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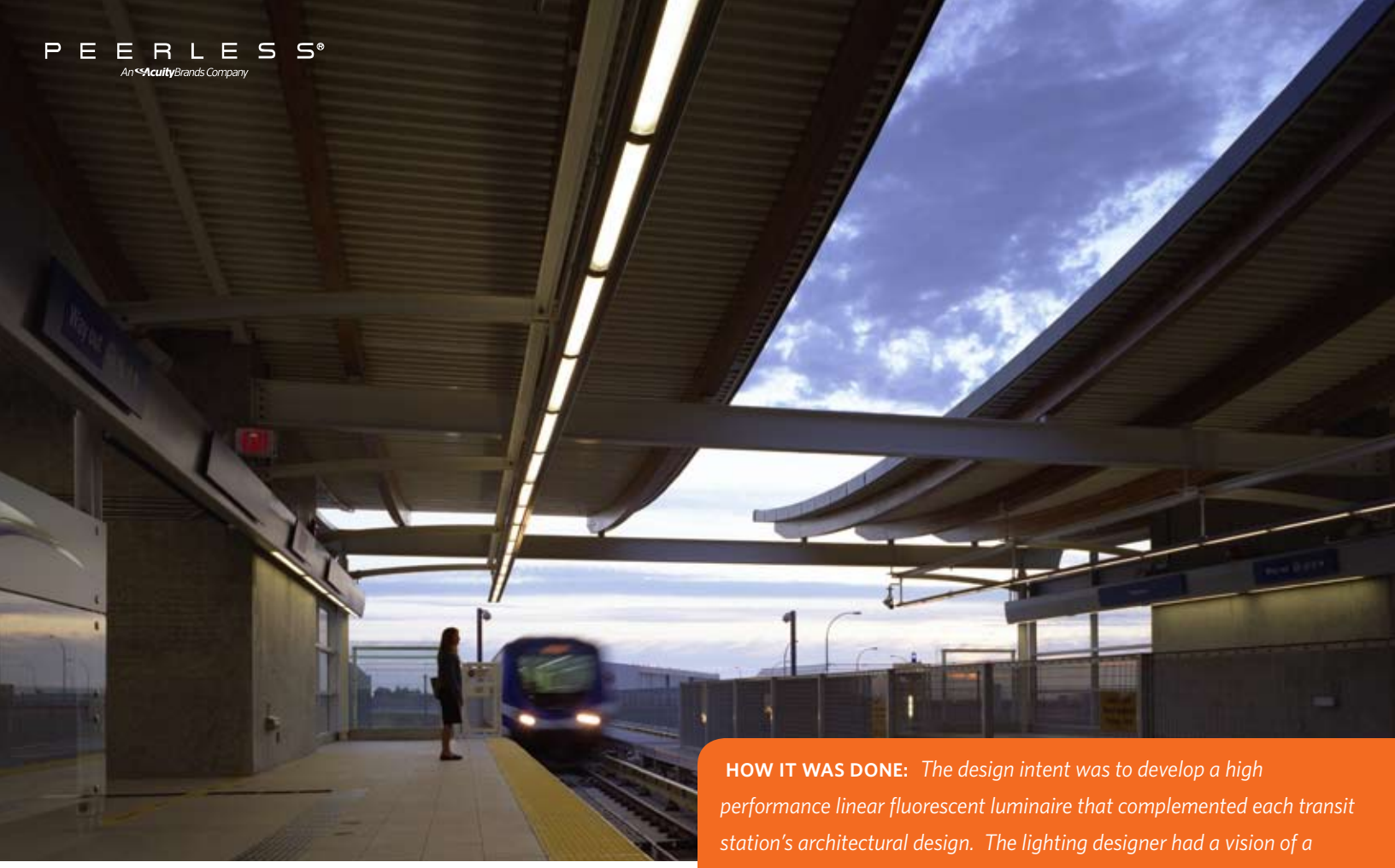

