VEDDER BRIDGE REPLACEMENT – BRIDGE LAUNCH OVERVIEW

Why a Bridge Launch

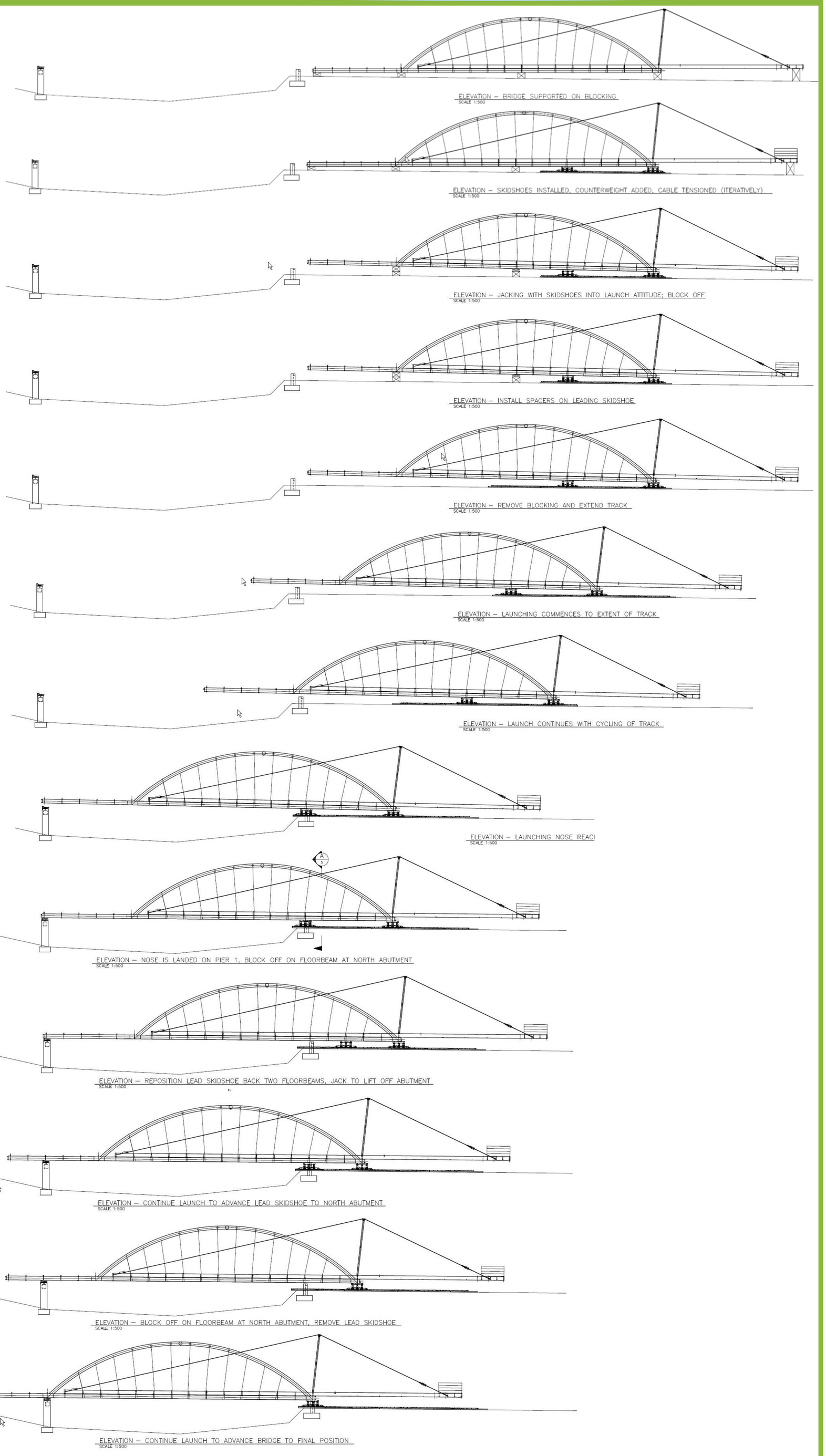
A fundamental component of the Emil Anderson Construction (EAC) design-build team's strategy for replacement of the Vedder Bridge was to construct the new bridge on land and launch the bridge into place over the river. The benefits of launching a bridge into place rather than building the bridge in place include:

- Eliminating the need for instream temporary supports. Building a conventional arch bridge in place would require supporting the middle of the bridge with temporary piles. By launching the bridge, there is no need for temporary piles in the middle of the river, thus reducing environmental impact. Also, instream work in the Vedder River can only be completed during certain times of the year, thus the duration of the project would have been delayed or extended by up to one year.
- Enabling assembly of the bridge over land, versus over water. By assembling the bridge on land and then launching it over the river, the need to work at heights and/or over water is reduced, resulting in a safer work environment for the crews assembling the bridge. Steel components can be fabricated in the plant in large sections, which reduces the amount of work needed to be completed in the field resulting in accelerated work, reduction in cost, and improvement in quality. The assembly of the steel bridge can start at the same time as the bridge substructure concrete work, thus reducing the total construction duration.

What is Unique about this Bridge Launch

Launching of bridges into position is not uncommon. The most common type of bridge launched is a steel girder bridge, which is a bridge with deep steel girders supporting the bridge from the underside. As the steel girders are deep, the bridge structure normally has sufficient strength to be cantilevered without additional support.

What is unique about this particular bridge launch is that the bridge is an arch, and the arch structure does not have the strength on its own to be cantilevered 60 meters without support on one end. To enable launching of the arch bridge, a "king post" support system is being used to provide the arch structure with the additional strength needed to be launched into place.



Who is Involved

- The owner of bridge is the City of Chilliwack.
- The design-build contractor responsible for the overall design and construction of the project is Emil Anderson Construction Inc. (EAC).
- The design team, responsible for the bridge design and the construction engineering of the launch, is Klohn Crippen Berger (KCB).
- The contractor responsible for lifting and moving of the bridge is Supreme Structural Transport. Supreme Transport, based in Maple Ridge, is one of British Columbia's structural moving pioneers. With an extensive variety of equipment and expertise, they can handle all kinds of challenging jobs, including industrial projects, marine projects, transformer transportation, house moving and raising, and bridge launching.
- The contractor responsible for fabrication and assembly of the bridge is Supreme Steel Vancouver (Canron). Interestingly, Supreme Steel, then at the time called Wester Bridge and Steel Fabricators, constructed the current Vedder Bridge structure in 1947.

CITY OF CHILLIWACK · EAC EMIL ANDERSON CONSTRUCTION (EAC) INC. · Klohn Crippen Berger · SUPREME STRUCTURAL TRANSPORT LTD.

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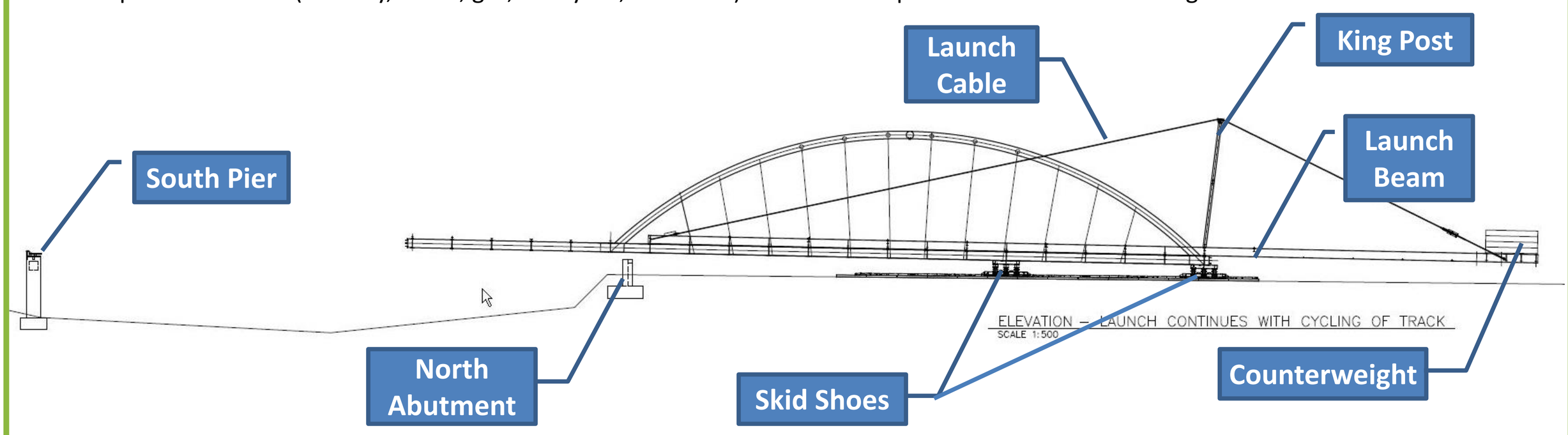
Quick Facts

