BERMINGHAM
FOUNDATION SOLUTIONS
SINCE 1897

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NIAGARA FALLS COFFERDAM

SIR ADAM BECK POWER STATION

"It was a tribute to the entire team that a project of this complexity and size was completed in the short construction window that the Niagara River allows."

– Doug Nemec, Project Manager, Bermingham.

World's largest hard rock tunneling machine - 15m (49.2ft)

Contracting

"To think out a bridge and design it,
this is comparatively easy
A man is alone with his drawing paper
But when he is building a bridge,
He must reckon with chains that give,
Pulleys that snap, workmen who mutiny,
Not to mention the anger of the river,
And the ever-present wrath of the Gods
For the Gods hold in horror
The victories of Men"

– Andre Maurois
Found among the papers of
Wm. Bermingham Contractor 1867-1949

It's one of the most innovative, high profile jobs in the Niagara region – an 11 1/2 km. long, 15.2m (50ft.) diameter tunnel being built under the mighty Niagara River. Once completed, Ontario Power Generation's billion-dollar tunnel will carry water from the river entering at a gigantic steel sheet cofferdam to the Sir Adam Beck Power Station, increasing the power of the generating station servicing Niagara Falls by some fifteen per cent.

Bermingham Foundation Solutions was contracted to design and build one of the largest cofferdams in the world, measuring 61m (200ft) by 137m (450 ft), to serve as the exit for a huge, 14.3m (47ft) diameter rock tunnel boring machine (TBM).

The cofferdam design is a cellular, gravity type made up of seven interlocking islands constructed on bare rock and capable of withstanding water and ice pressure for many years. It must seal off the river and provide a safe exit zone for the TBM, and then in approximately four years be removed quickly and efficiently. Pre-planning and anticipation of all construction obstacles was critical to the project's success. "If we made a serious mistake, we risked the cofferdam filling with water," said Brent Porteous, Bermingham's Superintendent. Members of Bermingham's Design, Manufacturing and Construction divisions were all involved in designing and developing the cofferdam template, and creating a 3D model which addressed many different challenges to ensure that it was water tight. Safety was the top priority. To help divert more water from the tunnel, a pre-cast concrete acceleration wall was built from a barge by McNally Construction. Geo-Foundations was the sub-contractor retained for the grout work. Perhaps the most challenging aspect of the project was the extremely tight planning timeline. The Bermingham team pulled out all stops to face an accelerated construction schedule, completing the work in less than half the original two-year, marine construction season timeframe.

PRESIDENT'S MESSAGE

THE VALUE OF HISTORY

As a company we are adventurous. We try new things, often first. Our growth in recent years is a result of that innovation."

– Patrick Bermingham

Those that have just started into contracting generally view a company's history with either respect or contempt.

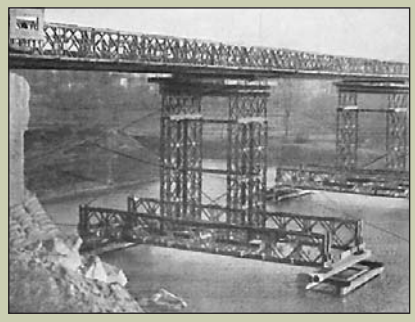
History is not reflected on the balance sheet and it doesn't entitle a company to a price premium on a contract. Each job has to be won with the most efficient methodology and men. There are times, however, when history can be more than black and white photographs on the wall. History that is accessible through a published job report, magazine article, or photo album enables a company to present to a client that a new idea can work. History is worth dollars when a company can demonstrate what it has done before or can show how not to repeat mistakes of the past.

At Bermingham, we believe it's not enough just to tell someone that our company has successfully completed the past 3000 contracts, or that we have been in business for 110 years. What matters is showing how we did it, including what went wrong, and then show how we believe it can be done. Only then does the difference between an idea and experience become clear.

