



**Metro®**

## **ISDS PROJECT**

INTEGRATED STATION DESIGN SOLUTIONS



## **Station Furnishings White Paper**

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**Gensler**

**ARUP**



**STUDIO-MLA**

**Claris Strategy**





# Station Furnishings

## White Paper

### 1.0 Element Overview and Problem Statement

#### 1.1 Description of Element

Station furnishings, such as benches and trash receptacles, enhance the passenger experience and increase accessibility and safety at public station areas. Benches improve station accessibility by providing seating for passengers who may not be able to stand for long periods of time. Trash receptacles help Metro maintain clean stations and serve an important safety function, allowing for orderly disposal of litter that might otherwise create slip or trip hazards, or end up on the train tracks where it can become a fire hazard.

#### 1.2 Problem Statement

Design standards have changed over the years, and as a result, Metro requires consistent standards for the design and placement of station furnishings across the system. A wide variety of furnishings exist in Metro stations. This creates a lack of aesthetic consistency, diminishing a cohesive system identity. The different types of furnishings create a maintenance challenge, requiring multiple sets of spare parts. Other specific challenges presented by the existing benches and trash receptacles include:

- In some stations, existing benches block visibility and create security concerns. These benches may create physical impediments when responding to security situations.
- Many benches and trash receptacles are painted and/or installed onto architectural surfaces, requiring constant maintenance.
- Some station areas lack benches, potentially creating difficulties for passengers who may be unable to stand while waiting for trains or buses.
- Trash receptacles with removable lids are difficult for Facilities Maintenance (FM) staff to empty and can cause injuries.

Metro's priorities for station furnishings include:

- Improving the passenger experience by providing furnishings at intuitive locations, such as trash receptacles at central entrance/exit points and benches at key waiting areas.
- Reducing clutter in the station.
- Enhancing safety and security by incorporating

crime prevention through environmental design (CPTED) principles.

- Simplifying maintenance, operations, and project delivery by creating a uniform standard that can be used systemwide and is consistent with the Systemwide Station Design Standards material palette and streamlined aesthetic.



**Figure 1-1** Varied trash receptacle designs. B (Red) and D (Purple) Line.



**Figure 1-2** Extremely narrow retrofitted benches. Florence station, A (Blue) Line.



**Figure 1-3** Difficult to maintain benches. Culver City station, E (Expo) Line.



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## 2.0 Design Process and Principles

### 2.1 Design Process

The Project Design Team for this element was led by Gensler, and included Arup, RAW, and Claris Strategies. Cost estimates were provided by Leyland Saylor Associates.

Metro departments across the agency provided input throughout the design process. Beginning in May 2018, Working Group Members accompanied the Project Design Team on site visits of existing Metro stations to observe and document the condition of existing station furnishings. The Project Design Team also conducted a series of interviews with representatives from a wide range of Metro departments, including:

- Arts + Design
- Environmental Compliance and Sustainability
- Facilities/Property Maintenance (including separate interviews with FM field staff and management)
- Fire and Life Safety
- Office of Civil Rights
- Operations Liaison and Planning
- Project Engineering
- System Security & Law Enforcement

Based on the analysis and information provided during interviews with Metro staff, the Project Design Team developed initial design concepts, which were presented to the Working Group in December 2018. Using the feedback provided by the Working Group members, the Project Design Team refined the initial design concepts into a draft Concept Design, which was submitted to the Working Group for review in January 2019. Comments provided on the draft Concept Design were addressed by the Project Design Team in the revised Concept Design submitted to Metro in March 2019. The Project Design Team submitted the final Concept Design in April 2019. Draft, revised, and final Design Documentation packages were submitted March 2020. For additional information, see “Table 2-1 Timeline of Design Process” on page 5.

### 2.2 Working Group Feedback

Working Group members provided the following feedback on station furnishings:

#### Station Seating Design

- Benches should have armrests in the middle to make it easier for mobility impaired passengers to use and to discourage unwanted activities, such as lying down.
- Curved seats are more comfortable for riders.
- It is preferred for benches to be anchored to the floor surface, not embedded, to allow for easy replacement as needed.
- Benches with sharp corners are not preferred, as they are hard to maintain and can be easily damaged. (Facilities Maintenance)
- Points of connection should be minimized to provide a clear and visible space below benches to increase security. (System Security & Law Enforcement)
- Bench design should discourage skateboarding.

