Appendix D
Bus Stop Guidelines Memorandum
1 INTRODUCTION

Successful transit service depends on a variety of factors, including, but not limited to: land use, density, accessibility, and convenience. The purpose of this document is to introduce bus stop typologies, with associated recommended amenities, which can be configured based on these factors, as well as provide guidance in locating bus stops and future bus stop balancing efforts.

Additionally, while this guide makes general recommendations regarding factors such as bus stop placement, amenities and amenity placement, ultimately factors such as site conditions, operational practices, and safety concerns will determine final design and implementation on a stop-by-stop, case by case basis.

2 BUS STOP TYPOLOGY

The bus stop is the first point of contact with the transit system for customers. A bus stop with inadequate amenities could hinder and deter passengers from accessing the transit network. The following section establishes amenity guidelines for facilities based upon various metrics including ridership, land use, equity, and accessibility. The typology document is designed around four bus stop levels: Standard Bus Stop (Level 0), Enhanced Stop Pair (Level 1), Mobility Plaza (Level 2), and Mobility Centers (Level 3), including their standard amenities, recommended locations along the route, and high-level design. Table 1 provides a comparison of each bus stop typology and its associated amenities; specific design renderings are provided in Appendix A. The Standard Bus Stop, broken into three types based on physical amenities (Type A, Type B, Type C), is designed to be applied to general bus stops throughout the CATS network and is discussed in further detail on page 2. The Enhanced Stop Pair, Mobility Plaza, and Mobility Center (collectively referred to as Mobility Hubs) are designed specifically for application along bus priority corridors.
### Table 1. Amenities by Stop Level & Type

<table>
<thead>
<tr>
<th>Stop Amenity</th>
<th>Standard Bus Stop (Level 0)</th>
<th>Mobility Hubs</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Type A</td>
<td>Type B</td>
</tr>
<tr>
<td>-----------------------------------</td>
<td>------------------</td>
<td>--------</td>
</tr>
<tr>
<td>5'X10' OR 5'X15' SHELTER</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>BENCH</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>SIMME SEATS</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>TRASH RECEPTOR</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>BICYCLE RACK</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>SCOOTER &amp; E-BIKE STORAGE</td>
<td>●</td>
<td></td>
</tr>
<tr>
<td>BUS STOP MARKER: SIGNPOST WITH SIGN</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>BUS STOP MARKER: PYLON</td>
<td>●</td>
<td></td>
</tr>
<tr>
<td>SIDEWALK WAYFINDING</td>
<td>●</td>
<td></td>
</tr>
<tr>
<td>BOARDING &amp; ALIGHTING AREA</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>CROSSWALK IMPROVEMENTS</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>OPERATOR RESTROOM</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BUS &amp; SIDEWALK BULB</td>
<td>●</td>
<td></td>
</tr>
<tr>
<td>BUS BAY</td>
<td>●</td>
<td></td>
</tr>
<tr>
<td>OFFBOARD FARE PAYMENT</td>
<td>●</td>
<td></td>
</tr>
<tr>
<td>PUBLIC WiFi¹</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>MICROTRANSIT PICKUP/DROPOFF AREA</td>
<td>●</td>
<td></td>
</tr>
<tr>
<td>LIGHTING</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>INFORMATION KIOSKS</td>
<td>●</td>
<td>●</td>
</tr>
</tbody>
</table>

**Recommended Amenity**

### 2.1 Typology by Level

The legend in Figure 1 is applicable to the bus stop diagram illustrated throughout each bus stop typology.

![Legend](image)

**Figure 1. Legend for Stop Diagrams**

¹ Not illustrated in Appendix A
Standard Bus Stop (Level 0)

The standard bus stop (Figure 2) which is further divided into three sub-categories, functions as the default system wide. A standard bus stop can be found at numerous intermediate points along bus routes, and it represents the minimum required amenities for bus passengers. Compared to the other typologies, this stop is presented as a single unit (as opposed to a pair or set of multiple) for maximum flexibility, though they should still be implemented in pairs when not one one-way streets. Situations that justify this stop level include:

- Local/Neighborhood shuttle bus stops
- On collectors, one-way streets, or similar traffic limitations
- Between activity centers
- At lower population and employment density land uses. The following activity density (population + employment) of a stop location is a good preliminary indicator for each sub-type:
  - Type A: <10 people + jobs / acre
  - Type B: 10-30 people + jobs / acre
  - Type C: >30 people + jobs / acre

Enhanced Stop Pair (Level I)

The enhanced stop pair (Figure 3) is the first major upgrade to bus stops along the bus priority corridors. Presented as a pair of opposite direction stops (preferably far-side), this stop level is appropriate for:

- Bus Priority corridors or high-ridership bus stops (>25 passengers per day)
- Within proximity to major activity generators

Implementation of this stop level would also include the construction and/or upgrading of standard pedestrian safety amenities, including crosswalks and pedestrian-priority signalization if not already present.

