



Metro®

ISDS PROJECT

INTEGRATED STATION DESIGN SOLUTIONS



Gensler

Operational Equipment White Paper

November 2021

Gensler

ARUP



STUDIO-MLA

Claris Strategy





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1.0 Element Overview and Problem Statement

1.1 Description of Element

The ISDS Operational Equipment element identifies standardized and integrated cabinets and enclosures for housing escalator controller and fire hose/fire extinguisher equipment, as well as other equipment that may be required now or in the future. The element also provides design guidance to standardize the type and locations of train berthing markers, and provides an overview of the best selection of materials for elevator finishes.

1.2 Problem Statement

Equipment Integration

Operational equipment installed across the Metro system is inconsistent and often presents aesthetic and potential safety and security issues. Currently, a variety of exposed and surface mounted cabinets exist (see Figure 1-1), creating maintenance challenges, leaving expensive equipment exposed to vandalism, and protrusions that can present safety hazards for patrons with disabilities. They create a cluttered and haphazard appearance that blocks open sight lines within Metro stations and can cause safety and security issues.

Berthing Markers

Berthing markers help operators safely and accurately “park” trains at station platforms. It is important that these markers are easily identifiable, recognizable and standardized in their size and locations. When locating berthing markers, it is important that operators have a clear view of the platform where customers are waiting. Existing berthing markers are of varying designs, are often not integrated as part of the station environment, and are not consistently placed. See in Figure 1-2.

Elevator Finishes

Metro stations are heavy-use and high-abuse environments, and frequent targets of abuse are the elevators. Issues with vandalism, homelessness, and urination inside elevator cabs require highly durable, moisture and corrosion resistant, and easily maintainable, yet aesthetically pleasing materials.



Figure 1-1 Existing retrofitted escalator control cabinet obtrusively located in public space at Pershing Square Station, B (Red) and D (Purple) Lines.



Figure 1-2 Existing ad-hoc berthing marker installation on tracks at APU/Citrus College Station, L (Gold) 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 and RAW.

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 Operational Equipment. The Project Design Team also conducted a series of interviews with representatives from a wide range of Metro departments, including:

- Arts + Design
- Asset Management
- Environmental Compliance and Sustainability
- Facilities 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 the information provided during interviews with Metro staff, the Project Design Team developed initial design concepts into a Draft Concept Design, which was submitted for review and finalized in June 2019. The Project Design team then submitted draft, revised and final Design Documentation packages in March 2020. For additional information, see “Table 2-1 Timeline of Design Process” on page 4.

2.2 Design Principles

Based on the comments provided by the Working Group, the project design team identified the following design principles for operational equipment:

Locate operational equipment in back-of-house spaces or integrate into a metal panel wall system or adjacent vertical surface within station public areas

- Flush panels will conceal and protect equipment while providing a clean, de-cluttered appearance within stations and eliminate ledges where dirt, dust and trash can build-up.

Install berthing markers in a clearly visible, consistent location

- Berthing marker sign colors, materials, fonts and sizes are documented in the Metro Standard Wayside Rail Operating Sign Catalog.
- Standardizing the locations of berthing markers for all station types allows for: (1) minimizing types of attachment methods, (2) creating a reliably consistent location for the signage, and (3) providing clear visibility for operators approaching a station.

Use materials for elevator interiors that are durable, moisture and corrosion resistant, easily maintainable, and aesthetically pleasing.

- Materials need to be graffiti and vandal resistant and withstand exposure to liquids, particularly urine.



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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, Asset Management, Environmental Compliance and Sustainability, Facilities Maintenance (including separate interviews with FM field staff and management), Fire and Life Safety, Office of Civil Rights, Operations Liaison and Planning, Project Engineering, and System Security & Law Enforcement.
Spring 2019	Project Design Team developed initial design concepts.
Spring 2019	Project Design Team presented initial design concepts to Metro.
May 2019	Draft Concept Design Package submitted.
June 2019	Revised Concept Design Package submitted.
December 2019	Draft Design Documentation Package submitted.
February 2020	Revised Design Documentation Package submitted.
March 2020	Final Design Documentation Package submitted.



