L'ASSOCIATION DES PILOTES MARITIMES DU CANADA
CANADIAN MARINE PILOTS' ASSOCIATION

Pilotage on the Welland Canal

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(SLIDE 1: TITLE)

Introduction

Being here today certainly brings back to my mind many good memories. It is indeed not far from here, as I was about to transit through the Panama Canal on what turned out to be my very last command as captain, that I received a call in February 1998 letting me know that the Great Lakes Pilotage Authority would become my next employer.

I started my apprenticeship as a Great Lakes Pilot, in Canada, shortly thereafter and I was eventually licensed for District 2 of the Great Lakes Pilotage Region, which happens to include another Canal of importance for marine traffic – the Welland Canal.

I have now been discharging my duties as a Welland Canal pilot for over 15 years and, during that time, I have completed over 1,000 assignments on the Canal.

Piloting on the Canal is something of a family tradition for me, as my father also was a Canal pilot. As a kid, I used to go on ships with him and, while he perhaps wanted something "better" for me, in the end, I guess he only had himself to blame if I became a pilot! As I grew up watching him, I developed a deep respect and appreciation for our profession; so much so that it was always clear in my mind that I wanted to become a Great Lakes – and a Welland Canal – Pilot!

The Welland Canal

(SLIDE 2: THE WELLAND CANAL)

The Welland Canal is located in Ontario. It is 43 kilometers long and is a crucial component of the St. Lawrence Seaway, connecting Lake Ontario and Lake Erie through the Niagara Peninsula. It essentially enables ships to ascend and descend the Niagara Escarpment, and bypass the Niagara Falls.

(SLIDE 3: THE ALTERNATIVE!)

Construction on the Canal began in 1824 and it became operational a few years afterwards. It has been enlarged three times since then and, today, it is comprised of eight locks, including a set of three twin locks – just like here in Panama.

(SLIDE 4: TWIN LOCKS)

The southern end of the Canal, at Port Colborne on Lake Erie, is approximately 100 meters higher than its northern end, at Port Weller on Lake Ontario.

(SLIDE 5: PROFILE)

The Canal is 9.1m deep. The maximum permissible length of a ship is 225.5 meters while the maximum beam is 24 meters. For their part, the locks are 233.5m by 24.5m.

This means the operational clearance that pilots have when going through the locks is sometimes approximately 15 centimeters on each side and all of 4m in front and behind. In other words, we need to make ships fit right in, just like a glove on someone's hand. I'll get back to this in a few minutes.

(SLIDE 6: A TIGHT FIT!)

Approximately 40 million tonnes of cargo are carried through the Canal each year by some 3,000 vessels, of various types. These vessels are comprised of ocean-going vessels, from about 50 countries, along with Canadian and U.S. vessels, known as "lakers", and built specifically for transporting cargo between ports within the Great Lakes-St. Lawrence system.

(SLIDE 7: THE GREAT LAKES- ST. LAWRENCE SEAWAY SYSTEM)

This system is actually the longest deep draft navigation system in the world, extending some 3,700 kilometers into the North American heartland. It plays an absolutely vital role in the continent's economy and the main cargoes that transit through it include iron ore for steel production, coal for power generation, limestone and cement for construction, and grain for both domestic consumption and export.

Since the Welland Canal is in Canada, you will not be surprised to learn that winter is an important factor in our operations! We do operate in ice conditions both on the Great Lakes, in general, and on the Canal itself.

(SLIDE 8: ICE!)

(SLIDE 9: MORE ICE!)

But the Canal – just like the rest of the Great Lakes-St. Lawrence system upstream of Montreal is shut down during winter – from January to March – when ice and weather conditions become a hazard to safe navigation. This also allows the St. Lawrence Seaway Corporation to do maintenance work, as may be needed.

(SLIDE 10: BUT SOMETIMES IT IS NICE!)

Pilotage service on the Welland Canal is provided by a federal government crown corporation, the Great Lakes Pilotage Authority. To deliver the service, the Authority enters into a service agreement with the Corporation that I am a member of – the Corporation of Professional Great Lakes Pilots.

My Corporation was established about 50 years ago, shortly after the St. Lawrence Seaway opened. The profile of our 23 pilots is similar to my own. In each and every case, pilots have achieved the rank of master prior to beginning their apprenticeship as pilots and, typically, they have also been captains on lakers in the region for many years.

The licensing process is rigorous: the apprenticeship lasts for many months, during which time the apprentice completes dozens of transits with a senior pilot. The examination process is administered by the Authority and, to be successful, candidates must demonstrate an excellent knowledge of local conditions during both written and oral exams held before a Board of examiners that is comprised mainly of licensed pilots, in addition to an evaluation trip on board a vessel.

