TP 13458E

PILOTAGE CERTIFICATE TRAINING FOR THE LAURENTIAN REGION (District II Quebec City-Les Escoumins)

Volume 2
Training Guide
and
Evaluation Guide – General information

by

Institut maritime du Québec

for

Transportation Development Centre
Transport Canada

November 1999

Institut maritime du Québec
Cégep de Rimouski

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This report reflects the views of the authors and not necessarily those of the Transportation Development Centre of Transport Canada.

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16. Abstract

Following recommendations made in the report entitled *Modernization of the Pilotage Certification Process in the Laurentian Pilotage Region* (TP 13145E), the Institut maritime du Québec has been mandated to develop a training program based on the skills needed to obtain a pilotage certificate.

The process of developing a performance-based training program consists of several steps. The six usual steps are the following:

1. Work environment analysis;
2. Design of the draft training program;
3. Validation of the draft training program;
4. Development of objectives and standards;
5. Development of a training guide;
6. Development of an evaluation guide.

Volume 1 of TP 13458E presents the first four steps in four distinct parts.

1. Work environment analysis (document validated by the participants);
2. Draft training program (document used in step 3);
3. Training program validation;
4. Training program.

Volume 2 presents steps 5 and 6 in two parts, addressing those interested in obtaining a pilotage certificate.

1. Training guide
2. Evaluation guide – general information

Volume 3 (protected document, with restricted distribution) contains the *Evaluation Guide*, which consists of *General Information on Evaluation* and *Evaluation Checklists*.

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Volume 1 : *Élaboration du programme de formation*.
Volume 3 (protégée) : *Guide d'évaluation*.

16. Résumé

Conformément aux recommandations formulées dans le rapport intitulé *Modernisation du processus de délivrance des certificats de pilotage dans la région de pilotage des Laurentides*, TP 13145F, l'Institut maritime du Québec s'est vu confier le mandat d'élaborer un programme de formation fondé sur les compétences nécessaires à l'obtention du certificat.

Le processus d'élaboration d'un programme de formation, selon l'approche par compétences, comporte plusieurs étapes. Les six étapes habituelles sont les suivantes :

1. L'analyse de la situation de travail;
2. La conception du projet de formation;
3. La validation du projet de formation;
4. La rédaction des objectifs et des standards;
5. La rédaction du guide pédagogique;
6. La rédaction du guide d'évaluation.

Le volume 1 du TP 13458F regroupe les quatre premières étapes en quatre parties distinctes.

1. Analyse de la situation de travail (document validé par les participants);
2. Conception du projet de formation (document utilisé pour l'étape 3);
3. Validation du projet de formation;
4. Programme de formation.

Le volume 2 présente en deux parties, les étapes 5 et 6. Il s'adresse tout particulièrement à la clientèle intéressée par l'obtention de ce certificat de pilotage.

1. Guide pédagogique
2. Guide d'évaluation – Renseignements généraux.

Enfin, le volume 3 (document protégé à distribution restreinte) renferme l'ensemble du *Guide d'évaluation*, soit les *Renseignements généraux sur l'évaluation* et les *Cahiers d'évaluation*.

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SUMMARY

Background

The *Pilotage Act* stipulates that "no person shall have the conduct of a ship within a compulsory pilotage area unless the person is a licensed pilot or a regular member of the complement of the ship who is the holder of a pilotage certificate for that area." It further specifies that "no pilotage certificate shall be issued … unless the Authority designated for that area is satisfied that the applicant has a degree of skill and local knowledge … equivalent to that required of an applicant for a licence for that … area."

The new *Canada Marine Act*, passed in 1997, calls for a review of the procedure for issuing pilotage certificates in the light of the skills needed and the new technologies that are available. In the case of the Laurentian Pilotage Authority (LPA), a steering committee with representation from the LPA, Transport Canada, the Canadian Shipowners Association, the St. Lawrence Ship Operators Association, the Institut maritime du Québec, and the Transportation Development Centre hired the firm KPMG to investigate ways to modernize training and certificate issuing procedures. The results of the study, published in March 1998, are included in a report entitled *Modernization of the Pilotage Certification Process in the Laurentian Pilotage Region*, TP 13145E. The report's authors conclude that the procedure for issuing pilotage certificates needs revision to take account of new technologies, the specifics of the work environment, and the experience of candidates for pilotage certificates.

The study's recommendations with a direct or indirect bearing on development of the training program are:

- Build up a common core of knowledge as a source of coherent information accessible to all candidates;
- Set up a structured procedure for identifying what is available to students for training purposes, with particular attention to access to instructional materials;
- Develop a training program using a skills-based rather than a content-based method;
- Define clear objectives for candidates for pilotage certificates, tending away from a program based on knowledge and open-ended subjects and toward one based on performance, with standards to be met;
- Train candidates on a marine navigation simulator (which could also be used for the licensing procedure).

In the spring of 1998, pursuant to the study's recommendations, the steering committee mandated the Institut maritime du Québec to develop a training program based on the skills needed to obtain a pilotage certificate for the Laurentian Region.

Institut maritime du Québec procedure

The approach selected entailed defining essential professional skills and formulating them in the program in terms of objectives and performance criteria (or standards). Using the definition adopted by Quebec's department of education, a skill is:

an integrated set of the knowledge, abilities, attitudes, and perceptions necessary to perform a task or a work activity at the threshold of performance required.

To do this, the Institut joined forces with Éduc Action and identified six steps in the process best suited to meeting the stated need:

First step (13 and 14 January 1999): Analysis of the work situation. A working meeting of pilots, officers holding pilotage certificates, officers with a sound knowledge of the river, and a number of observers, resulted in a pooling of information for characterizing the profession, its duties, the skills and actions required, and suggestions for training. A paper entitled *Work Environment Analysis Report* was produced and submitted to participants to check for conformity with the meeting's findings.

Second step (February 1999): Design of a training program. Based on the initial determinants and data from the meeting, a draft program was produced and used for the next step. It was given the title *Draft Training Program*.

Third step (3 March 1999): Validation of the training program. A one-day validation meeting was held with pilots, officers with pilotage certificates, officers with extensive experience of the river, a representative of the Laurentian Pilotage Authority, and a representative of the St. Lawrence Ship Operators Association to improve and refine the draft. The fruit of this step was a document entitled *Validation Report of the Training Program*. This document was submitted to participants to check for quality and conformity.

Fourth step (late March 1999): Drafting of program objectives and standards. This step resulted in a document entitled *Training Program* (for marine pilotage certification, Quebec City-Les Escoumins).

The output of these first four steps was compiled in a single document entitled *Pilotage Certificate Training for the Laurentian Region (District II Quebec City-Les Escoumins)* – Volume 1, TP 13458E.

Fifth step (September 1999): Training guide. The *Training Guide* details program contents and suggested learning and teaching strategies. It is intended chiefly for teachers and trainers. It includes:

- information on the objectives and standards defined in the program;
- the weighting given to each skill to be developed;
- theoretical and practical teaching strategies, for the classroom and for distance teaching;
- an annotated bibliography as a reference source for certification candidates.

Sixth step (November 1999): Evaluation guide. The purpose of rating is to measure attainment of the skills identified in the training program. It assesses whether the certification candidate is qualified to direct and control the movements of a vessel safely and in a variety of circumstances in the waters of the district in question. The *Evaluation Guide* specifies:

- items to be rated;
- the weighting given to each such item;
- suggested rating methods.

Observable and quantifiable action is described for each item to be rated, directly linked to the performance criteria in the training program standards. Rating methods are selected on the basis of the skill to be tested, in a representative professional context. They may include:

- practical tests conducted in a simulator or through exercises on the river, etc.;
- tests of knowledge in the form of essay-type or multiple-choice examinations, case studies, and written or verbal presentations.

The training guide and the first part of the evaluation guide (general information) have been made public so that certification candidates can study effectively, either alone or in class, and can become familiar with the broad principles of the rating methodology. These constitute Volume 2 of TP 13458E.

The *Evaluation Guide* repeats the general information on rating and includes another part entitled *Evaluation Checklists*. They make up Volume 3 (protected) of TP 13458E, circulation of which is restricted to the Laurentian Pilotage Authority.

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* Special thanks are extended to James Wilhelm, who authorized the use of his work entitled *Pilotage Primer*.

PART 5

Training Guide

November 1999

TABLE OF CONTENTS

1 INTRODUCING THE TRAINING GUIDE

The purpose of this *Training Guide* is to set out in detail the content of the training program as well as recommended teaching and learning strategies. It is primarily intended both for instructors and for candidates for certification. It is offered as the preferred support tool for implementing the *Pilotage Certificate Training for the Laurentian Region (District II Quebec City-Les Escoumins).* It presents various ways to approach objectives and standards, opening up a learning process adapted to the training context and the candidates being trained. It gives the instructor a tool for developing lesson plans.

The *Training Guide* consists of two sections. The first section presents information on the general and, more specifically, on the adult education aspects of the training. The second section contains a training outline for each of the program modules.

2 TERMINOLOGY

Program
Set of integrated learning activities for the purpose of meeting training objectives measured against established standards.

Objective
Skill to be acquired or mastered.

Standard
Level of performance to be achieved in order to meet an objective.

Skill
A skill is an integrated set of the knowledge, abilities, attitudes, and perceptions necessary to perform a task or a work activity at the threshold of performance required.

3 SECTION ONE – GENERAL INFORMATION

3.1 Training principles and targets

This section is intended for instructors. Its purpose is to assist them by providing ways of tackling objectives and organizing instruction, so that they can meet training targets by taking into account the context and the candidates being trained.

Main principles

These principles provide guidelines for choosing strategies and methods to meet training goals and objectives.

- Keep in mind that a person's ability to learn is closely linked to the strategies and methods used to meet training objectives.

- Give preference to practical learning activities and projects suited to the work situation and the real world.

- Encourage active participation and make candidates responsible for their own learning.

- Take into account adults' academic background and prior experience and incorporate these into the training.

- Communicate with candidates in proper English and use correct technical terminology.

- Promote reinforcement and absorption of material by gradually increasing complexity and by making candidates apply what they know to a range of practical situations.

Training targets

The program is intended to develop the skills and abilities needed to pilot a ship in this marine district. As well, it should strengthen candidates' ability to form judgments, to analyse and synthesize, to develop their seaman's sense, leadership and ability to work in a team, to withstand stress, and to react appropriately in unforeseen situations. These behaviour patterns are essential and should be reinforced by the instructor whenever appropriate. They are drawn from the program objectives.

3.2 Approach and learning strategies

Skill-based training program

This is a skill-based training program. These skills have been identified using a work environment analysis that considers various job factors and the context and draws on the experience of senior officers. An objective and standard have been assigned to each skill to be mastered. These skills have been incorporated into a training plan aimed at preparing candidates for certification. Organizing the skills by system makes it possible to move smoothly from one objective to the next, avoiding pointless repetition and promoting absorption of the material.

Recommended adult training approach

Since this program is intended for adults with varying academic backgrounds and levels of work experience, the adult education approach has been used to develop teaching and learning strategies. This approach takes into account how adults function in a learning situation and the working context in which they exercise their profession.

Preparatory training for certification of officers takes place in three compulsory basic modules over a ten-week session. Preferably, these modules should each be taken in a single session. Practical training sessions in the simulator and on the river may vary according to the candidate's ability. A job-related diagnostic test will be administered before training starts. It will enable the instructor and candidate to determine what has already been learned and to target skills to be developed for certification. The optional modules will be offered at times and under conditions set by the training institution.

The introductory module is the cornerstone: it sets the parameters for a safe environment where experimentation is valued and interaction with colleagues is encouraged. It enables candidates to make the connection between the program, the job, and the skills to be developed, in order to learn the ways of the organization. Shipping accidents can be used to initiate a discussion and generate interest in the training program. Finally, the module will explain certain notions relating to learning strategies to facilitate the memorization of local knowledge.