HOW IT WAS DONE: *The design intent was to develop a high performance linear fluorescent luminaire that complemented each transit station's architectural design. The lighting designer had a vision of a sleek, curved contemporary form that Peerless custom designed with an IP65 rating. The precision optics created maximize the output of a single T8 lamp with an asymmetric distribution designed to eliminate any light spill onto the track.*

Canada Line

PROJECT:
Canada Line Rapid Transit Inc. (CLCO)/SNC-Lavalin
Canada Line Transit BC
Vancouver, British Columbia

PEERLESS PRODUCTS:
Station

ARCHITECTS:
Busby Perkins + Will, Walter Francl Architect Inc.
Hotson Bakker Boniface Haden Architects + Urbanistes
Hywel Jones Architect Limited
Kasian Architectural Interior Design and Planning Ltd.
Stantec Architectural Ltd.
Via Architecture

ELECTRICAL ENGINEERS:
Genivar, Stantec, MCW Consultants Ltd.

LIGHTING DESIGNER
Total Lighting Solutions

LIGHTING REPRESENTATIVE:
Interlite Sales

PHOTOGRAPHY:
Rob Hansen, Charlie McLarty

Vancouver's new Canada Line rapid transit system consists of 16 stations servicing the region's growing residential, business, healthcare and educational centers as well as the city's port, convention center and airport. Completed August 2009 on budget and ahead of schedule—well in time for the Winter Olympics that will be held in Vancouver, Richmond and Whistler in 2010—it adds about 10 road lanes of transit capacity in this dense urban corridor. Funded by the Governments of Canada, British Columbia and Vancouver and Vancouver Airport and the Greater Vancouver Transportation Authorities, and built to last 100 years, Canada Line ranks as one of the top 10 infrastructure projects in Canada.

SNC-Lavalin won the bid to design, build, operate, maintain and partially finance the transit system that would meet or exceed safety, speed, reliability, customer satisfaction and other specifications set by the agencies within a fixed-price contract. During the design phase in 2005, it became clear that the project required systemwide thematic architectural and lighting elements for use in all Canada Line stations.

Recognizing the importance of lighting's impact on perception, the design of which would benefit from dedicated expertise, SNC-Lavalin's internal design team engaged local lighting design firm Total Lighting Solutions

with the objective of rendering Canada Line entrances to be unique and highly visible in a busy urban visual environment. This task, focused on branding, progressed into development of the systemwide lighting standards and lighting concepts, and ultimately into a detailed lighting plan for individual stations.

"The old lighting standards were isolated from architectural design and finishes selection and contained outdated light levels," says Galina Zbrizher, IALD, LC, principal. "We developed new lighting standards that are tied with the section on architecture and finishes, and specified reflectance values that addressed lighting quality as well as quantity—factors such as visibility, uniformity, glare control and visual comfort."

Canada Line includes stations both above ground and below, designed with different platform configurations where passenger arrival and departure are compressed into short periods of extreme activity in a confined space. Most of the remaining stations' area is dedicated to circulation, including concourses and vertical circulation—stairs, escalators and elevators—varying 20–50 ft. in height. As such, public safety was the primary consideration.

"Our design focused on maximizing good visibility and visual comfort, while providing very uniform illumination on all surfaces by reducing shadows and glare and by clearly demarcating the physical boundaries of spaces," says Zbrizher.

The design intent was to integrate lighting with architecture in a manner that enhanced branding and recognition in complex urban environments, promoting the use of public transportation. This proved particularly challenging as the 16 stations were given distinctive designs by seven different teams of architects.

"As we were dealing with a public transit, we had to solve the challenge of meeting strict budgets while designing a lighting system that transforms spaces that are in effect light industrial environments into dignified public space," Zbrizher points out.

Finally, the lighting was designed in an environmentally responsible manner, utilizing basic principles of avoidance of overlighting, integration of daylight, and use of energy-efficient components and automatic shutoff and daylighting controls in an effort to maximize energy savings. All lighting is automatically turned off on a schedule during times that the stations are closed to the public,

while lighting in daylighted spaces is shut off via photosensor when sufficient daylight is present, further reducing energy costs.

