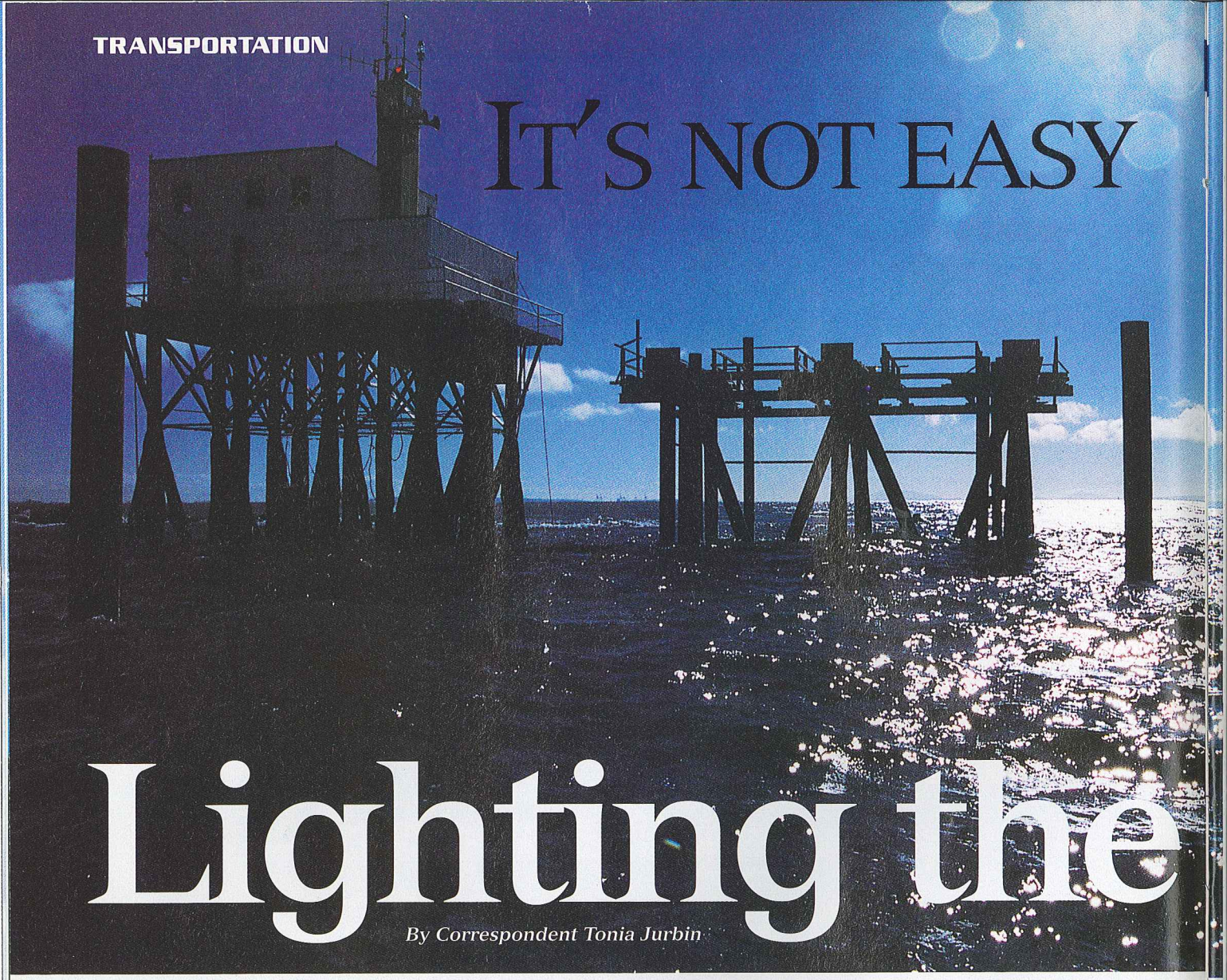


IT'S NOT EASY

Lighting the

By Correspondent Tonia Jurbin

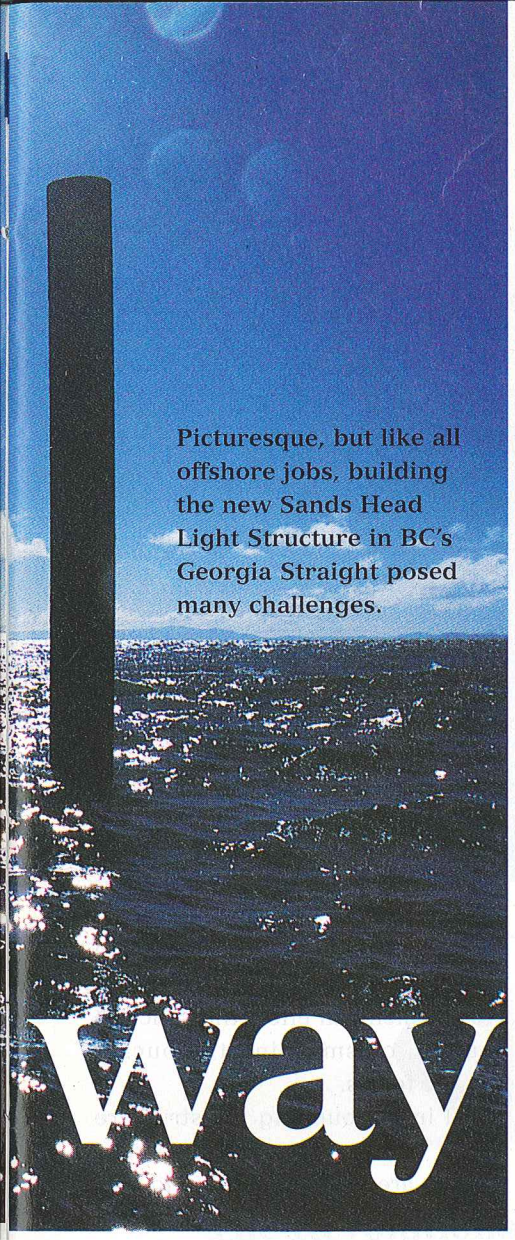
From Christopher Columbus to the superfreighters of today, marine navigation has always relied on some means of guidance. For Columbus, it was the stars and luck of the tides. For the superfreighters, it's satellites and computers with little to no luck involved. But the one thing that many people still associate with sailing the seas is the lighthouse that helped guide the sailors safely ashore.

Through modern technology, however, most lighthouses are being turned off and replaced by electronic devices. Fortunately for Canadian sailors and their peers from other lands, not all is dark in Canada. There are, in fact, still welcoming lights burning and the following tells you why contractors are playing a major part in "Lighting the Way."

In 1865, at the height of the Cariboo Gold Rush, a lightship station was built at the mouth of the Fraser River at South Sand Heads as a navigational aid that remained in service until 1879. At that time a stationary beacon was not considered viable because of constant channel shifting.

That same year, however, the North Sand Heads lighthouse was built but by 1905, the sandbars had shifted to the point where the light beacon was almost 2 kms off the shipping channel and a new Sand Heads was built. It was finally retired in 1912 after many years of leaking.

In 1913, Sand Heads Lightship No. 16 was anchored near the shipping channel and the old Sand



Picturesque, but like all offshore jobs, building the new Sands Head Light Structure in BC's Georgia Straight posed many challenges.

Way

Heads North structure was demolished. No. 16 remained in service until about 1956 when a permanent 11 m x 15 m building, costing about $238,000, was built on steel pilings.

Today, however, that latter structure is now being replaced by West Shore Constructors of North Vancouver at a cost of $650,000. Estimated duration of the contract was a short two months, depending on the weather, because the work had to be done during the winter.