Complementary learning methods are highly recommended to ensure adequate preparation and meshing with candidates' availability. We will alternate between self-learning, classroom work, simulator sessions, and shipboard training. For example, much local knowledge might be gained in the classroom while learning to prepare a passage plan, followed by a period of self-learning with a tutorial. After this, local knowledge might be applied to practical situations in the simulator. River passages, under the supervision of a senior officer, might be made either during or after the training, depending on how the program is organized. Finally, in preparation for certification, candidates might perform bridge watch emergency situation simulations in the simulator, followed by analysis sessions. The instructor should take every opportunity to reinforce the values associated with teamwork on the bridge. In the medium term, modern computer-assisted training material may be prepared to facilitate self-learning.

Instructors should give special weight to interactive methods based on exercises, discussion, analysis and teamwork. In a skills-based approach, the methods used should promote gradual assimilation of theoretical knowledge for use in practical situations in all representative job contexts.

Finally, we recommend continual evaluation of candidates to support their efforts, help them monitor their progress, and adjust their focus as necessary.

Learning strategies

To learn effectively and efficiently, candidates should be familiar with the learning process and make it their own. Generally speaking, abilities and behaviours essential for the development of a skill are acquired in four phases: experience, knowledge, practical training, and the ability to think for oneself.[1]

Experience – In the first phase, it is necessary to get the candidates' attention and spark their interest to motivate them. Starting with the objectives presented them, candidates make the connection with their experience and note what they lack. At this stage, the instructor helps the candidates to analyse their needs and to target their goals.

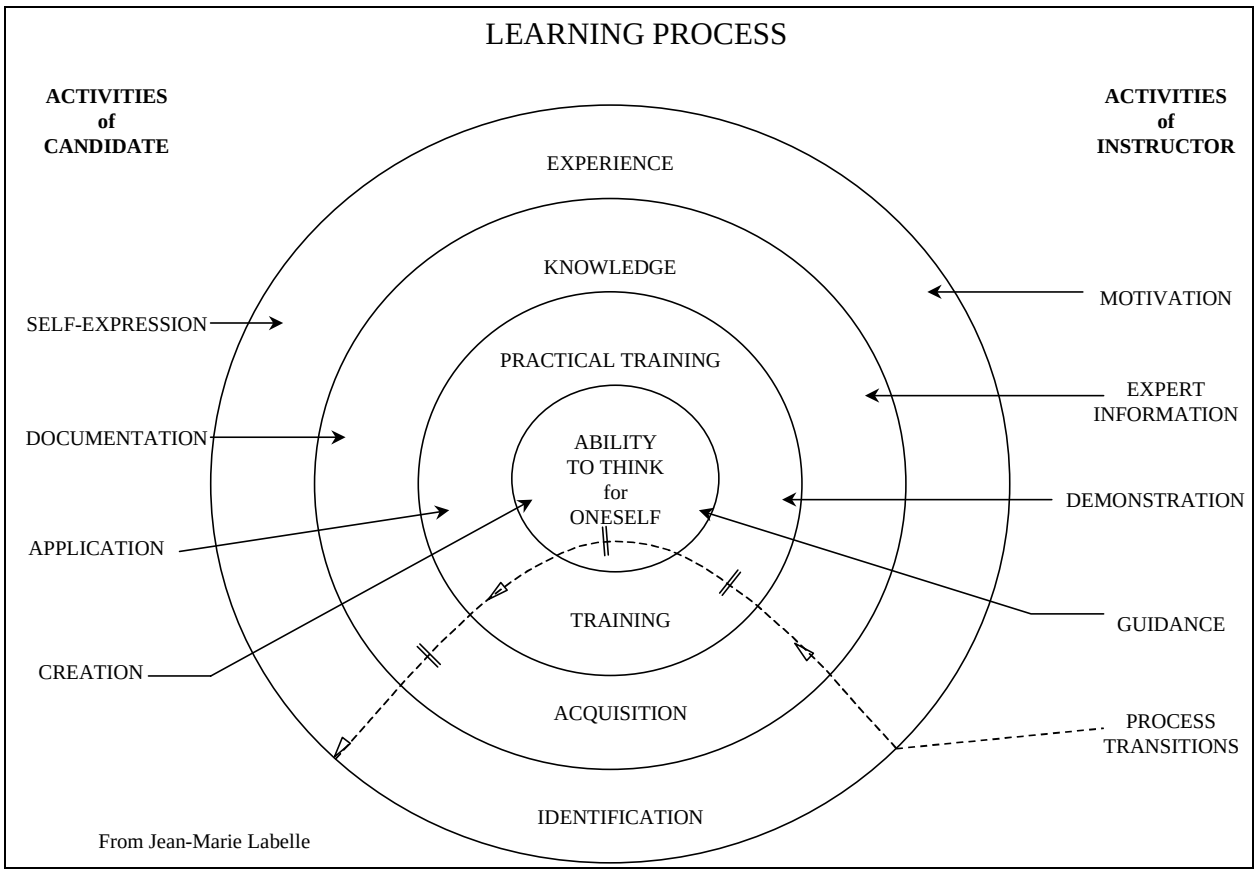
Knowledge – In the second phase, candidates gather information about the subject either independently or by theoretical work in the classroom. They absorb the new knowledge with a view to eventually using it in practical situations. The instructor is the expert. He transmits the appropriate knowledge and teaches candidates methods for committing the information to memory properly.

Practical training – In the third phase, candidates apply their new knowledge to activities typical of the job under the guidance of the instructor. The instructor demonstrates, verifies students' comprehension, and gives them feedback. In this phase of training, the instructor is the evaluator.

Ability to think for oneself – In this last phase, candidates progress smoothly towards self-reliance. They apply the theoretical and practical knowledge they have acquired to situations they are likely to encounter on the job. The instructor is the guide who suggests new things to try, encouraging students to think for themselves and even to develop their own methods when necessary.

[1] Theory set out by Jean-Marie Labelle, *La réciprocité éducative*.

This process is illustrated in the following diagram, representing one target to be reached.



3.3 Goals of the program

This program trains candidates to direct and control the movement of a ship in the waters of the marine district in total safety. Pilotage in any marine district requires thorough local knowledge of inland and coastal waters. This program trains candidates only for the class of ship for which they request certification.

At the conclusion of training, candidates will be able to plan a passage in the marine district; to conduct their ship in complete safety, avoiding obstacles to navigation; and to decide what action to take in bad weather and in emergency situations.

After the optional training modules, candidates will be able to perform docking and departure manoeuvres, to pilot a ship in ice, to manage bridge resources, and to perform manoeuvres specific to anchorage in the marine district.

In general, the program focus is as follows:

- to give candidates the skills they need to do their jobs – in other words, to enable them to perform correctly, to the required standard, the tasks and the activities inherent in the work;
- to promote personal development by adding to the candidates' professional knowledge.

The training is also intended to build the candidates' ability to form judgments; to analyse and synthesize; to develop their sense of seamanship, leadership skills, and ability to work in a team; to withstand stress; and to react appropriately in unforeseen situations.

3.4 Training prerequisites

Three requirements have been proposed and accepted as prerequisites for admission to the program.

- Prerequisites set by the Laurentian Pilotage Authority for registering for certification.
- College-level diploma in navigation, or recognized equivalent experience.
- Experience in navigating in ice, prerequisite for the target skill: *Deciding which measures to take for ice navigation*.

A new prerequisite has been added as a result of the analysis performed for this training guide:

- Experience using an ECDIS (Electronic Chart Display and Information System) generated electronic chart.

3.5 Required skills

Program overview[2]

Program: Pilotage Certificate Training for the Laurentian Region (District II Quebec City-Les Escoumins)

Program Code:

Mandatory skills

Skills	Duration
1. Planning the passage into the marine district	120 h
2. Navigating a ship in the marine district's confined waters	120 h
3. Carrying out emergency measures specific to the marine district	30 h
Duration	270 h

Optional skills[3]

Skills	Duration
4. Deciding which measures to take for ice navigation	30 h
5. Carrying out docking manoeuvres	30 h
6. Bridge resource management	30 h
Duration	90 h

3.6 Description of the training outlines

The training outlines available to the instructor and the candidates are found in this part. At the beginning of each module, we repeat the **objectives and standards** described in the training program. The **training outline**, which follows the objectives and the standards, deals with duration, training environment, content, and suggested teaching/learning methods. Each outline covers one skill component. For example, five training outlines have been prepared for the module *Planning the passage into the marine district.* We suggest an introductory module at the beginning of the program describing the work, the study program, and information required for the smooth functioning of the program.

[2] These skills deal with application of local knowledge.

[3] The optional skills can be acquired one at a time or all at once, depending on the candidate's needs.

FOR EACH MODULE

Reading an objective and standard

- **Statement of skill** describes the observable behaviour expected at the conclusion of training.
- **Working context** outlines the conditions under which the job is performed. It acts as a reference for establishing the conditions under which the candidates are placed for evaluation.
- **Skill components** add clarifications about the skill and the behaviour expected. The components identify major stages in exercising the profession and the main skill components.
- **Performance criteria** define the requirements to be met for each skill component. The criteria make it possible to properly assess whether training objectives have been met.

Reading of the training outline

- **The skill component** identifies the result expected at the end of training. Each refers back to the numbers indicated under the Objective and Standard of the module.
- **Duration** is an indication of the relative importance of a component. Some flexibility will allow the instructor to adjust to his group.
- **The training environment** provides suggestions on environment and tools to be used.
- **Content** presents the main elements to be introduced, but without imposing restrictions.
- **Suggested methods** present ways of approaching the learning activity. For instance, the instructor should master the rudiments of simulator demonstrations. The columns on Content and Suggested Methods should be read in sequence.

Note: All data in the training outlines relate to the marine district under study.

4 SECTION TWO – TRAINING OUTLINES

4.1 Introductory module

This introductory module does not refer to a skill. Its purpose is to:

- **inform and motivate candidates with respect to the training;**
- **set up a group training context and atmosphere that promote learning**.

Training environment

The training environment is of vital importance. To get the most out of the training, adult trainees must feel confident and accepted by the instructor and the group. To establish such an atmosphere, we must encourage friendly interaction among group members so that they get to know each other. It is also important to define with them, from the outset, the ideal atmosphere: sharing of experience, experimentation and personal commitment, respect for each person and his or her differences, learning as much as possible from mistakes as well as from successes in the learning process. With a suggested length of three hours, this introduction flows smoothly into Module 1.

CONTENT	SUGGESTED METHODS
1. "Ice-breaking" introductory activities.	• Ask the participants to form groups of three, introduce themselves to each other and explain why they want to take the training. • Follow up with group introductions.
2. Information on the work.	• Lead a group discussion on piloting, how this marine district is different, and what its manoeuvring problems are.
3. Information about the training program: – skills to be acquired; – how the training will be given; – program organization; – ideal atmosphere; – certification requirements.	• Present an overview of the main points of the training program by connecting it to the work. • Answer questions from participants.
4. Testing of current knowledge bases: – general knowledge; – experience with electronic aids, such as radar and electronic charts.	• A diagnostic test should be administered by the institution prior to training.

4.2 Module 1: Passage plan

Module 1	Passage plan	Duration: 120 h
OBJECTIVE		**STANDARD**
Statement of skill Planning the passage into the marine district.[4]		**Working context** • On the basis of data on ship's characteristics and navigating conditions. • Using: – conventional and electronic charts; – relevant technical documentation; – plotting instruments.
Skill component 1. Gathering data from documentation.		**Performance criteria** 1.1 Precisely define geographical boundaries of the marine district. 1.2 Correctly list vessel types normally under way in the marine district. 1.3 Correctly locate concentrations of pleasure craft and small commercial vessels. 1.4 Approximately forecast their movements. 1.5 Identify areas where spray can cause icing problems. 1.6 Full report from technical documentation of: – specific weather conditions by season; – micro-climates.

[4] The passage plan, as well as all the skills, must relate to the type of ship for which the candidate has requested certification.