Once licensed, our members are qualified to complete assignments in three specific pilotage areas: the Welland Canal, which represents about 70% of our assignments, the so-called “west tour”, for assignments that go from Port Colborne to Detroit and, finally, the “river tour” for assignments on the Detroit and St. Clair Rivers, a district that we share with our American colleagues.

Now that I have provided you with an overview of the Canal, let me talk about the most important part – pilotage on the Canal!

Close Quarters Pilotage

Really, pilotage on the Canal is defined by one fundamental characteristic: in virtually everything that we do, we operate in a close quarters environment.

As I just described, the locks that we operate in leave us just a few centimeters on each side! At the same time, the underkeel clearance at our disposal, once we are in, is normally less than one meter.

In the reaches and the lock wall approaches, the underkeel clearance can sometimes actually be even less than that – as little as 30 centimeters!

Obviously, this is an environment that doesn’t leave any room for guesswork!

(SLIDE 11: MEETINGS)

And things don't really get any better once you are out of a lock. The space you have at your disposal to operate when you meet another vessel is so restricted that in virtually every other district, the meeting would be deemed to have been a "near-miss" and you would have to file in an incident report.

A near miss it may very well be but – due to the skills of our pilots – the important word here is "miss"; and no incident of any consequence has ever taken place on the Canal in respect of pilotage.

Of course, this is also an environment in which there is simply no space for tugs and "mules". So, it really is all about knowing the waters almost centimeter by centimeter and having very good shiphandling skills.

It's also all about timing.

(SLIDE 12: TIMING IS EVERYTHING!)

Approaching a lock is especially delicate. We actually need to maneuver by literally "sliding" on the approach wall – that is, we come in at a 15 degree angle and then we bring the whole vessel sliding alongside the wall.

We then reach the "elbow" and, at that point – one way or another – we have got to get the stern off the wall. Normally on a fixed right hand propeller or a variable pitch left hand propeller, we use a stern movement to "flush" the stern off the wall, when upbound, which then takes speed off the ship and enables us to line up the entrance to the lock.

(SLIDE 13: SLIDING – 1)

(SLIDE 14: SLIDING – 2)

(SLIDE 15: SLIDING – 3)

(SLIDE 16: SLIDING – 4)

Upbound transits may be especially intimidating. This is so because the whole ship is boxed-in at the bottom of the lock, waiting to get lifted up in a matter of a few minutes – 10 actually – by the 80 million liters of water that pour in.

(SLIDE 17: UPBOUND!)

When entering the locks, we are more concerned about the superstructure during upbound transits than during downbound transits – for obvious reasons since during downbound transits, most of the ship is *above* the lock, and the risk of damaging the superstructure is far less.

Coming in a lock during an upbound transit, with the concrete walls right in your face, the vessel's speed really should be less than one knot. Sideway inertia is also something you need to be careful about, so you must go in slowly in order to counter it.

(SLIDE 18: DOWNBOUND!)

In a downbound transit, you can go a little faster – up to 1.5 knot. As it takes less time to do the line handling, downbound transits take a little less time overall than upbound transits.

An average assignment is eight hours long, but it can range anywhere from four to 14, depending on where you board the vessel and the amount of traffic. Because of the level of concentration that is required at all times, a pilotage assignment is rarely equivalent to a full transit through the Canal. Instead, pilots typically do half of the Canal before being relieved.

I have talked a lot about how restricted the space can be. But, even smaller vessels present their own challenges. When we conduct anything under 20m in beam, depending on the weather conditions, we'll make the lock "on the fly". This means that we don't use the approach wall but rather line up the lock and come straight in!

(SLIDE 19: ON THE FLY!)

In those situations, I'll handle the joysticks myself and maneuver the ship directly in. I have to line up the port wall, in order to avoid damage when going astern to stop the ship, then I have to get the ship over to the starboard side of the lock, to get the lines out or to attach suction cups.

I mentioned the word "conduct" in respect of what we do. This is because under the Canadian Pilotage Act, as is the case in many other places around the world, pilots legally have conduct of the vessel from the moment it enters in a compulsory pilotage area. Pilots may only be relieved by the ship's master in the event that he has reasonable grounds to believe that a pilot is putting the vessel's safety at risk – which of course we never do!

Stopping in the Lock!

I just talked about the concrete walls and the need to come in at a slow speed.

Clearly, stopping in the lock is absolutely key!

(SLIDE 20: THE WALL!)

In normal conditions, depending on the length of the ship, we stop a few meters before the concrete wall. By the way, we also call these walls, the “breast walls” – I actually really wonder why, considering there is nothing at all soft or maternal about them!

In extraordinary conditions, however – such as when the ship suffers an engine failure – there is a need for extraordinary measures! One such measure, available for downbound assignments, is perhaps a unique feature of the Canal – the ship arrester.