#### Station Seating Material

- Use perforated material for transparency to increase security. (System Security & Law Enforcement)
- Benches with wire steel material need to be strong enough to prevent vandalism, such as cutting of material. (Facilities Maintenance)
- Wooden and concrete benches are difficult to clean and less vandal resistant.
- Stainless steel benches are preferred for durability and consistency with Metro’s Systemwide Station Design Standards.





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### Trash Receptacle Design

- Trash receptacles with fewer points of connection are preferred for easy cleaning around the base and replacement as needed.
- Trash receptacles should have curved or angled tops (not flat) to discourage placement of items on top. (Facilities Maintenance)
- Removable lids can damage floors when dropped on the ground during maintenance or scavenging. Side opening and side loading to provide easy access for maintenance crew is preferred.
- Smaller openings on receptacles are preferred to discourage scavenging and enhance security.
- Trash receptacles should not have handles or locks to reduce the likelihood of damage. (Facilities Maintenance)

### Trash Receptacle Material

- Consider explosive resistance material. (System Security & Law Enforcement)
- Should not be a light weight material as it is not durable.
- Use of perforated material for visibility for security purposes.

### Station Furnishings Placement

- Allow enough space between trash receptacles and benches for odor relief.

### 2.3 Design Principles

Based on the comments provided by the Working Group and best practice findings, the Project Design Team identified the following design principles for station furnishings:

#### Security / Vandal Resistance

- Use perforated material to provide transparency.
- Provide armrests to discourage lying down on benches.
- Provide smaller openings for trash receptacles to discourage the placement of large items that may pose a security risk.
- Use trash receptacle liners that are transparent enough for a bomb robot to be able to scan through a trash receptacle.

#### Reduce Maintenance Required

- Furnishings should have minimal connection points to the ground as possible so they can be easy to replace or relocate.
- Furnishings should be easy to clean/maintain and be made with durable materials.
- Furnishings should not have flat surfaces that collect dirt and debris and water ponding.
- Furnishings should be modular so they are easy to repair.
- Avoid using locks or any removable parts on trash receptacles that can be easily damaged.

#### Enhance the Passenger Experience

- Provide space between benches and trash receptacles for odor relief.
- Locate benches at key waiting areas in intuitive locations.
- Incorporate ergonomic design to enhance passenger comfort.



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**Table 2-1** Timeline of Design Process

May to June 2018	Project Design Team and Metro Working Group Members conducted site visits of existing stations, including: 7th St/Metro Center, Arcadia, Aviation/LAX, Bundy, Cal State LA, Harbor Freeway, Hollywood/Highland, North Hollywood, Pacific Coast Highway, and Wilshire/Vermont.
June to November 2018	Project Design Team conducted interviews with Metro departments, including: Arts + Design, Environmental Compliance and Sustainability, Facilities Maintenance (separate interviews conducted with Facilities Maintenance staff and management), Fire and Life Safety, Office of Civil Rights, Operations Liaison and Planning, Project Engineering, and System Security & Law Enforcement.
September to December 2018	Project Design Team developed initial design concepts.
December 2018	Project Design Team presented initial design concepts to the Metro Working Group.
January 2019	Draft Concept Design Package submitted.
March 2019	Revised Concept Design Package submitted.
April 2019	Final Concept Design Package submitted.
May 2019	Draft Design Documentation Package and White Paper submitted.
June 2019	Revised Design Documentation Package submitted.
October 2019	Second Revised Design Documentation Package submitted.
February 2020	Final Design Documentation Package submitted.
March 2020	Draft MRDC and Architectural Standard / Directive Drawings updates submitted.



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### 3.0 Design Solution

In response to the need for a consistent standard for station furnishings, the Project Design Team developed design solutions for benches and trash receptacles that create a balance between the requirements of the high use/high abuse environment of the Metro system and the desire for a simple, minimal, clean, and modern design aesthetic. The design solutions for station furnishings are intended to transcend current design trends and have a timeless quality to them so as not to become dated or antiquated.

