES

Passenger pick-up and drop-off areas for ridehailing, microtransit, etc



Transit ticket and integrated payment kiosks

Bus, shuttle, or light rail stop

Real time transit information & other shared mode information

Freight loading/ unloading area

### PARKING AND CHARGING SERVICES

Electric vehicle charging (including bicycles & scooters)

Short term bike parking

Long term bike parking

Bikeshare & scootershare parking

Carshare parking and access points

### PRIORITY ACCESS

Prioritized walkways for all ages and abilities

Prioritized bike and micromobility access

Safe bicycle and pedestrian crossings

### AMENITIES

Publicly accessible WiFi and phone charging

Community space

Complementary retail

Activated furnishing zone with appropriate support infrastructure

## Why it matters

Current trends related to new and emerging transportation technology, suggest that the site programming and available amenities of a mobility hub can help the City to achieve:

**MAKING TRAVEL CHOICES BETTER FOR EVERYONE:**

- Make it easier for people to navigate the transportation system and have consistent experiences
- Create more reliability and redundancy by leveraging both private and public sector multimodal options

**EXPANDING COVERAGE OF TRANSPORTATION SERVICES:**

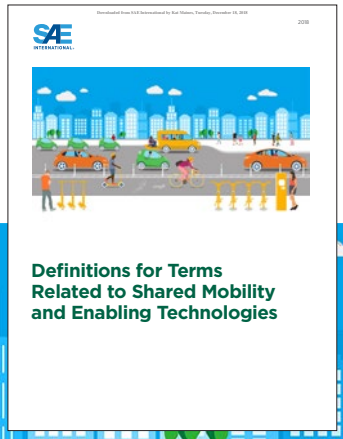
- Provide mobility options where – or when - transit service is not available
- Increase options for the first and last mile access to transit

**MANAGING PRIVATE MOBILITY SERVICES:**

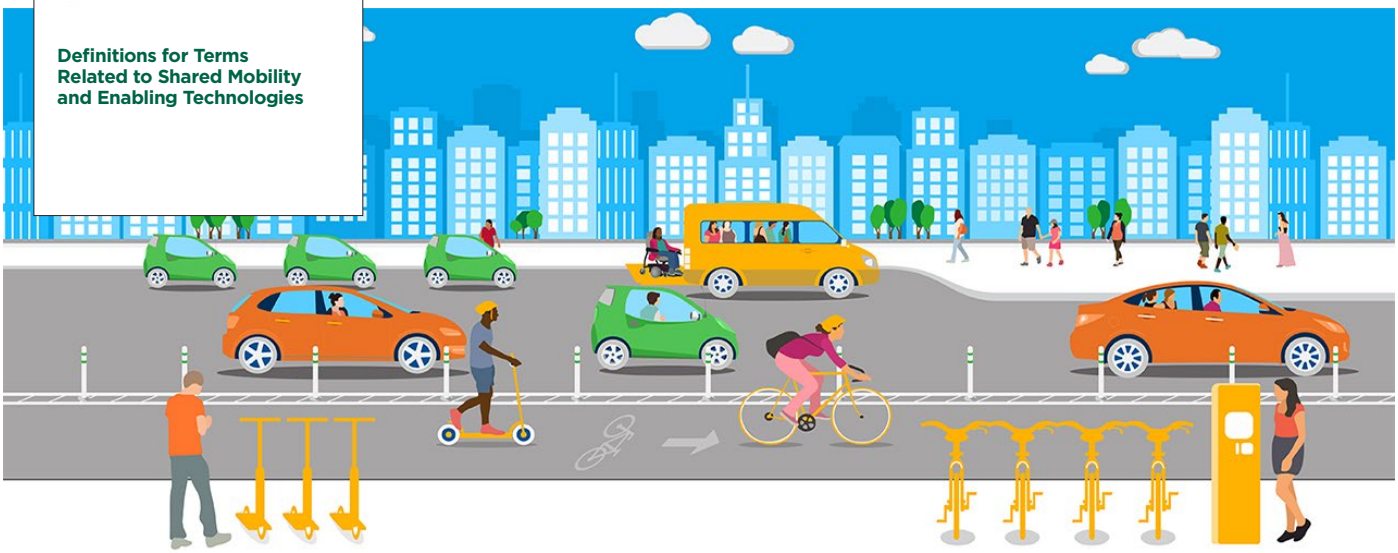
- Apply curbside management strategies to allocate space at mobility hubs
- Make connections to public transit more desirable to private sector providers
- Create centralized and convenient locations for accessing social equity programs of private mobility providers
- Influence prevalence of (or access to) lower carbon and shared, and multi-passenger modes

**PORTLAND'S MOBILITY HUB TYPOLOGY ALIGNS WITH PBOT'S BROADER NEW MOBILITY STRATEGY:**

"PBOT will actively manage new mobility services to ensure they enhance the lives of all Portlanders, offer attractive alternatives to car ownership, and hold true to our shared values around safety, equity, and climate change." – ***PBOT New Mobility Strategy, April 2020***




The *Definitions for Terms Related to Shared Mobility and Enabling Technologies* memo is a useful resource for navigating the terminology of this document. The image below demonstrates the different modes defined in this document and how they may share space within the street. *Image source: SAE International*




# Locating a Mobility Hub in Portland

## Where do mobility hubs belong?

The City of Portland has identified mobility hubs as a transportation system element that has the potential to advance City goals, if developed and implemented strategically. The Mobility Hub Typology provides a framework for the early process of defining the mobility hub concept and illustrating its relationship to Portland's land use and transportation context. This relationship is rooted in an understanding that:

**TRANSPORTATION CHOICE IS INFLUENCED BY:**

- Land use density
- Multimodal transportation network density, including transit density and service level
- Density of destinations
- Community demographics and individuals' ability to access transportation options
- Cost, efficiency, reliability, safety, and enjoyability of the options available
- A range of policy and programmatic structures already in place in Portland (such as parking districts, cost of parking, shared mobility service areas, and similar)

**MOBILITY HUB DEVELOPMENT IS INFLUENCED BY:**

- Space within the public right-of-way
- Land use zoning (permitted uses)
- Availability and cost of parcels outside of the right-of-way
- Partnerships with land-owning entities, such as TriMet, PG&E, and similar, as well as with funders and developers
- Site constraints
- Scale of hub site design/intended programming
- Existing/prior investments in infrastructure (such as MAX stations or electric vehicle charging)
- Demand for specific modes and services

Mobility hub siting and planning must account for this range of factors. Success is contingent on identifying feasible locations for mobility hub investment that are also appropriately located to support transportation choice and advance City goals and strategies, such as the 2035 Comprehensive Plan Investment Strategies, focusing growth in Centers and Corridors. While the Mobility Hub Typology does not identify these locations, it provides the foundation for how to identify those locations and how to program and design identified sites to best suit Portland's varied contexts. The following section further explains how the Mobility Hub Typology fits within a siting and planning process.

