



Canadian Consulting Engineering Awards 2023

Transportation | Spirit Trail Over Lynn Creek

Submission by

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Project Name

Spirit Trail over Lynn Creek

Project Client

District of North
Vancouver (DNV)

Location

North Vancouver,
British Columbia

Services Provided

- Prime consultant
- Preliminary bridge design and optioneering
- Parametric bridge modelling
- Detailed bridge design
- Interdisciplinary design coordination
- Cost estimating
- Contract preparation
- Tender support
- Construction support
- Contract Administration



Opportunity

The new Spirit Trail crossing over Lynn Creek is a multi-use bridge located in North Vancouver, that completes a key active transportation connection along the Spirit Trail. It provides the community with a connection to the city – from the Spirit Trail to Lynn Creek and Park & Tilford Town Centres – to facilitate commuter travel, daily errands/shopping, and recreation/exercise. Active travellers now have a car-free way to travel between North Vancouver and its surrounding municipalities quickly and safely.

The North Shore Spirit Trail is a unique and scenic trail spanning across three municipalities on the North Shore: City of North Vancouver, the District of North Vancouver and the District of West Vancouver. Once fully complete, the Spirit Trail will connect residents from Horseshoe Bay to Deep Cove with a continuous, relatively flat greenway. A paved trail will be orientated for people of all ages and abilities, including pedestrians, cyclists, inline skaters and people with wheeled mobility aids.



Previously, to cross Lynn Creek, trail users needed to detour through heavily congested Main Street or Keith Road. In addition, residents near the intersection of Hunter Street and Mountain Highway were obligated to walk 1.2km (16 minutes by foot, or longer if taking the Main Street route) along Keith Road to reach Park & Tilford – and residents in new areas of development along Mountain Highway did not have any trail access to Park & Tilford, necessitating travel by vehicle. The existing Keith Road Bridge includes staircases and significant elevation changes, limiting the use of this crossing and not supporting active transportation for all ages and abilities.

A direct and car-free pathway across Lynn Creek was identified to be an integral component of the Spirit Trail network to encourage mode shift from motor vehicles to active travel, for residents of North Vancouver.

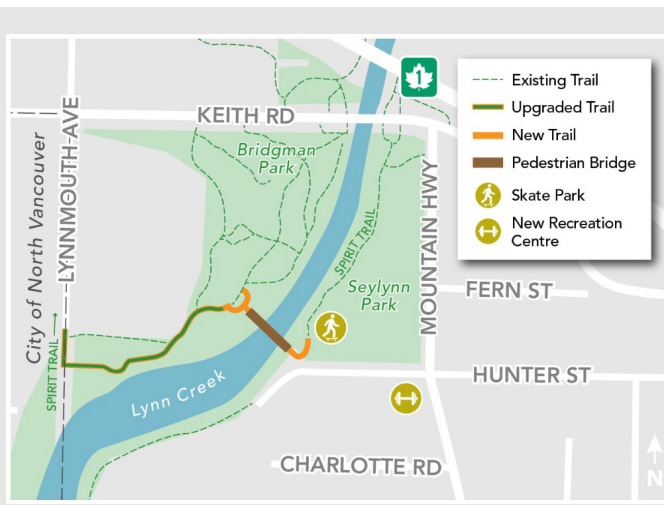


Video series highlights Spirit Trail pedestrian bridge

Solution | The Spirit Trail

Mott MacDonald led a team with Alta Planning + Design, DMD & Associates Electrical Consultants, Thurber Engineering Ltd. (geotechnical), Durante Kreuk Ltd. (landscape architecture) and Diamond Head Consulting Ltd. (environmental) to develop an integrated design solution to connect Bridgman Park and Seyllynn Park across Lynn Creek.

In addition to the bridge crossing, the existing Spirit Trail pathway adjacent to Lynn Creek was upgraded to be an improved active transportation facility by increasing pathway width to 4m, with widening at horizontal curves, and providing asphalt pavement and lighting. Spirit Trail design emphasis was placed on provision of accessible trails for entry-level cyclists, in-line skaters, and people with wheeled mobility aides, including wheelchairs, walkers, and strollers.



Trail Improvements, East Approach (Hunter St Plaza):

- The design of the bridge's east approach descends in an 'S' curve to provide intuitive and comfortable connection between path and bridge. The 'S' curve helps to limit the extent of the approach embankment and preserve existing visibility to the Seyllynn Skate Bowl to the north. The circular alignment combined with a shallow grade (up to 3%) helps to keep the bridge accessible to all ages and abilities, per Spirit Trail guidance and limit the speeds of descending traffic.
- The inside of the 'S' curve has been designed as a plaza space. This plaza is visible and directly accessible from Hunter Street. Benches, waste bins, bicycle parking, a water fountain and repair station, and wayfinding signage are provided in the plaza for trail users to pause and orient themselves. The space also acknowledges the area as a likely meeting point among users. A pedestrian and cycle counter is provided on the pathway entering the bridge with a visual counter, which will be helpful for future planning for plaza development.