Mobility Plaza (Level II)

The Mobility Plaza (Figure 4) is essentially two sets of enhanced stop pairs treated as a singular unit at intersecting bus priority corridors or high-frequency routes. Conditions that could justify this bus stop level include:

- Intersection of Bus Priority Corridors
- Intersection of two major arterials
- Intersection of high-ridership local neighborhood route/shuttle and bus priority corridor

Implementation of this stop level would also include the construction and/or upgrading of standard pedestrian safety amenities, including crosswalks and pedestrian-priority signalization if not already present.
Mobility Center (Level III)

The Mobility Center is the highest stop level and is largely like the Mobility Plaza in terms of stop amenities. Its major defining feature is an off-street location, which enables it to serve more buses and serve as a layover/end of route facility. Conditions that could justify the stop level include:

- Type A: Transfers to LYNX Light Rail or Bus Rapid Transit (BRT) stations, commuter buses, or other regional connections
- Type B: Major bus transfer locations, route termini, and/or major activity centers
- Type C: Availability of a park and ride facility

Figure 5, Figure 6, and Figure 7 are conceptual diagrams for Mobility Centers in three different contexts (Types A, B, and C), though these contexts are not necessarily mutually exclusive. As shown in Table 1, unlike the three types of Standard Bus Stops, in which amenities vary according to available resources, all three types of Mobility Centers should contain the same amenities even if they need to be deployed in different locations or quantities based on local conditions. That is, the three types of Mobility Centers reflect different kinds of intermodal connections (light rail, BRT, buses, park and rides, or some combination of two or more) rather than different kinds or levels of amenities.
Bus Stop Amenity Spatial Constraints

The typical layouts shown for Levels 0, I, and II in the Appendix A reflect ideal sidewalk and right-of-way conditions in which there are few limitations on amenity placement due to ample sidewalk space. In reality, and as shown in the diagrams below, in many locations either incremental extensions of sidewalk-adjacent concrete paving areas or elimination/downsizing of certain amenities may be necessary for ADA-compliant clearances until the areas in question can be rebuilt to the ideal conditions shown in the Appendix A. Ideally, the prerequisite improvements for ideal conditions would be codified and triggered whenever any redevelopment adjacent to the bus stop occurs such that the adjacent developers could pay for and construct the necessary improvements.

Figure 8, Figure 9, and Figure 10 illustrate different opportunities for expanding sidewalk-adjacent concrete paving areas.

**Figure 8.** Depicts how a shelter pad was added off the sidewalk on the frontage grounds of the adjacent property (with cooperation from the property owner).

**Figure 9.** Depicts how the space between boarding and alighting areas is paved so a shelter can be inserted into the space without obstructing the narrow sidewalk.

**Figure 10.** Depicts a scenario in which boarding and alighting areas were fitted into a curbside planting strip that cannot be paved over as part of any sidewalk.

Typology Evaluation

Table 2 on the next page summarizes the scoring system that is recommended to serve as a guide for a quantitative first round assessment of a bus stop, followed by a more in-depth site-specific review of the bus stop and adjusting the typology of the bus stop to the surrounding context as needed.
Table 2. Typology Score System

<table>
<thead>
<tr>
<th>Evaluation Category</th>
<th>Evaluation Criteria</th>
<th>Scoring</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ridership</td>
<td>Boardings</td>
<td>1 point per average weekday daily boarding</td>
</tr>
<tr>
<td></td>
<td>Bus Priority Corridor</td>
<td>50 points if on a Bus Priority Corridor and has at least 15 daily boardings</td>
</tr>
<tr>
<td>Wait Time</td>
<td>Transfers</td>
<td>5 points if stop is a transfer location between two Bus Priority Corridors or LYNX Light Rail</td>
</tr>
<tr>
<td></td>
<td>Frequencies</td>
<td>0 points if stop is outside the Bus Priority Corridor network (longer wait times could indicate a higher need for shelter or seating)</td>
</tr>
<tr>
<td>Rider Profile</td>
<td>Equity Populations</td>
<td>10 points if stop is in predominantly minority and/or low-income area (as defined by CATS)</td>
</tr>
<tr>
<td></td>
<td>Reliant Populations</td>
<td>10 points if stop is in area with higher-than-average elderly or persons with disability</td>
</tr>
<tr>
<td>Activity Generator</td>
<td>Human Service Facility</td>
<td>10 points if one or more of the following existing or planned facilities, are within 1,320 feet of the stop: Medical facility, hospital, dialysis clinic, social security office, or County service center</td>
</tr>
<tr>
<td></td>
<td>Activity Destinations</td>
<td>5 points if one or more of the following existing or planned facilities, are within 1,320 feet of the stop: Public library, public school, recreation center, senior center, or supermarket/pharmacy</td>
</tr>
<tr>
<td></td>
<td>Major Employer</td>
<td>5 points if within 1,320 feet of the stop: is an existing or planned job center with more than 50 jobs</td>
</tr>
<tr>
<td></td>
<td>Operator Relief</td>
<td>5 points if the stop is assigned as an official relief/layover point</td>
</tr>
</tbody>
</table>

Based on the criteria above, the different stop levels were assigned minimum scores necessary for amenity implementation (Table 3). This methodology relies on data availability concerning ridership, service levels, transfer points, operational details, rider demographics, trip generator, and human services facilities.