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3.0 Design Solution

In response to the need for a more standardized and cohesive station environment, the Project Design Team developed design solutions that address three sub-elements of operational equipment: equipment integration, berthing markers and elevator finishes.

3.1 Equipment Integration

There are many types and sizes of equipment cabinets installed throughout Metro stations that are used to house operational equipment, including but not limited to fire hose, hose bibs, and escalator controllers. The key design solution principle for equipment integration (with the exception of escalator controllers) is that they should be installed flush and fully integrated into the adjacent wall surface, typically an architecturally finished wall panel system. Equipment cabinets mounted flush to architectural wall finish should match material, finish and color of the adjacent modular wall panel, and blend in with surrounding materials. All equipment cabinet and wall panel doors are required to swing 180 degrees and have a tamper-proof lock.

Different equipment requires different depths of interstitial wall space to achieve a flush condition, and thus the size of cabinets will vary. For instance, hose bibs require a deeper box than fire hose cabinets to ensure the on/off handle can be accessed. Coordination early in the design process is necessary to ensure sufficient interstitial space to accommodate different equipment types and sizes.

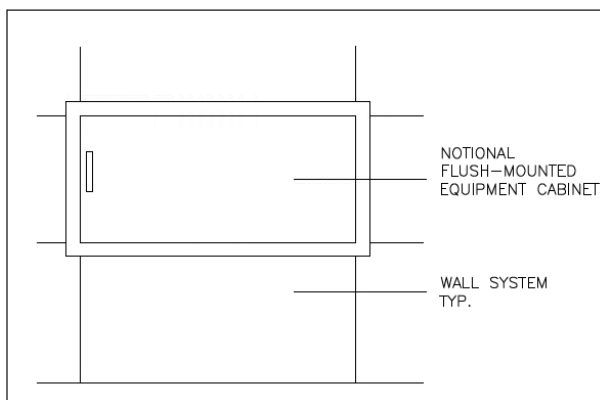


Figure 3-1 Operational equipment cabinet concept that is flush with wall system (does not apply as escalator controller housing).

Escalator Controllers

Historically, Metro escalator controllers are placed in escalator machine pits, see Figure 3-2. Escalator pits were large enough to house the escalator controllers because escalators were being operated with 2 flat treads on each end of the escalator. However, Metro has since updated their ADA standard to provide 3 flat treads on both ends of escalators, reducing the size of the pits to where escalator controllers no longer fit in the space. Thus, the design solution is to dedicate a room near the escalator to house the escalator controller. For example, as shown in Figures 3-3 and 3-4, a room dedicated to house the escalator controller can be constructed behind and under the escalator and stairs (note that a separate facilities maintenance closet should also be accommodated in this same areas). Another solution would be to house the escalator controller in a cabinet that is integrated within a modular metal panel wall system, see Figure 3-5. Early coordination must take place to ensure the proper depth of the wall panel system to accommodate the required space needed for escalator controller equipment. To provide remote activation at either locations, an escalator controller panel can be mounted on the front face of the escalator.



Figure 3-2 Escalator controller located in the escalator machine pit.



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Figure 3-3 Escalator controller located in a nearby room, behind and under the escalator at Universal/Studio City Station, B (Red) Line.



Figure 3-4 Equipment room located in a nearby room, behind and under escalator and stairs. Metro Line M4 station, Budapest Metro.

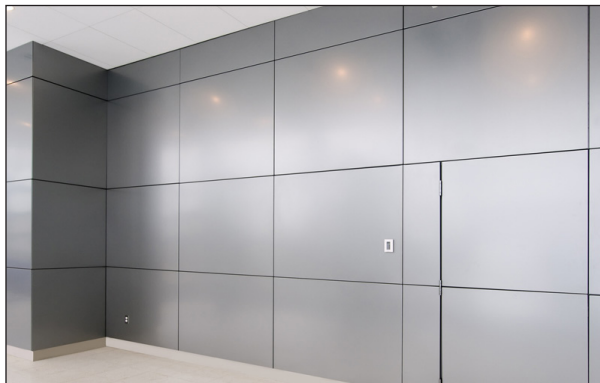


Figure 3-5 Equipment cabinet integrated within metal panel wall system.