STEP 1

### MEASURING NEED AND DEMAND

A *Suitability Analysis* maps the factors that influence transportation choice, including an Equity Analysis, to determine areas of the City most suited for clustering transportation choices

STEP 2

### ALIGNING WITH OUTCOMES

A *Prioritization Analysis* establishes criteria to further narrow areas of suitability based on alignment with City goals (such as congestion mitigation or transportation equity or investment in Metro's 2040 Growth Strategy Centers and Corridors)

STEP 3

### ADJUSTING FOR SCALE AND CONTEXT

A *Mobility Hub Typology*, provided in this document, confirms typical context of prioritized areas and recommending mobility hub type and scale to serve that context

STEP 4

### EVALUATING CANDIDATE SITES

A *Feasibility Analysis* evaluates feasibility of implementing mobility hubs within prioritized areas based on available right-of-way, potential land acquisition or potential land-owner partnerships, and permitted uses and applicable development and design standards (per zoning code)

STEP 5

### MAKING IT WORK

*Site Design & Programming* creates a design concept that fits within the selected site and reflects the appropriate mobility hub type, including such details as access routes, ingress/egress, transit operational needs (e.g. number of bus bays, layover facilities, or similar), micromobility operational needs (e.g. parking capacity, payment kiosks, loading/unloading for rebalancing vehicles, or similar).

## Unique challenges of siting mobility hubs

Recent efforts to site mobility hubs in Portland and elsewhere have offered important lessons learned:

1

### Location, location, location

Real estate is a tricky business. While an outcomes-driven approach to planning for hub sites is preferred, this is not the state of the practice. Because locating any new facility outside of the public right-of-way is challenging, the process often begins with an agency recognizing that a publicly-owned site is available for repurposing and then taking a similar process but in reverse: designing and programming new uses for the site, checking for feasibility, estimating demand, and then setting performance metrics to align with outcomes. Beyond the tendency to let availability of land dictate the planning process, the potential for unintended consequences is another challenge when locating hubs. Implementation of a mobility hub may have impacts on property values, resulting in the displacement of low income residents, or create other unanticipated impacts on vulnerable populations, adjacent residents and neighborhoods.

2

### Constrained rights of way

Locating a hub within publicly-owned right-of-way avoids the real estate hurdle, but presents the challenge of making it fit seamlessly and cohesively within existing constraints. Even before shared mobility deployed on Portland's streets, modes and services were competing for space within the right-of-way - from dedicated bus lanes and protected bike lanes, to on-street parking and delivery truck loading zones. Siting mobility hubs is an opportunity to evaluate the placement of existing access to services, potentially reclaiming space by re-locating, co-locating, or consolidating what is already there.

3

### Existing policies

Local land use policies and regulations dictate permitted uses outside of the public right-of-way. This presents a challenge when hubs are designed as a combination of unique elements that may range from complementary retail uses to electric charging infrastructure.

# 4
## Capacity limitations

Right-sizing a mobility hub's services to meet a site's demand is not always a simple, or immediately solvable, equation. If a bus or light rail route is operating at capacity – without empty seats to fill with new riders that a mobility hub is intended to attract, the timing may not be right for investing in new infrastructure and connections. If a site is chosen with the goal of making connections to transit easier and to tap into latent demand, the transit serving the site must be able to rise to the occasion. At a busy location, this could mean reducing headways on a bus route or adding capacity to an already full light rail vehicle. Decisions like those affect system-wide operations and the delicate balance of transfer timing, traffic signal timing, and more.

# 5
## Meaningful engagement

The purpose and function of mobility hubs within the transportation system is closely tied to new and emerging trends in transportation technology and services. These trends are new and complex by nature and also shift at a rapid pace. Gaining input from communities adjacent to or impacted by hub sites is critical to planning, design, and implementation. Yet the pace of outreach and engagement often does not match the pace of technology, and the potential impacts of a hub may be difficult to articulate to an audience not directly engaged in new mobility services. Typically community engagement in public versus private projects varies. Community needs, desires, and priorities may not be well-centered in all projects.

# 6
## Known unknowns

With the rapid pace of change in technology, uncertainty is a given. Questions around the long-term viability of new and emerging service models has implications for investing in new infrastructure. Mobility hubs must thread the needle between short- and long-term outcomes - designing for flexible and repurposable infrastructure where possible and incorporating ongoing evaluation of how hub investments are impacting broader city goals.

# IV.

# Portland's Mobility Hub Typology

## Making mobility hubs work for Portland

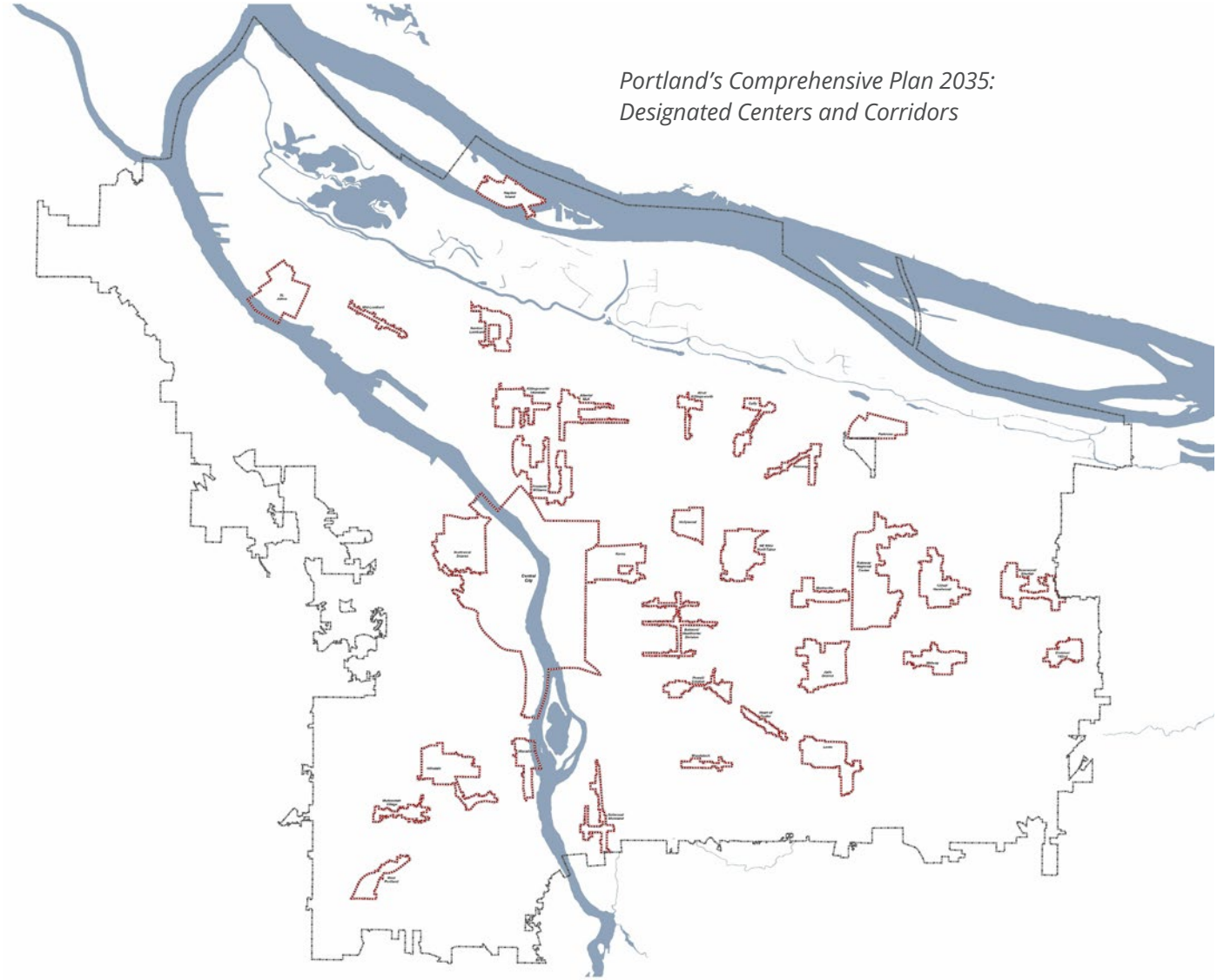
The City of Portland's 2035 Comprehensive Plan proposes to focus future growth in mixed use Centers and Corridors, which will serve as the anchors of convenient, walkable neighborhoods. According to the Portland Bureau of Planning and Sustainability:

Centers are compact, walkable and pedestrian-oriented urban places that are a focus for community activity, commercial services and housing. They are connected to public transit and active transportation networks. Centers range in scale from the Central City's Downtown, the metro region's center, to small neighborhood centers providing more local access to services. **The four types of centers are:**

- **Central City:** Serves the entire city and region.
- **Gateway Regional Center:** East Portland's major center and the only Regional Center within the City of Portland.
- **Town Centers:** Anchor a large area or district of the city.
- **Neighborhood Centers:** Smaller centers that serve surrounding neighborhoods.

Corridors, like centers, are areas where Portland will grow and change over the next 25 years. They are busy, active streets with redevelopment potential. While corridors may extend for several miles, locations along corridors that are places of more focused activity are considered to be centers. **The four types of corridors are:**

- **Civic:** most important and busiest transportation corridors
- **Neighborhood:** narrower main streets that connect neighborhoods
- **Transit Station Areas:** around light rail/major transit stations
- **Enhanced Greenways:** park-like corridors



*Portland's Comprehensive Plan 2035: Designated Centers and Corridors*

A total of 33 centers and corridors are designated within the City of Portland, and reflect a range of typical contexts in Portland that can inform mobility hub planning and design. The contexts provide a useful tool for understanding the land use characteristics of specific areas and the likely needs and available options of daily travelers, not only for the designated areas, but also for the areas that do not fall within a center or corridor boundary. To capture the potential of mobility hubs to expand the coverage of transportation services in Portland, the Mobility Hub Typology identifies two types of contexts that occur outside of center and corridor boundaries and may fall within priority areas:

- Activity centers, such as neighborhood retail, with limited transit service (including limited hours of service, headways greater than 15 minutes, or limited stop/station density)
- Activity centers with no transit service


## What does a mobility hub look like in Portland?

Portland's conceptual typology includes four primary types: Major Mobility Hub, Mid-Size Mobility Hub,, Minor, and Mini Hub. For each hub type, the collection of elements that allow the site to support seamless mobility connections are categorized in the following four ways:

- **Transit and Trip-making** includes design elements that support dynamic movements to and from the mobility hub site, including boarding and alighting for transit, pick-up and drop-off zones, and wayfinding and trip-planning signage. The common thread of this category is the fluidity of the action, occurring by the second and minute, with a high value for efficiency of movement and safe access to/from travel lanes.
- **Parking & Charging** includes design elements for stationary vehicles, whether parking personal vehicles, shared cars, shared micromobility devices, electric vehicles, or motorized wheelchairs that are accessing charging infrastructure. This zone is characterized by an end of trip action for the vehicle or device, whether short-term or long-term, and whether or not it is the end of trip for the individual.
- **Priority Access** includes design elements for human-scale travel to and from the site. This zone captures sidewalks, bike lanes, micromobility lanes, crossing treatments and similar investments that enable persons to safely and comfortably access the hub's other design elements.
- **Amenities** include complementary design elements that add value to the user's experience, but are not core to the function of using the site's transportation services. This could include public art, outdoor seating, complementary retail, shops, cafes, and restaurants, a playground, food cart pods, concierge services, and similar.

### CASE STUDY: SOUTH WATERFRONT LOWER TRAM TERMINAL

Did you know that Portland already has a successful mobility hub? Planned more than two decades ago, and implemented in phases, the South Waterfront Lower Tram Terminal fits modern definitions of an effective mobility hub.

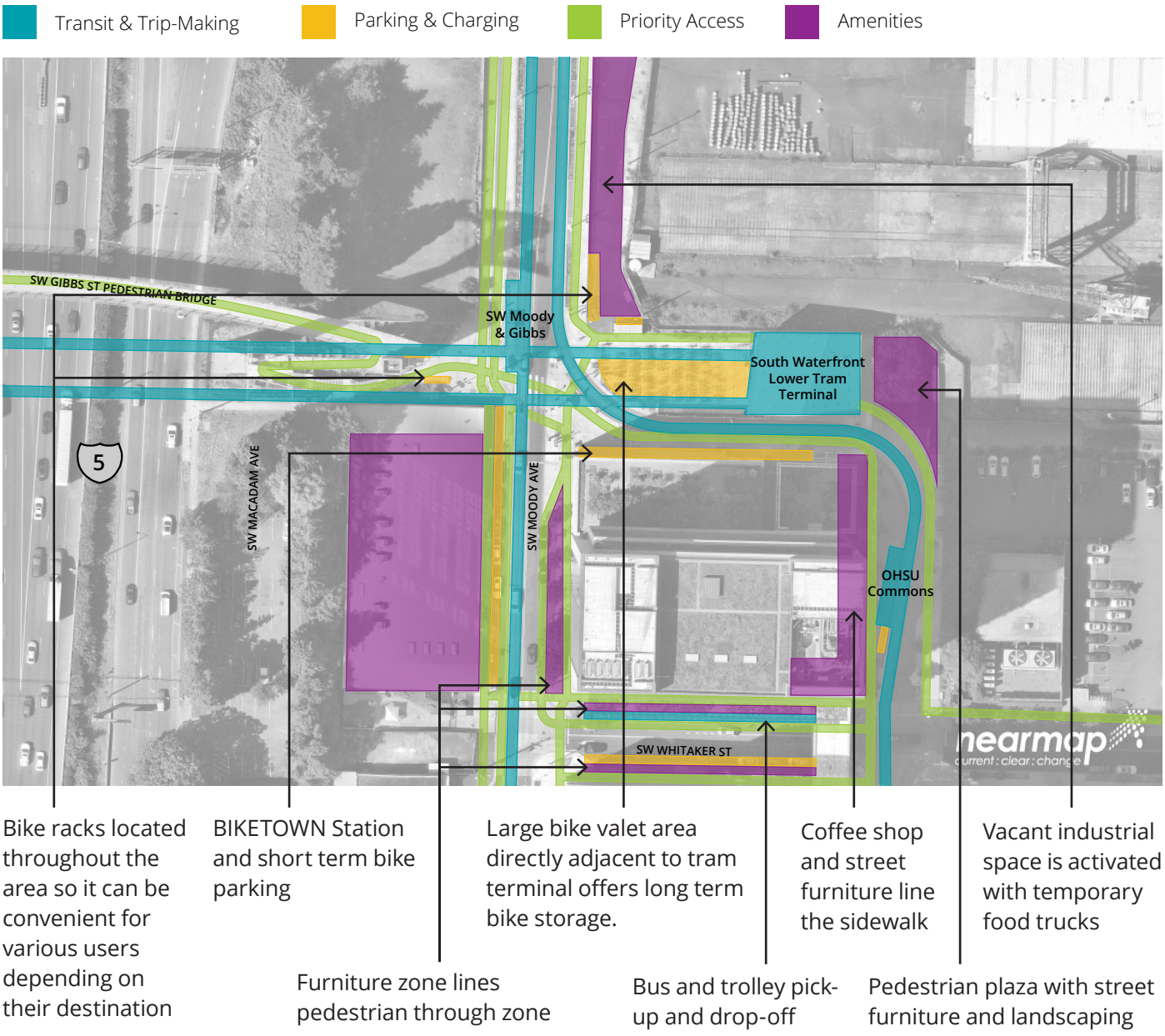
Existing Mobility Hub Attributes:

- Public transit as part of suites of services:
  - Aerial tram provides essential transfer connectivity between OHSU's two campus locations, activating the line
  - Transit stops serve the streetcar (NS Line) and two bus routes (35 and 36) with frequent service
  - Biketown station adjacent to aerial tram
  - Drop off zones (for paratransit and, potentially other uses)

- Cohesive, intentional design
  - Human-scale community space for activity/gathering; places and retail locations to linger
  - Adjacency and/or clear line of sight between traveler amenities and transfer options (with the exception of the drop off zone)
  - High density of employment and services
- Access for active transportation:
  - Curb protected bike facilities offer cyclists low stress connectivity to the area
  - Wide sidewalks
  - Street-side and in-building bike parking options are high capacity
  - Curb extensions and marked crossings facilitate safe and comfortable connection to and between the various modal options

When considered through the lens of the Portland Mobility Hub Typology, the site offers each of the four zonal elements and is characteristic of a Major Mobility Hub.

*Portland's Mobility Hub: South Waterfront Lower Tram Terminal*




# V.

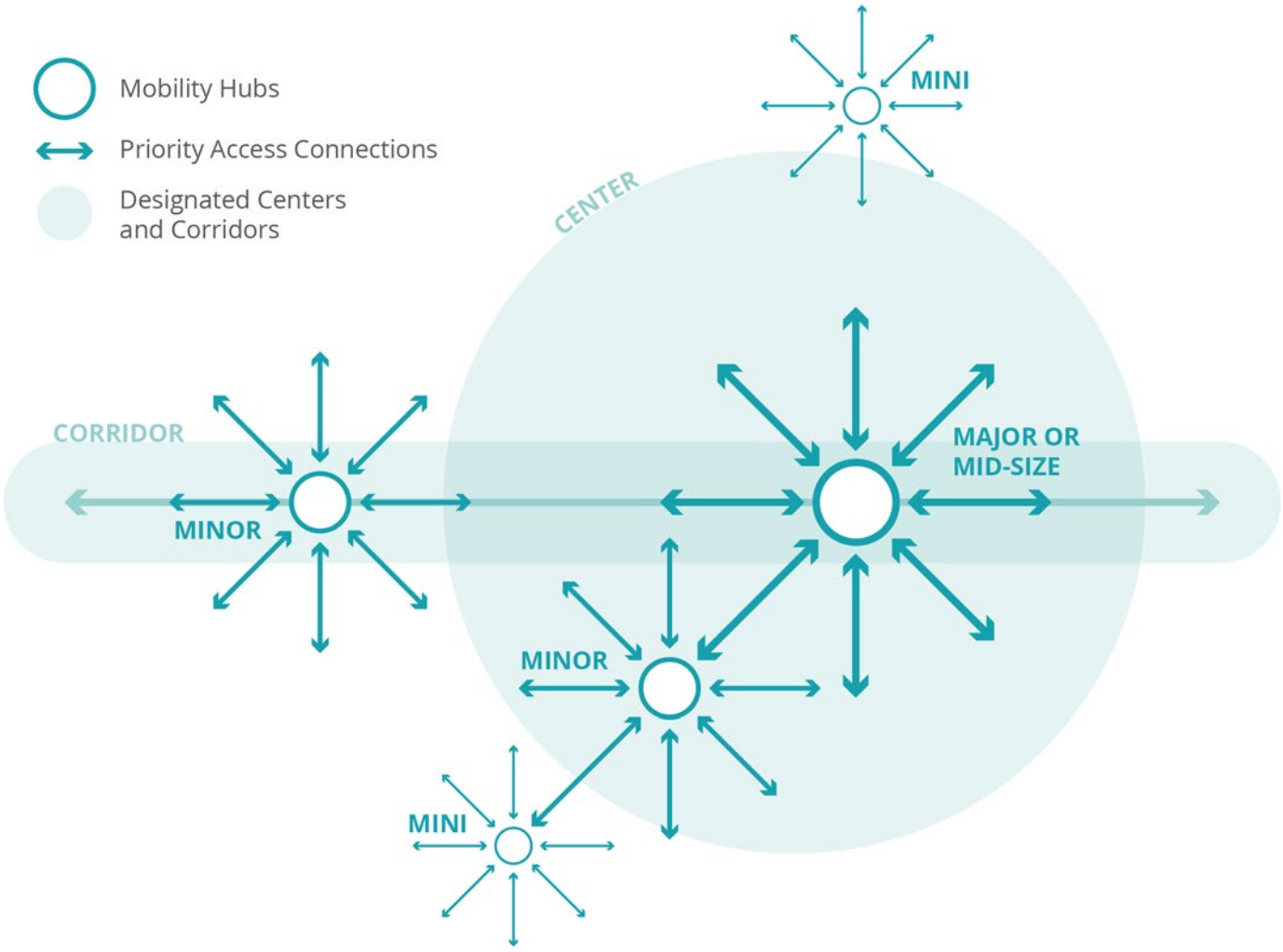
# Four Types of Mobility Hubs

The types of centers and corridors designated in Portland correspond to unique land use and transportation context that align with Portland's four types of mobility hubs: Major, Mid-Size, Minor, and Mini. Each reflects a collection of elements that allows the site to function as a seamless mobility connector in different contexts. The Mini Hub has a small footprint and serves a smaller access-shed than the large-scale Major Mobility Hub. The Major Mobility Hub has a large footprint, provides access for high capacity modes, and serves a large access-shed reflecting regional demand. The four types of mobility hubs will complement one another, acting as nodes within a connected mulitmodal eco-system.

Hubs are not intended to serve all needs of all transportation system users. Hubs are not a replacement for all transit stops, stations, pick-up/drop-off zones, micromobility parking, charging infrastructure hubs, or other existing and future investments. Rather, the Mobility Hub Typology illustrates the combination of elements that can be applied strategically in prioritized areas when gaps or barriers to seamless transportation occur.

The chart below shows the relationship of Portland's designated Centers and Corridors, as well as areas beyond those designated zones, with the application of the four types of mobility hub. In practice, more than one type of hub may suit an area. For example, a Center may be large enough in size and demand that it warrants both a large (Major or Mid-sized) and a small (Minor) hub. Similarly, a long Corridor may warrant multiple mobility hub sites. Outside of these designated Centers and Corridors, small-scale hubs (Mini Mobility Hubs) may be self-sufficient in serving mobility needs, or may act as a link to the services and amenities available at nearby larger hubs (e.g. first and last mile trips). The Conceptual Mobility Hub Network shown below illustrates these scenarios.