Table 3. Minimum Score by Bus Stop Typology

<table>
<thead>
<tr>
<th>Standard Bus Stop (Level 0)</th>
<th>Mobility Hubs</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Type A</td>
</tr>
<tr>
<td>Minimum Score</td>
<td>----</td>
</tr>
</tbody>
</table>

Page 6 of 10
2.2 Bus Stop Location

Bus stops provide critical connection points between the multimodal network and bus routes, and proper location is critical to ensure safe and efficient connections. The bus stop should be in an area where typical improvements, such as a bench or shelter, can be placed in the public right of way. A bus stop location should consider potential ridership, traffic and rider safety, and bus operation elements that require site-specific evaluation. Personal security of passengers should always be at the forefront of bus stop location and amenity decisions, such as ensuring adequate lighting, waiting spaces safe from road traffic, and accessible boarding areas for all passengers.

The following section outlines the factors to be considered when siting a bus stop based upon its typology. These parameters can be based on the built environment, land use, level of service, connectivity to other transportation options, and proximity to major trip generators. While multiple conditions are presented for each bus stop typology, not all are necessary to justify a specific bus stop type.

Bus Stop Placement

In general, bus stops should be located at either the near-side or far-side of an intersection (as opposed to mid-block locations). Advantages of a far-side stop include reduced delay from a bus idling at a red signal after serving a stop, better visibility of pedestrians for other drivers, and minimizing conflicts with right-turning vehicles. However, far side stops can also create the potential for vehicles to queue behind a stopped bus into the intersection. Bus stops should be placed to minimize operational difficulties such as lane changes and weaving maneuvers of approaching vehicles. Where it is not acceptable to stop the bus in traffic and a bus pullout is warranted, a far-side stop is generally preferred. Additional situations and appropriate bus stop placements can be found in Table 4. As with other elements of the roadway, consistency of stop placement lessens the potential for operator and passenger confusion.

Table 4. Stop Placement Situations and Preferred Placement

<table>
<thead>
<tr>
<th>Situation</th>
<th>Bus Stop Placement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Any signalized intersection where bus can stop out of travel lane</td>
<td>Far-side</td>
</tr>
<tr>
<td>The route alignment requires a left turn at the intersection</td>
<td>Far-side</td>
</tr>
<tr>
<td>There is a high volume of right turns at an intersection or immediately after a transit route turns right</td>
<td>Far-side</td>
</tr>
<tr>
<td>Complex roadway intersections (geometry and/or signal timing)</td>
<td>Far-side</td>
</tr>
<tr>
<td>Intersections with transit signal priority (TSP) implementation</td>
<td>Far-side</td>
</tr>
<tr>
<td>Wide shoulders or multiple lanes where vehicular traffic is controlled by a signal</td>
<td>Near-side or Far-side</td>
</tr>
<tr>
<td>Two lane streets where vehicles will not pass around a stopped bus</td>
<td>Near-side</td>
</tr>
<tr>
<td>Bus length exceeds capacity of far-side bus zone</td>
<td>Near-side</td>
</tr>
<tr>
<td>The route alignment requires a left turn, and it is infeasible or unsafe to locate a bus stop far-side of the intersection after the left turn</td>
<td>Mid-block</td>
</tr>
<tr>
<td>If blocks are too long to have all stops at intersections</td>
<td>Mid-block</td>
</tr>
<tr>
<td>Major transit generators not served by stops at intersections</td>
<td>Mid-block</td>
</tr>
</tbody>
</table>

Similar to the spatial constraints affecting the placement of bus stop amenities, the ideal bus stop placements shown in the Appendix A, in which Levels I and II benefit from combined bus stop/crosswalk bulbs, may not always be possible. Since
arterial roadways without curbside parking usually cannot contain bulbouts, alternate arrangements, such as nearside or farside layouts that are “flush” or that contain pull-ins, may need to be employed instead.

Figure 11 and Figure 12 illustrate different opportunities for placing bus stops in scenarios where bulbouts are not possible.

![Figure 11](image1.png)  ![Figure 12](image2.png)

**Figure 11.** Depicts a scenario in which a bus stop had to remain “flush” with the roadway edge with no option for either a bulbout or pull-in. The planting strip was paved from the boarding area back to the crosswalk to accommodate placement of amenities.

**Figure 12.** Depicts a scenario in which a pull-in was possible by cutting into the space normally dedicated to a planting strip and setback. An off-sidewalk space was paved on the adjacent property to accommodate placement of amenities.

### Stop Spacing Standards

Stop spacing should be thoroughly considered when creating new routes, modifying existing routes, or when evaluating performance issues along a route. Adequately spaced bus stops across the transit system enhance accessibility in general.