Patrick Bermingham, President

WW2 Bailey Bridge
Across the Maas – Vaal Canal at Hatert

Constructed by First Canadian Army directed by Colonel Spike Bermingham



DESIGN BUILD SOLUTIONS
MEETS IMPOSSIBLE DEADLINE AND SITE CONDITIONS

If there's a challenge to be met, Bermingham people rise to the occasion with innovative solutions.

A company-wide effort was key to the success of the Sunfish Pond shoring project bordering the Royal Botanical Garden lands in Hamilton. CN Rail contracted Bermingham as General Contractor to construct a structure that would allow railway expansion to accommodate increased GO Transit service in the area.

The existing embankment was unstable and access was almost non-existent.

"We basically came up with the concept for construction because nobody could figure out how to do it,"

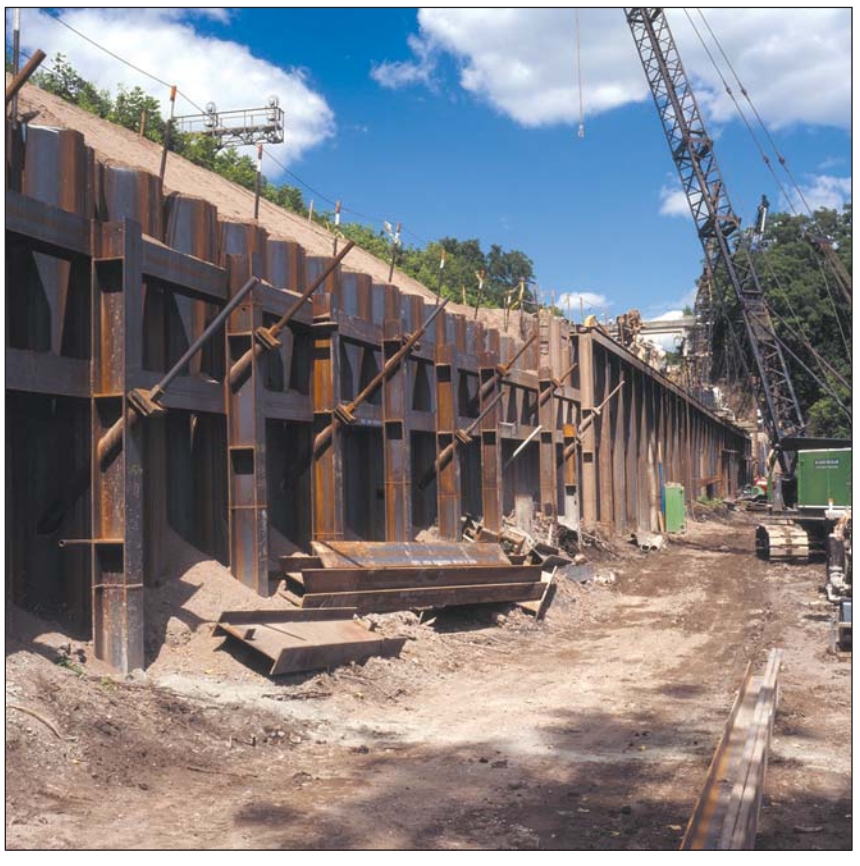
– Todd Barlow, Project Manager

Isherwood & Associates were retained to affirm that the engineering design was suitable. The wall was a combination of H-piles, sheet piles, pipe piles with tie down anchors, and the entire structure was self-supporting, acting in cantilever.