Module 1	Passage plan	Duration: 120 h
OBJECTIVE	**STANDARD**	
Skill component 2. Plotting courses.	**Performance criteria** 2.1 Clearly indicate natural and man-made obstacles along course, such as: – depth, length, and width of fairways; – shoals, reefs, and shallow waters; – wrecks; – aerial cables and bridges. 2.2 Careful plotting of courses made good. 2.3 Precisely indicate distances to be covered in each leg of course. 2.4 Adapt normal course as required to take into account tides and speed of currents. 2.5 Judiciously choose danger limits with regard to ship and conditions. 2.6 Work meticulously.	
Skill component 3. Indicating visual aid information on the chart.	**Performance criteria** 3.1 Precisely identify buoyage system and fixed aids, such as: – beacons and buoys; – man-made leading lines; – principal known natural leading lines; – principal coastwide landmarks; – steering lights. 3.2 Precisely record lateral distances of landmarks in relation to course made good. 3.3 Precisely calculate and plot danger bearings.	
Skill component 4. Preparing the hypothetical radar alignments.	**Performance criteria** 4.1 Precisely calculate anticipated relative movement on the basis of echo from landmarks used. 4.2 Precisely indicate following data: – lateral and longitudinal distances; – points of course changes; – safety margins.	

Module 1	Passage plan	Duration: 120 h
OBJECTIVE	**STANDARD**	
Skill component 5. Drawing up the passage plan.	**Performance criteria** 5.1 Take into account type of ship and navigating conditions. 5.2 Work out safe speed, taking into account conditions prevailing in the marine district. 5.3 Accurately determine time required for each leg of course. 5.4 Make a realistic estimate of: – passage times through high-risk areas; – arrival time at destination. 5.5 Make appropriate annotations regarding calling-in points and frequencies to be used to communicate with Vessel Traffic Services. 5.6 Record detailed information on secondary fairways and courses leading to harbours and anchorages. 5.7 Make note of random factors affecting passage. 5.8 Comply with regulations regarding change of pilot. 5.9 Prepare a complete, clear, and precise passage plan.	

TRAINING OUTLINE

Skill 1 **Planning the passage into the marine district** **Duration: 120 h**

Module 1 **Passage plan**

Component 1 At the conclusion of training, the candidate will be capable of **gathering data from documentation**. **Duration: 9 h**

Training environment

In the classroom and independently:

- on the basis of documentation referring to the marine district, such as sailing directions, sector meteorological guide, river climatological charts, and other appropriate charts.

CONTENT	SUGGESTED METHODS
1. Reviewing boundaries of the marine district established by regulations. 2. Types of vessels that sail in the marine district: freighters, container ships, tankers, RO-RO, passenger vessels, military vessels, coasting vessels, ferries, pleasure craft, etc. 3. Location and schedule of ferries sailing between shores of the marine district. 4. Small craft: – location of marinas and small craft sailing in the marine district; – their approximate movements. 5. Weather conditions: – specifics of the marine district; – factors that can cause ice formation on upper works: temperature, wind, ship's position in the river; – locations with micro-climates.	*Instructor* • Introduce module and the five targeted components. Explain importance of thoroughly memorizing local knowledge. This module will therefore require several hours of individual study. Working on blank charts is the best way of memorizing data. • Using an audio-visual or multimedia document, introduce specifics of navigating in the marine district and among small craft. Ask candidates to identify what action should be taken in various cases. *Candidates* • On the basis of available documentation, note: – boundaries of the marine district, plot them on charts; – types of vessels; – marinas, seasonal competitive events, tourists circuits; – small craft movements; – weather conditions specific to each season. • Record boundaries of the marine district on blank charts.

TRAINING OUTLINE

Skill 1 **Planning the passage into the marine district** **Duration: 120 h**

Module 1 **Passage plan**

Component 2 At the conclusion of training, the candidate will be capable of **plotting courses**. **Duration: 36 h**

Training environment

In the classroom and independently:

- using conventional and electronic charts;
- using blank Mercator charts provided by instructor;
- using legend chart and documentation pertaining to the marine district: sailing directions, meteorological guides, tide and current tables, List of Lights, buoys and fog signals, Notices to Mariners;
- using plotting instruments.

CONTENT	SUGGESTED METHODS
1. General topography: – cities, towns, villages, and harbours; – fairways, their extent, their depth at zero on the chart, their width; – shoals, reefs, and shallow waters; – wrecks; – aerial and underwater cables, bridges. 2. Tides and currents in the marine district: – effects of weather conditions on predicted tide level; – times and heights of high and low tides at reference ports and secondary ports; – height of tide at a specified time; – depth of water at a given point; – tidal window allowing safe passage at an exact time and location for a given draught; – location of currents relative to tides, and their speed.	*Instructor* • Give a quiz to test candidates' knowledge of symbols used in Chart Number 1 (Conventional signs-Abbreviations-Terms) • Present contents of module and alternate with practical chart drafting exercises. Gradually increase the level of complexity to aid the memorization process. *Candidates* • Study different points of the topography shown on appropriate charts and in Sailing Directions. • Gradually enter various topographical points from memory on a basic Mercator chart. Coast and island outlines as well as structures are already shown. This practice will enable candidates gradually to establish their local knowledge of the marine district.

3. Courses and distances: – recommended courses to make good; – distance for each leg of course; – courses to approach ports from main fairways, and recommended anchorages. 4. Danger limits based on ship and navigation conditions. 5. Plotting courses to be made good, keeping in mind various factors: – type of ship; – tides; – tidal currents; – natural obstacles; – contour lines of shoals and reefs; – ship traffic. 6. Recommended protocol for plotting courses. 7. Meticulousness. 8. Plotting courses on an electronic chart.	• Plot courses starting from various contexts, with increasing complexity. • Establish an effective work procedure: – observe and record outlines of shoals and reefs; – determine passage distances at danger points; – plot boundaries; – plot courses made good. • Plot courses made good as directed by instructor. *For electronic charts* • Candidates will transfer courses plotted on conventional charts to electronic charts. The instructor will be available to assist if needed.

TRAINING OUTLINE

Skill 1 **Planning the passage into the marine district** **Duration: 120 h**

Module 1 **Passage plan**

Component 3 At the conclusion of training, the candidate will be capable of **indicating visual aid information on the chart**. **Duration: 36 h**

Training environment

In the classroom and independently:

- using conventional and electronic charts;
- using legend chart and documentation for the marine district, List of Lights, buoys and fog signals;
- using plotting instruments.

CONTENT	SUGGESTED METHODS
1. Buoy and beacon system used in the marine district. 2. Types of fixed and floating aids recorded on charts: – principal lights, clearance marks, buoys, beacons, facilities, and objects indicating a passage free of obstacles to navigation; – visual aids indicating shallow waters; – known natural leading lines and man-made leading lines. 3. Location, features, and range of navigational aids. 4. Calculating distances between visual aids and course made good. 5. Danger bearings: – locate existing bearings on the chart; – calculate other danger bearings; – calculate safe bearings.	*Instructor* • Generate interest with an exercise testing candidates' knowledge. For example, identify on the marine district chart lesser-known visual aid symbols or identify visual aids by category, etc. • Introduce module and alternate with practical exercises. Gradually increase level of complexity to aid memorization. • A video presenting the various visual aids in the marine district would be a good training tool. *Candidates* • Study buoy and beacon system and principal fixed aids using charts and technical documentation.

6. Protocol for entering data on charts, as recommended: – conventional charts; – electronic charts.	• From memory, enter various visual aids on the charts used in Component 2. This exercise will enable candidates gradually to establish their local knowledge of the marine district. They must memorize official visual aids. It is recommended that candidates also develop their own landmarks • Record lateral distances to points of reference and plot danger bearings in relation to course made good, as directed by instructor.

TRAINING OUTLINE

Skill 1 **Planning the passage into the marine district** **Duration: 120 h**

Module 1 **Passage plan**

Component 4 At the conclusion of training, the candidate will be capable of **preparing hypothetical radar alignments**. **Duration: 30 h**

Training environment

In the simulator:
- using conventional and electronic charts; using radar provided;
- using radar provided;
- using navigation scenarios set by instructor.

CONTENT	SUGGESTED METHODS
1. Hypothetical radar alignments method: – advantages; – limitations and errors. 2. Method of calculating anticipated relative movement from landmark echo. 3. Programming table for using hypothetical radar alignments: – lateral and longitudinal distances; – course changing points; – safety margins.	*Instructor* • Check experience of hypothetical radar alignments method and adapt training accordingly. • Review hypothetical alignments technique. • Demonstrate on electronic chart how to obtain data for use with table. • Demonstrate tuning of available radars on simulator. • Present a navigation scenario. • Vary scenarios, gradually increasing complexity of passage plans to be prepared. • Conclude with passages carried out on simulator using hypothetical alignments method. *Candidates* • Plot courses and boundaries on chart. • Identify landmarks visible on radar. • Measure elements used to set up table of hypothetical alignments.

	• Set up radar. • Check for possible errors and correct as needed. • Take into account limitations: – inherent in using radar at sea; – specific to radar used aboard ship. • Make a passage using hypothetical alignments technique and perform essential checks, most importantly while changing course.

TRAINING OUTLINE

Skill 1 **Planning the passage into the marine district** **Duration: 120 h**

Module 1 **Passage plan**

Component 5 At the conclusion of training, the candidate will be capable of **drawing up the passage plan**. **Duration: 9 h**

Training environment

In the classroom:

- on the basis of data on ship's characteristics and navigating conditions;
- using conventional and electronic charts, as well as relevant technical documentation and plotting instruments.

CONTENT	SUGGESTED METHODS
1. Passage plan: – advantages and limitations of a passage plan; – essential elements of a passage plan; – characteristics of a passage plan. 2. Safe speed in view of: – navigation conditions; – type of ship. 3. Calling-in points and radio frequencies to be used to communicate with Vessel Traffic Services. 4. Estimating times: – for each portion of course; – for each mandatory calling-in point; – for passage through high-risk areas; – for arrival at destination. 5. Random factors, such as particularly difficult and unexpected weather conditions, an oncoming ship experiencing difficulties, etc.	*Instructor* • Introduce elements of a passage plan succinctly and provide a model. • Introduce theory behind each component of a passage plan. *Candidates* • With Vessel Traffic Services, determine type of vessel traffic anticipated on the river during passage: – types of vessels; – position of vessels. • Prepare passage plans, gradually increasing complexity. • Develop an initial passage plan for a standard navigating scenario using what has been learned in earlier components. • Prepare other passage plans for various situations: – winter season with risk of spray but without floating ice; – difficult weather conditions; – special conditions related to ship's loading.

6. Emergency plans to handle random factors, such as need for emergency anchorage, exiting a marked fairway, etc. 7. Points of no-return. 8. Regulations respecting pilot changes.	• Accompany each scenario with a plot of courses made good and annotations on charts. • At the end of this module it is important that candidates be able to recite rapidly from memory the local knowledge learned, so as to be prepared to react appropriately in any situation.

4.3 Module 2: Pilotage in the marine district

Module: 2	Pilotage in the marine district	Duration: 120 h
OBJECTIVE		**STANDARD**
Statement of skill Navigating a ship in the marine district's confined waters		**Training environment** • Teamwork. • Various situations and visibility conditions. • On the basis of data on ship's characteristics and navigation conditions. • Using: – passage plan, navigational instruments, such as ECDIS-generated electronic chart and technical documentation. • Paying special attention to the most difficult passages in the marine district.
Skill component 1. Anticipating the ship's behaviour in the marine district's shallow and confined waters.		**Performance criteria** 1.1 Precisely assess squat and its effect. 1.2 Properly anticipate ship's reactions when meeting and passing in a fairway. 1.3 Correctly estimate stopping and turning distances as a function of depth under keel. 1.4 Correctly anticipate ship's reactions in relation to its centre of gravity, in the most difficult passages. 1.5 Precisely estimate increase in draught as a result of list. 1.6 Take into account effects of suction at stern.

Module: 2	Pilotage in the marine district	Duration: 120 h
OBJECTIVE		**STANDARD**
Skill component 2. Determining the ship's position with visual and electronic aids: – while under way; – during course changes.		**Performance criteria** 2.1 Precisely measure bearings and distances from lights, leading lines, principal recognized landmarks. 2.2 Check accuracy of buoy and beacon system. 2.3 Correctly position ship on the basis of radar information, including hypothetical alignments and racon bearings. 2.4 Recognize location of cities and towns. 2.5 Know distances and bearings of easily identifiable targets to confirm ship's position. 2.6 Make judicious use of known markers for course changes. 2.7 Carry out critical checks using electronic chart.
Skill component 3. Establishing navigation strategies.		**Performance criteria** 3.1 Rapidly analyse gathered data: – Notices to Shipping; – information from bridge watch; – information from navigational aids. 3.2 Take into account ship's anticipated behaviour. 3.3 Properly anticipate squat. 3.4 Make appropriate decisions in extreme weather conditions based on ship's position.