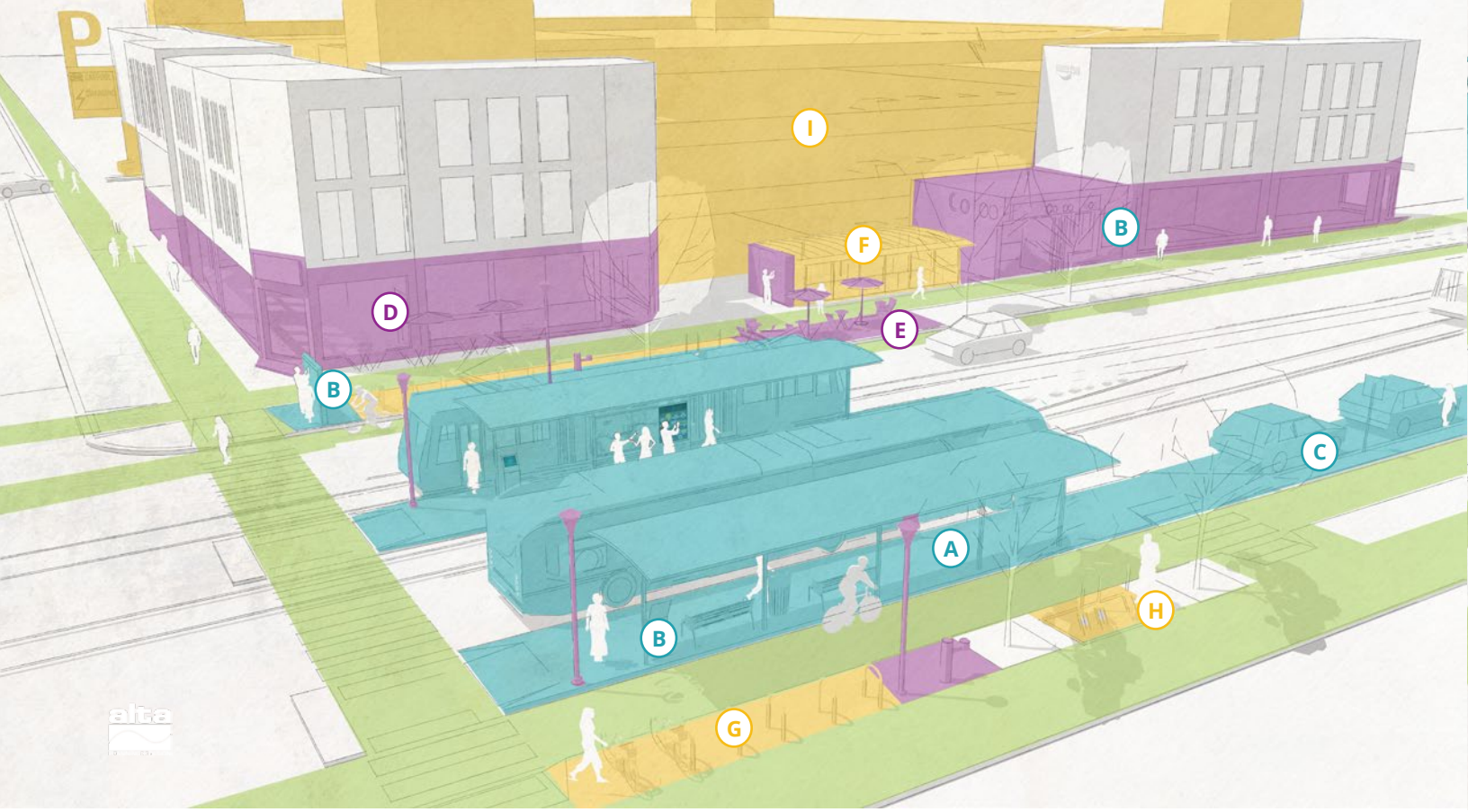
*Conceptual Mobility Hub Network within the framework of Portland's Designated Centers and Corridors*




| | PORTLAND'S DESIGNATED CENTERS | | | |
|---|---|---|---|---|
| *Centers:* | CENTRAL CITY | GATEWAY REGIONAL | TOWN | NEIGHBORHOOD |
| 1. Major | ◐ | ● | ● | ○ |
| 2. Mid-size | ◐ | ● | ● | ◑ |
| 3. Minor | ● | ● | ◑ | ● |
| 4. Mini | ○ | ○ | ○ | ○ |
| Area Description | The urban core of Portland served by light rail, streetcar, bus, charging infrastructure, and a range of shared mobility services; the area already connects modes and services in a dense environment and is highly constrained; Minor and Mini hubs may fit within the existing fabric to link specific subsets of services and reduce gaps. | An area served by light rail, bus, and some shared mobility services that is large enough in size to warrant a system of hubs from the Minor scale on local roads and collector streets, to the Mid-size scale on collector and arterial streets, to the Major scale at a single location that serves as a regional hub (such as Gateway Transit Center). | An area served by bus and in some cases, light rail and shared mobility services that may warrant a combination of one or more Mid-size or Minor hubs to complement a single Major scale location that serves as a regional hub. | A local area served by bus and some shared mobility services that may warrant one or more Minor hubs. |

● *Primary application area* ◐ *Secondary application area* ○ *Does not apply*

| | DESIGNATED CORRIDORS *OUTSIDE* PORTLAND'S DESIGNATED CENTERS | | | AREAS *OUTSIDE* OF DESIGNATED CENTERS AND CORRIDORS |
|---|---|---|---|---|
| *Corridors:* | CIVIC CORRIDORS | TRANSIT STATIONS AREAS | NEIGHBORHOOD CORRIDORS/ ENHANCED GREENWAY CORRIDORS | TRANSIT-LIMITED ACTIVITY AREAS |
| 1. Major | ○ | ○ | ○ | ○ |
| 2. Mid-size | ○ | ● | ○ | ○ |
| 3. Minor | ● | ◐ | ◐ | ● |
| 4. Mini | ◐ | ○ | ● | ● |
| Area Description | Outside of designated centers, pockets of multimodal demand along Civic Corridors may warrant Minor or Mini hubs to fill gaps in service or facilitate first/last mile access to a Major or Mid-sized hub. | Outside of designated centers, Transit Station Areas, as designated in the Comprehensive Plan, may warrant Mid-sized or Minor hubs to reduce barriers to access to transportation and provide redundancy in multimodal options. | Outside of designated centers, pockets of multimodal demand along Neighborhood Corridors and Enhanced Greenway Corridors (as designated in the Comprehensive Plan) may warrant Minor or Mini hubs to fill gaps in service or facilitate first/last mile access to a Major hub. | A local area not targeted for dense growth and investment (i.e. not in a designated center or corridor) that has limited or no bus service and likely some shared mobility services; the area may warrant a Minor and/ or a Mini hub that connects service-limited areas to new options and that provides first/last mile access to transit. |




## 1A. Major Mobility Hub with MAX Light Rail

The Major Mobility Hub represents the largest of the four mobility hub types. It provides a vision of how mobility hubs could be assembled in highest demand areas where there is sufficient space. Structured parking helps prioritize preferred vehicle usage with designated spaces for carpool and electric vehicles.