A common design aesthetic and the use of a common material for station furnishings will help provide an easily identifiable and singular identity within the system. A singular style of benches and trash receptacles through common placement within each station will create a coherent design narrative across the system. This cohesive, integrated design language contributes to well-designed station public areas that support positive customer experience and instill community pride in the system. See Figures 3-1 and 3-2 for best practice examples.



**Figure 3-1** Station furnishings at Überseequartier station on the Hamburg U-Bahn line U4.



**Figure 3-2** Station furnishings at Aalto University station, Helsinki Metro.



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### 3.1 Benches

The design solution for benches feature a modular system that can be adapted to the needs of the various station types throughout the Metro system. The modular system can be configured to provide four or eight seats per unit with or without backrests. The base unit consists of two stainless steel support posts and connecting bar, to which individual seats are attached. The seats are approximately 24" in width and designed with a stainless steel woven mesh bordered with a continuous round stainless steel bar. Arm rests, also constructed of stainless steel, are provided between each seat.

### 3.2 Trash Receptacles

The design solution for trash receptacles is a free-standing, drum-shaped unit approximately 24" in diameter with a rounded top and singular support post at the bottom, constructed of stainless steel panels and woven mesh. Access for maintenance occurs with a non-lockable, side hinged opening. Trash receptacles feature a 32 gallon, heavy-gauge, transparent plastic liner, which accommodates disposable transparent, heavy-duty plastic bags.

Trash receptacles may be installed as a single unit or dual unit. While Metro does not currently have an in-station recycling program, the design allows a second receptacle to be added for recycling if desired by Metro in the future. For additional information, see "Table 3-1 Key Design Features" on page 11.



**Figure 3-3** Trash receptacle (dual unit shown with optional recycling receptacle).



**Figure 3-4** Eight-seat bench with backrests.



**Figure 3-5** Four-seat bench with backrests.



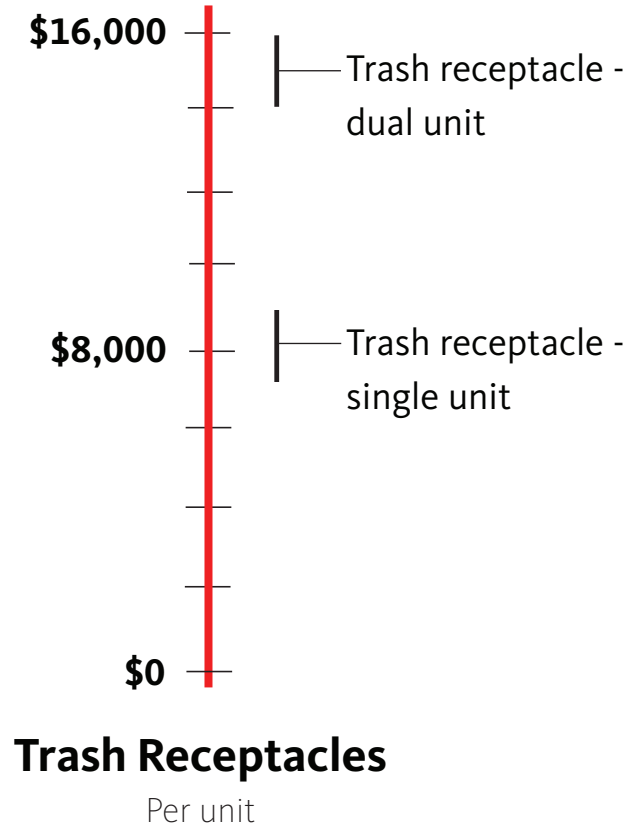
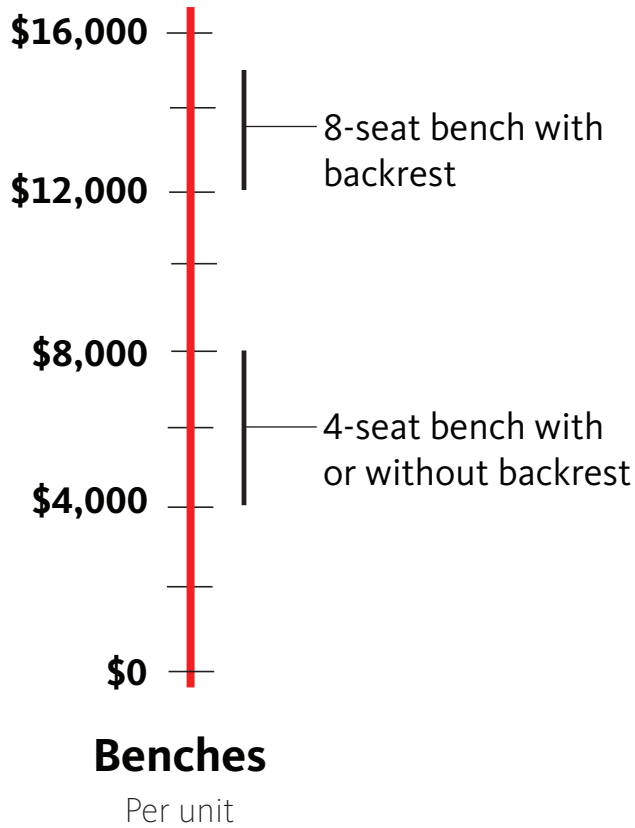
**Figure 3-6** Four-seat bench without backrests.



