

Smooth OPERATOR

L.A. Metro's innovative new operations and maintenance facility is the latest addition to the area's growing transit network.

BY SEAN FEENEY

Photos: RNL and Chang Kim Photography

LOS ANGELES COUNTY Metropolitan Transportation Authority (Metro) keeps a lot of people moving.

The entity serves as the transportation planner, coordinator, designer, builder and operator for one of the country's largest, most populous counties. More than 10 million people live, work and play within its 1,433-sq.-mile service area.

Metro's Expo Light Rail Line is the first passenger rail line to connect downtown Los Angeles and Santa Monica in over 60 years. Designed by architect RNL, industrial design manager MDG and structural engineer Nabih Youssef Associates Structural Engineers (NYASE), the Expo Division 14 Operations and Maintenance Facility is a critical component of the Expo Line. Metro wanted Division 14 to represent innovation, sustainability, functionality and wellness, as well as fit in with a neighboring recording studio and nearby residences. Completed this past May, the facility maximizes the use of natural light and is on track to attain LEED Gold certification.



Sean Feeney

(sean.feeney@rnlidesign.com)

is a senior associate at RNL and was the lead architect and construction administrator on the Expo Division 14 project.

Five in One

The project encompasses over 70,000 sq. ft of building area on a narrow 9.7-acre site. Five major building components make up the facility: main building, secondary building, wash building, cleaning platform and guardhouse. The main building contains the primary train maintenance bays and shops, an operator breakroom, amenities and the yard control and administration offices. The secondary building contains the blowdown bay and wheel-truing bay, and the wash building is a drive-through train wash. The cleaning platform is a double-track platform for daily interior cleaning, and the guardhouse is a 24/7 security hub at the main entrance to the site.

Early design concepts expressed the facility's industrial nature and provided a sculptural aesthetic to the public. On the interior, the structural steel system was exposed and expressed with dark gray paint, and the metal deck ceiling, walls and floors were painted white. Structural steel travels from the maintenance areas to the finished operations areas and is meant to visually bring together the two different personalities of the facility: maintenance and operations.

The typology of a rail maintenance facility requires tall unimpeded bays in the direction of train travel to accommodate the overhead contact system (OCS)—the electric lines that power the trains—and pantograph while still meeting seismic requirements; LA Metro Expo Division 14 resides in a Seismic Design Category D.

NYASE analyzed the site and facility needs and concluded that a structural system with multiple framing schemes proved to be the most economical and functionally viable solution. Open-span moment frames allowing train travel were used in the north-south direction in combination with braced frames in the east-west direction. The braced frames pass through the

second-floor soft areas, including offices and hallways, and the steel framing allowed maximum visibility of the yard from the control suite, second-floor offices and operator amenity rooms. The narrowness of the site required a unique solution of overlapping some of the building spaces over the train yard and the maintenance area. The moment frames span 34 ft over two train tracks, and the main hallway cantilevers over a part of the maintenance area.

Maximizing Visibility

The control suite is the heart and brain of the facility and was designed to cantilever out from the north elevation to provide views to both sides of the yard. All train operations in the yard are controlled from within this room, so exceptional visibility of the two lead tracks to the main line and the other remote buildings—and really the site as a whole—is mandatory. A centrally located two-story mega-V brace—each brace spanning 70 ft—allowed two columns to be removed that would otherwise partially block the view out the side windows of the suite, and is visible to commuters riding by the facility on the Expo Line.

- ◀ The narrow site created an overlapping program: two rail tracks pass underneath the “north bar.”
- ▶ The steel lobby stairs hang from the roof structure.



In some locations, the structural steel had to be limited in depth and width in order to fit within the very thin profiles of the building. Subtle tweaks to the structure, including the corner offset transfer columns, allow the glazed curtain wall to wrap around the corners uninterrupted so that the fine detailing of the window mullions and metal panel reveals match up with the underlying 5-ft building grid.

While steel is plentiful throughout the facility, the lobby stairs and associated supporting steel are the only exposed steel members that were required to meet architecturally exposed structural steel (AESS) quality standards. The lobby stair is composed of ½-in. bent steel plate and has multiple landings to ascend to the second floor height of 22 ft. The stair was designed to look monolithic; it literally hangs from the roof structure above via 1½-in.-diameter rods. Glass railings with illuminated handrails were added to further express the steel plate stairs.

In other parts of the facility, the steel takes on a more industrial aesthetic. An insulated precast concrete panel system was used in these spaces, and NYASE coordinated closely with a precast contractor to make sure the structural steel system was robust enough to accept the additional burden of the concrete



- ▶ Long spans are hidden within the metal panel profiles.
- ▶ The project encompasses over 70,000 sq. ft of building area on a 9.7-acre site.





▲ The control suite has a view of the full length of the yard.



▲ An early rendering of the site.

walls. Precast panels were also used as shear walls for some of the buildings to seismically brace the structural framing.

Healthy Maintenance

The main purpose of the facility is for the maintenance and storage of 45 light rail cars. There are three run-through train bays (no dead ends) that are used for quick service and inspection as well as more time-dependent tasks such as component change-out and truck repair.

The steel-framed bays have a clear height of over 30 ft to accommodate the continuous OCS wire that passes through and the two large bridge cranes that dominate the bay. Train roofs are accessed by an elevated composite deck platform, safety platforms made of metal grating allow the passage of light and

serve as fall protection and a recessed pit area provides access to the undercarriage of the trains. The structural steel in this space is painted a dark gray to differentiate from the background of the white ceiling, walls and floors. To enhance safety, much of the miscellaneous steel, such as guardrails, lift cages and platform edges, are painted an obvious yellow.

The north bar of the main building, which contains the operations administrative offices, the control suite and the operators room and amenities, provides ample views towards the north through a floor-to-ceiling glazed curtain wall. In order to take advantage of borrowed light, many of the interior partitions are glazed, which gave the design team an additional opportunity to express the industrial nature of the project by ghosting the brace frames behind translucent walls.

▼ The large V brace is visible from passing Expo Line light rail trains.



▲ Structural steel expresses itself in the office areas as well as the maintenance areas.



▲ Large skylights fill the maintenance area with diffused natural daylight.

The design of Expo Division 14 is industrial and efficient as well as attractive and mindful of its place in the surrounding community. The open, steel-framed facility provides a healthy, naturally lit environment for its employees—as opposed to the dark, grungy spaces typically associated with such facilities—and offers Metro passengers a glimpse, and perhaps better appreciation, into the inner workings of the train system and the structural systems that make it possible. ■

Owner

Los Angeles County Metropolitan Transportation Authority

Design Manager/Industrial Facility Design

MDG

General Contractor

Kiewit Building Group

Architect

RNL

Structural Engineer

Nabih Youssef Associates

Steel Team

Fabricator

Beck Steel, Lubbock, Texas



Detailer

Dowco Consultants, Ltd.,



Surrey, B.C., Canada

▼ Structural braced frames are expressed sculpturally.



▼ The maintenance area of the main building.