### TYPICAL APPLICATION

- Existing park and ride lots with MAX service
  - E.g. Gateway MAX Station
- Underutilized commercial parking lots
- Could be implemented as a private-public partnership with large employment centers such as malls or hospitals

### POTENTIAL DESIGN FEATURES

#### *Transit and Trip Making Services*

(A) Light rail (and/or aerial tram) accessible boarding area

(B) Trip planning information and ticket kiosks

(C) Passenger pick-up and drop-off

#### *Amenities*

(D) Retail space for businesses that support trip-chaining, such as bike shops, grocery/ convenience stores, or coffee shops
  - Showers and lockers for bicyclists integrated into infill development
  - Wifi hub, phone docking stations, and public restrooms

(E) Features that enhance sense of place

#### *Parking and Charging Services*

(F) Expanded long-term bicycle storage facilities

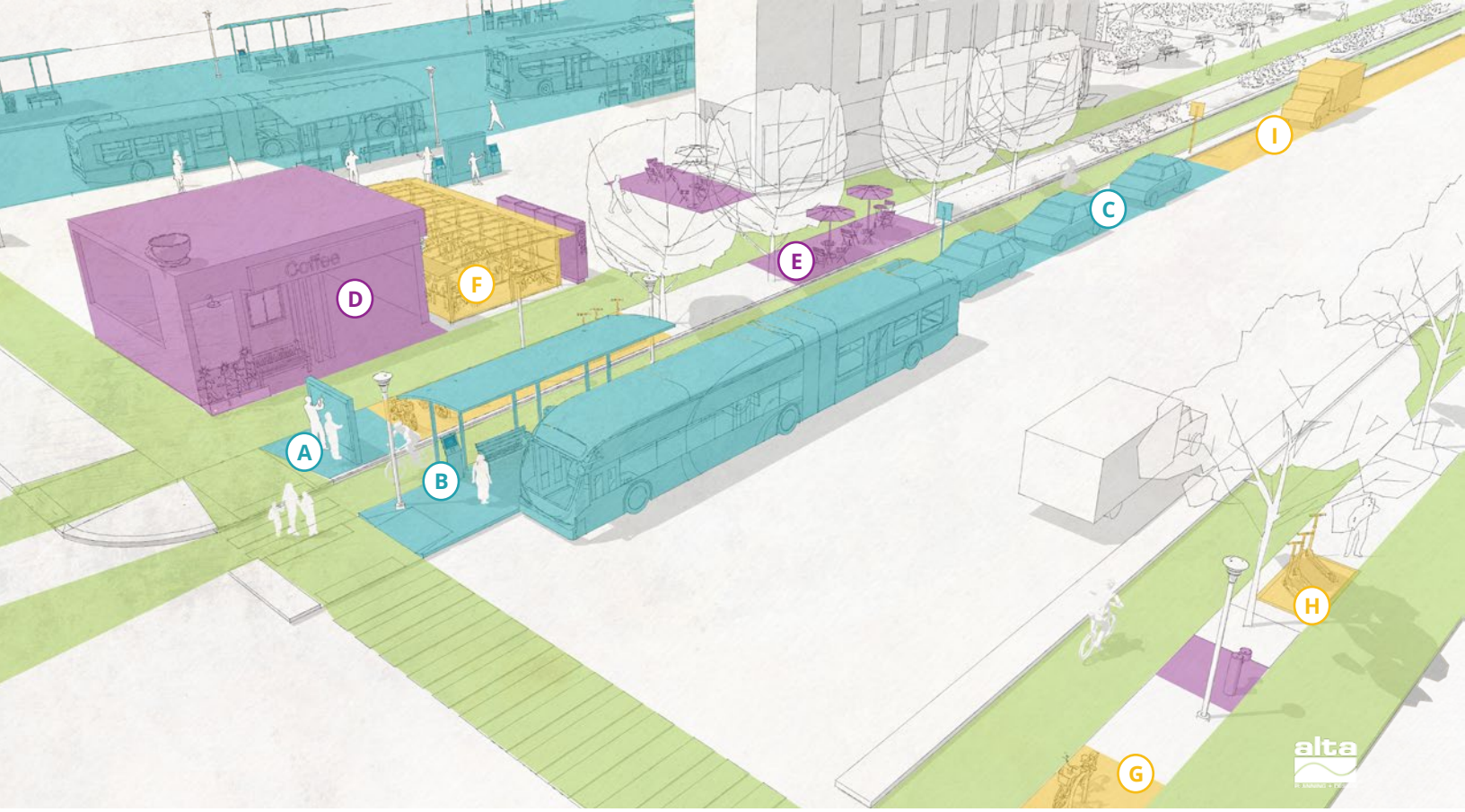
(G) Short term bike parking

(H) Designated micromobility parking and charging

(I) Vehicle parking
  - Carshare, carpool, guaranteed ride home
  - Electric vehicle charging stations

#### *Priority Access*

- Comfortable and continuous walkways
- Comfortable and continuous bikeways
- Safe and frequent road crossings for people walking and biking




## 1B. Major Mobility Hub with Bus Bays

The Major Mobility Hub with Bus Bays shows a similar density of services as the version with MAX service, but instead it prioritizes space for bus transfer. This includes off-street bus bays as well as facilities that allow drivers to take breaks, which remains an important element of transit operations until automated vehicles become a viable option.

### TYPICAL APPLICATION

- Existing park and ride lots with bus service
- Underutilized commercial parking lots
- Could be implemented as a private-public partnership with large employment centers such as malls or hospitals

### POTENTIAL DESIGN FEATURES

*Transit and Trip Making Services*

(A) Multiple accessible bus boarding areas

(B) Trip planning information
- Ticket kiosks

(C) Passenger pick-up and drop-off

*Amenities*

(D) Retail space for businesses that support trip-chaining, such as bike shops, grocery/ convenience stores, or coffee shops
- Showers and lockers for bicyclists integrated into infill development
- Wifi hub, phone docking stations, and public restrooms