**Table 5** shows CATS’ stop spacing guidelines by service type.

<table>
<thead>
<tr>
<th>Service Type</th>
<th>Stop Spacing Guideline</th>
</tr>
</thead>
<tbody>
<tr>
<td>Local and Neighborhood Shuttles</td>
<td>4 to 6 stops per mile</td>
</tr>
<tr>
<td>High-Frequency</td>
<td>4 bus stops per mile</td>
</tr>
<tr>
<td>Express</td>
<td>As needed</td>
</tr>
</tbody>
</table>

### Bus Stop Balancing

Bus stop balancing can improve safety for passengers and operators, increase operational efficiency, reduce travel time, improve reliability, and create consistent and predictable spacing between stops. As CATS conducts periodic reviews of bus stop spacing, it is important to follow a consistent process to designate stops as candidates for consolidation, relocation, or retention. This systematizes the balancing process, preventing ad hoc decisions that can cause average bus stop spacing to grow more unbalanced over time.

Before considering removal and relocation of a stop that does not meet the spacing standard, its importance to the CATS network, amenities, and ridership should also be evaluated. This begins by assessing the value to the network (transfer connections), investment that has already been made to the facility (existing amenities and ADA upgrades), existing ridership, and how the removal or relocation impacts adjacent bus stops. The flowchart in Figure 13 describes the process for evaluating bus stop placement on CATS routes, with the goals of increasing safety, efficiency, and reliability.

As Bus Priority corridors are implemented, the impact of corridor stop balancing and facilities (such as Level II and Level III Mobility Hubs) on intersecting routes should be evaluated in regard to the bus stop balancing along those routes as well.
2.3 Inventory Control Guidelines

To ensure that the amenities specified in Table 1 are provided, CATS should implement an inventory control system that tracks the presence of amenities specified for each of the roughly 3,000 stops in the CATS system. The CATS Planning Department will be responsible for carrying out regular stop surveys and maintaining an updated stop amenity inventory. In addition to the presence of the required amenities, stop surveys could note amenity condition, as well as the status of ADA compliance at each stop.

Combined with weighted stop scoring based on ridership, demographics, and other factors, the inventory control system will factor into balancing priorities and the development of an improvement schedule by which stops can be brought up to their standard. Table 6 provides a high-level overview of the amenities that should be tracked.

Figure 13. Bus Stop Evaluation Decision Tree
Bus stop locations and conditions affect multiple stakeholders engaged in CATS’ capital programming, planning, maintenance, and operations. Bus stops may also be affected by activities by other agencies (e.g., roadway improvements by the Charlotte Department of Transportation, developer activities in adjoining properties.) With this in mind, it is critical that CATS develop a data strategy that:

- Ensures that all in-house applications use the same standard station ID, such that information from the bus stop inventory control system may be used in Hastus, Remix, and other applications used by CATS planning, maintenance, and operations teams
- Ensures that changes made in the field to bus stop locations are regularly (and preferably, automatically) updated in other applications that use bus stop locations for operational planning (e.g., Hastus, Remix.)
- Allows changes in bus stop locations and amenities to be promptly communicated to relevant stakeholders (e.g., CATS customers, community leaders, CATS and CDOT engineering and maintenance teams.)
- Considers how other agencies and stakeholders may use information on bus stop locations and amenities (e.g., CATS asset management and state-of-good repair program, CDOT roadway programs, social service agencies, developers, and privately developed transit apps.)

### Table 6. Bus Stop Inventory List

<table>
<thead>
<tr>
<th>General Attributes</th>
<th>Amenities (Quantities and Conditions)</th>
<th>ADA Improvements</th>
<th>Additional Amenities (Quantities and Conditions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description</td>
<td>Shelter</td>
<td>Boarding Area Dimensions</td>
<td>Bicycle Rack</td>
</tr>
<tr>
<td>Street &amp; Cross Street</td>
<td>Bench</td>
<td>Boarding Area Slope</td>
<td>Scooter &amp; E-Bike Storage</td>
</tr>
<tr>
<td>Direction</td>
<td>Simme Seats</td>
<td>Clear Area</td>
<td>Sidewalk Wayfinding</td>
</tr>
<tr>
<td>Routes Served</td>
<td>Trash Receptor</td>
<td>Sidewalk Connection</td>
<td>Crosswalk</td>
</tr>
<tr>
<td>Facility Level (0, 1, 2, 3)</td>
<td>Bus Stop Marker</td>
<td>Operator Restroom</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Pylon</td>
<td>Bus &amp; Sidewalk Bulb</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Lighting</td>
<td>Bus Bay</td>
<td>Offboard Fare Payment</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Public Wifi</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Real-Time Information Systems</td>
</tr>
</tbody>
</table>

Bus stop locations and conditions affect multiple stakeholders engaged in CATS’ capital programming, planning, maintenance, and operations. Bus stops may also be affected by activities by other agencies (e.g., roadway improvements by the Charlotte Department of Transportation, developer activities in adjoining properties.) With this in mind, it is critical that CATS develop a data strategy that:
A standard bus stop is found at numerous intermediate points along bus routes, and it represents the minimum required amenities for bus passengers. The following pages show three types of standard bus stops that reflect variations in available space and resources (Type C is shown on this page).

