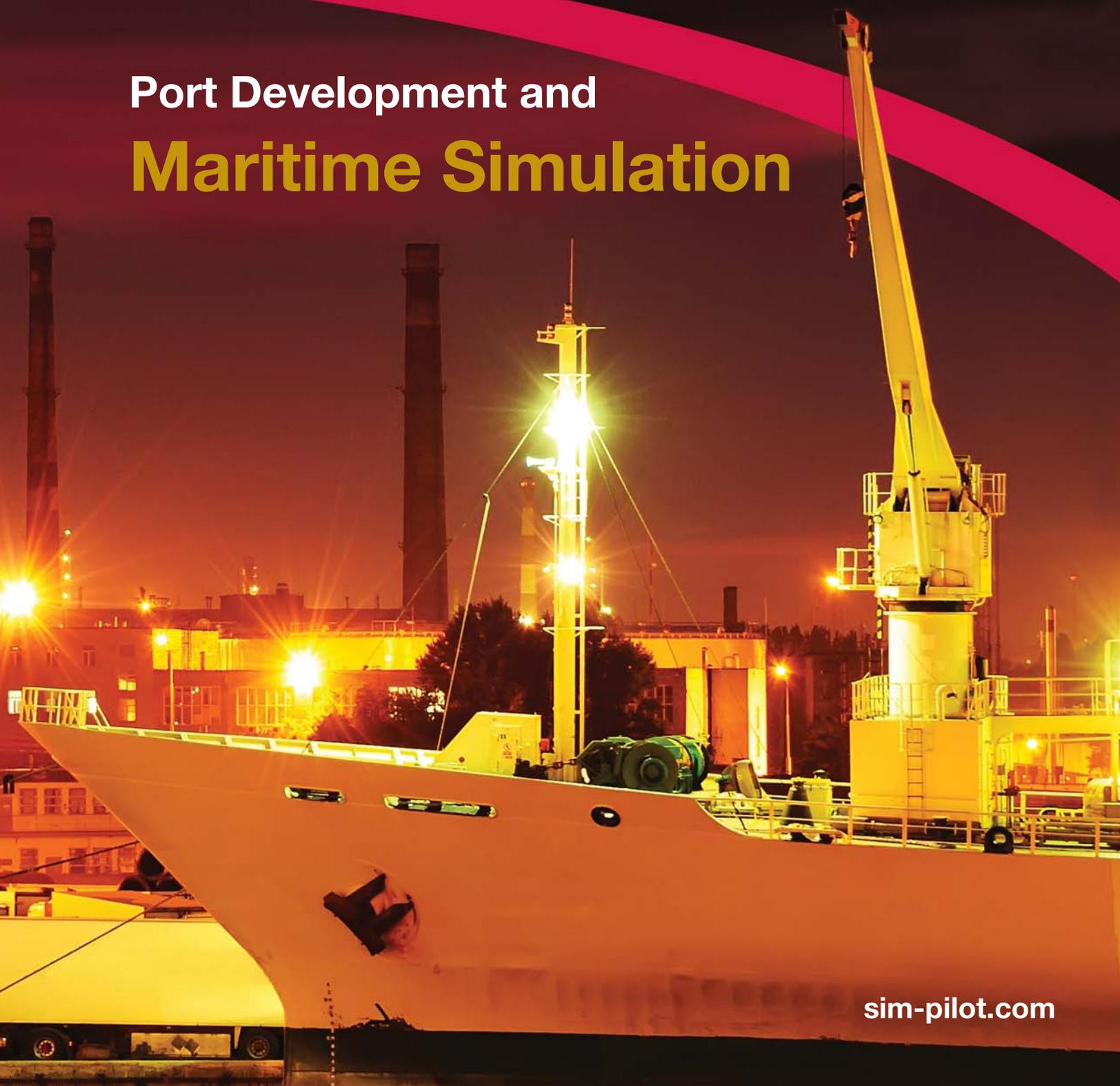




CORPORATION OF  
LOWER ST. LAWRENCE PILOTS

Maritime Simulation and Resource Centre

# Port Development and Maritime Simulation



[sim-pilot.com](http://sim-pilot.com)