Module: 2	Pilotage in the marine district	Duration: 120 h
OBJECTIVE		**STANDARD**
Skill component 4. Avoiding obstacles on the course.		**Performance criteria** 4.1 Rigorously check accuracy and reliability of electronic navigational aids. 4.2 Correctly determine special features of most difficult passages in the marine district. 4.3 Make judicious decisions based on ship's behaviour, tides, currents, and traffic. 4.4 Constantly maintain ship on set course. 4.5 Maintain a safe speed based on prevailing conditions in the marine district, according to regulations. 4.6 Commit fully to memory distances and danger bearings of main landmarks. 4.7 Comply strictly with regulations and passage plan. 4.8 Be constantly alert.
Skill component 5. Announcing arrival times at crucial points.		**Performance criteria** 5.1 Accurately estimate arrival times at calling-in points, course changing points, difficult passages, and meeting points with other ships. 5.2 Take into account factors that affect speed made good. 5.3 Comply strictly with communication procedures in force in the marine district.

Module: 2	Pilotage in the marine district	Duration: 120 h
OBJECTIVE	**STANDARD**	
Skill component 6. Anchoring the ship.	**Performance criteria** 6.1 Precisely calculate ship's swinging circle. 6.2 Importance in choice of anchorage of depth, nature of bottom, number of shackles to be veered out, ships nearby and other factors. 6.3 Take into account ship's characteristics. 6.4 Take into account factors external to ship. 6.5 Perform approach manoeuvre safely and correctly.	

TRAINING OUTLINE

Skill 2 **Navigating a ship in the marine district's confined waters** **Duration: 120 h**

Module 2 **Pilotage in the marine district**

Component 1 At the conclusion of training, the candidate will be capable of **anticipating the ship's behaviour in the marine district's shallow and confined waters**. **Duration: 3 h**

Training environment

In the classroom:

- on the basis of technical documentation, appropriate charts, and established formulas.

Independently:

- practice doing calculations using drill cards.

CONTENT	SUGGESTED METHODS
Applying general knowledge of navigation to the context of the marine district. 1. Types of ships and their navigational particularities when meeting in confined waters. 2. Squat and its effect on ship's behaviour. 3. Manoeuvres for passing and meeting other ships and anticipating the effects of these manoeuvres. 4. Stopping distance and turning circle as a function of depth under keel. 5. Ship's centre of gravity and its effect on ship's behaviour in a twisting passage. 6. Draught increase due to list. 7. Suction at stern and its effect on ship's behaviour.	The material in this entire module should be approached in two ways: in the classroom and in the simulator under the direction of the instructor, and by the candidates independently, in actual situations on the river, under supervision. *Instructor* • Quiz candidates on behaviour of ships in confined waters and plan training accordingly. • Introduce module and its six components. Discuss with the group how the training is organized: candidates will work independently, in the classroom, in the simulator, and on the river. • Briefly review general theoretical knowledge and give calculation exercises applied to the marine district.

	Candidates • On the basis of mathematical formulas and depth under keel: – calculate squat in a wide shallow fairway; – calculate squat in a narrow shallow fairway; – assess effects on ship's behaviour. • Using technical documentation, characteristics of the other ships and those of own ship, anticipate effect of passing and meeting manoeuvres in fairways. • On the basis of manoeuvring characteristics of own ship, assess increased stopping distance and turning circle as a function of depth under keel. • On the basis of ship's stability tables, data on cargo, fuel, stores, and other relevant factors, calculate ship's centre of gravity so as to be able to anticipate possibility and amplitude of list during a sharp turn. • Using relevant technical documentation, calculate increase in draught when ship lists during a rapid change of course.

TRAINING OUTLINE

Skill 2 **Navigating a ship in the marine district's confined waters** **Duration: 120 h**

Module 2 **Pilotage in the marine district**

Component 2 At the conclusion of training, the candidate will be capable of **determining the ship's position with visual and electronic aids while under way and during course changes**. **Duration: 45 h**

Training environment

In the classroom:

- using conventional charts, the Mercator charts used in Skill 1, *Sailing directions*, and other relevant documentation.

In the simulator, for a maximum of four candidates[5]:

- on the basis of departure and arrival coordinates supplied by instructor.

CONTENT	SUGGESTED METHODS
1. Bearings and distances of officially recognized landmarks: – lights; – leading lines; – beacons; – natural features. 2. Means of checking accuracy of beacon and buoy positions. 3. Positioning ship using navigational radar: – bearings; – distances; – hypothetical radar alignments; – racons; – always keep in mind advantages and limitations of using radar. 4. Cities and towns: – location; – names; – visual and radar recognition.	*Instructor* • Introduce various types of visual aids used in the marine district. Various teaching tools can be used, such as videotapes, reference books, marine charts, etc. • Present candidates with techniques for memorizing bearings and distances of visual aids in relation to course. • Stress importance of memorization so as to be prepared to react appropriately in any emergency situation. • Give candidates memorization exercises. • Prepare and present simulator exercises requiring use of radar for positioning.

[5] In the event that the training institution has only one booth equipped with a visual system, only two individuals at a time can work in the simulator; the two others can work on planning their manoeuvres. Use of the simulator must be managed efficiently, taking into account the other training needs of the institution.

5. Known sea or landmarks used for changing courses. 6. ECDIS-generated electronic chart – used as a tool and for checking course at critical points.	• In the simulator, place own ship close to cities and towns in the marine district; project radar images on computer screen and have candidates identify them. *Candidates* • On the basis of charts and relevant documentation, measure: – distances between targets and ship's intended position; – bearings between targets and ship's intended position; – distances and bearings between targets for identification purposes. • Using charts and technical documentation: – determine relative positions of beacons and buoys in relation to easily identifiable natural landmarks; – check accuracy using electronic chart and radar techniques. • Plot ship's position on chart: – by locating conspicuous landmarks using radar; – by measuring distance between these landmarks and own ship. • Locate racons using radar, measure range from own ship, and plot position on chart. • Memorize bearings and ranges of conspicuous radar targets so as to be able to confirm ship's position while under way and at course changing points. • Memorize lateral range to radar landmarks so as to be able to keep to the right of fairway when meeting other ships. • Using radar and hypothetical radar alignments technique, continuously determine position of own ship on chosen course made good. • Using technical documentation and charts, memorize location of agglomerations, whether small groups of houses or larger cities and their suburbs.

	• Using charts, note, measure, and memorize ranges to conspicuous landmarks so as to be able to rapidly confirm ship**'**s position. • Using charts, note, measure, and memorize ranges to known conspicuous landmarks so as to be able to confirm course changing points. This requires memorizing bearings and ranges of at least two visual landmarks that can be observed simultaneously. • During simulation exercises, check ship's position, particularly at course changing points, using visual landmarks and appropriate electronic aids. • Compare with results obtained by conventional methods.

TRAINING OUTLINE

Skill 2 **Navigating a ship in the marine district's confined waters** **Duration: 120 h**

Module 2 **Pilotage in the marine district**

Component 3 At the conclusion of training, the candidate will be capable of **establishing navigation strategies**.[6] **Duration: 12 h**

Training environment

In the classroom and in the simulator:
- teamwork;
- using technical documentation and charts;
- on the basis of passage plans prepared by candidates and scenarios prepared by instructor, with increasing levels of complexity;
- for extreme weather and various other conditions.

On the river:
- under the supervision of a qualified individual.

CONTENT	SUGGESTED METHODS
1. Reviewing types and sources of information necessary for making decisions: – deviations; – traffic; – hazards; – predictable changes in the plan; – navigational aids; – Notices to Shipping; – weather conditions. 2. Applying general theoretical knowledge regarding ship's behaviour learned in Component 1.	In this component, candidates will learn to rapidly analyse information transmitted by the bridge watch regarding various aspects of navigation, keep in mind ship's anticipated behaviour, and make appropriate decisions. *Instructor* • Simulate situations that require prompt reaction. This sharpens candidates' reflexes and tests the effectiveness of alternative navigation strategies. • Simulate meetings in narrow fairways where ships may affect each other. Candidates' strategy will have to take into account the possibility of interaction as well as effect of suction.

[6] It is recommended that Component 4 be taught before this one.

	• Simulate passages at low tide in shallowest fairways in the marine district. Candidates will have to take into account various effects on ship's behaviour, such as normal deceleration, increased turning circle, increased stopping distances – in short, reduced manoeuvring effectiveness. • Simulate extreme navigating conditions – for example: snowstorm with high winds when approaching a particularly difficult area. This will enable the instructor to test the effectiveness of candidates' contingency plans, usually included in passage plan. • Ask candidates to justify decisions at several points during simulations. They should be able to do so on the basis of navigation conditions, local knowledge, and ship's behaviour. Such exercises will prepare them for certification examinations. • Using a report form, note whether or not candidates meet performance criteria set out for this module. • Provide continuous feedback regarding successfully completed aspects as well as areas that need improvement. • Perform individual and group analyses. The simulator's recording and display systems may prove highly useful during these analyses. *Candidates* • Predict how ship will behave in a range of particularly difficult navigating situations and make appropriate decisions. • Calculate ship's squat at speeds normally maintained during passage and prepare strategies, and more especially for very narrow fairways. Refer to passage plan. • Justify decisions in terms of the context.

TRAINING OUTLINE

Skill 2 **Navigating a ship in the marine district's confined waters** **Duration: 120 h**

Module 2 **Pilotage in the marine district**

Component 4 At the conclusion of training, the candidate will be capable of **avoiding obstacles on the course**.[7] **Duration: 45 h**

Training environment

In the simulator:
- teamwork;
- on the basis of passage plans established by candidates and scenarios programmed in the simulator by instructor;
- for various situations, such as the cold season, with risk of spray without floating ice, reduced visibility, difficult weather conditions;
- using charts, technical documentation, and plotting instruments.

On the river, in the marine district:
- under the supervision of a qualified person.

CONTENT	SUGGESTED METHODS
1. Reviewing methods for checking accuracy and reliability of navigational aids: – electronic aids; – visual aids. 2. Known obstacles in the marine district: – location; – navigation strategies for avoiding them. 3. Location of difficult passages in the marine district: – Port of Quebec to Pointe Alliance; – Cap Maillard to Cap aux Oies (Île aux Coudres); – Cap de la Tête aux Chiens to Anse aux Pilotes (mouth of the Saguenay); – caution zone on the open sea at Les Escoumins (converging traffic).	*Instructor* • Set navigating conditions for each simulation exercise on the basis of tides, currents, and traffic, and gradually increase complexity. • Simulate instrument errors during passage to test effectiveness of verification methods candidates have planned to use. • During the simulation exercise, displace certain aids that are likely to move because of external factors, such as bad weather, high tides, strong currents, ship colliding with aid.

[7] In the simulator the candidate should also be able to announce the arrival times required in Component 5.

4. Particularities of difficult passages: – currents; – topography; – weather conditions; – regulations; – rules governing passing and meeting. 5. Safe speed. 6. Safe ranges and bearings. 7. Remind candidates of the importance of staying alert and following established plans as closely as possible.	• Program conditions, such as traffic, weather conditions, etc. requiring speed adjustments. • Periodically test candidates' ability to use memorized data. • With simulation exercises, test appropriateness of candidates' strategies for approaching obstacles. • Check accuracy of steering and heading orders as well as keeping a lookout during simulator exercises. • Assess candidates' ability to keep ship on established course. • Determine whether candidates comply with passage plan and applicable regulations. • Ask candidates to justify decisions at a number of times during simulations. They must be able to do so on the basis of navigating conditions, local knowledge, and ship's characteristics. This exercise will prepare them for certification examinations. • Provide continuous feedback regarding successfully completed aspects, as well as areas that need improvement. • Perform individual and group analyses. The simulator's recording and display systems may prove highly useful during these analyses. *Candidates* • Study data provided by instructor prior to undertaking passage on simulator. Use relevant charts and technical documentation. • Check reliability of navigational aids by using reliable methods. • Check accuracy of floating visual aids using charts and technical documentation.