**Level 0: Standard Bus Stop**

Amenity Overview (Type C)
**5’ X 10’ SHELTER**
Use the 10’ long Tolar cantilever shelter model at standard bus stops.

*Model:* 25516-00 (Signature Sunset 01)
*Quantity:* 1 per stop
*Approx. Dimensions:* 5’ x 10’ x 9’

---

**BICYCLE RACK**
Add a u-style bicycle rack to each bus stop.

*Type:* steel u-rack
*Quantity:* 1 per stop
*Approx. Dimensions:* 1’ x 2’6” x 2’6”

---

**BUS STOP SIGN**
Add a 2” square signpost with a flag-mounted bus stop sign to the head of each stop. The bottom of the sign must be at least 7’ above the sidewalk. Each sign should list the CATS website, stop number, and a QR code for more info.

*Type:* 2” steel square post
*Quantity:* 1 per stop
*Approx. Dimensions:* 2” x 2” x 10’

---

**BOARDING & ALIGHTING AREA**
Keep a 5’ x 8’ area at the head of each bus stop clear for wheelchair ramp deployment.

*Type:* concrete pad (painting optional)
*Quantity:* 1 per stop
*Approx. Dimensions:* 5’ x 8’

---

**CROSSWALK IMPROVEMENTS**
If signalized crosswalks with curb ramps aren’t already present, either add them or consider adding RRFB (rectangular rapid flashing beacon) refuge crossings where conventional signalization isn’t possible.

*Type:* various materials
*Quantity:* varies as needed
*Approx. Dimensions:* varies as needed

---

**BICYCLE RACK**
Add a u-style bicycle rack to each bus stop.

*Type:* steel u-rack
*Quantity:* 1 per stop
*Approx. Dimensions:* 1’ x 2’6” x 2’6”

---

**SINGLE BENCH**
One bench is included inside each shelter. While a single standardized bench model is recommended for ease of procurement and maintenance, different models, sizes, and configurations can be used to accommodate varying ridership loads and neighborhood aesthetic contexts.

*Model:* 13023-121 (Tolar Euro)
*Quantity:* 1 per stop
*Approx. Dimensions:* 1’6” x 6’ x 1’6”

---

**TRASH RECEPTOR**
Add a trash receptacle next to each shelter.

*Type:* steel
*Quantity:* 1 per stop
*Approx. Dimensions:* 2’ x 2’ x 3’

---

**SIMME SEATS**
Add a pair of prefabricated Simme Seats to the base of the signpost at each bus stop (see right for signpost details).

*Model:* SS1
*Quantity:* 1 pair per stop
*Approx. Dimensions:* 1’6” x 1’6” x 1’6” ea.

---

**LIGHTING IMPROVEMENTS**
If absent or inadequate, add context-sensitive lighting to improve nighttime visibility and safety. Explore solar battery power in locations where power conduits are absent.

*Type:* various materials
*Quantity:* varies as needed
*Approx. Dimensions:* varies as needed

---

**TRASH RECEPTOR**
Add a trash receptacle next to each shelter.

*Type:* steel
*Quantity:* 1 per stop
*Approx. Dimensions:* 2’ x 2’ x 3’

---

**Level 0: Standard Bus Stop**
Amenity Descriptions (Type C)
While not strictly necessary, if the budget permits it may be helpful to paint or dye boarding and alighting area(s) to more clearly indicate to third parties the space that must be kept clear for ADA accessibility. Such markings may also help bus operators pull in consistently.

**Level 0: Standard Bus Stop**
Amenity Layout (Type C)
TYPE A ALTERNATIVE:
Standard Bus Stop with Bus Stop Sign, Trash Receptor, Lighting Improvements, and Boarding & Alighting Area

Since the available sidewalk space and/or agency resources may not always allow for all the amenities in the Type C layout on previous pages, a Type A alternative reduces the number of amenities at a standard bus stop to four: a bus stop sign, a trash receptor, lighting improvements, and the 5' x 8' boarding & alighting area for wheelchair ramp deployment.

The reduced amenities are more practical for deployment at a large number of stops, but the goal should still be to upgrade as many stops as possible to Type C whenever sidewalks are periodically rebuilt or as agency resources permit.
**TYPE B ALTERNATIVE:**
**Standard Bus Stop with Bus Stop Sign, Simme Seats, Bench, Trash Receptor, Lighting Improvements, and Boarding & Alighting Area**

Since the available sidewalk space and/or agency resources may not always allow for all the amenities in the Type C layout on previous pages, a Type B alternative reduces the number of amenities at a standard bus stop to six: a bus stop sign with simme seats, a bench, a trash receptor, lighting improvements, and the 5’ x 8’ boarding & alighting area for wheelchair ramp deployment.

The reduced amenities are more practical for deployment at a large number of stops, but the goal should still be to upgrade as many stops as possible to Type C whenever sidewalks are periodically rebuilt or as agency resources permit.