3.2 Berthing Markers

Standardizing the location of berthing markers provides a consistent location for the signage and ensures they are consistently visible for operators.

For at-grade and aerial stations, it is not recommended to locate berthing markers on the trackside, opposite of the platforms. Instead, berthing markers shall be mounted on the platform side of the train so operators do not need to avert their eyes to the opposite side of the platform and away from waiting passengers, creating a potentially dangerous situation.

In order to provide clear visibility and to reduce additional clutter on the station platform, it is recommended the berthing marker be installed on a stainless steel pipe that is integrated onto the guardrail located at the end of the platform. Berthing marker material, color, font and size requirements shall follow the Metro Standard Wayside Rail Operating Sign Catalog.

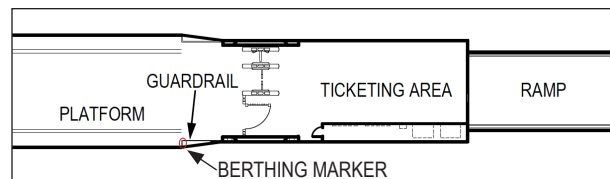


Figure 3-6 Plan view of Metro at-grade center platform showing guardrail where berthing marker shall be integrated.



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3.3 Elevator Finishes

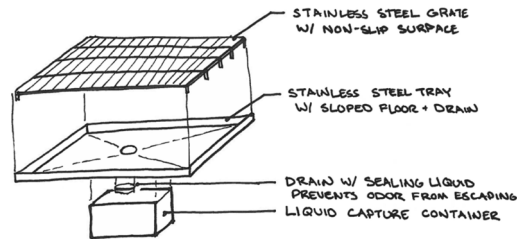
Vandalism, graffiti, homelessness and urination are some of the issues Metro is facing in its elevators. Many of the current elevators have glass cab walls and doors, which provide visibility into the cab from the platform; however, many older elevators installed throughout the system have opaque cab walls and doors. Following Metro's current standards, new elevators should be located in highly visible locations such as center of train platforms and utilize 360 degrees see-through glass cab walls and doors. This improves line-of-sight visibility and reduces the likelihood of incidents in elevators.

Studies were initiated to determine if new design solutions could be developed to cope with issues of urination in elevator cabs. Liquid capture and liquid absorption options were studied and they were determined to be impractical because of the regular maintenance and cost that would be required to maintain such systems. Additionally, it was determined that these systems would not address the issue of solid human waste, which is also a concern. See Figure 3-5 for initial design study conducted that was eventually decided to be impractical for Metro use.

Upon completion of research and design studies, the Project Design Team concluded that the existing MRDC requirements for elevator materials and finishes are the most satisfactory selections as they balance the required level of abuse resistance with aesthetic criteria, shown in Figure 3-6.

Other transportation agencies were studied to determine if similar circumstances existed and how they handled such issues. Some agencies, such as Bay Area Rapid Transit (BART) in San Francisco, contracts for elevator attendant service with the nonprofit Urban Alchemy (Figure 3-7). Elevator attendants are located in the street and platform elevators at 4 different stations during BART operating hours. The physical presence of staff acts as deterrents to anti-social behavior. Elevator staff also act as ambassadors of the rail system, providing assistance to patrons with limited mobility. BART's 2018-2019 budget estimated that posting attendants at two stations cost the agency \$1.6 million annually. This is a recommended solution for Metro, particularly at stations where elevator abuse is a frequent issue.