(E) Features that enhance sense of place

*Parking and Charging Services*

(F) Expanded long-term bicycle storage facilities

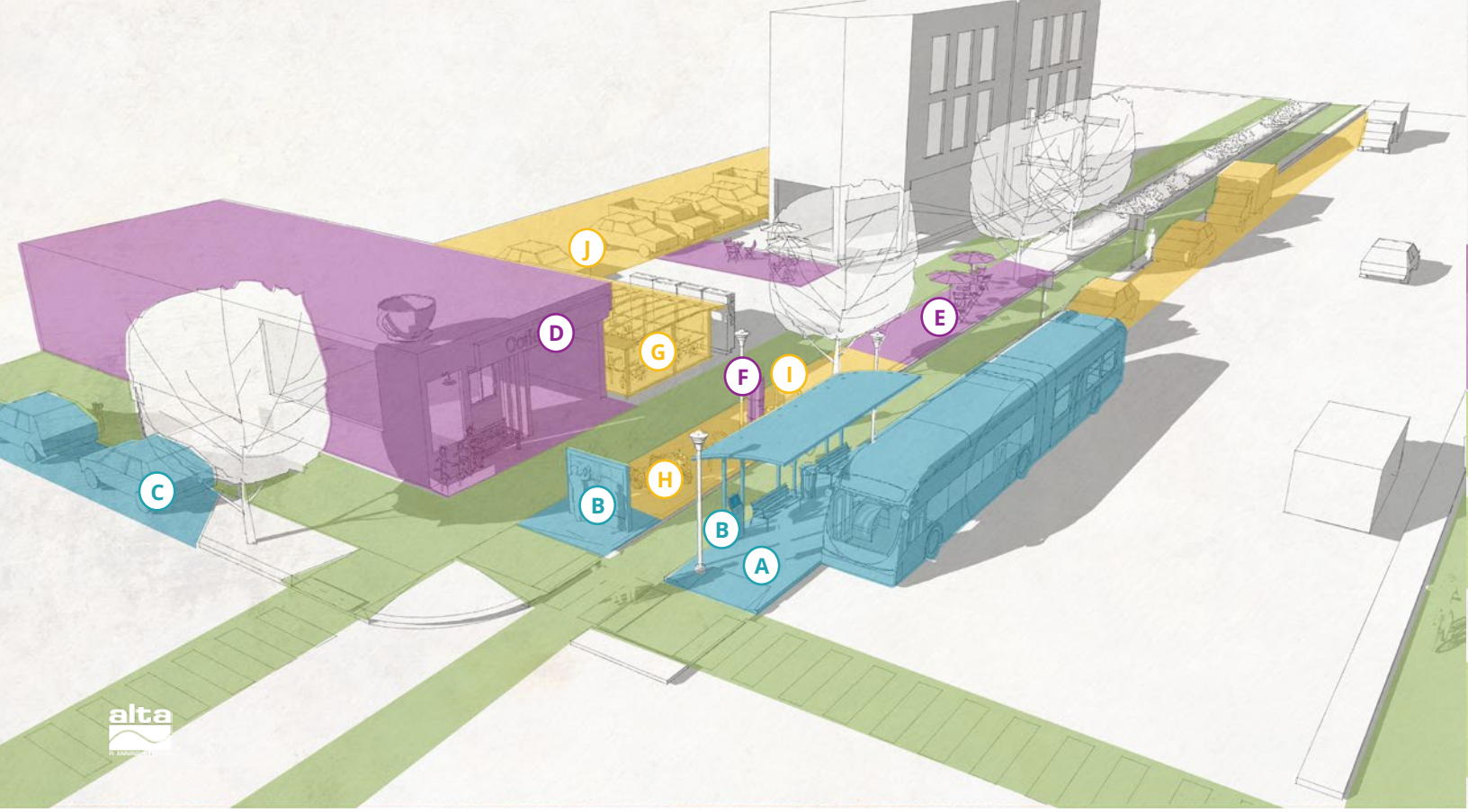
(G) Short term bike parking

(H) Designated micromobility parking and charging

(I) Vehicle parking
- Carshare, carpool, guaranteed ride home
- Electric vehicle charging stations

*Priority Access*

- Comfortable and continuous walkways
- Comfortable and continuous bikeways
- Safe and frequent road crossings for people walking and biking




## 2. Mid-Size Mobility Hub

The Mid-Size Mobility Hub demonstrates how new technology can make it more convenient to pair transit with active transportation modes. It shows how a high demand bus stop could be upgraded with additional features where space allows. Long term bike storage and prioritized vehicle parking help facilitate longer trips where users may not return for a day or more. This could be a place to accommodate autonomous vehicle pick-up and drop-off in the future as well as other new technologies that access Portland's streets.

### TYPICAL APPLICATION

- At existing or new bus stops
- Along major arterials
- May be configured as floating bus boarding island with separated bikeway

### POTENTIAL DESIGN FEATURES

#### *Transit and Trip Making Services*

- (A) Bus accessible boarding area
- (B) Trip planning information that is accessible to all and ticket kiosks to facilitate pre-boarding payment
- (C) Passenger pick-up and drop-off

#### *Amenities*

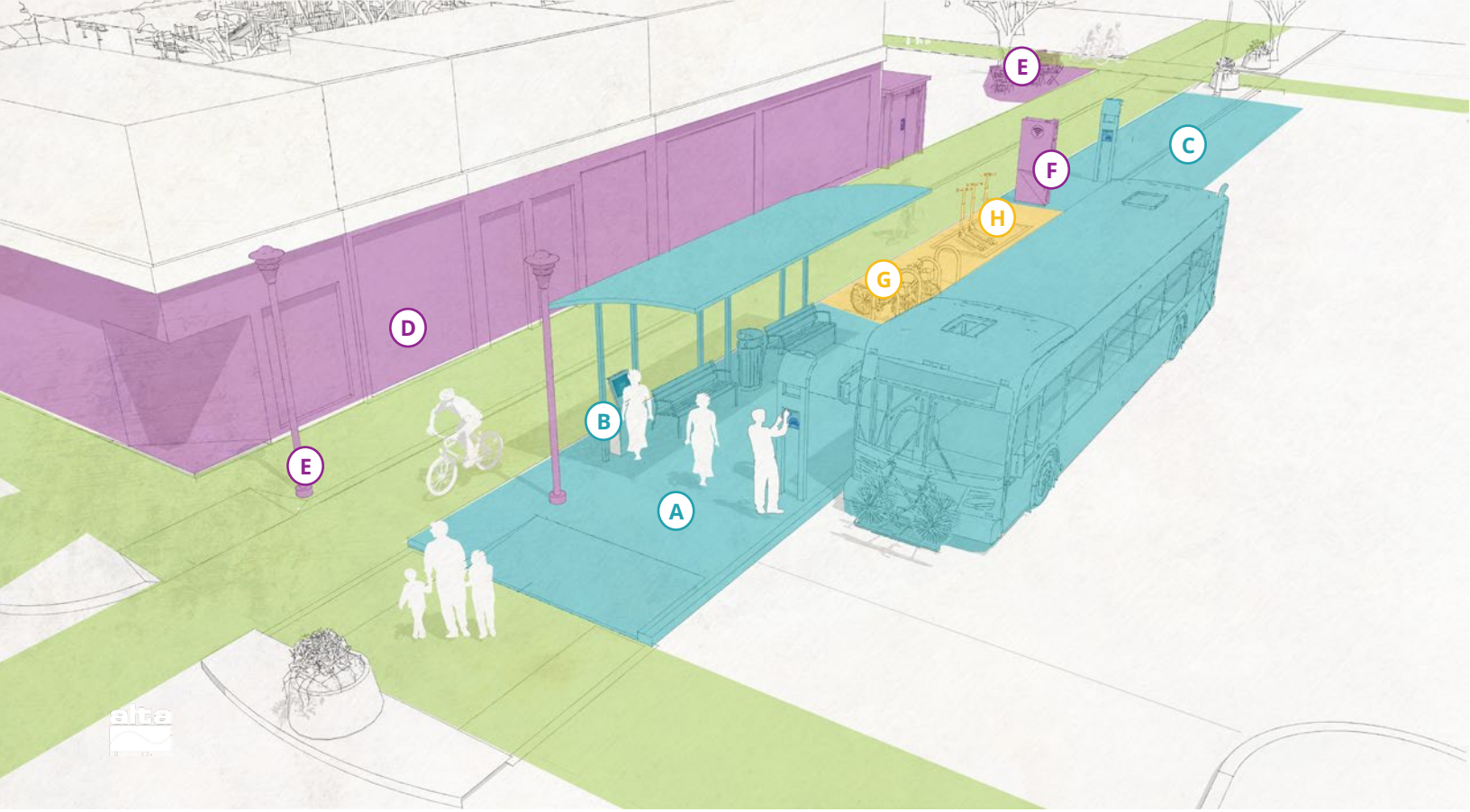
- (D) Retail space for businesses that support trip-chaining, such as bike shops, grocery/ convenience stores, delivery lockers, or coffee shops
- (E) Features that enhance sense of place like seating and lighting
- (F) Wifi availability for people who do not have data to access shared mobility services