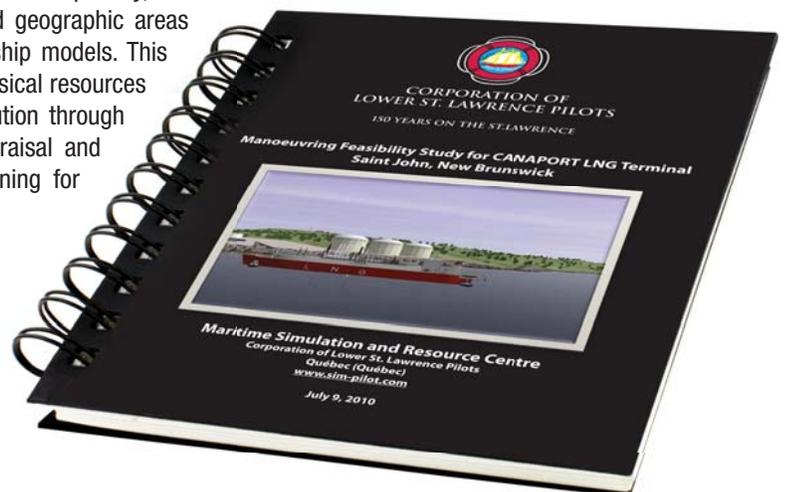


## Port Development and Maritime Simulation

In operation since December 2004, the **Maritime Simulation and Resource Centre (MSRC)** has been purposely built to function as a total turnkey port procedural development centre. It is one of the few facilities in the world offering a full range of simulation options spanning from stand-alone desktop simulation to fully interactive, manned tug and large vessel simulations.

For projects requiring the knowledge of ship manoeuvres, the MSRC can draw on the vast experience of members of the Corporation of Lower St. Lawrence Pilots (CLSLP). The synergy derived from the combination of new technology with pilot experience generates exceptional added value for the MSRC and enables the Centre to offer unique expertise for projects involving navigation safety.

MSRC also features an in-house database compilation capability, which permits to build, modify or customize simulated geographic areas to suit client specific requirements as well as ship models. This extremely unique combination of human and physical resources enables MSRC to provide flexible and total solution through all stages of port development to include: appraisal and conceptual design, manoeuvring procedure training for new facilities, data capture and reporting.





## 1. Full Mission and Tug Simulators

The Kongsberg Full Mission Simulator (FMS), operated by the MSRC, is one of the most advanced simulators of its type in the world and is continually being upgraded. It is equipped with a fully instrumented DNV Class “A” configured bridge with 330° visuals that exceeds the requirements of STCW’95 regulation. The Centre is also equipped with three fully instrumented ship bridges, with a horizontal field of 240°. Each bridge can be configured as a standard or azimuth propulsion tug as well as any vessel in the MSRC’s ship library.

With the FMS, the MSRC has the capacity to run four individual own ships in the same or in separate exercises. A wide range of targets and vector tugs can be added, pre-programmed or handled at will during the course of any exercise. As a concrete example, the MSRC’s instructors can simultaneously train ship pilots/captains and tug masters in manoeuvres related to high seas towing, port or escort operations.

The MSRC has a wide range of visual databases as well as a full database development and editing suite to allow pilots to create and modify their own databases. The Centre also has a wide range of ship models to allow training familiarization ranging from container vessels to liquefied natural gas (LNG) tankers to cruise ships with azimuth controls.

## 2. Tug Simulator

The MSRC tug simulators are specifically designed to support high fidelity training and detailed procedural rehearsal for the full range of tugging operations. This capability is achieved by combining two critical operational components: **purpose-built tug wheelhouses**, which replicate the controls, layout, and tools used by a tugboat captain and **high fidelity mathematical models** of the tugboat.



### 3. MSRC Project Realization Proposal

Using a navigation simulator to determine the feasibility of a port project, being able to create all the actual conditions and components of a project to be built or modified, and having a chance to manoeuvre ships are an excellent opportunity for any project designer. From an existing geographical area with waterways or from a database built by the MSRC team, it is possible to reproduce a project virtually and then perform complete and realistic simulations.

#### 3.1 Databases

In addition to the twenty or so databases of geographical sites it already has, the MSRC has softwares available specifically designed to produce and bring up-to-date the integrated databases required for simulations.

Our programming team can build new geographical areas and waterways, as well as the necessary applications, such as radar files, navigational aids, ECDIS, etc. It is also possible to model and introduce, into existing databases, structures such as new quays in order to validate the safety of new navigation conditions for approaching, berthing, etc.