**Level 0: Standard Bus Stop**
Type B Alternative
An enhanced stop pair consists of two farside bus stops at select intermediate high-ridership points or other important points along high-frequency bus routes. The bus stop amenities on this page are provided as a minimum; see next page for amenity descriptions.
Level I: Enhanced Stop Pair
Amenity Descriptions

**5' X 10' SHELTER**
Use the 10’ long Tolar cantilever shelter model at enhanced stop pairs. Incorporate public art into shelter walls, varying the design by location if possible.

*Model: 25516-00 (Signature Sunset 01)*
*Quantity: 1 per stop (2 total)*
*Approx. Dimensions: 5’ x 10’ x 9’*

**PYLON**
Add a pylon at the intersection side of each bus stop displaying real-time arrival info and wayfinding. Each pylon should list the CATS website, stop number, and a QR code. Each pylon can also offer a public wifi connection.

*Type: internally lit/powered steel or plastic*
*Quantity: 1 per stop (2 total)*
*Approx. Dimensions: 1’6” x 3’ x 10’*

**SIDEWALK WAYFINDING**
Supplement the pylons with thermoplastic sidewalk arrows pointing to the paired bus stop across the intersection.

*Type: blue thermoplastic*
*Quantity: 1 array on each side of the crosswalk between the stop pair (2 total)*
*Approx. Dimensions: TBD*

**BOARDING & ALIGHTING AREA**
Keep a 5’ x 8’ area at the head of each bus stop clear for wheelchair ramp deployment.

*Type: concrete pad (painting optional)*
*Quantity: 1 per stop (2 total)*
*Approx. Dimensions: 5’ x 8’*

**CROSSWALK IMPROVEMENTS**
If signalized crosswalks with curb ramps aren’t already present, either add them or consider adding RRFB (rectangular rapid flashing beacon) refuge crossings where conventional signalization isn’t possible.

*Type: various materials*
*Quantity: varies as needed*
*Approx. Dimensions: varies as needed*

**LIGHTING IMPROVEMENTS**
If absent or inadequate, add context-sensitive lighting to improve nighttime visibility and safety. Explore solar battery power in locations where power conduits are absent.

*Type: various materials*
*Quantity: varies as needed*
*Approx. Dimensions: varies as needed*

**BUS & SIDEWALK BULB**
Build bus stop bulbs at both farside stops and integrate into crosswalk bulbs.

*Type: concrete*
*Quantity: 1 per stop (2 total + crosswalks)*
*Approx. Dimensions: 90’ long (60’ length for articulated buses + 10’ for rear buffer + 20’ for front taper)*

**PAIRED BENCHES**
One bench is included with each shelter, but add a second bench next to each. While a single standardized bench model is recommended for ease of procurement and maintenance, different models, sizes, and configurations can be used to accommodate varying ridership loads and neighborhood aesthetic contexts.

*Model: 13023-121 (Tolar Euro)*
*Quantity: 1 additional per stop (2+2 total)*
*Approx. Dimensions: 1’6” x 6’ x 1’6”*

**TRASH RECEPTOR**
Add a trash receptor next to each shelter.

*Type: steel*
*Quantity: 1 per stop (2 total)*
*Approx. Dimensions: 2’ x 2’ x 3’*

**BICYCLE RACK**
Add a u-style bicycle rack to each bus stop.

*Type: steel u-rack*
*Quantity: 1 per stop (2 total)*
*Approx. Dimensions: 1’ x 2’6” x 2’6”*

**SCOOTER & E-BIKE STORAGE**
Paint a rectangle for depositing scooters and e-bikes next to each bus stop.

*Type: white paint*
*Quantity: 1 per stop (2 total)*
*Approx. Dimensions: 5’6” x 18’*

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*Images and diagrams of each amenity are included in the document.*
While not strictly necessary, if the budget permits it may be helpful to paint or dye boarding and alighting area(s) to more clearly indicate to third parties the space that must be kept clear for ADA accessibility. Such markings may also help bus operators pull in consistently.
A Mobility Plaza consists of four farside bus stops that serve as transfer points between the intersection of two high-frequency bus routes. The bus stop amenities on this page are provided as a minimum; see next page for amenity descriptions.

**Level II: Mobility Plaza**

**Amenity Overview**
5' X 15' SHELTER
Use the 15’ long Tolar cantilever shelter model at Mobility Plaza bus stops. Incorporate public art into shelter walls, varying the design by location if possible.

**Model:** Signature Sunset 14 (Tolar)
**Quantity:** 1 per stop (4 total)
**Approx. Dimensions:** 5’ x 15’ x 9’

SIDEWALK WAYFINDING
Supplement the pylons with thermoplastic sidewalk arrows pointing to the transfer bus stops across the intersection.

**Type:** blue thermoplastic
**Quantity:** 1 at each corner (4 total)
**Approx. Dimensions:** TBD

PAIRED BENCHES
One bench is included with each shelter, but add a second bench inside each. While a single standardized bench model is recommended, different models, sizes, and configurations can be used to apply to varying neighborhood aesthetic contexts.