	• Study charts thoroughly to detect and memorize difficult areas of the marine district. • Determine particularities of these difficult areas so as to be able to negotiate them in complete safety. • Completely memorize bearings and ranges to landmarks best positioned to serve as safety markers in critical spots. • Keep ship on course to be made good by correctly anticipating factors that might cause deviations. • Maintain a safe speed as defined in the rules of the road and local regulations and by own judgment based on experience under way. • Using conspicuous landmarks, keep ship to the right in the fairway when meeting other ships. • Comply with regulations at all times during simulation exercises. During certification examinations, violation of a regulation could lead to automatic failure. • Be constantly alert during passage. The instructor can check alertness during simulation exercises using simulator's recording and display systems. • To prepare for oral examination, justify decisions in terms of the situation.

TRAINING OUTLINE

Skill 2 **Navigating a ship in the marine district's confined waters** **Duration: 120 h**

Module 2 **Pilotage in the marine district**

Component 5 At the conclusion of training, the candidate will be capable of **announcing arrival times at crucial points**.[8] **Duration: 3 h**

Training environment

In the classroom and in the simulator:

- on the basis of exercises relating to estimated times.
- using ship's technical documents, conventional and electronic charts, tide and current tables.

CONTENT	SUGGESTED METHODS
1. Calling-in points in the marine district indicated in regulations. 2. Review general knowledge of factors affecting sailing times: – loading of ship; – tide conditions; – shipping traffic; – weather conditions; – depth under keel. 3. Reviewing calculations to assess speed made good used to estimate arrival times at various crucial points. 4. Communication procedures in force in the marine district.	*Instructor* • Present practical estimating problems that include predicted tidal conditions, anticipated traffic and weather forecasts. Candidates should estimate anticipated arrival times at crucial points in passage, taking into account ship's technical data. • Candidates will use electronic as well as conventional charts to measure distance for each portion of course.

[8] To be taught preferably at the same time as Component 4, *Avoiding obstacles on the course*.

	Candidates • In the classroom, on the basis of ship's technical documents, charts, tide and current tables, and weather forecasts, determine speed made good at any point of passage. • Check estimates by means of simulation exercises. • In the classroom, on the basis of official documentation on communication, note all procedures relevant to information transmission and apply them during simulation exercises.

TRAINING OUTLINE

Skill 2 **Navigating a ship in the marine district's confined waters** **Duration: 120 h**

Module 2 **Pilotage in the marine district**

Component 6 At the conclusion of training, the candidate will be capable of **anchoring the ship**. **Duration: 12 h**

Training environment

In the classroom and in the simulator:

- teamwork;
- using technical documentation, charts and plotting instruments;
- on the basis of data describing the situation.

CONTENT	SUGGESTED METHODS
1. Anchorages in the marine district and their characteristics. 2. Factors to be considered in choosing an anchorage: – available manoeuvring area; – depth; – nature of the bottom; – regulations; – prohibitions. 3. Ship's swinging circle at anchor and ways of establishing it on the basis of factors to be considered: – ship's technical data; – ships nearby; – anticipated weather conditions; – length of chain to be veered out; – tides. 4. Ship's manoeuvring characteristics to be taken into consideration.	*Instructor* • Program simulations with difficult weather conditions and various anchorages. *Candidates* • Memorize designated anchorages and their characteristics: – depth; – nature of the bottom; – extent of available manoeuvring area. • Analyse ship's technical data with respect to: – ship's turning circle in relation to various load conditions; – stopping distances as a function of engine commands and load conditions; – capacity of anchor gear.

	• On the basis of charts and data provided, calculate ship's turning basin including a safety margin for factors to be taken into account. • Taking into account information obtained from Vessel Traffic Services on depth of water, which will help to determine the number of shackles to be veered out, choose an anchorage that will meet both current and anticipated needs.

4.4 Module 3: Emergency manoeuvres

Module: 3	Emergency manoeuvres	Duration: 30 h
OBJECTIVE		**STANDARD**
Statement of skill Carrying out emergency manoeuvres specific to the marine district		**Training environment** • Teamwork • For emergency situations in the marine district such as breakdowns, collision, grounding, fire, taking on water, search and rescue operations, shipwrecks, man overboard. • On the basis of data on: – type of ship; – emergency situation; – ship's position; – additional and random factors. • Using: – passage plan; – navigating instruments such as ECDIS-generated electronic chart; – emergency procedures in the International Safety Management Code (ISM).
Skill component 1. Planning emergency manoeuvres.		**Performance criteria** 1.1 Adapt standard manoeuvres to reflect ship's position in the marine district and type of emergency. 1.2 Meticulously identify high-risk areas in the marine district. 1.3 Judiciously select times for emergency plan drills.

Module: 3	Emergency manoeuvres	Duration: 30 h
OBJECTIVE	**STANDARD**	
Skill component 2. Deciding on emergency manoeuvres.	**Performance criteria** 2.1 Rapidly analyse all the data. 2.2 Take into account environmental risks. 2.3 Assess appropriateness of action to be taken in relation to characteristics of the environment. 2.4 Assess appropriateness of decision to use a secondary fairway. 2.5 Give clear and precise orders. 2.6 Maintain self-control and objectivity.	
Skill component 3. Carrying out towing manoeuvres.	**Performance criteria** 3.1 Assess appropriateness of decision to tow or to be towed. 3.2 Perform manoeuvres appropriate to narrowness of fairway: – while under tow; – while towing. 3.3 Correctly adjust length of tow, taking into account situation and ship's position. 3.4 Comply strictly with applicable laws and regulations.	

TRAINING OUTLINE

Skill 3 **Carrying out emergency manoeuvres specific to the marine district** **Duration: 30 h**

Module 3 **Emergency manoeuvres**

Component 1 At the conclusion of training, the candidate will be capable of **planning emergency manoeuvres**. **Duration: 9 h**

Training environment

In the classroom and in the simulator:

- for emergency situations such as breakdowns, collisions, groundings, fires, taking on water, search and rescue operations, shipwrecks, man overboard;
- teamwork;
- on the basis of data provided by instructor;
- using emergency procedures in the International Safety Management Code (ISM).

Note: All data in the module training outlines relate to the marine district under study.

CONTENT	SUGGESTED METHODS
1. Reviewing types of emergencies and reminding candidates of the need to be ready for any contingency. 2. High-risk areas in the marine district. 3. Adapting standard manoeuvres. 4. Procedures: – notify Vessel Traffic Services; – security call. 5. Preparing emergency orders appropriate to the ship.	*Instructor* • Introduce module and its three components. Discuss with the group how the training is organized: candidates will work independently, in the classroom, and in the simulator. • Present an audio-visual document about various accidents that have occurred in the marine district. • Analyse them with candidates and discuss possible factors. • Remind candidates of the value of preparing emergency orders that are appropriate for the ship and the marine district. Preparing and practising emergency orders provides a solid base if the trouble is taken to do them properly. A well-prepared officer can rapidly handle deviations required by random factors.

	• Present types of emergencies and various cases that candidates will work on in groups of two. They will adapt standard emergency manoeuvres to their own ship. • Analyse with whole group emergency orders that candidates prepared in groups of two. • Present some simulation scenarios and, with candidates, test effectiveness of contingency manoeuvres. For example, during meeting in narrow fairway, oncoming ship goes out of control. *Candidates* • In groups of two, adapt standard emergency manoeuvres to own ship so as to be prepared to react appropriately to any contingency in the marine district: – identify areas of high risk in the marine district from charts and relevant documentation; – prepare scenarios for various emergency situations in terms of type of ship, its position in the marine district, and navigating conditions. • Test effectiveness of some contingency manoeuvres by means of simulation exercises with the help of instructor. • To complete planning, indicate appropriate moments for implementing emergency manoeuvres on the river or in the simulator.

TRAINING OUTLINE

Skill 3 **Carrying out emergency manoeuvres specific to the marine district** **Duration: 30 h**

Module 3 **Emergency manoeuvres**

Component 2 At the conclusion of training, the candidate will be capable of **deciding on emergency manoeuvres**. **Duration: 15 h**

Training environment

In the classroom and in the simulator:

- for emergency situations such as breakdowns, collisions, groundings, fires, taking on water, search and rescue operations, shipwrecks, man overboard;
- teamwork;
- on the basis of scenarios provided by the instructor, and passage plans;
- using standardized vocabulary document for communications on the bridge.

CONTENT	SUGGESTED METHODS
1. Reviewing procedures in emergency situations. 2. Reviewing factors to be taken into account. 3. Safeguarding human life. 4. Possibly devastating effects of an accident on the environment. 5. Desirable attitudes, such as self-control, decisiveness, effective management of human and material resources, coherence in the various stages of execution, compliance with procedures. 6. Factors affecting the decision to use a secondary fairway.	*Instructor* • Prepare various scenarios, indicating type of emergency, type of ship, its position in the marine district and navigating conditions. • In simulation, it is possible to create, for example, navigation scenarios where the logical and safe manoeuvre is deviation from course into secondary fairway. • Record candidates' exercises while in the simulator. • View exercises, evaluate candidates' behaviour in terms of self-control and objectivity of decisions. • Ask candidates to justify decisions. They should be able to do so on the basis of local knowledge, ship's behaviour, and situations presented in scenarios. This justification exercise will prepare them for certification examinations. • Encourage discussion for the main purpose of self-criticism and, if necessary, to bring the group closer together.

	Candidates • In the simulator, practice various scenarios prepared by instructor. This will enable candidates to test their theoretical knowledge and build their confidence. • Rapidly analyse data: – using visual and electronic navigational aids and relevant documentation; – taking into account emergency conditions and various players involved. • Before performing any manoeuvre, take into account potential environmental effect. In some cases, the “lesser of two evils” must be chosen. • Determine appropriateness of using secondary fairway. • Take action deemed most appropriate for avoiding a dangerous situation. • Give precise and clear orders in compliance with communication protocol.

TRAINING OUTLINE

Skill 3 **Carrying out emergency manoeuvres specific to the marine district** **Duration: 30 h**

Module 3 **Emergency manoeuvres**

Component 3 At the conclusion of training, the candidate will be capable of **carrying out towing manoeuvres**. **Duration: 6 h**

Training environment

In the classroom and in the simulator:

- for unexpected tow situations;
- using specialist reference works on towing and special local conditions;
- using charts, technical documentation, and regulations.

CONTENT	SUGGESTED METHODS
1. Factors determining whether or not to use a tug: – types of ships in question; – ship's position; – regulations; – operating conditions; – weather conditions, etc. 2. Towing manoeuvres in a narrow fairway. 3. Factors influencing length of tow: – ship's position; – type of ship; – action of swell; – wind resistance; – wind direction; – currents; – sheer and yaw of towed ship; – type of hawsers available (elasticity, tensile elongation to breaking point). 4. Applicable laws and regulations. 5. Co-operation between masters and pilots.	*Instructor* • Test candidates' knowledge of common towing manoeuvres. • As far as the simulator permits, prepare emergency scenarios for the following situations: – while towing a ship; – while under tow. *Candidates* • Commit to memory regulations specific to the marine district. • Study the proposed emergency situation. • Analyse all factors affecting the manoeuvre and decide whether or not to use towing. • Justify your choice referring to factors to be taken into account, local knowledge and ship's probable behaviour.

	• In the simulator, perform appropriate manoeuvres while complying with safety regulations during such movements: – while under tow; – while towing. • Cooperate with master of tug, role to be played by instructor in the simulator, when under tow. Switch roles and give those instructions yourself. • Adjust length of tow as a function of: – local knowledge; – environmental conditions; – type of gear available; – types of ships involved.