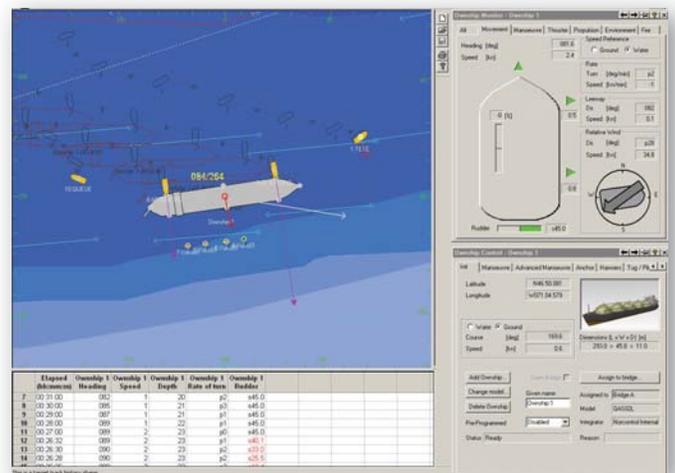
#### 3.2 Modelized Ships

For simulations, the MSRC already has several ship models (bulk carriers, oil tankers, container ships, LNG carriers, tugs, passenger ships, etc.). Each ship model is unique, with manoeuvring characteristics very faithful to those of the ship on which the model was based.

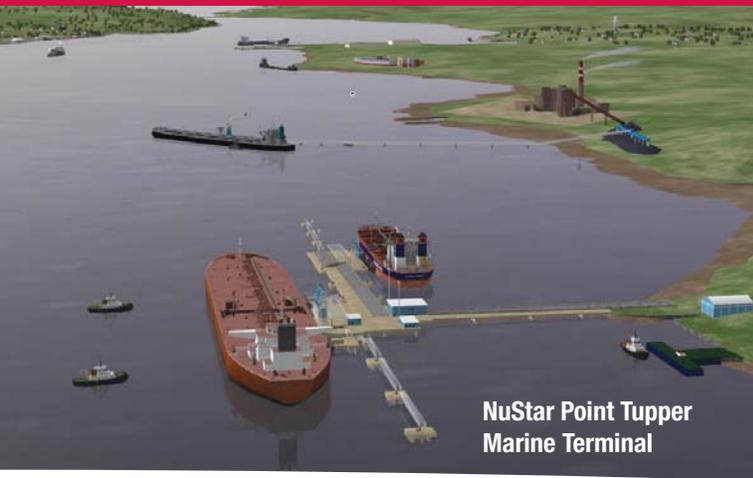
The MSRC is also equipped with the most recent Kongsberg ship modeler software. Based on the experience of our pilots, we have the capability of developing realistic mathematical ship model which react on simulation as ships do in real life.

#### 3.3 Fast-Time Simulation

Significant portions of port development work at the preliminary phases can often be conducted using Kongsberg desktop simulation software and to the largest extent possible, using what Kongsberg refers to as ownship vessels which are fully interactive and their performance is completely influenced by external forces such as big ship speed, wind, and sea state.



Data Capture Fast-Time Simulation



### 3.4 Real-Time Simulation

#### 3.4.1 Total Port Development – Proof of Concept to Procedural Training

MSRC's fully interactive tug and large vessel simulation capabilities also mean that the facility provides a total turnkey port procedural development centre. Simulations that only employ what are commonly referred to as “vector” or “target tugs” (i.e. a force applied by the instructor that simulated the tug's towline force) are somewhat restrictive in that they provide results that are dependant upon this simulated towline force which may not consider real world tug manoeuvring or control complications such as physical space constraints or the design of the big ship, overhangs, and limited push/pull attach points.

The facility at MSRC can support the port development from initial conceptualization through to the final manoeuvring process optimization and emergency preparedness. The phases in a typical fully integrated port simulation design might include:

#### 3.4.2 Appraisal and Conceptual Design

This phase and its associated simulation scenarios may often be completed by MSRC staff requiring only some consultation from local pilots/port authorities.

#### 3.4.3 Conceptual Validation and Procedural Design

This phase and its associated simulation scenarios typically require the participation of local pilots/tug masters/port authorities. Based on findings from the appraisal and conceptual design phase, this phase includes functions such as:

- > developing a risk assessment matrix and determining environmental condition operating limits;
- > determining the best mode of employing tugs at various stages of the operation;
- > assessing potential casualty or catastrophic failures and determining a suitable emergency preparedness/response plan; and
- > compiling a comprehensive report of complete findings and recommended implementation actions and training requirements.