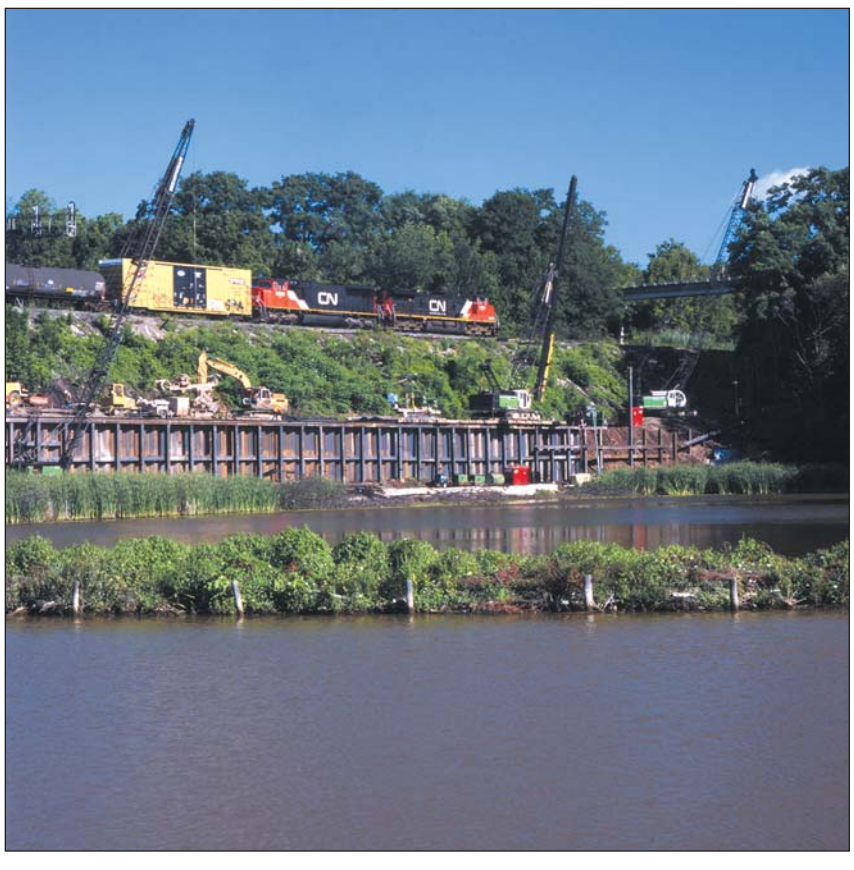
The unique aspect of the Sunfish Pond development is that it served a dual purpose – to stabilize the existing embankment as well as retain the future embankment. "We had to build our own access," explains Todd, "The permanent structure we were building also served as our equipment access because we were working beside sensitive marshland in the RBG." A portion of the wall was anchored into the ground with tiebacks and then crews backfilled behind the wall so that cranes could drive piles from the top of the wall. Two thirds of the wall was retained by driving A-frames behind the wall, which were then tied to the front of the structure. "The A-frame and the permanent works also became our trestle for access. It was designed for long-term performance to retain the embankment and support our equipment," says Todd. That ingenious methodology saved both time and money.

Extremely tight scheduling created a major challenge – the project started at the end of May 2006 and was completed before the end of August to allow CN time to complete pre-scheduled switch work over the long holiday week-end in September. "At the end of the job, we were working two shifts, 21 days straight in order to meet the deadline. At the tender stage the geotechnical information suggested the piles would go to 37m (120 ft) at the deepest point. The reality, however, was that they went over 61m (200ft.) so basically we did double the work in the same amount of time," says Todd. It was a case of teamwork between Bermingham divisions. Manufacturing provided an intense amount of support by fabricating the components of the job so they would minimize the time on site for assembly. As Todd compliments, "We really pushed our use of resources and manpower to the limit, but it was amazing to see all the people rally around and step up to the plate."