"We used continuous lines of linear fluorescent and minimalist layouts to create strong graphic language integrated with the architecture and finishes and express the dynamic character of mass transit."

The majority of luminaires are linear high-performance T8, T5 or T5HO fluorescent luminaires with a narrow lensed aperture, organized in disciplined patterns repeated across the system and oriented in the direction of travel as a means of improving wayfinding.

"We used continuous lines of linear fluorescent and minimalist layouts to create strong graphic language integrated with the architecture and finishes and to express the dynamic character of mass transit," Zbrizher says. "Each pattern of light is associated with a particular location within the stations and provides a familiar feature that helps make orientation intuitive."

The predominant lighting patterns consist of a line of light in the concourse and connectors that lead to and from the train platform to entrances and exits; a double row of downlights were the fare paid zone begins; a series of downlights over vertical circulation spaces; and indirectly illuminated ceilings on the platform plus a line of light at the platform edge and wall opposite the platform. The downlights, provided by Gotham Lighting and designed specially for this project to be of the same physical size for compact fluorescent amalgam lamps and ceramic metal halide lamps, are efficient and easy to maintain.

The wall opposite the platform edge is similarly lighted by linear fluorescent luminaires integrated into the cable tray. In stations where cable trays are not located at the platform, recessed and surface-mounted wallwashers are used to improve volumetric brightness and make the confined platforms appear visually more spacious. On the concourses, mezzanines and connectors, all finishes are primarily matte with high reflectance values to improve lighting uniformity and reflectivity.

"We built a fairly limited vocabulary of luminaires, which allowed us to reduce capital costs by standardizing lighting equipment," says Zbrizher. "We required luminaires that are robust and can withstand

vandalism, dust and the elements while supporting our branding and wayfinding goals."

The project's most common and distinctive lighting element, for example, is a custom platform-edge luminaire by manufacturer Peerless Lighting based on a concept developed by Zbrizher, which provides indirect illumination for the platform and directly lights the platform edge at 20 fc (with sharp cutoff on the track side to avoid waste).

The Peerless luminaire provides high efficiency and easier maintenance because it was designed to utilize a single electronic-ballasted high-performance T8 lamp in its cross section. To accomplish this goal—as typical platform-edge luminaires contain 2–3 lamps—the optics were designed to maximize luminaire efficiency at 79 percent, producing 23 percent direct and 77 percent indirect distribution from a continuous lensed 3.25-in.-wide bottom aperture and 2-in.-wide top aperture.

"Frankly, I was a little skeptical about the manufacturer being able to achieve all of our requirements for this luminaire and I admired their composure that they did not laugh at our request!" Zbrizher recalls. "We are very happy with the results. Peerless met all design challenges and built a remarkable transit luminaire that withstands harsh environments, has an incredible efficiency, has very specific optics suitable to platform application, and has a streamlined appearance. During the construction, Peerless provided us and our client with continual support including on-site visits and assistance."

Canada Line opened on August 17, 2009 and was enthusiastically received by Vancouverites, Zbrizher says.

"We informally surveyed about 20 laypeople on what they thought of the lighting in the new stations," she adds. "Every single person said the stations 'feel safe.' Most said the stations are brighter than stations on the existing light rail transit line—which of course is due to higher luminance and uniformity combined with the absence of glare."

She adds: "Canada Line is a complex project built on a tight schedule. It's very satisfying for us to know we accomplished our client's goal of building a transit system that the public sees as bright, where people feel safe, and that is dignified and promotes the use of public transportation."

CANADA LINE—CONTINUED

ABOUT THE DESIGNER

Galina Zbrizher is the founder of Total Lighting Solutions Inc., a Vancouver-based lighting design firm. Over the past 25 years, Zbrizher has designed interior and exterior lighting for a wide variety of public and private projects. She holds a degree of Master of Science from Kharkov (Ukraine) Institute of Municipal Construction. She is a professional member of the International Association of Lighting Designers (IALD) and currently serves on the IALD Board of Directors. Since 1983, she has also been a member of Illuminating Engineering Society of North America (IESNA) and served in 1993-1994 as President of the Toronto Section.