#### 3.4.4 Manoeuvring Procedure Training for New Facility

Once the conceptual validation and procedural design phase is complete, MSRC's fully interactive tug and pilot simulation capabilities can then be used to conduct emergency response training to prepare for common problems/complications as well as “worse case” scenarios, etc.

### 3.5 Data Capture and Reporting Capabilities

MSRC's simulator is equipped with detailed, automated data capture tools that facilitate the assessment of simulation outcomes, and support the production of empirical findings both in numeric and graphical form. For port development projects, this can be used in a number of ways. Initial simulator predictions and their tabulated results can support the basis for preliminary conceptual and policy design, and the preparation of basic operational frameworks. Information gathered from live trials or initial project implementation can then be used to further refine simulator outputs. These refined computer models can then be used to deliver advanced training for the new port's routine operational and emergency response procedures.



St. Lawrence Seaway

## 4. Pertinent Experience

List of relevant projects conducted by MSRC's team over the past few years:

- > Navigation Simulation Study for a new LNG Terminal in Levis, Canada
- > Navigation Simulation Study for a new LNG Terminal in Cacouna, Canada
- > Special Cargo Project Carrier
- > St. Lawrence Seaway Database Development (Montreal to Lake Superior)
- > New Passenger Liner Jetty
- > Dredging Project in Cacouna Harbour
- > Valero Refinery Terminal, VLCC manoeuvring with tugs
- > Port of Quebec Feasibility Study for a new port infrastructure
- > Navigation Simulation Study for a new port in Columbia
- > Database development for the area of Guayaquil, Ecuador
- > Post Panamax Navigation Simulation Study for the St. Lawrence River
- > CANAPORT LNG Terminal, LNG manoeuvring with tugs
- > NuStar Point Tupper Marine Terminal, VLCC manoeuvring with tugs



## Testimonials

### The Very Best of Ship Simulator Centres

“Just to convey my personal thanks to you for all your help and considerations during our rather long simulation project. We got through an immense amount of work. I can’t remember having completed so much quality work in such a relatively short time at any other simulator.

Your team were outstanding in their individual contributions to the work at hand, not in only carrying out their practical skills but in the comments, observations and recommendations that they provided throughout. Please convey my sincere thanks to all concerned for being so professional, hospitable and making us feel perfectly at home. This made the project so much easier to complete.

Thanks again for everything, I hope to see you all again in the not too distant future at what I consider to be the very best of ship simulator centres. I should be happy for you to use me as a reference at any time should you ever require the same, please do not hesitate.”

Well done and thank you so much.

**Capt. L.J. (John) Swann MMFG, SNAME**  
Marine Consultant  
Ausenco Sandwell

### Liquefied Natural Gas Project in Levis

“The work carried out for Rabaska by the MSRC and the CLSLP’s pilots was and continues to be of inestimable value to the success of our Liquefied Natural Gas Project in Levis. The various simulations run were extremely useful in helping us validate the feasibility, reliability, and safety of the marine portion of our project.

Furthermore, in addition to helping us evaluate and further the design of our marine facilities, the simulations were of great value in communicating or “showing” the project to regulators, both marine (TERMPOL) and environmental (BAPE/CEAA), to the public and other community stakeholders, as well as to our various partners and LNG suppliers.

As we move through construction towards operations, the simulator will again fulfill a vital role, that of training the crews of the LNG carriers and support vessels that will be calling upon our facility.”

**Glenn Kelly**  
President and Operations Director  
Rabaska (GNL)



## A Team with Exceptional Knowledge of Ship Handling and Advanced Navigational Skills

“Towing Solutions Inc. has participated in several training sessions at the Maritime Simulation and Resource Centre in Quebec City and has always found the facility and staff to be of exceptional quality. We especially appreciate that the staff is not only largely made up of senior pilots and a few naval officers all of whom have exceptional knowledge of ship handling and advanced navigational skills, but they also are extremely well versed in the operation of the simulator itself.

This latter feature is the one that we appreciate the most, as their staff literally has the ability to identify and fix problems when they surface, where most other facilities in North and Central America cannot. Needless to say, this capability leads to a much higher customer satisfaction level.

Another significant advantage when working with this facility is their ability to create, in house, very accurate area models which allows them to respond quickly to a customer’s request and by working directly with that customer, provide exactly what they desire.

Finally, the facility also has several partners who are experts in particular fields that can be brought in to facilitate special classes if a customer desires something unique that the onsite staff does not have the required level of expertise in.

