MORRISON HERSHFIELD

UNITED BOULEVARD RECYCLING AND WASTE CENTRE COQUITLAM, BC

METRO VANCOUVER

Photo Credit: CMTN & Bruce Denis

2022 CANADIAN CONSULTING ENGINEERING AWARDS
CATEGORY: D. Environmental Remediation

ASSOCIATION OF CONSULTING ENGINEERING COMPANIES | CANADA
ASSOCIATION DES FIRMES DE GÉNIE-CONSEIL | CANADA

CANADIAN CONSULTING engineer

UNITED BOULEVARD RECYCLING AND WASTE CENTRE

Location:	Coquitlam, British Columbia
Completed By:	2021
To Be Entered in Category:	D. Environmental Remediation
Firm Name:	Morrison Hershfield
Role in the Project:	Prime Consultant, Functional Design, Preliminary Design Detailed Design, Environmental sustainability design, Construction Administration, Commissioning.

>> United Boulevard Recycling and Waste Centre

SUMMARY

Metro Vancouver's new United Boulevard Recycling and Waste Centre sits on 6.2-hectares of brownfield on the former Coquitlam Landfill. Morrison Hershfield's project team implemented innovative and sustainable engineering solutions, overcoming unique challenges and allowing for the safe and reliable development of this large centre on a closed landfill site. This facility has a vital role in Metro Vancouver's efforts to reduce waste, meet ambitious regional recycling goals and move to a circular economy.

>> Scalehouses

Q.1
INNOVATION

The new United Boulevard Recycling and Waste Centre sits on a 6.2-hectare brownfield site on the former Coquitlam Landfill at 995 United Boulevard in Coquitlam, BC. This innovative and sustainable facility has an important role in Metro Vancouver's efforts to reach its diversion goals and move to a circular economy.

Morrison Hershfield was Prime Consultant for this project. Unique challenges were overcome in terms of subsidence, landfill gas emissions and leachate management. This project implemented innovative architectural, geotechnical, structural, mechanical, electrical, landfill gas, landfill cover, civil engineering and landscaping methodologies allowing for the safe and reliable development of this large structure on a closed landfill site. Sustainable innovation was a priority, for example using over 40,000 tonnes of incinerator bottom ash as structural fill.

The steel superstructure is the size of nearly four hockey rinks, featuring a remarkable clear span of 71.4 metres X 98.5 metres. The clear span provides for operational flexibility and maneuverability. The transfer building has a 5,800 m2 flat tipping floor with three material chutes, a below grade compactor, and a maintenance garage. The facility features free recycling area access ahead of the scales. The site also includes an administration building, two scale houses, six scales, a recycling attendant booth, and number of green infrastructure elements. There are dedicated traffic lanes for large and small vehicles and a dedicated service vehicle access to maximize user safety. The project also incorporates a landfill closure system, landfill gas collection and local street upgrades.

>>Administration building

Numerous innovative engineering solutions were implemented to achieve sustainable results. They address geotechnical, structural and environmental challenges such as differential settlement, landfill gas hazards, leachate control, and contaminated materials management, and include:

- 40,000 tonnes of incinerator bottom ash used as structural fill to construct the ground features, including the sub-base for the new transfer station. This material would otherwise go to waste.
- Concrete mat foundation supports the massive transfer building to eliminate potential complications related to penetrating the base of the landfill.
- No material excavated on the site left the site – it was all re-used.
- Concrete mat foundation supports the massive transfer building to eliminate potential complications related to penetrating the base of the landfill.
- Prefabricated metal structure with flexible utility connections rests on the slab-on-grade foundation to resist twisting and cracking.
- Landscaping design includes low maintenance native species planted above a geoembrane liner system. Several invasive species found on site were removed.
- Sustainable, active transportation is encouraged by integrating a mixed-use walking/biking path along the frontage of the site.
- High efficiency and natural lighting is incorporated. Care was taken to minimize the impact of lighting on habitat at the nearby Brunette River.
- Active landfill gas management and monitoring system.
- Sealed site to control leachate.
- Stormwater management.
- Odour & noise management.

>> Installation of Landfill Cover System

Q.2

COMPLEXITY

As buried municipal solid waste (MSW) breaks down, ground settles, the site gives off methane gases and liquid wastes leach out of the ground. Constructing on a former landfill requires engineering solutions to a variety of specific structural and environmental challenges, such as mitigation of landfill gas, total and differential settlement due to municipal waste compression, vector control and cut/fill balance of grading.

Geotechnical Complexity: Municipal waste and compressible soil restricted site layout, grading and structural design. Modeling the geological profile provided parameters for settlement and seismic design. A mat foundation supports the massive transfer building instead of piled foundations, eliminating complications related to penetrating the base of the landfill. Buildings are designed to accommodate differential settlement. The prefabricated metal building has flexible utility connections and rests on the slab-on grade concrete foundation to resist twisting and cracking. Site grades avoid significant excavation depths into the municipal waste and grading fill heights that trigger significant settlement.