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Cost estimates: station furnishings



**Figure 3-7** Cost estimates for station furnishings.

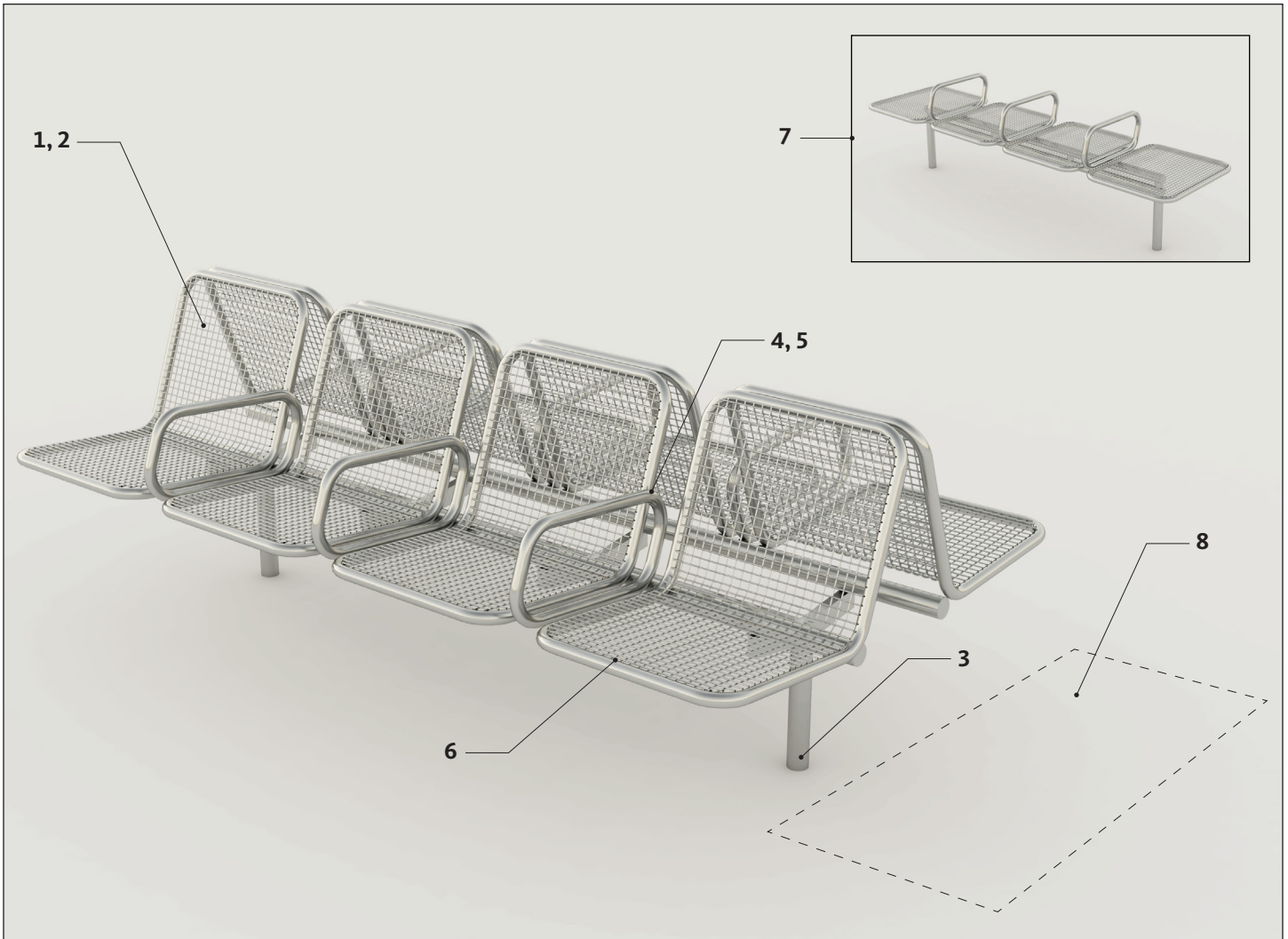
Note: Costs provided represent estimates from a manufacturer in 2021. Cost estimates exclude engineering, inspection, testing, permitting, installation, and sales tax. Bulk purchasing station furnishings may lead to cost reduction per unit. Leyland Saylor Associates provided initial rough estimates based on concept design (not reflected in Figure 3-7).





