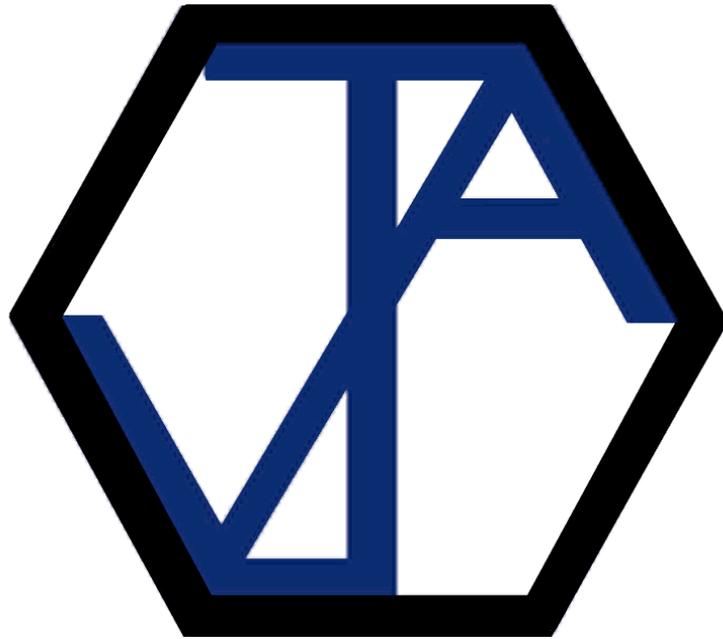


# **Brandywine Hydro Project**

**Rockford Energy Corporation**

**Designed & Developed By:**



**Villholth Jensen & Associates Ltd.**  
**Consulting Engineers**

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**Prime Consultant:** Villholth Jensen & Associates Ltd  
**Project:** Brandywine Hydro Project  
**Client:** Rockford Energy Corporation

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## Overview - The Client:

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Rockford Energy Corporation is a private company that specializes in the development of small hydro plants, specifically Run-of-the-River or Green Power type power plants. The Brandywine project is Rockford Energy Corp.'s first project, with others being planned.

## Overview - The General Contractor:

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LEDCOR Industrial Limited has played a major role in the development and construction of residential, institutional, and industrial projects in British Columbia.

## Overview - The Consultant:

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Villholth Jensen & Associates Ltd (VJA), established in 1986, is a successful Vancouver consulting engineering firm. The company has extensive local and international experience. Areas of expertise include design and development of Ports and Marine Structures, Civil and Structural Engineering, Coastal and Offshore Engineering, along with all aspects of Project Management. VJA's list of clients includes BC Ferry Corporation, BC Hydro, Placer Dome, Public Works Canada, and Vancouver Port Corporation, to name but a few.

Prior to the Brandywine project, VJA was the structural consultant on the Morseby Island hydro project. This project was constructed in 1989. Recently, VJA served as structural engineers on a new Ready-Mix Concrete Plant project in North Vancouver. Prior to that, VJA served as prime consultant on the Direct-Hit Facility project at Pacific Elevators in Vancouver. VJA served in a similar capacity on the Fermenting Cellar project at Molson Breweries in Vancouver.



*Completed weir and COANDA Screen structures*



*Lock-blocks on downstream side of structures*



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## **Project - Specifications:**

The Brandywine project features the water intake which is located in the Brandywine River at elevation +823. The powerhouse, which includes turbines and generators, is located about 4.5 km downstream at elevation +540. A penstock, with plastic pipe on the upper run and steel pipe on the lower run, connects the intake with the turbines. The static water head is 283m and the maximum power output is 7.5 MW.

## **Project - Design & Construction:**

Preliminary and detailed design of the hydro plant facility started in April 2002. The Contractor, LEDCOR Industrial Limited, was selected in early June 2002. From there on, it became a design-build project. When the snow had melted, some parts of the upper run for the penstock still had to be surveyed. Similarly, until the river flow was at its minimum in late summer of 2002, the actual soil conditions in the river at the location of the intake structure could not be assessed.

The intake facility, which was designed to use COANDA Screens, consists of a heavy concrete structure placed across the river, with the weir elevation at +823m. Below the weir is the channel over which the COANDA Screens are installed. Some of the water goes through the screens into the channel. The rest passes over the screen, flushing sand and debris by. The water in the channel is directed to the water chamber which is connected to the turbines at the powerhouse by the penstock. The intake structure also includes a bypass channel and a valve chamber with four gates. When all gates are closed, the water passes over the weir and no water is directed to the water chamber. When the two gates in the COANDA channel are open, all or part of



*Weir and channel without COANDA Screens*



*COANDA Screens in place*



the water goes through the channel and into the water chamber. Any excess water passes over the weir. When the upper gate in the bypass and the water chamber gate are open, all or part of the water goes to the water chamber. Any excess water is directed over the weir.

