HAMILTON TRANSIT CENTRE

BUILDINGS

2017 CCE AWARD SUBMISSION – PROJECT REPORT

WSP

PROJECT OUTLINE

The Hamilton Transit Centre (HTC) is the newest facility in the South Coast British Columbia Transportation Authority / TransLink network and provides the infrastructure necessary to service, maintain and dispatch a fleet of 300 buses. This project is important to maintaining the availability and reliability of public transportation in the Vancouver Lower Mainland and is also TransLink's most energy efficient facility, incorporating Compressed Natural Gas fueling and designed to LEED Silver equivalency. WSP provided an integrated, in-house, multi-disciplinary project team including design/project management, architecture, structural, mechanical, electrical, civil, communications, security, and sustainable design on this project.

INNOVATION

The Hamilton Transit Centre (HTC) is the newest facility in the South Coast British Columbia Transportation Authority / TransLink network and provides the infrastructure necessary to service, maintain and dispatch a fleet of 300 buses, community shuttles and non-revenue vehicles. The project incorporates eight main structures located on a 7.3 ha / 18 acre site, including the Operations & Administration Building, Maintenance Building, Fuel Building, Fuel Island, Bus Wash Facility, Wastewater Treatment Plant, Vault Pull and Tire Storage Building.

The ultimate purpose of the facility is the timely dispatch of the bus fleet. This is driven by many factors, including the efficiency and safety of the facility design and the productivity of staff. For staff efficiency and comfort, the buildings incorporate natural light, bright colours, beetle-kill structural wood panels, energy efficient lighting and radiant heating in an open-concept design. These were integrated with other facility systems, including new, automated approaches to tracking bus movements and providing maintenance records using Radio Frequency Identification (RFID) tags and improved access to bus roof-mounted equipment through unique, lightweight platform designs. At the same time, conflicting requirements, such as the mandated increased ventilation rates necessary when maintaining CNG-fueled equipment, had to be incorporated.

By its nature, a transit centre requires large areas for parking the fleet, but that fleet also needs to be located close to the population it serves. Building a transit centre in an area with very high land costs means the site design must be as efficient as possible. Additionally, portions of the site area were dedicated to public parkland and landscaping to meet City rezoning and development guidelines so useable site area became extremely tight. In order to meet these site constraints, the design team minimized site circulation distances. With a 300-vehicle fleet, reducing circulation distance by 100 m per vehicle per day represents an annual savings of nearly 11,000 km travelled, which improves schedules, lowers costs and lessens wear on the fleet and site infrastructure. The efficiency of the site layout was maximized, particularly in the fuel-wash cycle, to reduce the time, effort and environmental impact of the site operations, while maintaining safety. This was achieved by evaluating various vehicle and employee circulation patterns and the impact that changes to one would have on the others.

As the design of transit vehicles has evolved – the floors of buses have become lower, making them more accessible, but this has displaced much equipment to the roof of the vehicles. Batteries, radiators, fans, heaters, electronics and fuel tanks now require roof access for maintenance. By working closely with the TransLink project team, WSP devised a new design for rooftop access platforms. Replacing the traditional hydraulic 'drawbridge' style of platform with an electrically-actuated 'drawer' style platform has several benefits, including increased flexibility in bus positioning with reduced risk of vehicle damage, improved worker safety with reduced edge gaps and lighter weight structures, allowing a roof-supported design and mainly column-free space for much of the maintenance shop.

Watch a short video on the Hamilton Transit Centre project at canada.wsp-pb.com/worldofpossibilities

COMPLEXITY

The facility is located on a brownfield industrial site which required significant environmental remediation and an extensive preloading operation. Parts of the preload continued to settle well after others stopped, threatening to extend the project schedule. As well, significant off-site work involved two municipalities, numerous private utility providers as well as Provincial and Federal ministries for the dyke work along the Fraser River. Due to the extent of the site works, this was all addressed through multiple, overlapping construction contracts to maintain the project schedule. Efficient management of numerous design and construction packages, permitting processes and Authorities Having Jurisdiction was a key factor in the success of the project. Coordinating these activities required a high level of project management and constant communication within the design team, with TransLink and other stakeholders to keep the process moving forward in a timely manner.

The design was nearly completed as a diesel-only facility when TransLink elected to incorporate CNG and gasoline powered vehicles and fueling into the facility as a result of changing economics in the natural gas market. This resulted in significant changes to the building ventilation and electrical systems, particularly in the maintenance and fueling buildings, as diesel fuel is typically non-flammable, whereas CNG is a lighter-than-air fuel which can create explosive mixtures. TransLink also wished to retain the interior fueling arrangement originally designed for diesel fueling, so the general building arrangements were left unchanged, while changes were made to the mechanical and electrical systems to accommodate this fuel. Increased ventilation rates work against energy efficiency so a balance was required to permit safe operation while maintaining comfort and efficiency. An early decision to use in-floor radiant heating in the maintenance building was a definite advantage in obtaining this balance.