4.5 Module 4: Pilotage in ice

Module: 4	Pilotage in ice	Duration: 30 h
OBJECTIVE	**STANDARD**	
Statement of skill Deciding which measures to take for ice navigation.	**Working context** • Teamwork. • Using weather information and Notices to Shipping. • Using data on ship type and classification. • Using applicable documentation.	
Skill component 1. Reading ice charts.	**Performance criteria** 1.1 Determine nature of ice using international and Canadian codes. 1.2 Properly identify location of ice in the marine district.	
Skill component 2. Recognizing hazards specific to the marine district.	**Performance criteria** 2.1 Accurately describe ice conditions specific to the marine district, such as: – location and timing of ice formation; – causes and locations of ice jams; – stretches of fast ice; – effect of wind on ice build-up. 2.2 Accurately identify critical locations in the marine district. 2.3 Accurately predict ice movement. 2.4 Accurately identify potential hazards such as floating ice loosened from tidal flats. 2.5 Take emergency action dictated by risks inherent in navigating in ice.	

Module: 4	Pilotage in ice	Duration: 30 h
OBJECTIVE	**STANDARD**	
Skill component 3. Analysing the factors that influence navigation.	**Performance criteria** 3.1 Take into account ship's characteristics. 3.2 Take into account data on ice and navigating conditions. 3.3 Recognize criteria limiting radar use in ice conditions. 3.4 Decide what preventive action to take in shallow waters in winter. 3.5 Establish strategies with engine room in case sea suction filters become obstructed. 3.6 Accurately identify unfavourable conditions anticipated during passage. 3.7 Take into account weather factors that could hamper accurate identification of ice conditions. 3.8 Take into account effect ship's speed can have on fast ice along the shore.	

Module: 4	Pilotage in ice	Duration: 30 h
OBJECTIVE	**STANDARD**	
Skill component 4. Determining strategies for navigation under escort and with an icebreaker.	**Performance criteria** 4.1 Correctly assess need for icebreaker assistance. 4.2 Correctly determine availability and position of icebreakers in the marine district. 4.3 Maintain constant two-way radio watch on established frequency in escort situations. 4.4 Closely co-operate with icebreaker captain. 4.5 Correctly interpret sound, visual, and radio signals specifically used in communications with an icebreaker. 4.6 When in convoy, strictly maintain distance between ships ordered by commander of operations. 4.7 Correctly anticipate escorting icebreaker's manoeuvres.	
Skill component 5. Determining strategies for navigation without escort.	**Performance criteria** 5.1 Judiciously select best courses. 5.2 Accurately assess speed for entering ice when navigating without escort. 5.3 Maintain a speed that will keep ship under control at all times. 5.4 Accurately gauge best time to negotiate a difficult passage. 5.5 Take traffic into account before undertaking a difficult passage. 5.6 Clearly identify conditions dictating recourse to an icebreaker.	

TRAINING OUTLINE

Skill 4 **Deciding which measures to take for ice navigation** **Duration: 30 h**

Module 4 **Pilotage in ice**

Component 1 At the conclusion of training, the candidate will be capable of **reading ice charts**. **Duration:** [9]

Training environment

In the classroom, independently, in the simulator, if available:

- teamwork;
- on the basis of charts obtained daily from the Canadian Ice Service, and relevant documentation;
- using multimedia documents on CD-ROM on ice navigation.

CONTENT	SUGGESTED METHODS
1. Ice charts, nature, and interpretation.	*Instructor* • Introduce the module. • For learning purposes, use of the international ice code is recommended, supplemented by local updates from the Canadian Ice Service. A video shot in the marine district would enable candidates to associate codes with pictures, thereby making them easier to remember. *Candidates* • On the basis of charts received from the Canadian Ice Service, decode the information so as to establish nature of ice conditions in the marine district. • Locate ice in the marine district. Establish, according to codes on charts, the nature and concentration of the ice. This exercise will help to decide what measures have to be taken for navigating in ice.

[9] The duration of each component will be determined by the instructor in charge of the module.

TRAINING OUTLINE

Skill 4 **Deciding which measures to take for ice navigation** **Duration: 30 h**

Module 4 **Pilotage in ice**

Component 2 At the conclusion of training, the candidate will be capable of **recognizing hazards specific to the marine district**. **Duration:**

Training environment

In the classroom or independently, if a multimedia document on CD-ROM is available:
- using relevant documentation.

CONTENT	SUGGESTED METHODS
1. Hazards specific to the marine district: – location and timing of ice formation; – cause, location, and timing of ice jams; – stretches of fast ice; – effects of wind on ice concentration. 2. Factors affecting ice movement: – topography; – tides; – currents; – winds; – ship movements; – icebreaker activity; – ice jams; – temperature changes. 3. Potential hazards: – ice fields; – fast ice that could come loose; – tidal flat ice, which is very dangerous when loose. 4. Specific emergency action.	*Instructor* • On the basis of conventional charts, ice charts, information drawn from relevant documentation, describe the specifics of the marine district. • Candidates can learn in the classroom or independently by studying topography, using background information available in relevant documentation and recent information obtained from the Canadian Ice Service. *Candidates* • On the basis of ice charts, topography, and the history of ice formation in the marine district, available documentation, local knowledge and information obtained from appropriate services, make note of critical areas in the marine district and commit information to memory. • Examine each factor that could affect ice movement and make best guess as to anticipated sequence of events. • Make note of potential hazards.

	• After examining all relevant criteria, including anticipated traffic, quantity, and type, take appropriate measures before undertaking the passage through the marine district. • Candidates can work in the classroom or independently.

TRAINING OUTLINE

Skill 4 **Deciding which measures to take for ice navigation** **Duration: 30 h**

Module 4 **Pilotage in ice**

Component 3 At the conclusion of training, the candidate will be capable of **analysing the factors that influence navigation**. **Duration:**

Training environment

In the classroom or independently, if a multimedia document on CD-ROM is available:
- using relevant documentation.

CONTENT	SUGGESTED METHODS
1. Sources of information: – technical documentation; – Vessel Traffic Services; – weather data; – ice charts. 2. Factors affecting navigation: – ship's manoeuvring ability; – weather conditions; – vessel traffic; – nature and concentration of ice; – stage of tide; – strength and set of currents; – depth under keel. 3. Use of radar: – limits in radar performance; – risk of erroneously interpreting ice returns. 4. Preventive action in shallow waters. 5. Best time for negotiating shallow fairways. 6. Obstruction of sea suction filters.	For this component, candidates can work in the classroom or on their own, if a multimedia document on CD-ROM is available. *Candidates and instructor, as the case may be* • On the basis of technical documentation, assess ship's manoeuvring ability. On the basis of data regarding ice conditions in the marine district, assess effect of all factors external to ship on its ability to safely negotiate planned passage. • On the basis of available technical documentation, weather conditions, nature of ice conditions, determine criteria affecting radar performance in ice conditions: range, detection, false readings, false echoes, etc. • On the basis of information obtained from Vessel Traffic Services and other ships, ice charts and local knowledge, take into account conditions affecting navigation. Analyse all factors and make decision based on best guess.

7. Potentially adverse conditions. 8. Effects of ship's speed on tidal flat ice.	• According to conventional and electronic charts, ship's draught, nature and concentration of ice, weather conditions, stage of tide, strength and set of currents and anticipated traffic, determine preventive action for navigating in shallow waters. Determine best time for negotiating shallow fairways. • By observing ice and in consultation with engine room, determine whether it is necessary to warn duty engineer that sea suction filters might become obstructed with ice. Candidates can work in the classroom with a tutor or independently. • Using information received from Vessel Traffic Services and other ships in the area, and on the basis of weather forecasts, stage of tide, and strength and set of current, depth under keel at various points along passage, and anticipated traffic, determine adverse conditions likely to be encountered during passage. Candidates can work in the classroom with a tutor or independently. • According to weather forecasts, information about nature of ice and technical characteristics of radar used, take into account the possibility that readings could be misinterpreted, which would lead to an incorrect identification of ice conditions. Take into account the fact that, because of absorption and diffraction, large concentrations of ice may not return enough echo to the radar antenna to be detected. Candidates can work in the classroom with a tutor or independently. • According to knowledge of ship, nature of fast ice and stage of tide, take into account effect of excessive speed when passing close to a stretch of fast ice. Candidates can work in the classroom with a tutor or independently.

TRAINING OUTLINE

Skill 4 **Deciding which measures to take for ice navigation** **Duration: 30 h**

Module 4 **Pilotage in ice**

Component 4 At the conclusion of training, the candidate will be capable of **determining strategies for navigation under escort and with an icebreaker**. **Duration:**

Training environment

In the classroom or independently:

- using applicable documentation and a multimedia document on CD-ROM, if available.

CONTENT	SUGGESTED METHODS
1. Reviewing general knowledge regarding factors that determine when to use an icebreaker. 2. Reviewing sound, visual, and radio signals specifically used in communications with an icebreaker. 3. Reviewing regulations and standard manoeuvres used in navigating under icebreaker escort. 4. Using radar to maintain agreed distance from icebreaker or between ships in convoy.	Methods will be based on available teaching tools: a) a videotape on ice conditions in the marine district, with commentary by the instructor, could be shown to candidates; b) An ice condition simulator is being developed and could be used, when available; c) A multimedia document on CD-ROM is being developed and could also be used, when available.

TRAINING OUTLINE

Skill 4 **Deciding which measures to take for ice navigation** **Duration: 30 h**

Module 4 **Pilotage in ice**

Component 5 At the conclusion of training, the candidate will be capable of **determining strategies for navigation without escort**. **Duration:**

Training environment

In the classroom.

CONTENT	SUGGESTED METHODS
1. Factors to be taken into account when making course choices: – traffic; – concentration, nature, and anticipated movement of ice; – tides and currents; – weather conditions. 2. Safe speed: – for entering ice; – for maintaining control of ship. 3. Difficult passages and negotiating manoeuvres. 4. Ice navigating systems, conventional or polarized radar, as well as SAR and NOAA imageries, etc.	Methods will be based on available teaching tools: a) a videotape on ice conditions in the marine district, with commentary by the instructor, could be shown to candidates; b) an ice condition simulator is being developed and could be used, when available; c) a multimedia document on CD-ROM is being developed and could also be used, when available.

4.6 Module 5: Docking manoeuvres

Module: 5	Docking manoeuvres	Duration: 30 h
OBJECTIVE		**STANDARD**
Statement of skill Carrying out docking manoeuvres.		**Working context** • Teamwork. • For docking and departure manoeuvres at wharves or wharf complexes in the marine district. • On the basis of data on type of ship, its position, and additional and random factors. • Using a passage plan, navigating instruments including ECDIS-generated electronic chart, wharf plans, technical documents. • In compliance with regulations.
Skill component 1. Planning manoeuvres.		**Performance criteria** 1.1 Accurately assess ship's manoeuvring ability. 1.2 Make note of relevant details regarding wharves, harbour facilities, and services available in the marine district. 1.3 Accurately determine size and features of manoeuvring area. 1.4 Make detailed note of available navigational aids. 1.5 Take into account: – water depth at wharfside; – weather factors; – capacity of ship's gear and hawsers; – other ships berthed nearby; – information obtained from Vessel Traffic Services. 1.6 Account for hydrodynamic effects on ship of stage of tide.

Module: 5	Docking manoeuvres	Duration: 30 h
OBJECTIVE		**STANDARD**
Skill component 2. Assessing the need to use a tug.		**Performance criteria** 2.1 Take into account tug's capacity. 2.2 Take into account harbour regulations. 2.3 Make a sound decision.
Skill component 3. Getting under way and docking manoeuvres.		**Performance criteria** 3.1 Follow the plan. 3.2 Perform manoeuvres safely and correctly. 3.3 Comply with harbour regulations.

TRAINING OUTLINE

Skill 5 **Carrying out docking manoeuvres** **Duration: 30 h**

Module 5 **Docking manoeuvres**

Component 1 At the conclusion of training, the candidate will be capable of **planning manoeuvres**. **Duration: 9 h**

Training environment

In the classroom:

- on the basis of scenarios describing operating parameters and information obtained from Vessel Traffic Services;
- on the basis of the characteristics specific to each candidate's ship;
- using ship's technical documentation; books on wharves and harbour facilities in the marine district; documentation on regulations; marine charts; tidal almanacs; tidal current charts.