All in all, this is one of the finest simulation facilities in the world today.”

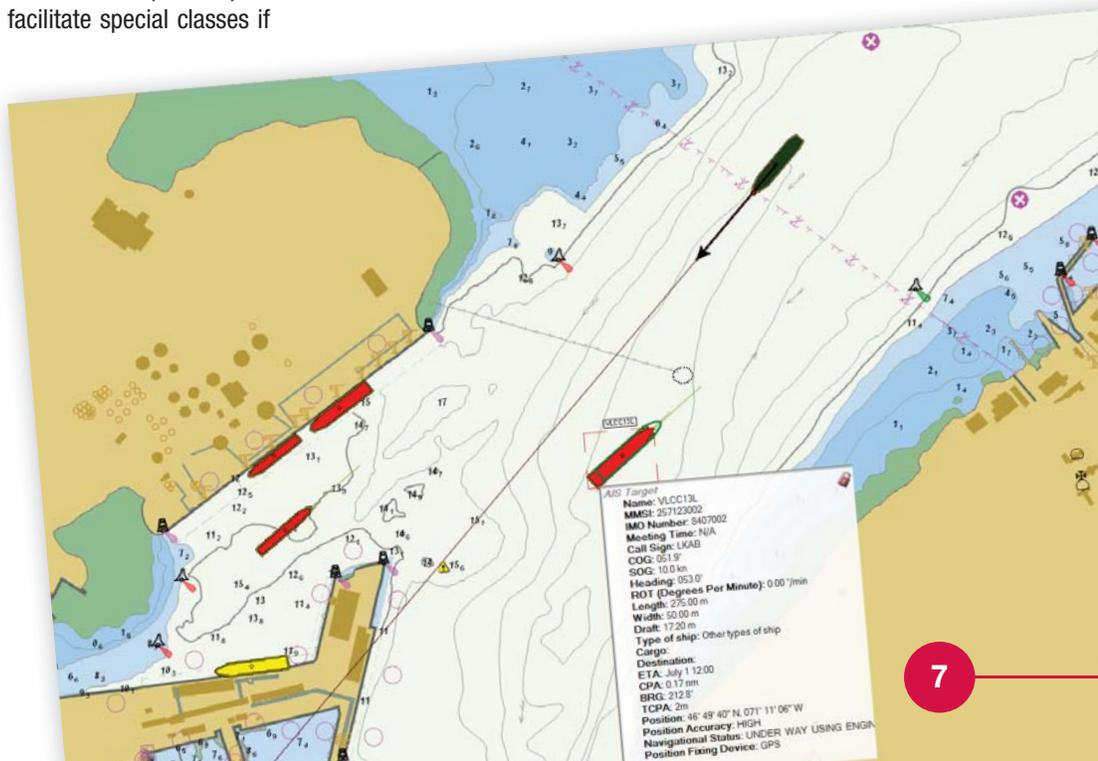
**Captain Gregory Brooks**  
President  
Towing Solutions Inc.

## LNG Tanker Manoeuvres

“Since June 2005, six series of manoeuvring simulations using different types of LNG tankers (135,000 to 210,000 m<sup>3</sup>) have been carried out at the Corporation of Lower St. Lawrence Pilots’ Maritime Simulation and Resource Centre in Quebec City. The purpose of these simulations was to study and identify the weather conditions and wind and current limits so as to guarantee the safe transit of the Chenal du Nord, and the berthing and departure of these ships at the future Rabaska terminal in Quebec (Levis).

During these simulations, I witnessed firsthand the quality of the Centre facilities, the competence of its technical personnel, the realism of its simulations and the professionalism of its pilots. We were able to evaluate all possible situations, including ones requiring abnormal or emergency manoeuvres. The Centre has continued to develop and expand with the addition of three large simulation cabins designed to test the behaviour and effectiveness of operation with tugs in real-life situations.”

**Captain Philippe Bor**  
Maritime Expert





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# Experience **Quebec City** and its Unique Attractions

A visit to the Maritime Simulation and Resource Centre is already a unique experience in itself. Why not take advantage of the opportunity to discover all the beauty and wealth of one of the oldest port cities in America... the majestic City of Quebec!

You are sure to be delighted by its heritage sites, its picturesque neighbourhoods, its artistic and cultural activities, and its gastronomic treats!



**CORPORATION OF  
LOWER ST. LAWRENCE PILOTS**

**Maritime Simulation and Resource Centre**

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