The contract included supplying and installing piles, building the pile caps, supplying and installing precast concrete panels, structural steel walkways, handrails, ladders, and tide cages.

Prior to any construction, geotechnical information showed about 8 m of soft to compact silty sand underlain by dense sand and, there were no surprises.

The buildings will be placed on pile caps supported by 16, 508 mm dia 10 mm wall closed-end steel piles averaging about 30 m. Six of the piles are vertical, the remaining 110 had batters ranging from 70 to 80 deg. The piles were shop spliced, driven full length, reinforced with full-length cages and filled with concrete. Specs called for a tip elevation of –20.5 m, or embedment length of about 13 m. The mudline elevation at this location is about –7 m, and the tide range is 4.6 m.

Floors of the structure are about 9.2 m elevation and divers will install zinc anodes for cathodic protection of the steel piles. The piles were driven using an 80 ton Lima 700 crane and a 7200 pound drop hammer.

Conventionally, this kind of job might have been done using a spud barge, a large barge with up to three piles that can be dropped into the mudline once in position. On this job, however, because of the rough water at the time of the year, the crew opted to drive six, 610 mm x 13 mm x 25 m mooring piles embedded about 8 m.

Using this arrangement, the barge could be kept on site overnight except in rough weather. In a six-week period, the barge was only towed in twice, but about seven-crew-days were lost when the barge returned for materials and was not able to get back to the site.

Once the 15 m x 39 m working barge was secured, four 406 mm x 13 mm x 25 m falsework piles were driven. GPS coordinates of the new and existing light structure provided so the layout was done using the existing structure as a reference. The falsework piles and falsework beams outlined the new structure.