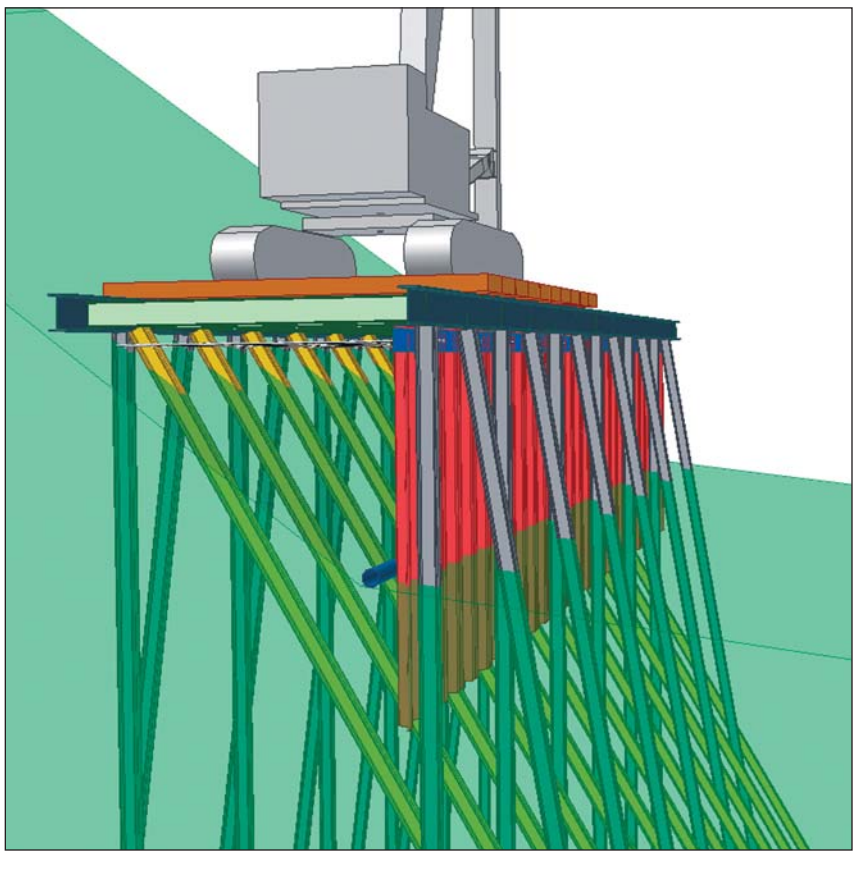
The constructed trestle became part of the permanent wall.



Transition from tie-back wall to self-supporting wall.



The shoring project, bordering marshland, enabled CN Railway expansion.

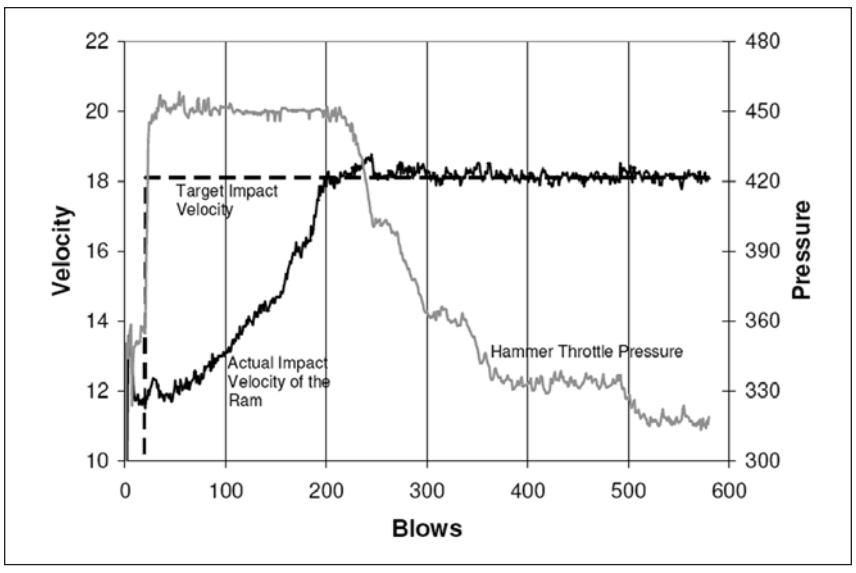


3D model illustrating the trestle/permanent wall.

ENERGY CONTROL SYSTEM RECENTLY PATENTED

ANOTHER STEP TOWARDS INTELLIGENT PILE DRIVING

Bermingham took a giant step forward towards intelligent pile driving with a patent for its automatic energy monitoring and control circuit for use with its Berminghammer impact hammers. The energy control system (ECS) has the ability to control the impact velocity (or stroke) of the hammer automatically. It uses proximity switches on the hammer to measure the impact velocity of the ram and then controls the throttle on the hammer automatically to achieve the desired impact energy. It can also be interfaced with other data acquisition systems such as sound or vibration monitoring. When the alarm has been set for a vibration or sound limit, the hammer will automatically reduce its stroke or energy. The system also has the ability to connect with pile driving analysis (PDA) that will, when programmed, tell the energy control system to instantly reduce the hammer energy if the allowable stress in the pile is exceeded. Corman Construction of Annapolis Junction, MD used the new hammer energy control system, supplied by Sunbelt Pile Driving Rentals, for the Virginia abutment of the second span of the Woodrow Wilson Bridge in Washington D.C.