- This is the first arch bridge in the world (that the Design-Build Team is aware of) that has been launched with a king post support system.
- The total weight of the bridge, suspended pipes, launch girder, and counter weight is approximately 420 tonne (926,000 lbs, 105 medium size Asian elephants, 336 Honda Civics)
- The total weight of the counter weight is approximately 148 tonne (326,300 lbs, 37 medium size Asian Elephants, 118 Honda Civics)
- The bridge was fabricated in Delta, BC, at Supreme Steel's Canron facility.
- The launch cable is a spiral strand cable with a minimum breaking strength of 4,070 kN (415 tonne –force, 915 kip) .
- One launch cable weighs approximately 2,000 kg (4,400 lbs, 0.5 medium size Asian elephant, 1.6 Honda Civics)
- The precast concrete counterweight panels, will form part of the bridge deck after the bridge is in place.
- The bridge system has been designed to minimize the amount of work needed to be completed over water. Completing work over land is far safer, more productive and cost effective.
- The suspended utilities (sanitary, water, gas, BC Hydro, and Telus) have all been preinstalled under the bridge.



King Post Support System

The king post support system consists of the following components:

- Two temporary steel launch beams, each measuring 90 meters in length. The southern 55 meters of the launch beams are connected to the arch bridge floor beams, and the northern 35 meters are cantilevered off the back end of the arch bridge.
- One king post frame, measuring 14 meters in height, connected to the launch beams at the north end of the bridge.
- Two launch cables, one for each launch beam, connected to the southern end of the launch beam, strung up over top of the king post frame, and then connected to the northern end of the launch beam.
- Fifty two precast concrete counterweight panels positioned on the north end of the launch beams.

King post support systems have been used for a number of recent major bridge launches, including the Coast Meridian Bridge in Port Coquitlam, the north approach to the new three tower cable stay bridge across the Firth of Forth in Scotland, and the famous Millau Bridge in France. To the best of the design team's knowledge, a king post support system has not ever been used for the launch of an arch bridge.

The Mechanics of Moving the Bridge

The bridge is being moved into place using four travelling supports, called skid shoes, located at the north end of the bridge. Each skid shoe has a stainless steel sliding surface on the underside of the assembly, and is positioned on a track lined with Teflon pads, enabling the skid shoes to smoothly slide on the support surface. Using a series of hydraulic jacks on each skid shoe, the bridge is picked up off its temporary supports. Once the bridge is picked up and fully supported by the four skid shoes, the bridge is propelled forward by a hydraulic jacking system, in 1 meter increments at a time. The expected rate of advance is 6 to 8 meters per hour.

Although the bridge is 80 meters in length, the critical part of the launch is the first 60 meters when the bridge is cantilevered over the river, until the south end of the bridge touches down on the pier. It is anticipated that the first 60 meters of travel will be completed in one day. The remaining 20 meters of travel requires a series of detailed and coordinated steps and is anticipated to take two to three days to complete.