Effective Use of Waste: Used over 40,000 tonnes of incinerator bottom ash as structural fill to construct ground features, including additional sub-base for the foundation. Wastewater biosolids are used in the growing medium for vegetated areas.

Landfill Gas: Managed by an active gas management system, a liner system with utility “boots” for slab penetrations and a liquid membrane beneath the building slabs. The raft foundations sit well above the MSW and allows for easier application of membranes to prevent landfill gas from accessing the building. Buildings are safety monitored for gas intrusion.

Leachate: The sealed site prevents water from infiltrating the municipal waste and leaching contaminated water that would need treatment. The site is covered with an impermeable geomembrane barrier, asphalt or concrete and meet the BC Landfill Closure Criteria.

>> Bottom ash was reused as structural fill

Q.3

SOCIAL AND/OR ECONOMIC BENEFITS

The sustainable reuse of the former Coquitlam Landfill transformed a brownfield site into a state-of-the-art waste and recycling facility for the region. Building on an underutilized brownfield site allows undeveloped greenfield sites to remain as such. The site is expandable and the entire community benefits from this important asset.

The full-service United Boulevard Recycling and Waste Centre caters to commercial, municipal, and small vehicle customers. It has a free recycling depot, three times larger than the old depot, with twice as many weigh scales plus recycling options for a wider variety of items.

This one-stop drop-off facility will make recycling and waste management more convenient for the region's residents and for many of the region's waste haulers with operations located nearby.

The centre has a processing capacity of about 600 tonnes per day and will be open 363 days a year, serving about 200,000 customers. More space and improved traffic flows will reduce wait times and improve safety. Changes make recycling more convenient and accessible for the community, which will help Metro Vancouver reach its regional recycling goal of 80%. This will help protect the environment and further reduce Metro Vancouver's carbon footprint.

>> Transfer Station

UNITED BOULEVARD RECYCLING AND WASTE CENTRE | COQUITLAM, BC

Constructing on a former landfill requires engineering solutions to a variety of specific structural and environmental challenges.

>> Inside Transfer Station

Q.4

ENVIRONMENTAL BENEFITS

Metro Vancouver's priority is to reduce and recycle as much of its waste as possible. Generally speaking, recycling saves energy, reduces deforestation and minimizes greenhouse gas emissions from landfills. With United Boulevard's expanded recycling opportunities and processing capacity of about 600 tonnes per day, the new facility serves the evolving needs of a growing community and will help Metro Vancouver reach its regional recycling goals.

The United Boulevard Recycling and Waste Centre transformed underutilized brownfield land into an asset for the community. This full-service facility was designed with reuse and sustainability in mind and has an important role to play in Metro Vancouver's efforts to reduce waste and move to a circular economy.

Innovative and sustainable solutions implemented as part of the project include the reuse of over 40,000 tonnes of incinerator bottom ash as structural fill to construct ground features on the site, including additional sub-base for the foundation of the new transfer station. This material would have otherwise gone to waste. Additionally, all excavated material was reused on the site. Wastewater biosolids are used as a growing medium for vegetated areas.

An impermeable geomembrane barrier plus asphalt or concrete cover the site, meeting the BC Landfill Closure Criteria. This improves environmental elements of the old landfill site by sealing the surface and redirecting surface rainwater to a stormwater collection system. It also caps the surface and directs landfill gas from below to a landfill gas collection system that captures and burns methane and other harmful emissions reducing them by 99%.

Q.5
MEETING CLIENT'S NEEDS

Metro Vancouver is responsible for waste reduction and recycling planning, solid waste regulatory framework, and the operation of solid waste facilities throughout the region. Recycling and waste centres are an integral part of Metro Vancouver's waste management system.

The new United Boulevard Recycling and Waste Centre is three times larger than the old Coquitlam Recycling and Waste Centre. It is one of the most comprehensive solid waste facilities in North America. It offers significantly enhanced recycling opportunities and is anticipated to help Metro Vancouver reach its ambitious regional recycling goals.

"We are already a North American leader in waste reduction and recycling with a 64-per-cent diversion rate. This new facility, serving approximately 200,000 customers per year, will make it easier and more accessible to recycle all kinds of items, and will help us reach our regional goal of an 80-per-cent recycling rate," said Jack Froese, chair of Metro Vancouver's Zero Waste Committee.

Construction began in 2018 on the former Coquitlam landfill, a completely undeveloped brownfield site. The new facility demonstrates that large structures can be successfully developed on challenging closed landfill sites using advanced geotechnical, structural, mechanical, electrical and civil engineering solutions. Underutilized brownfield land was transformed into an asset for the community, with far-reaching environmental benefits.

>> Transfer Station Under Construction

The steel superstructure is the size of nearly four hockey rinks, featuring a remarkable clear span of 71.4 X 98.5 metres.

The United Boulevard Recycling and Waste Centre opened to the public on March 14. 2022.

MORRISON HERSHFIELD