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**Figure 3-8** Benches. For selected features, refer to Table 3-1 for details.



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**Figure 3-9** Trash receptacles. For selected features, refer to Table 3-1 for details.



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**Table 3-1** Key Design Features

Design Feature	Rationale
1. All materials and fasteners for station furnishings are to be 316 grade stainless steel with #4 brushed finish.	<p>Stainless steel provides a clean and modern aesthetic, consistent with Metro's Systemwide Station Design Standards material palette, and is a highly durable material requiring minimal maintenance:</p> <ul style="list-style-type: none"><li>• No painting or sealing of the material is required and a non-directional finish withstands dirt, fingerprints and minor scratches.</li><li>• 316-grade stainless steel was selected to provide better corrosion resistance than standard 304-grade stainless steel due to the addition of molybdenum to the steel. All components of each element should be of the same stainless steel material to resist galvanic action between dissimilar materials.</li></ul> <p>A #4 brushed finish is recommended to conform with Metro's Systemwide Station Design Standards material palette and reduce the visibility of scratches or damage that may occur.</p> <p>Other materials that were considered and rejected during the ISDS design process include: wood, which was determined to require more frequent maintenance and replacement; plastic, which was determined to not meet the fire/life safety requirements for below grade stations; and stone or concrete, which were considered to be more costly to maintain and did not provide the level of transparency for security.</p>
2. Benches and trash receptacles are to feature a stainless steel woven wire mesh.	<p>Woven wire mesh provides passenger comfort (for seating), while allowing visibility for security and ease of maintenance:</p> <ul style="list-style-type: none"><li>• Wire mesh provides a comfortable seating area by allowing more movement under the weight of a passenger than a solid sheet material.</li><li>• Wire mesh provides a high degree of transparency, allowing Metro security to see objects or people that may be located behind or below benches.</li><li>• Wire mesh allows for dirt and liquids to fall through the seat pan, providing a dry and clean seat more often than a perforated or solid material seat. Compared to a solid material, wire mesh provides less surface area reducing the opportunity for graffiti.</li><li>• Wire mesh mitigates extreme temperatures due to limited surface area contact (compared to a solid stainless steel sheet surface).</li></ul>



