



■ Bridges



Reference Details:

Owner Translink Corporation, BC, Canada +++ **Contractor** Golden Crossing Constructors JV (Main contractor: Bilfinger+Berger, Vancouver, Canada, and CH2MHill +++ **Engineer** Leonhard Andre and Partner / Buckland & Taylor, Vancouver, BC, Canada

DSI Unit DSI Canada Ltd., Western Division, Surrey, Canada

DSI Scope Development, testing, supply and installation of the hydraulic DYWIDAG Lifting System (6 pumps and 24 jacks incl. hardware); supply of DYWIDAG Threadbars® Ø 47 mm grade 950/1050 and DYWIDAG Threadbars® Ø63 mm grade 517/690 including hardware



Lifting of Pier Templates for Stay Cable Bridge using Hydraulic DYWIDAG Lifting System

Golden Ears Bridge across the Fraser River, Langley, Greater Vancouver Area, BC, Canada

The new stay cable bridge across the Fraser River near Vancouver in western Canada is situated in a beautiful landscape. The bridge is named after the nearby mountain chain »Golden Ears«, a local modification of »Golden Aeries«, meaning the nests of the eagles hunting at that section of the coast.

Construction of the new Golden Ears Bridge started in the summer of 2006. After its scheduled completion in the summer of 2009, the bridge will significantly contribute to improving the traffic situation in the Greater Vancouver Area.

The 968 m continuous hybrid extradosed stay cable bridge with 3 main spans of 242 m each crosses the Fraser River at a structurally critical site. In that area, the Fraser River is considerably influenced by tide changes with currents in changing directions. The development of pier templates that are resistant to the continuous changing of the flow direction on one hand and that can be anchored in the thick alluvial mud layers of the river on the other hand posed a special technical challenge for this project.

It was decided to rest the 4 pylons on massive concrete pile caps that are 3 m thick, 45 m long and 18 m wide and supported by 12 piles of 2.5 m diameter and lengths up to 85 m each. To build one of these pile caps, its outer shape (bottom and surrounding walls) was cast as a concrete template structure. That template was floatable and positioned at the required position of the bridge pier. After 6 piles for temporary support had been driven through the template, it needed to be lifted out of the water to its desired elevation. The 1,300 t concrete template had to be lifted simultaneously on all 24 points from its floating position on the water to a level up to 3 m higher to prevent damage to and overloading of the individual load-carrying elements. Therefore, the owner looked for a hydraulic lifting system.

At the proposal of DSI Canada, a lifting system using 24 manually controlled hydraulic hollow jacks was used. A full size test of one lifting unit (pump with control unit and 4 jacks à 110 t) in the DSI plant in Surrey, BC, demonstrated the suitability of that system. Together with the contractor, DSI engineers established detailed procedures for the lifting.

For each of the 6 temporary piles, 4 hydraulic jacks were connected to one pump. An assembling of flow control valves and load lowering valves enabled the pump operator to permanently control and adjust the force and lifting speed for each jack. A technician from DSI Canada supervised the lifting of the first pier template, explaining the exact handling of each section. The manually controlled system was found to be more effective for this project than a computer controlled lifting system.

DSI Canada provided the complete DYWIDAG Lifting System including hardware for this challenging project. In addition, DSI Canada supplied 47 Ø mm DYWIDAG Threadbars with an ultimate load capacity of 1,820 kN that were anchored in the concrete bottom plate to connect it to the 24 lifting points by using

the lifting equipment.

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