LIQUID CAPTURE SYSTEM



LIQUID ABSORPTION SYSTEM

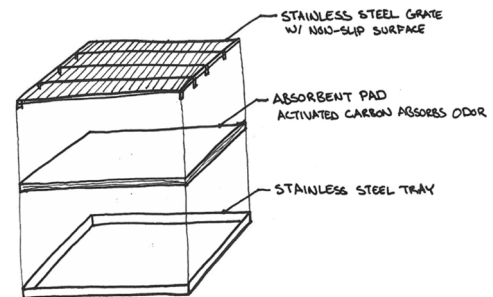


Figure 3-7 Elevator cab design studies eventually proved impractical.

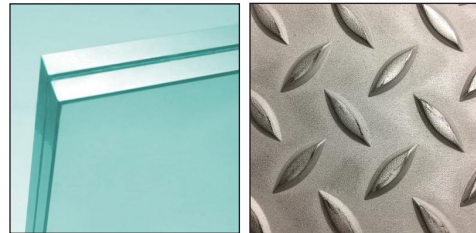


Figure 3-8 Laminated glass, 316 grade stainless steel with brushed #4 wall finish and welded seam pan 316 grade stainless steel diamond plate flooring as standard elevator materials (finishes per the existing MRDC requirements).



Figure 3-9 BART elevator ambassador.



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Table 3-1 Key Design Features

Design Feature	Rationale
1. Operational equipment, with the exception of escalator controllers, shall be housed in equipment cabinets that are installed flush with the adjacent wall surface. Equipment cabinets shall match the adjacent wall system material, color, and finish. Cabinet locations are to be installed to coordinate with the wall panel system joints.	Operational equipment cabinets installed flush with the adjacent wall surface eliminates obstructive equipment in the station public area, improving the customer flow and experience. This also eliminates ledges where dirt, dust, and trash can build-up.
2. A dedicated equipment room shall be designed to house the escalator controller. The room should be located to minimize the impact to visibility and circulation within the station, ideally behind and under the escalator and stairs.	Equipment rooms provide a secure location for escalator controllers with minimal impact to the station public area. To provide remote activation at these locations, an escalator controller panel can be mounted on the front face of the escalator.
3. Escalator controllers can also be located in a cabinet that is integrated within a modular metal panel wall system.	Equipment cabinets that are flush and integrated within the wall system present a cleaner, de-cluttered appearance and are easier to clean and maintain, and eliminates potentially dangerous obstacles to patrons with disabilities. To provide remote activation at these locations, an escalator controller panel can be mounted on the front face of the escalator.
4. Per Design Feature 1, all equipment cabinets shall be flush with the adjacent wall surface and have matching door handle style and finish. Door handles to be flush lever style and approved for ease of use, have a tamperproof lock, and be brushed stainless steel. Hinges to be flush/continuous and doors to open a full 180 degrees.	Flush lever pulls are easier to operate than other types of pulls. Ensuring all cabinet hardware are the same reduces procurement issues.



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Design Feature	Rationale
5. Berthing markers shall be installed in a systematic manner and not on platforms.	It is not recommended to locate berthing markers on the trackside, opposite of platforms, as it creates barriers to visibility for operators. For at-grade and aerial stations, berthing markers shall be mounted on a stainless steel pipe and integrated onto the guardrail that is located at the end of the platform. Berthing marker material, color, font and size requirements shall follow the Metro Standard Wayside Rail Operating Sign Catalog.
6. On-site elevator attendants.	Elevator attendants help improve the customer experience. They provide a sense of safety and security for customers and reduce unwanted behavior.
7. Elevator finishes should follow Metro's current standards: use of laminated glass, 316 grade stainless steel with brushed #4 wall finish, and welded seam pan 316 grade stainless steel diamond plate flooring.	Elevator cab materials are chosen for their durability and aesthetic qualities: • Glass provides visibility into the elevator cab from the surrounding station area, enhancing security and deterring behaviors that violate Metro's passenger code of conduct. • Stainless steel resists corrosion caused by urine, and welded seams prevent liquid from penetrating behind interior finishes. These durable materials ease maintenance and reduce life cycle costs.

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.

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