Trail Improvements, West Approach (Bridgman Park Trail Connection):

- The bridge's west approach descends and splits into two curves, merging into the Bridgman park mainline trail. The curved approaches are necessary for the provision of accessible grades (4-5%) that are in line with all ages and abilities (AAA) design. The curves also allow for pathways to meet at 60- to 90-degree angles at junctions, improving visibility between users on the mainline trail and those coming onto or off the bridge. Perpendicular connections between pathways contribute to the design of comfortable curve radii that ensure cyclists can enter and exit the bridge in either direction without dismounting.



Solution | The Spirit Trail Bridge

The Spirit Trail bridge required a solution that was durable with cost-effective maintenance, aesthetic, and minimal in impact to Lynn Creek and the surrounding environment. This multi-use bridge, which is 4m-wide and 52m-long, connects the two banks of Lynn Creek, and can be used by all modes of active transportation without requirement for users to dismount from either bicycles or other means of active modes while crossing the bridge. The following summarizes key aspects:

Low maintenance and durability of materials

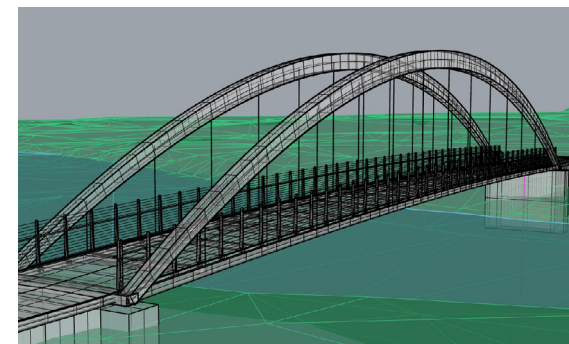
- The selection of weathering steel makes for a more durable bridge with low maintenance as paint coating/ rusting of steel is not a concern. Staining of the concrete deck from rust filled rain droplets from the arches were minimized the appropriate drip detailing to further minimize deck maintenance. This included usage of stainless-steel struts to connect the arches rather than weathering steel. Top flanges of the arches and tie chords were sloped outward to prevent rusty rainwater from dripping onto the concrete deck/curb. Rainwater is also guided off the arch prior to reaching the abutments to minimize staining of the substructure.

Aesthetic design to complement nature

- Tied arches are aesthetically pleasing from a geometric perspective with inclusion of natural curves. Architectural elements were integrated into the design by using non-prismatic arch section that decreased in section moving towards each abutment; this created a tapering effect that is aesthetically unique. Hanger rods utilized thin stainless steel elements, and bridge railings consisted of built up steel sections with cables pulled through posts. From the user perspective, the hangers and cables appear relatively transparent, and transparency reduces the feeling of containment and increases the perceived exposure to the creek below.

Environmentally sensitive area

- Lynn Creek is an ecologically sensitive salmon spawning habitat, and preservation of this water space as well as surrounding forest and foliage were an essential consideration for overall design as well as approach. The connecting pathway was set back from the creek extents for further protection of the riparian zone, with less opportunity for disturbance or contamination. On the bridge, rainwater was contained and directed to abutment soakaways to prevent overflow of contaminated materials into the creek.
- The bridge crosses the environmentally sensitive Lynn Creek as a clear span to eliminate the impact of piers in the creek. Lighting is placed at deck level to reduce light pollution into the salmon spawning grounds below: LED strips hidden underneath the curb lip were used to focus illumination to the bridge deck while eliminating any potential light pollution to the creek below.



Outcome

The new Spirit Trail bridge crossing over Lynn Creek completes a key connection in the Spirit Trail between Lynn Creek Town Centre and Park & Tilford Town Centre.

This connection provides opportunity for expanded active transportation routes in North Vancouver by extending the Spirit Trail and upgrading the existing trail network. The extended trail also provides welcome connectivity between new developments on Mountain Highway (Keith Road to Crown Street) which have created population demand to access commercial areas (Park and Tilford).

The wide, accessible design of the Spirit Trail connections and future plaza offer North Vancouver residents a new community hub to gather and establish an enhanced sense of community. Existing and future facilities are easily accessible and welcoming to all ages and abilities, from the Seylynn Park bowl to the new Bridgman Park playground.

“These connections are really important to allow residents and visitors to move within the community without having to be in their vehicles.”

Erin Moxon

Section Manager for Project Delivery Facilities,
District of North Vancouver