**Model:** 13023-121 (Tolar Euro)
**Quantity:** 1 additional per stop (4+4 total)
**Approx. Dimensions:** 1’6” x 6’ x 1’6”

BOARDING & ALIGHTING AREA
Keep a 5’ x 8’ area at the head of each bus stop clear for wheelchair ramp deployment.

**Type:** concrete pad (painting optional)
**Quantity:** 1 per stop (4 total)
**Approx. Dimensions:** 5’ x 8’

CROSSWALK IMPROVEMENTS
If signalized crosswalks with curb ramps aren’t already present, either add them or consider adding RRFB (rectangular rapid flashing beacon) refuge crossings where conventional signalization isn’t possible.

**Type:** various materials
**Quantity:** varies as needed
**Approx. Dimensions:** varies as needed

TRASH RECEPTOR
Add a trash receptor next to each shelter.

**Type:** steel
**Quantity:** 1 stop (4 total)
**Approx. Dimensions:** 2’ x 2’ x 3’

INFORMATION KIOSK
Add an information kiosk at the most visible entrance point to the Mobility Plaza displaying supplemental content distinct from the real-time arrivals and wayfinding on the nearby pylons. Each kiosk can also offer a public wifi connection.

**Type:** internally lit/powered steel or plastic
**Quantity:** 1 total
**Approx. Dimensions:** 1’6” x 3’ x 10’

BICYCLE RACK
Add a u-style bicycle rack to each bus stop.

**Type:** steel u-rack
**Quantity:** 1 per stop (4 total)
**Approx. Dimensions:** 1’ x 2’6” x 2’6”

LIGHTING IMPROVEMENTS
If absent or inadequate, add context-sensitive lighting to improve nighttime visibility and safety. Explore solar battery power in locations where power conduits are absent.

**Type:** various materials
**Quantity:** varies as needed
**Approx. Dimensions:** varies as needed

SCOOTER & E-BIKE STORAGE
Paint a rectangle for depositing scooters and e-bikes next to each bus stop.

**Type:** white paint
**Quantity:** 1 per stop (4 total)
**Approx. Dimensions:** 5’6” x 18’

CROSSWALK IMPROVEMENTS
If signalized crosswalks with curb ramps aren’t already present, either add them or consider adding RRFB (rectangular rapid flashing beacon) refuge crossings where conventional signalization isn’t possible.

**Type:** various materials
**Quantity:** varies as needed
**Approx. Dimensions:** varies as needed

PYLON
Add a pylon at the intersection side of each bus stop displaying real-time arrival info and wayfinding. Each pylon should list the CATS website, stop number, and a QR code. Each pylon can also offer a public wifi connection.

**Type:** internally lit/powered steel or plastic
**Quantity:** 1 per stop (4 total)
**Approx. Dimensions:** 1’6” x 3’ x 10’

BUS & SIDEWALK BULB
Build bus stop bulbs at all four far-side stops and integrate into crosswalk bulbs.

**Type:** concrete
**Quantity:** 1 per stop (4 total + crosswalks)
**Approx. Dimensions:** 90’ long
(60’ length for articulated buses + 10’ for rear buffer + 20’ for front taper)

Level II: Mobility Plaza
Amenity Descriptions
While not strictly necessary, if the budget permits it may be helpful to paint or dye boarding and alighting area(s) to more clearly indicate to third parties the space that must be kept clear for ADA accessibility. Such markings may also help bus operators pull in consistently.
A Mobility Center consists of four or more bus bays that serve as transfer points between light rail lines (Type A; shown above), multiple bus routes (Type B), and/or park and ride facilities (Type C). The bus stop amenities on this page are provided as a minimum; see next page for amenity descriptions.

Level III: Mobility Center
Amenity Overview (Types A, B, and C)
Level III: Mobility Center
Amenity Descriptions (Types A, B, and C)

**5’ X 15’ SHELTER**
Use the 15’ long Tolar cantilever shelter model at Mobility Center bus bays. Incorporate public art into shelter walls, varying the design by location if possible.

*Model:* Signature Sunset 14 (Tolar)
*Quantity:* 1 per bay (4 total)
*Approx. Dimensions:* 5’ x 15’ x 9’

**BOARDING & ALIGHTING AREA**
Keep a 5’ x 8’ area at the head of each bus bay clear for wheelchair ramp deployment.

*Type:* concrete pad (painting optional)
*Quantity:* 1 per bay (4 total)
*Approx. Dimensions:* 5’ x 8’

**PAIRED BENCHES**
One bench is included with each shelter, but add a second bench inside each. See full amenity description on Page A11.

*Model:* 13023-121 (Tolar Euro)
*Quantity:* 1 additional per bay (4+4 total)
*Approx. Dimensions:* 1’6” x 6’ x 1’6”

**OPERATOR RESTROOM**
Provide a secure operator restroom facility (2 single-occupant bathrooms and a utility closet) to the side of the Mobility Center.

*Type:* concrete block with brick veneer
*Quantity:* 1 total
*Approx. Dimensions:* 8’ x 17’6” x 9’

**BUS BAY**
Build 4 or more sawtooth bus bays and connect them to adjacent sidewalks, park and rides, and/or light rail stations.