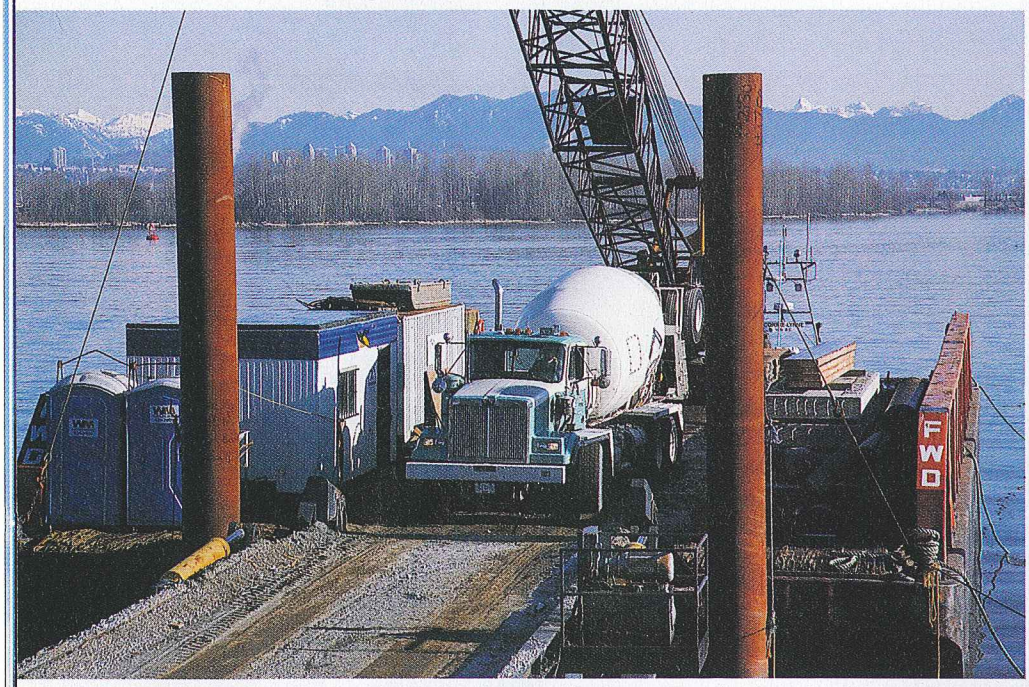
Crews were tested during bucket pours from a crane mounted on a bobbing barge.

The biggest challenge on this job was the remoteness of the site and the time of year.

"The site is basically in Georgia Straight so we're exposed to the westerly winds, especially at this time of years," says Brian Caspar, site superintendent for West Shore Constructors.

"However, we really got lucky with the weather, and the longer it stays nice, the better because in our bid, we carried extra money for missed time and extra towing. In the first three weeks, we had exceptional weather, but the last three haven't been as good, so we haven't been going out. The worst thing that can happen is that we call the crews to work, but it gets too rough to go out."

Getting back to the job at hand, once the falsework was in place, the six vertical piles were driven followed by more falsework beams that were



Delivering concrete from the batch plant to the site involved a 45-minute drive and a two-hour tug ride.

used to set and install the battered piles. After all the piles were installed, the falsework beams were removed and the falsework piles were extracted using a vibratory hammer.

After the piles were installed, the first of three major pours was carried out and about 90 m of concrete was pumped into the piles. In addition to the standard admixtures for retarding the set, it was a full 45-minute drive from the batch plant and another two-hour tug tow to the site. Superplastercisers were added just before the pour.

The concrete mix also had a high fly ash and silica fume content that improved performance in a saltwater environment. Once the piles were completed, the formwork for the pilecaps was built and the last 30 m of concrete was poured in two batches using a crane and bucket. The crane and bucket proved more labour intensive than pumping, but the contractor said that it was more cost effective in this case than tying up an pump for half a day to place 15 m of concrete.

Swells, waves, or just plain rough... call it what you will, concrete marine pours become much more challenging when the working barge is moving while pouring concrete from a bucket at the end of a crane boom.

"It was a little tricky positioning the bucket because you don't want to smash into the forms as a barge bounces about six or seven feet," says Mike Kobelka, a crane operator.

"At first we started pouring the farthest cap, but moving to the closer caps gave me a chance to get used to the movement of the barge with the boom in a more vertical position.

Once he got the feel of the vertical movements, Kobelka says he was able to use the crane to bob the bucket up and down effectively holding the bucket steady relative to the forms so that the crew could release the load without having an excessive drop (which can effect the concrete quality), or smashing the bucket into the forms.

All in all, building the structure serves to show that Canadian contractors are still on the scene to help ensure that mariners get ashore. ◆

Working from a barge adjacent to the new structure, crews are busy moving concrete.