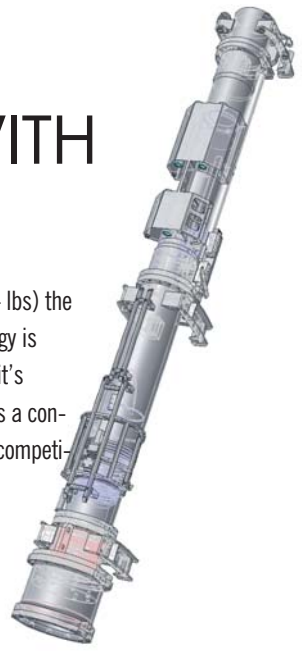


Data from the ECS - intellgient pile-driving.

INTRODUCING THE B64 DESIGNED WITH FEEDBACK FROM EUROPE

With a ram mass of 6,400kg (14,110lbs), and rated energy of 220 kJ (162,260 ft – lbs) the new Berminghammer model B-64 is one powerful hammer. It's stroke at rated energy is 3.5m (11.5 ft) or 35 blows per minute. The maximum physical stroke is 4m (13ft) and it's range of operation is 1.4 to 3.5m (4.5 to 11.5ft) or 60-35 blows per minute. The B-64 is a continuation of the clean generation of hammers, designed to weigh less, but hit harder than competitive hammers.

The B64 is capable of 35 blows per minute.



Features:

- Remote throttle with infinitely controllable energy
- Clean combustion
- Free-standing operation
- Fuel injection
- Easy start in soft driving
- Available with hydraulic trip
- Specialty driving adapters
- Available with on-board energy monitoring or control
- Environmentally friendly with no-drip operation, bio-fuels and oils
- All metric fasteners

A FIRST FOR NORTH AMERICA

THE B-6005 – FREESTANDING IN FLORIDA

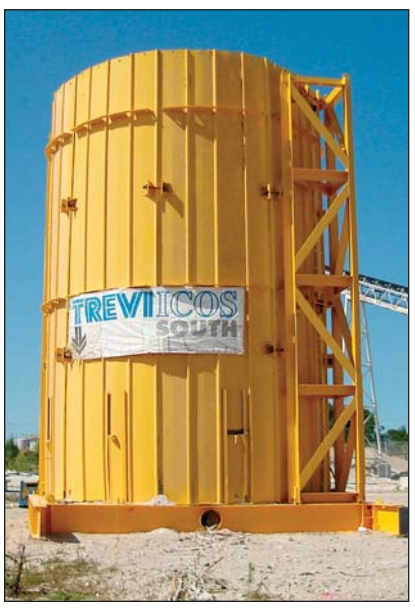
The piles reached lengths of 46m (150ft) – part of a project to twin a bridge on Route 79 over West Bay in Panama City Beach, Florida.

History was in the making on a piling project in Panama City Beach Florida at the end of 2006. It was the first time in North America where a diesel pile-driving hammer – the B-6005 – was used FREESTANDING on a pile. Sunbelt Pile Driving Rentals supplied the hammer, fitted with a special extended drive-sleeve and complete with a dedicated transportation and lay-down cradle, to contractor APAC-Southeast Inc. The design of the Berminghammer Direct Drive System makes it possible to run the hammer free-standing, eliminating the need for leads. This was an essential weight saving as the contractor's crane did not have the capacity to handle a conventional hammer and lead at the required reach.