*Type:* concrete
*Quantity:* Minimum of 4, but based on number of connecting bus routes
*Approx. Dimensions:* 70’ long (to accommodate both 40’ and 60’ buses)

**TRASH RECEPTOR**
Add a trash receptacle next to each shelter.

*Type:* steel
*Quantity:* 1 per bay (4 total)
*Approx. Dimensions:* 2’ x 2’ x 3’

**BICYCLE RACKS**
Add 5 u-style bicycle racks to the side of the Mobility Center.

*Type:* steel u-rack
*Quantity:* 5 racks
*Approx. Dimensions:* 1’ x 2’6” x 2’6”

**MICROTRANSIT PICKUP/DROPOFF AREA**
Build a pullout area adjacent to the driveways or parking areas for microtransit pickups and dropoffs.

*Type:* concrete
*Quantity:* 1 pullout area
*Approx. Dimensions:* minimum 75’ long (for at least 3 midsize microtransit vans)

**INFORMATION KIOSK**
Add an information kiosk at the most visible entrance point to the Mobility Center displaying supplemental content. See full amenity description on Page A11.

*Type:* internally lit/powered steel or plastic
*Quantity:* 1 total
*Approx. Dimensions:* 1’6” x 3’ x 10’

**SCOOTER & E-BIKE STORAGE**
Paint a rectangle for depositing scooters and e-bikes on the right side of the Mobility Center.

*Type:* white paint
*Quantity:* 1 total
*Approx. Dimensions:* 5’6” x 18’

**LIGHTING IMPROVEMENTS**
If absent or inadequate, add context-sensitive lighting to improve nighttime visibility and safety. See full amenity description on Page A11.

*Type:* various materials
*Quantity:* varies as needed
*Approx. Dimensions:* varies as needed

**PYLON**
Add a pylon at the head of each bus bay displaying the bay number, real-time arrival info, and wayfinding. See full amenity description on Page A11.

*Type:* internally lit/power steel or plastic
*Quantity:* 1 per bay (4 total)
*Approx. Dimensions:* 1’6” x 3’ x 10’

**OFFBOARD FARE PAYMENT**
Add a ticket vending machine (TVM) at each bus bay to allow passengers to purchase fares before boarding buses.

*Type:* ticket vending machine (TVM)
*Quantity:* 1 per bay (4 total)
*Approx. Dimensions:* 2’ x 2’6” x 6’

**CROSSWALK IMPROVEMENTS**
If signalized crosswalks with curb ramps aren’t already present, either add them or consider adding RRFB (rectangular rapid flashing beacon) refuge crossings where conventional signalization isn’t possible.

*Type:* various materials
*Quantity:* varies as needed
*Approx. Dimensions:* varies as needed
While not strictly necessary, if the budget permits it may be helpful to paint or dye boarding and alighting area(s) to more clearly indicate to third parties the space that must be kept clear for ADA accessibility. Such markings may also help bus operators pull in consistently.
MOBILITY CENTER TYPE B, EXAMPLE APPLICATION:
Northlake Mall (Lower Section)

In this scenario, the existing bus stops adjacent to Northlake Commons are retrofitted with bus bays and the other passenger amenities on Page A14, effectively upgrading the bus stops into a Type B Mobility Center.

This new hub would supplement the existing Northlake Mall hub (upper section) adjacent to Dillard’s, and the increased layover capacity demonstrates how Mobility Centers accommodate multiple combined end-of-route layovers.

Connections to Local Land Uses
In this scenario, an existing driveway and sidewalks to Northlake Commons are retained.

TYPE B VARIATION:
Mobility Center with Connection to Multiple Other Bus Routes

The previous pages depicted a Mobility Center connecting to a light rail station (Type A), but there also are instances where a Mobility Center may connect to other bus routes instead, such as at the end of a bus route. This page illustrates such a scenario; note that to the fullest extent possible, Type B Mobility Centers should still provide the same amenities as those for Type A (see Page A14).

Level III: Mobility Center
Amenity Layout (Type B)
MOBILITY CENTER TYPE C, EXAMPLE APPLICATION:
Albemarle Road Park and Ride

In this scenario, the existing Albemarle Road Park and Ride is upgraded to a Type C Mobility Center by retrofitting bus bays and the other passenger amenities on Page A14 into the facility.

Lawyers Road

Existing Park and Ride Lot

Optional Reserved Spaces for Carsharing

Connections to Local Land Uses
In this scenario, a midblock crossing is introduced across Lawyers Road to connect the Mobility Center to the Greenrock Estates apartment complex (to which there currently is a “desire path”).

TYPE C VARIATION:
Mobility Center with Connection to Park and Ride Facility

The previous pages depicted a Mobility Center connecting to a light rail station (Type A), but there also are instances where a Mobility Center may connect to a park and ride facility instead. This page illustrates such a scenario; note that to the fullest extent possible, Type C Mobility Centers should still provide the same amenities as those for Type A (see Page A14).

Level III: Mobility Center
Amenity Layout (Type C)
Level X: Bus Stop Type

Amenity Details