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Design Feature	Rationale
3. Benches and trash receptacles are to feature minimal attachment points (two points of attachment for benches and a single point of attachment for trash receptacles), securely fastened with tamperproof screws or bolts.	<p>Secure attachments provide for safety and security, while the minimal number of attachment points provides for ease of maintenance:</p> <ul style="list-style-type: none"><li>• Tamperproof attachments deter theft and prevent furnishings from becoming intentionally or unintentionally unattached, which could pose a safety hazard.</li><li>• Minimizing the attachment points provides a clearer line-of-sight below benches, ease of cleaning below and around benches and trash receptacles, and fewer patch and repair points when removing or relocating furnishings.</li></ul>
4. Benches feature individual seats and armrests attached with bolted connections.	<p>Individual seats and armrests with bolted connections allow for easy removal and replacement of damaged components.</p>
5. Benches feature armrests provided between seats only. No arm rests are provided for end seats.	<p>Armrests are designed to enhance safety and security, as well as accessibility:</p> <ul style="list-style-type: none"><li>• Armrests between seats prevent users from lying down on the benches or otherwise allowing for any one person to monopolize a large portion of a bench.</li><li>• Research shows that some riders may find it easier to sit and rise from a bench without the interference of an armrest and some riders have difficulty sitting down and rising and prefer the assistance that an armrest provides. The proposed design provides options for the greatest number of users.</li></ul>
6. Benches are designed so that the front edge of seating is no less than 17" and no more than 19" above the finished floor.	<p>This range provides the optimal seating height for the majority of the population and is the recommended height from the Revised Draft Guidelines for Accessible Public Rights-of-Way published by the United States Access Board.</p>
7. Two types of seats are provided for benches: seats with or without backrests.	<p>The designs are similar and the proper bench design can be designated based on the specific criteria required:</p> <ul style="list-style-type: none"><li>• Benches with backrests provide additional comfort and added support for passengers, while backless benches allow for placement in the middle of narrow center platforms and can be accessed from either side of the platform.</li></ul> <p>There are not any federal or state ADA requirements to provide benches at transit stations. However, if there is seating at a transit station that is a built-in element, it must comply with ADA requirements, which includes a backrest or a vertical surface immediately adjacent that can be used as a backrest. For seating that is not built-in, it is a recommended best practice to provide a reasonable number of seats with backrests to improve usability for customers with disabilities.</p>



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Design Feature	Rationale
8. There should be a clear space of 30" x 48" adjacent to 50% of benches provided in a station.	Research shows that within a station, wheelchair users typically do not transfer to a stationary bench and then back to a wheelchair when a train arrives. Instead, they prefer to wait in their wheelchair alongside other ambulatory riders sitting on stationary benches. Providing a clear floor space allows wheelchair users to sit shoulder-to-shoulder with ambulatory riders while waiting for a train.
9. Minimum seating requirements should be provided as follows: Light Rail (platform length 270') <ul style="list-style-type: none"><li>For at-grade side platforms, three single-sided benches to be provided on each platform.</li><li>For at-grade center platforms, four single-sided benches to be provided.</li><li>For aerial/underground side platforms, three single-sided benches to be provided on each platform.</li><li>For aerial/underground center platforms, four double-sided benches to be provided.</li></ul> Heavy Rail (platform length 450') <ul style="list-style-type: none"><li>For side platforms, three single-sided benches to be provided on each platform.</li><li>For center platforms, double end or center concourse, four double-sided benches to be provided.</li></ul>	These standards are based on a review of the current directive drawings and space availability. Relative to at-grade light rail stations, a greater number of seats are provided for aerial/underground stations due to their larger platform size. More seats are provided for heavy rail stations, due to the larger size of these platforms and the greater capacity of heavy rail trains.