Note: All data in the module training outlines relate to the specific marine district.

CONTENT	SUGGESTED METHODS
1. Reviewing general information regarding factors affecting manoeuvres at wharves. 2. Specifics of wharves and harbour facilities: – location; – types of wharves; – tidal currents indicated on charts; – local currents; – wharf sheltered or not; – environment, etc. 3. Characteristics of manoeuvring area for each wharf. 4. Known visual navigational aids at each wharf, such as steering lights, leading lines, buoys, etc.	*Instructor* • Introduce module and its objectives. • Lead a group discussion that will enable candidates to demonstrate their knowledge of: – wharves and harbour facilities in the marine district; – hazards specific to each facility; – manoeuvring characteristics of their respective ships, etc. • With the group, go over factors that have to be taken into account when planning manoeuvres at wharves. • Provide scenarios for situations requiring planning, as well as relevant instructions.

5. Local information required for planning: – water depth at wharfside, depending on tides; – weather; – information provided by Vessel Traffic Services. 6. Information on ship, capacity of its docking gear.	• Help candidates with planning. • Provide candidates with feedback on their plans. • Make a group analysis. *Candidates* • Analyse scenario and factors to be taken into account. • Consult applicable technical documentation for ship's manoeuvring characteristics. • Look up in appropriate reference works specifics of wharves and harbour facilities in the marine district, as well as available services. • Consult marine charts for extent and characteristics of manoeuvring area. • Look up tides information. • In teams, establish manoeuvring plans that take into account usual and random factors.

TRAINING OUTLINE

Skill 5 **Carrying out docking manoeuvres** **Duration: 30 h**

Module 5 **Docking manoeuvres**

Component 2 At the conclusion of training, the candidate will be capable of **assessing the need to use a tug**. **Duration: 3 h**

Training environment

In the classroom:
- using books on towing in the marine district.

CONTENT	SUGGESTED METHODS
1. Reviewing general knowledge regarding factors determining whether to use a tug. – local characteristics; – tide; – currents; – ships at wharfside; – regulations, etc. 2. Types of tugs, their capacities, service fees. 3. Harbour regulations.	*Instructor* • Review general theoretical knowledge regarding factors involved in deciding whether to use a tug, general knowledge that comes under the skill *performing emergency manoeuvres.* • Give various examples and analyse which decision would be most appropriate in each case. A scenario, preferably pre-recorded, could be presented in the simulator and analysed by the group.

TRAINING OUTLINE

Skill 5 **Carrying out docking manoeuvres** **Duration: 30 h**

Module 5 **Docking manoeuvres**

Component 3 At the conclusion of training, the candidate will be capable of **getting under way and docking manoeuvres**. **Duration: 18 h**

Training environment

In the simulator:
- using candidates' docking plans;
- using scenarios supplied by instructor, including data about ship's position and factors to be taken into account.

CONTENT	SUGGESTED METHODS
1. Reviewing general knowledge regarding types of manoeuvres on the basis of types of ships, navigating conditions, and characteristics of wharves and harbour facilities. 2. Specific regulations at certain wharves. 3. Rules of communication and specific sound signals.	*Instructor* • Check manoeuvring plans developed by candidates under Component 1 and discuss. • Conduct a pre-programmed demonstration. Explain the principles underlying docking and departure procedures. • Gradually increase level of difficulty in programming the simulator. • Incorporate simulation exercises. • Analyse completed exercises with candidates, noting strong points and areas requiring improvement. • Alternate simulator exercises with periods of analysis. *Candidates* • Perform manoeuvre complying as much as possible with all aspects of plan.

4.7 Module 6: Managing bridge resources

Module: 6	Bridge resource management	Duration: 30 h
OBJECTIVE		**STANDARD**
Statement of skill Bridge resource management.		**Working context** • Teamwork. • Using: – passage plan; – navigating instruments including an ECDIS-generated electronic chart; – technical documentation.
Skill component 1. Analysing events that lead up to accidents.		**Performance criteria** 1.1 Accurately analyse human factors contributing to accidents. 1.2 Determine appropriate preventive action. 1.3 Analyse in detail the chain of errors and how to break it.
Skill component 2. Communicating with the ship's crew.		**Performance criteria** 2.1 Recognize factors that help and hinder a healthy working atmosphere. 2.2 Observe strict rules for sending and receiving information.
Skill component 3. Taking a leadership role.		**Performance criteria** 3.1 Firm direction of watch during planned passage. 3.2 Controlled organization of teamwork. 3.3 Establish effective group synergy.
Skill component 4. Working as part of a team.		**Performance criteria** 4.1 Assign specific roles to bridge watch. 4.2 Respect organization during passage.
Skill component 5. Developing emergency procedures.		**Performance criteria** 5.1 Encourage active participation by bridge watch in development of emergency orders. 5.2 Conduct appropriate planning for periodic updating of acquired knowledge.

TRAINING OUTLINE

Skill 6 **Bridge resource management** **Duration: 30 h**

Module 6 **Managing bridge resources**

Component 1 At the conclusion of training, the candidate will be capable of **analysing events that lead up to accidents**. **Duration:**[10]

Training environment

In the classroom:

- using accident reports presented by instructor and commented on by all participants.

CONTENT	SUGGESTED METHODS
1. Human factors contributing to accidents: – contradictory data; – disagreement between watch members; – available relevant information not evaluated; – course plan not followed; – distraction; – failure to follow communication protocol; – inadequate organization; – failure to monitor ship's progress; – etc. 2. Chain of errors and how to break it.	*Candidates and instructor* • Analyse human factors contributing to accidents. When a shipping accident occurs in Canadian waters, the Marine Investigation Branch of the Transportation Safety Board prepares a public report. Analysis of these reports makes it possible to target and extract some of the human factors directly or indirectly responsible for accidents. To be performed in the classroom, with the help of the instructor. • After analysing case studies, discuss preventive methods. Once the elements that contributed to the accident have been identified, examine what steps would have ensured safe navigation. This is performed in the classroom with the help of the instructor.

[10] The duration of each component will be determined by the instructor in charge of the module.

	• An accident attributable to human factors is often the result of a succession of errors called the “chain of errors”. Using case studies, examine successive factors that contributed to the accident. Show how this chain could have been broken. *Note* Regarding the three preceding paragraphs, an excellent demonstration method would be to reproduce accidents in the simulator, presenting them on the screen with comments from the instructor, followed by a group analysis at the end.

TRAINING OUTLINE

Skill 6 **Bridge resource management** **Duration: 30 h**

Module 6 **Managing bridge resources**

Component 2 At the conclusion of training, the candidate will be capable of **communicating with the ship's crew**. **Duration:**

Training environment

In the classroom:
- for theory;
- for analysis and feedback.

In the simulator:
- on the basis of simulated passages where candidates work on communication with the bridge watch;
- using passage plans, technical documentation, and instructions from instructor.

CONTENT	SUGGESTED METHODS
1. Reviewing protocol for communicating with bridge watch. 2. Communicating with bridge watch: – factors that promote a healthy working atmosphere; – compliance with communication procedures; – establish standard techniques for transmitting information and orders depending on number of persons on bridge; – reduce factors that can be distracting, such as noise level, for example; – improve physical environment if possible.	*Instructor* • Introduce theory. The ability to transmit includes the ability to receive. In other words, when information is transmitted to someone, that individual must acknowledge receipt in accordance with a code or an approved method that everyone is familiar with. • During simulation exercises, record conversations of bridge watch and analyse them at the end of exercise. Note all breaches of procedure as well as superfluous communications. This is done in the classroom with the help of the instructor. • It is also possible to videotape simultaneously in order to review points where obvious errors were made.

	Candidates • In the simulator, navigate passages in co-operation with bridge watch, applying communication techniques and procedures. • Discuss with group factors that promote a healthy working atmosphere. Apply principles while simulating passages. • Eliminate, or reduce to a minimum, factors that hinder effective communication.

TRAINING OUTLINE

Skill 6 **Bridge resource management** **Duration: 30 h**

Module 6 **Managing bridge resources**

Component 3 At the conclusion of training, the candidate will be capable of **taking a leadership role**. **Duration:**

Training environment

In the classroom:
- for theory;
- for analysis and feedback.

In the simulator:
- on the basis of simulated passages carried out in teams, where each member takes his/her turn at assuming the responsibilities of the leader;
- using passage plans, technical documentation, and instructions from instructor.

CONTENT	SUGGESTED METHODS
1. Characteristics of effectively organized teamwork on bridge: – compliance with organization chain-of-command chart; – clearly assigned roles and tasks; – clear procedures; – effective group synergy, etc. 2. Leadership role on bridge watch team: – planning; – organizing; – directing, supervising; – monitoring. 3. Means of creating synergy for ensuring safe and effective navigation: – brief, articulate communications; – rapid, precise positioning; – maintaining surest and most economical course.	*Instructor* • In the simulator, present case studies showing lack of leadership. Perform group analysis of errors committed. • Prepare and supervise simulation exercises. • Record simulation exercises on video and audio and review parts that relate to objectives, noting instances where leadership is obviously lacking. This can be done with self-critique, with the help of the instructor and comments made by the group. • Note whether actions and means used by leader and bridge watch demonstrate a combined effort, creating effective group synergy.

4. Responsibilities of leader: – call meeting of bridge watch before undertaking passage; – review passage plan; – assign roles; – undertake passage adhering strictly to established procedures; – bring to order any members of watch who stray from assigned roles or fail to follow procedures established by common consent. 5. Leader's attitudes: – personal discipline; – respect for others; – firmness; – competence; – technical talents; – organizational skills; – planning skills; – sound judgment; – sense of democracy.	*Candidates* • Organize work of bridge watch. • Call meeting before undertaking passage to: – assign roles to bridge watch, taking into account individual ability and experience, considering possible interchangeability of roles; – establish procedures; – clarify any controversial point prior to departure; – ensure that each understands what is expected of him; – explain clearly leadership role and kind of support each can expect. • Ensure passage plan is followed during exercise. • Analyse finished passage with bridge watch. Note human factors that helped or hindered.

TRAINING OUTLINE

Skill 6 **Bridge resource management** **Duration: 30 h**

Module 6 **Managing bridge resources**

Component 4 At the conclusion of training, the candidate will be capable of **working as part of a team**. **Duration:**

Training environment

In the classroom
- for theory;
- for analysis and feedback.

In the simulator:
- on the basis of simulated passages carried out in teams;
- using passage plans, technical documentation, and instructions from instructor.

CONTENT	SUGGESTED METHODS
1. Organizing teamwork: – number of individuals available; – individual competence; – navigating equipment; – nature and location of operations; – operating conditions.	This component is closely linked to Component 3. Both can be covered simultaneously, depending on individual roles on bridge watch. See suggested methods in preceding training outline.

TRAINING OUTLINE

Skill 6 **Bridge resource management** **Duration: 30 h**

Module 6 **Managing bridge resources**

Component 5 At the conclusion of training, the candidate will be capable of **developing emergency procedures**. **Duration:**

Training environment

In the classroom:
- for various navigating and emergency situations;
- using technical documentation.

CONTENT	SUGGESTED METHODS
1. Possible emergency situations. 2. Need to prepare emergency orders. 3. Steps bridge watch must take in each emergency situation. 4. Emergency plans as an integral part of passage plan as a whole.	Preparing emergency orders was covered in Module 3. Test candidates' knowledge and plan training accordingly. *Instructor* • Discuss with group need to develop orders for dealing with emergency situations. • Provide exercises dealing with preparing emergency orders and instructions regarding teamwork. • The instructor can introduce the topic of emergency orders and, by way of example, present existing orders used on certain ships. Authorization to use these orders should be obtained from the appropriate sources. Orders prepared by candidates will be analysed in the classroom. • Analyse quality of teamwork on the basis of: – results achieved in performing task; – how tasks were performed; – working atmosphere.