STATNAMIC LOAD TEST SETS RECORD

45 MEGANEWTONS!

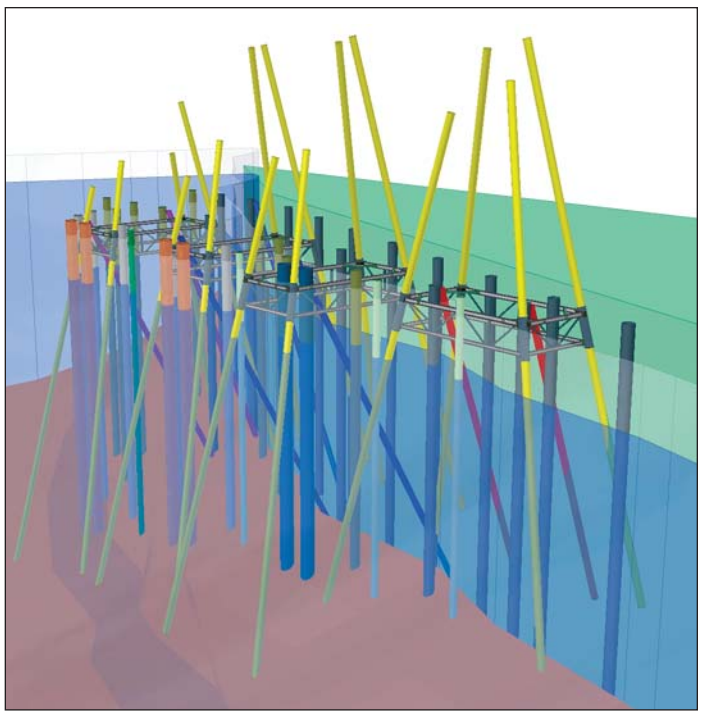
Applied Foundation Testing of Florida performed a Statnamic load test to 45-MN (5,000 tons) – a new world record – with a device recently upgraded by Bermingham. The test was performed at the Miami International Airport Intermodal Center. The test foundation was 1.4m (54in) diameter rock socketed, drilled shaft with a total length of 20.4m (67ft) installed by Trevicos South. Mike Justason, Product Manager, emphasizes, "This moves Statnamic another step forward. We were stalled at 30MN for the last few years and now we've made the leap into the 40MN realm. There are even larger Statnamic devices on the horizon."



3D PROJECT PLANNING & VISUALIZATION FOR ALASKAN PROJECT

Bermingham has been developing a new tool for the industry – "Project Planning and Visualization" using three dimensional CAD modeling. "It's useful for everyone involved with a project to plan the sequence of construction. Such was the case in Alaska where civil contractor ACC Hurlen relied on the CAD model in planning the cruise ship pier it was building in Ketchican, Alaska. Rental equipment from Bermingham included a large custom lead system and reverse circulation drill. The challenging aspect of the project included drilling of battered piles," says Louis Fritz.

On-site in Alaska.



3D CAD Modelling lends support.

BUILDING A BRIDGE IN AFRICA

CUSTOMIZED EQUIPMENT & SERVICE

"Everyone spoke Portugese or Africano so there was lots of hand signals and drawing in the sand -- homemade construction site sign language."

– Niels Christensen

Texeira Duarte, a large international construction company from Portugal, contracted Bermingham for some customized foundation equipment and assistance in building a bridge over the Limpopo River, near Maputo, Mozambique in south east Africa. Bermingham provided a drilling system consisting of a 30/30 reverse circulation drill and slides for a vibratory hammer, cross-over and shock absorbers to work with their down-the-hole hammer, attachments for their crane, as well as a set of leads – 37m (100 ft) of C18 with gates, 23m (75 ft) of air lifts and 24m (80 ft) of kelly bars. Most importantly, Bermingham people lent their expertise – from behind the scenes and on-site. Stefano Gabaldo was involved with detailing the system and coordinating all aspects of the project with the customer. Niels Christensen, Plant Manager, was requested to spend a month in Africa helping the contractor rig up the equipment and supervise during startup and monitor the progress during actual construction.

30/30 drill in action on the C-18 VTL system.

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