I have actually had to use this system twice in my career, after the ship blacked out, and I can attest that it really does work! The way it works is somewhat similar to what’s taking place on board an aircraft carrier when a plane comes in to land – a cable comes in action to help stop the vessel.

There is a cost attached to using this mechanism – about $10,000 – but, obviously, this is far better than crashing in the gate of the lock! I can let you imagine for a second the consequences if that was to happen!

First, we would be going down “waterfall type” from more than 10m high and, then, we would basically be flooding the Niagara region!

Let me show you how it works!

(VIDEO 1: SHIP ARRESTER – from 1:25 to 2:16)

Another particular feature of our operations has to do with the use of so called “vacuum pads”, which is a hands-free mooring system, to secure ships in position in the lock chambers. Here as well, we tend to use various alternative names for it – I wonder who is so creative in this respect! Anyway, we also call them “suction cups”. But my American friends – and others, I’m sure – will know what I mean if I tell you that a third name for it – and the more frequently used – is “The Monica”!

(SLIDE 21: SUCTION CUPS!)

As far as I know, this system of “vacuum pads” is unique to the Welland Canal. We have been going through the testing and trial procedures for five years now and we are already at the fourth generation. So, instead of using the ship’s wires and linesmen at every lock – with four lines to secure the ship in the lock, we can now pull into the lock and these pads – three pairs – reach out .6m, “grab” the ship and hold it in a secure position as the water level raises or lowers in the lock.

The system has been installed in one lock but I understand that it will be

installed in all locks over the next few years.

Of course, I'm not here as a salesman for this system but I can say that it meets our needs and has been working well for us. It takes away the danger of breaking lines and it is also much quicker.

Let me show it to you.

(VIDEO 2: SUCTION CUPS – from 0:43-1:23)

The Landing Boom

Another particular feature of our pilotage has to do with the use of what we call a 'landing boom". It is a procedure for securing the ship on the approach wall when it is necessary to wait for traffic.

Some of these booms consist of something as simple as a wooden plank that is 6 centimeters inches thick by 33 centimeters wide and 1 meter long, with a hole cut in the center and a three centimeters diameter rope that runs through two sets of pullies located on the 7.5m long landing boom.

A deck hand on the vessel sits on the plank and one of the mates swings it to the shore and lowers the deck hand onto the dock as the ship is approaching the wall.

(SLIDE 22: ELECTRICITY GENERATION)

Another unique feature of the Canal, and which makes a difference in my life as a pilot, is the fact that the Canal generates its own electricity – it even sells some to the City of St. Catharines. The electricity is made from the water flow in the pen stock below lock four, creating some eddies and currents there. Considering the very limited margins of maneuver that we have, this makes our entrance at lock four somewhat more challenging.

Using navigational tools

Before I conclude, let me say a word about how we use navigational aids on the Canal.

In normal conditions, we mainly use the AIS data coming from the pilot plug in order to get information about the position of other vessels. We also rely on our own GPS, connected to our PPUs, primarily to obtain highly accurate independent data regarding both the vessel's speed over ground, and its position.

While it is of little use once inside the lock, it can help get us to the

approach wall in the event visibility decreases abruptly and you are caught between locks. It is also very helpful when meeting other vessels because one of the unique features of our PPUs is the ability to “click on a vessel” and automatically predict the meeting position at both vessels’ current speed.

(SLIDE 23: RESTRICTED VISIBILITY)

When visibility gets to zero – and this happens particularly in the spring, when we have warm mornings but still freezing cold water, and in the fall, when the water is warmer but the air is cool – well, when visibility gets to zero, it’s ugly – as I’m sure it is for all of you!

Of course, in these situations, we still use our tools but, frankly, such situations are also a great example of the overall nature of our pilotage. All in all, if we were to rely too much on tools such as AIS, we would end up in big trouble!

(SLIDE 24: AIS ERROR)

Our pilotage is therefore in many ways what I would call – with respect – “old school”. In such incredibly close quarter situations, we can’t rely too much on tools that might easily mislead us. This is why our pilotage largely relies on good traditional seamanship, excellence in shiphandling skills, and – dare I say – even intuition.

Again, just like every pilot in this room, this sixth sense that a pilot has developed after years of experience; this intriguing human quality of knowing by instinct what’s “right” and what’s not, what will work and what will not; this “feel” for things, is at the very heart of what we do on the Canal, every day.

Conclusion

Of course, as we very well know, all pilotage is different. And, clearly, everyone in this room operates in the most challenging pilotage district in the world!

In my case, all I can say about my job is that – just like you – I have the privilege of being right when I say that!

In closing, let me tell you show you a picture that is worth a thousand words in respect of how our colleagues sometimes have to find their way to the vessels we pilot!

(SLIDE 24:MY RELIEF!)

Thank you!