SOCIAL AND/OR ECONOMIC BENEFITS

This project is important to maintaining the availability and reliability of public transportation in the Vancouver Lower Mainland. Transit centres are the hubs of transit systems – they keep buses on the roads to get passengers where they need to go. HTC allows Translink to grow their bus fleet to approximately 2000 buses, supporting greenhouse gas emission reduction targets, by way of improved public transit. As well, the facility complements the surrounding neighbourhood through its pleasing design, dedicated parkland and new community amenities.

Reliable public transportation is an amenity that is always in demand, but most people do not want it based in their backyard. The HTC site is at the eastern gateway to the City of Richmond and has commercial and residential neighbours, including a neighbourhood daycare, so the project needed to relate well to the existing community. Public meetings were used to gain input from neighbours regarding the proposed design and the issues important to them. Parkland, landscaping with infiltration trenches, bike paths, intersection improvements and public seating areas were all included in the project to benefit the neighbourhood. Funding for a local daycare facility were also provided as part of the rezoning process.

Often projects of this type are built in remote locations with little regard for aesthetics or the surrounding community. This project illustrates how the design team can produce a solution that fits into and provide benefits to the surrounding community and is aesthetically pleasing, while still meeting the project objectives for safety, reliability and efficiency.

ENVIRONMENTAL BENEFITS

The design of new dedicated parkland and community outdoor space surrounding the facility resulted in the remediation and beautification of the existing brownfield industrial site – 2,500m^3 of contaminated soils and over 37,500m^3 of unsuitable fill material were removed and properly disposed of. An application for a Certificate of Compliance to industrial land use standards is currently being processed. As well, the dyke and dyke walls on the property lines were raised, improving flood protection for the City of Richmond.

Use of timeless, long-lasting materials translated into a dramatic visual statement of wood ceilings and roofs. An extensive amount of wood sourced from pine beetle stands was used throughout the facility to meet TransLink's commitment to support the BC timber industry and the province's "Wood First" policy. The maintenance building features cross-laminated timber (CLT) panels, while the operations building features CLT panels and glulam timber structure.

From its inception, the sustainable design objective for the HTC project was to achieve a LEED Silver rating and to incorporate as many sustainable features as practical. This type of project does not fit within the typical uses and building types for which the LEED rating system was developed, but there was enough flexibility in the program and project to make it achievable. TransLink elected not to certify the project with CaGBC, but this project pursued a LEED Silver certification using the LEED-Canada NC 2009 rating system and achieved an adequate number of credits that is equivalent to achieving a LEED Silver rating. HTC is TransLink's most energy efficient facility.

MEETING CLIENT'S NEEDS

TransLink's objectives for the HTC project were:

- To provide an efficient and reliable operations centre for the fleet, with a safe and pleasant working environment for 700 staff, in order to permit the closure of outdated facilities in Vancouver-Oakridge and North Vancouver.
- To have a sustainable and aesthetically pleasing, but robust design, resulting in reduced environmental impact and maintenance requirements, with a goal to achieve LEED Silver equivalency.
- Part-way through the design process, to accommodate an increase in the percentage of the bus fleet using Compressed Natural Gas (CNG) fuel.

WSP was involved through the complete lifecycle of the project from choosing the site in 2009 to opening on Labour Day, 2016. Prior to the acquisition of the site, WSP and TransLink worked together to define the key project requirements of HTC, based on past projects, in order to confirm that the site was suitable for the intended use. This working relationship continued through the rezoning process, as negotiations with the City impacted the size and shape of the site. Detailed interviews were held with key functional groups and project stakeholders at the start of the design phase to clearly define the functional requirements of the facility. Once defined, a week-long design charrette was held with these groups to define the conceptual layout.

WSP's strength lies in the firm's ability to assemble an integrated, well-coordinated, multidisciplinary project team of in-house resources where the combined expertise exceeds the sum of its parts. Over the six year duration of the project, WSP provided project and design management; architecture; structural, mechanical, electrical and civil engineering; communications and security; and sustainable design.

"One distinct advantage of selecting WSP is the fact that WSP is a multidiscipline firm with in-house architectural services as well as all engineering disciplines... This made it easy to meet with all disciplines and groups ... WSP provided considerable expertise to our stakeholders with minimum effort required on our part." - Joe Halhead, A.Sc.T., Senior Project Manager, TransLink, Engineering and Project Services.