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Design Feature	Rationale
10. Trash receptacles are 24" in diameter and feature a rounded top.	The rounded top of the trash receptacle reduces dirt and dust build-up, prevents refuse from being placed on the top, allows for liquids to drain, deters bird from roosting, and deters people from climbing and standing on the trash receptacle.
11. Trash receptacles feature minimal openings (no larger than 5" by 10") with no flaps or doors that users have to touch.	<p>The design of the trash receptacle opening enhances safety and security and provides for both ease of maintenance and ease of use:</p> <ul style="list-style-type: none"><li>• The minimal size opening provides safety and security as it prevents placement of large items, such as explosive devices, in the trash receptacle.</li><li>• The minimal size opening supports the appropriate use of a trash receptacle by deterring the disposal household refuse or placement of overly large items.</li><li>• The minimal opening size minimizes rain and animal intrusion into the trash receptacle.</li><li>• Passengers prefer not to come in contact with the trash receptacle when using it.</li></ul>
12. Trash receptacles feature a stainless steel hinged door on the side with no handles or locks to allow access for maintenance staff.	<p>Metro maintenance staff recommended side access for ease of maintenance:</p> <ul style="list-style-type: none"><li>• This design allows the liner to be tilted outward and the bag removed and replaced, which is considered to put less stress on the maintenance staff when maintaining the trash receptacle.</li><li>• The door does not feature a lock because it was noted by Metro staff that any lock will simply be tampered with.</li></ul>
13. Trash receptacles feature a 32 gallon, heavy-gauge, transparent plastic liner that accomodates a disposable transparent, heavy-duty plastic bag.	<p>Metro maintenance staff recommended this size and configuration for ease of maintenance.</p> <p>Metro System Security &amp; Law Enforcement recommends that trash receptacle liners be transparent enough so that a bomb robot is be able to scan through the trash receptacle.</p>

**Note: This table provides a summary of key features only and is not an exhaustive list of all design features. Project design documentation provides complete details and requirements, and is available upon request.**

### Contact Us

#### METRO SYSTEMWIDE DESIGN

[metro.net/projects/station-design-projects/](https://metro.net/projects/station-design-projects/)

**Adam Light**, *Senior Director*, [LightA@metro.net](mailto:LightA@metro.net)

**Rachelle Andrews**, *Transportation Planning Manager*, [AndrewsRa@metro.net](mailto:AndrewsRa@metro.net)

**Jenny Wong**, *Senior Transportation Planner*, [Wongle@metro.net](mailto:Wongle@metro.net)

**Jila Mendoza**, *Transportation Associate I*, [MendozaJi@metro.net](mailto:MendozaJi@metro.net)



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Amador Nafrada, Systems Engineering	Jacob Lieb, First/Last Mile Planning
Andres Di Zitti, Rail Transportation	Jenny Wong, Systemwide Design
Andrew Kao, Bike Share Planning and Implementation	Jila Mendoza, Systemwide Design
Andrina Dominguez, Environmental Compliance and Sustainability	Joseph Russell, Marketing
Androush Danielians, Engineering Management	Karen Parks, System Security & Law Enforcement
Angelka Grandov, Project Engineering	Katherine Lemmon, First/Last Mile Planning
Anthony Jusay, Bike Share Planning and Implementation	Kay Koopman-Glass, Safety
Anthony Loui, Operations Liaison and Planning	Kristie Crawford, Marketing
Arkady Bernshteyn, Rail MOW Engineering	Lan-Chi Lam, Marketing
Aspet Davidian, Project Engineering	Lance Glover, Arts + Design
Austin Phung, Systemwide Design	Lena Babayan, Facilities Maintenance Contracts
Avital Shavit, OEI	Letitia Solis, Light Rail Wayside Systems
Benjamin Alcazar, Office of Civil Rights	Nadine Lee, OEI
Bernadette Mindiola, Marketing	Nicholas Saponara, Transit Oriented Communities
Bonn Dumaliang, Systems Engineering	Mario Del Rosario, Systems Engineering
Brad Owen, Construction Management	Marshall Epler, Rail MOW Engineering
Brady Branstetter, Facilities/Property Maintenance	Mauro Arteaga, TAP
Brandon Farley, Operations Liaison and Planning	Maya Emsden, Arts + Design
Carlos Martinez, Facilities Maintenance Contracts	Mayen Alcantara, Arts + Design
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Dulce Cristobal, Systems Engineering	Shaunt Avanesian, Facilities Maintenance Contracts
Ebelin Castillo, Marketing	Stephen Toms, Asset Management
Eladio Salas, Wayside Systems Facilities Maintenance	Susan Gray, Arts + Design
Emmanuel Liban, Environmental Compliance and Sustainability	Susan Walker, System Security & Law Enforcement
Erica Lee, TAP	Thomas Eng, Safety
Fred Feng, Systems Engineering	Timothy Lindholm, Facilities Engineering-Operations
	Zipporah Yamamoto, Arts + Design