#### *Parking and Charging Services*

- (G) Expanded long-term bicycle storage facilities
- (H) Short term bike parking
- (I) Designated micromobility parking and charging
- (J) Vehicle parking
  - Preferential parking for carshare, carpool, guaranteed ride home
  - Electric vehicle charging stations

#### *Priority Access*

- Comfortable and continuous walkways
- Comfortable and continuous bikeways
- Safe and frequent road crossings for people walking and biking




## 3. Minor Mobility Hub

The Minor Mobility Hub demonstrates how new technology can make it more convenient to pair transit with active transportation modes. It includes all of the features to support micro-mobility services plus bus transit service and rideshare pick-up and drop-off. This could be a place to accommodate autonomous vehicle pick-up and drop-off in the future as well as other new technologies that access Portland's streets.

### TYPICAL APPLICATION

- At existing or new bus stops
- At neighborhood centers
- May be configured as floating bus boarding island with separated bikeway

### POTENTIAL DESIGN FEATURES

*Transit and Trip Making Services*

(A) Bus accessible boarding area

(B) Trip planning information that is accessible to all and ticket kiosks to facilitate pre-boarding payment

(C) Passenger pick-up and drop-off

*Amenities*

(D) Retail space for businesses that support trip-chaining, such as bike shops, grocery/ convenience stores, delivery lockers, or coffee shops

(E) Features that enhance sense of place like seating and lighting

(F) Wifi availability for people who do not have data to access shared mobility services

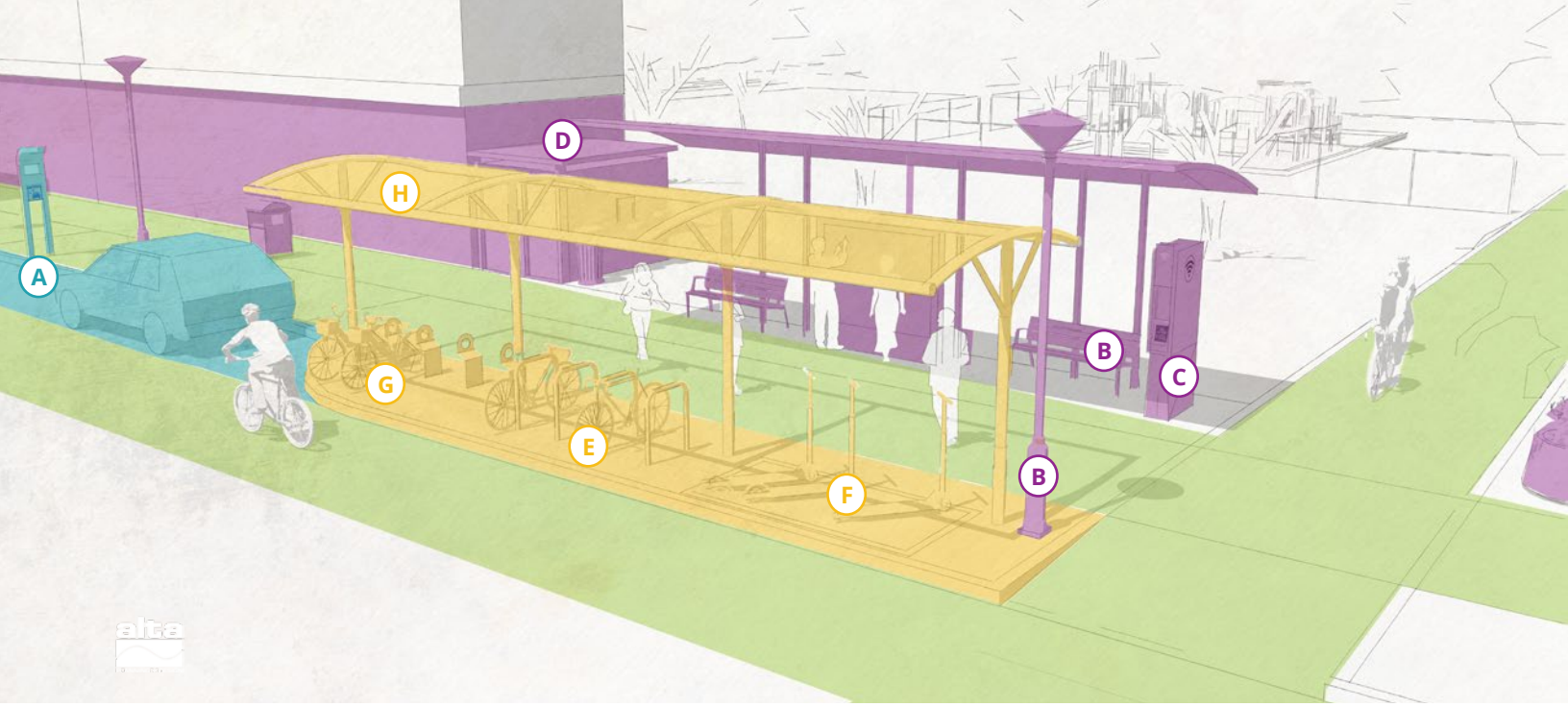
*Parking and Charging Services*

(G) Short term bike parking

(H) Designated micromobility parking and charging

*Priority Access*

- Comfortable and continuous walkways
- Comfortable and continuous bikeways
- Safe and frequent road crossings for people walking and biking




## 4. Mini Mobility Hub

The key distinction with the Mini Mobility Hub is that it does not include bus or rail transit service. It is a central hub for mini services such as walking, bicycling, scootering, and rideshare. Users will access shared mobility services using personal smart phones, or pre-purchased membership. A kiosk or integrated payment option could be provided on-site for accessing shared mini options. Parking for dockless vehicles must satisfy demand.

### TYPICAL APPLICATION

- Trailheads
- Where an off-street trail intersects an on-street bikeway or pedestrian route
- Along collectors and arterials without transit service
- At neighborhood centers without transit service
- At campus institutions (colleges and hospitals), employment centers, and community service clusters without transit service

### POTENTIAL DESIGN FEATURES

*Transit and Trip Making Services*

(A) Passenger pick-up and drop-off area

*Amenities*

(B) Features that enhance sense of place like seating and lighting

(C) Wifi availability for people who do not have data to access shared mobility services

(D) Public restrooms and water stations as appropriate

*Parking and Charging Services*

(E) Short term bike parking

(F) Designated micromobility parking

(G) Bikeshare parking and docks

(H) Weather protection for bike and micromobility parking

*Priority Access*

- Comfortable and continuous walkways
- Comfortable and continuous bikeways
- Safe and frequent road crossings for people walking and biking

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