Preparation of the construction site at the intake structures started early October 2002. Two bypass pipes were installed to direct the river flow under the structures.

Following that, an upstream dam was constructed. The construction area across the river was then cleared of boulders and built up with base material.

Construction of the structures started mid-October and progressed rapidly, with the excavation for the water chamber starting November 1st. By the end of November, most of the structures in the river were completed and the rip-rap upstream was in place. The temporary bypass pipes were then closed and the water was let through the bypass channel. The downstream part of the work and the construction of the water chamber was in general completed by December 18th, at which time the snow was closing down construction. All gates were then closed and the water was directed over the weir.

Construction of the powerhouse started mid-November 2002. Most of the civil work was completed late December 2002. Work started again in January 2003, with the erection of the powerhouse steel taking place late January 2003.

Work on the penstock started early May 2003. This included excavation for the steel penstock and concrete thrust blocks, laying of steel pipes and bents, field welding, construction of thrust blocks, and backfilling and compacting. Installation of the steel penstock, about 2.5km, was in general completed by the end of July 2003. Work on the plastic penstock, 1.86km, started mid-July and was in general completed late August 2003. Flushing, filling, and pressure testing were completed September 4, 2003.



*Installation of equipment*



*Bifurcation at powerhouse*



*Installation and welding of penstock. Construction of thrust block.*



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## Project - Successful Completion:

After equipment testing was complete and the hydro plant successfully connected to the BC Hydro grid in mid-September, the plant began producing power.



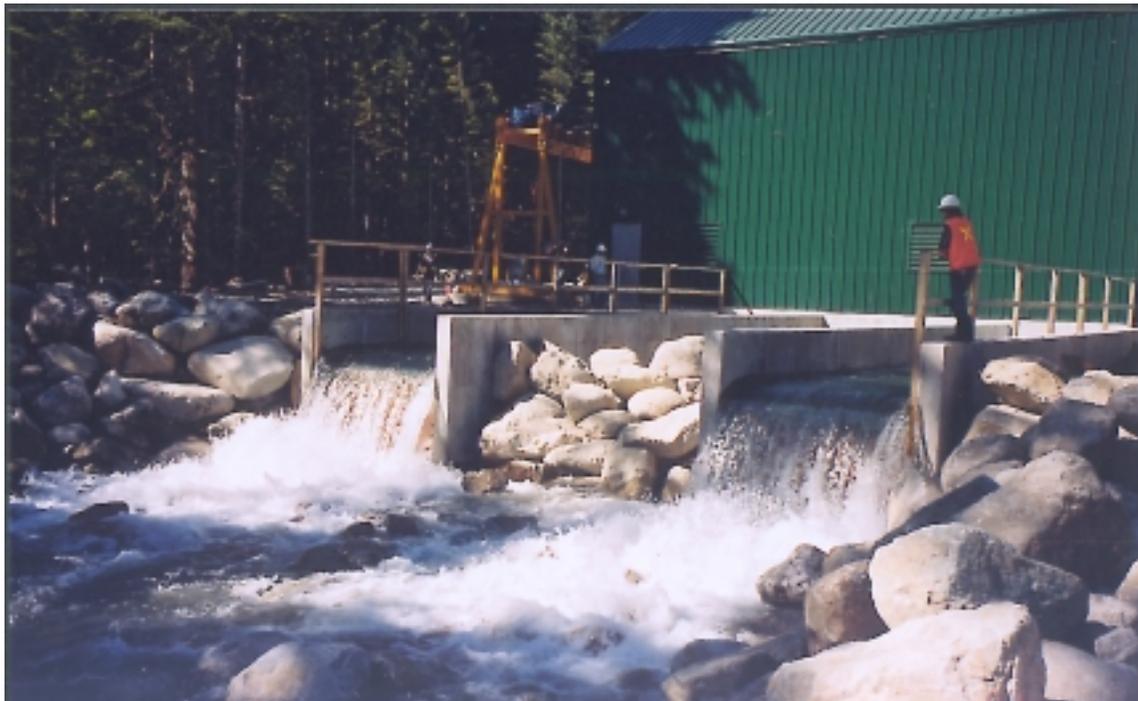
*Preparation and fusing of plastic pipes*

## In Conclusion:

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Rockford Energy Corporation's new Brandywine Hydro Project is only one example of VJA's commitment to quality. Our team of Professional Consulting Engineers is committed to the efficient planning and engineering of projects, combining technical skill with environmental sensitivity.

For more information about our services, please visit our web site at [www.vja.bc.ca](http://www.vja.bc.ca), or call us at (604) 985-0781.



*Raceway outlet during flushing and testnig of equipment*