	• Provide feedback to teams about strong points and areas for improvement, and make suggestions. • Lead a discussion on lessons covered in this exercise. • Emphasize need to practice emergency procedures. Emergency orders prepare people to respond promptly to an incident that could have dramatic repercussions. To make these orders into effective tools, they have to be implemented in practice periodically. Encourage candidates to practice dealing with foreseeable emergencies on a regular basis. *Candidates* • On the basis of: – official documentation covering conduct of ships; – instructions from ship owner; – Master's requirements; – ship's manoeuvring characteristics; – types of cargo and various weather conditions. • Prepare emergency orders that will provide bridge watch with guidance enabling them to react rapidly in an emergency or unusual situation. • Perform an individual self-evaluation of work performed in a team.

5 BIBLIOGRAPHY

- Notices to Mariners
- Sailing Directions
- Tide Tables
- Current Tables
- Radio Aids to Navigation
- List of Lights, Buoys and Fog Signals
- A Pilotage Primer, by Captain J. Wilhelm
- Behaviour of Ships in the Narrow and Confined Channels of the St. Lawrence River
- Stopping Distances of Ships
- Theory and Practice of Manoeuvres, by G. Danton
- Stability of Ships (41 volumes available in the library)
- Regulations for Preventing Collisions … by L. Rhéaume
- Symbols and Abbreviations (Chart Number 1)
- TP 968E, Canadian Navigational Aids System
- TP 4330, Standard Marine Navigation Vocabulary
- TP 13067 (replacing TP 1018, Recommended Code of Nautical Procedures and Practices), Canadian Watchkeeping Standards
- TP 3175E, French-English Lexicon
- TP 13117, Training Program in Bridge Resource Management
- Bridge Procedures Guide
- Recommendations respecting fundamental principles and directives on the conduct of ships to be observed during the bridge watch (IMO, STCW Code)
- TP 5064, Ice Navigation in Canadian Waters
- Climatological Charts for the St. Lawrence
- Manice, Manual on Recognizing Ice Formations
- Manab, Manual of Abbreviations
- Climatology of Ice Thickness
- C. 1263, General Pilotage Regulations
- C. 1268, Laurentian Pilotage Authority Regulations

Note

- This list is not exhaustive and will be completed during training. Numerous other reference works can be consulted, at the candidates' discretion.
- We have not listed works on navigational aids, of which many are available to candidates.
- The instructor will help candidates to choose reference works.

PART 6

Evaluation Guide

November 1999

TABLE OF CONTENTS

1 EVALUATION GUIDE – INTRODUCTION

The purpose of the *Evaluation Guide* is to set out the specifics of the pilotage certification examination. It is aimed at evaluators as well as at instructors in the training program preparing candidates for certification. It covers all the skills in the training program.

Essential skills for qualifying for basic certification are as follows:

1. Planning the passage into the marine district;
2. Navigating a ship in the marine district's confined waters;
3. Carrying out emergency manoeuvres specific to the marine district.

Skills 4 and 5, which have been added to basic certification, are as follows:

4. Deciding which measures to take for ice navigation;
5. Carrying out docking manoeuvres.

Skill 6, *Bridge resource management*, does not fall under the purview of the Laurentian Pilotage Authority.

This Guide consists of two sections. The first section contains general information about evaluation. The second section contains the evaluation checklists for each test. These tests measure the extent to which the skills described in the training program have been mastered.

2 TERMINOLOGY

Test
Written, oral, or practical exercise performed by a candidate as part of an examination or competition for the purpose of evaluating his or her abilities and knowledge.

Practical test
Used to evaluate a work product or process.

Practical knowledge test
Used to evaluate knowledge directly linked to the job function.

Cognitive skills
Relate to the knowledge and the intellectual ability needed to perform a job function – i.e., the mental functions involved in perceiving, understanding, and knowing.

Psychomotor skills
Relate to the performance of an activity or a task – i.e., the dexterity required by various procedures.

Interactive social behaviour
Relates to attitudes and work habits – i.e., the way in which an individual relates to his or her environment.

Program
Integrated set of learning activities carried out with a view to meeting training objectives as measured against established standards.

Skill
A skill is *an integrated set of the knowledge, abilities, attitudes, and perceptions necessary to perform a task or a work activity at the threshold of performance required.*

Objective
Skill to be learned and mastered.

Standard
Level of performance, considered to be the threshold of success by which it is recognized that an objective has been met.

In-training evaluation
Evaluation performed during training. It enables the learning process to be tracked, to determine the candidate's strong and weak points, and to take corrective action as necessary.

Post-training evaluation
Takes place after the conclusion of training with a view to certification and makes it possible to assess the level of skill achieved.

3 SECTION ONE – GENERAL INFORMATION ON EVALUATION

3.1 Principles of evaluation

In this section, we set out some guiding principles for activities leading to certification.

The concept of skill

Candidates are evaluated on how well they have mastered each skill (see the section on Terminology for a definition) described in the training program.

Curriculum-based approach

The evaluation of learning is part of an extended process including:

- an analysis of the work environment;
- a description of the objectives and standards used in the training program;
- a specific statement of course content and teaching/learning methods as set out in the *Training Guide*;
- a definition of evaluation targets and strategies as set out in this guide.

Criterion-based interpretation

"Criterion-based interpretation makes it possible to establish an individual's learning level in terms of performance… with respect to a task or a work activity in the light of predetermined criteria and criterion levels … This approach consists in determining to what extent a learner has met an objective as defined in the program." [TRANSLATION][1] Evaluation is therefore based on clearly established, observable, and quantifiable criteria.

Multidimensional evaluation

Evaluation covers the three dimensions that, to various degrees, go to make up a skill:

- cognitive skills, which relate to the knowledge and the intellectual ability needed to perform a job function – i.e., the mental functions involved in perceiving, understanding, and knowing;
- psychomotor skills, which relate to the performance of an activity or a task – i.e., the dexterity required to accomplish various procedures;
- interactive social behaviour, which bears on attitudes and work habits.

[1] Quebec department of education: *Guide général d'évaluation*. Revised version, May 1993, p. 3.

Qualitative standards

To meet evaluation standards, tests should respect the following criteria:

Validity:	The test measures only what should be measured.
Reliability:	The test measures accurately and consistently.
Objectivity:	The test measures without bias.
Completeness:	Evaluation targets cover all program objectives – especially critical skill components.

3.2 Evaluation strategies

The provisions of the Pilotage Act, the General Pilotage Regulations, and the Laurentian Pilotage Authority Regulations set out in detail all the eligibility criteria that pilotage certification candidates must meet.[2] It is important to remember that candidates will be evaluated for the ship for which they have requested certification.

In view of the varying backgrounds of the candidates entering training, a diagnostic test will be used to measure their general knowledge. This test will be developed by the instructor and administered at the time of registration, before starting the training program.

The suggested evaluation methods are part of an overall strategy. Their purpose is to measure all aspects of the job function under study, as described in the work environment analysis report.

A variety of evaluation methods make it possible to accommodate all learning styles without giving one special weight over the others. Different forms of observation will be used, such as identification of shortcomings, monitoring recordings of words and actions, simulation, and various situation scenarios.

A word of caution

The evaluation methods proposed for Tests 1, 2, and 3 leading to basic certification should be applied as a unit, because each one measures a different facet of the job function. If one test were given more weight than the others, this Evaluation Guide could not be used, since some of the evaluation criteria would be invalidated.

It is also important to stipulate that, for the evaluation to be valid, the simulator has to be able to adequately reproduce conditions on the river.

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[2] Taken from the *Programme d'études pour brevets et certificats de pilotage entre les Escoumins et Montréal* [LPA Pilot Licensing and Certification Program – Les Escoumins to Montreal].

For basic skills 1 to 3

1. Planning the passage into the marine district;
2. Navigating a ship in the marine district's confined waters;
3. Carrying out emergency manoeuvres specific to the marine district.

Three complementary evaluation strategies have been set out to measure mastery of skills 1, 2, and 3. They will be used to measure the knowledge, abilities, attitudes, and behaviours needed to obtain a certificate. As stated earlier, they are thus multidimensional.

1. **Preparing a passage plan for a part of the marine district.**
   The purpose of this evaluation is to measure the candidate's local knowledge and ability to plan a passage so as to be prepared to face any situation. In their expectations, shipowners stressed the need for passage planning. However, one should avoid drawing a parallel with the pilots' situation, which is very different. This evaluation will be performed by the training institution under the responsibility of the Laurentian Pilotage Authority (LPA). The presence of a selection board member will ensure credibility.

2. **Piloting a ship similar to the candidate's, in the simulator, through a portion of the marine district.**
   Piloting in the simulator will measure the candidate's ability to anticipate the behaviour of a ship in difficult navigating conditions and to react appropriately to ensure a safe passage through the marine district. The candidate will also have to deal with an emergency situation. This evaluation will be performed by the training institution under the responsibility of the LPA. The presence of a selection board member will ensure credibility.

3. **Comprehensive oral examination.**
   The two preceding evaluations verify the acquisition of knowledge, reflected in the passage plan, and of skills, through pilotage in the simulator. They relate to only one section of the marine district. This examination is intended to verify the competence of the candidate to pilot a ship in any situation through the entire marine district. Its approach will be to integrate all knowledge, abilities, and attitudes, making it truly worthy of being called a comprehensive examination.

It will cover the candidate's ability to make judicious and objective judgment calls based on memorized local knowledge, while maintaining self-control and demonstrating self-confidence. It will cover the entire marine district without, however, duplicating material from the two previous tests. This examination will administered by an LPA selection board.

For skill 4 – Deciding which measures to take for ice navigation.

4. **A written test.**
   Since experience in ice navigation is a prerequisite for the training, we are limiting this evaluation to a written questionnaire. This will verify local knowledge of winter navigation in the district and will be prepared jointly by the training institution and the LPA, which will administer the test.

For skill 5 – Carrying out docking manoeuvres.

5. **Docking in the simulator.**
   This evaluation covers the candidate's ability to come alongside correctly and safely, allowing for navigating conditions and the peculiarities of the harbour. The candidate should plan the manoeuvres before executing them in the simulator. This evaluation is performed by the training institution under the responsibility of the LPA.

For skill 6 –Bridge resource management.

6. **Under the responsibility of Transport Canada.**
   This skill is not considered in the evaluation checklists because it comes under the responsibility of Transport Canada.

Here, in tabular form, are the evaluation methods and test durations for pilotage certification.

Mandatory skills for basic certification

Skill	Evaluation method	Duration
1[3]	1. Preparing a passage plan for a section of the route.	3 h
2 and 3	2. Piloting in the simulator using the passage plan.	3 h
Comprehensive	3. Oral examination covering the entire marine district for the purpose of evaluating the candidate's ability to make objective decisions based on local knowledge while maintaining self-control.	3 h

Optional skills that can be added to the certificate

Skill	Evaluation method	Duration
4	4. Written questionnaire covering local knowledge required for navigating in ice.	1 h
5	5. Docking executed in the simulator.	2 h
6	6. Under the responsibility of Transport Canada. Not evaluated in this guide.	

3.3 Administration of tests

Responsibility for evaluation

Under the regulations, certification of officers is the responsibility of the LPA, which has suggested that post-training evaluation be performed jointly by the training institution and itself. A neutral external party like Transport Canada might administer the tests as the agent of the LPA. This is current practice for other types of certification.

Evaluation using a skill-based approach differs from traditional methods. To assist examiners and ensure uniformity, we suggest that training in evaluation be provided, based on the approach recommended in this Guide. Production of complementary materials – such as questionnaires and candidates' booklets – could provide opportunities for learning during this training. We also recommend that an evaluation specialist be present at the sessions, especially for the more complex aspects such as evaluating work in the simulator and evaluating oral examinations.

[3] Statement of evaluated skills
1. Planning the passage into the marine district.
2. Navigating a ship in the marine district's confined waters.
3. Carrying out emergency manoeuvres specific to the marine district.
4. Deciding which measures to take for ice navigation.
5. Carrying out docking manoeuvres.

Pre-session activities

Each examiner is provided with a set of evaluation notes containing relevant information.

For practical tests 1, 2, and 5, the training institution and the LPA prepare the candidate's booklets, which usually contain instructions; information about the grading system for each stage; description of the test, indicating the candidate's task and the procedure; and tools at his or her disposal (see sample in Appendix). The instructor will program the simulator.

For practical knowledge tests 3 and 4, the training institution and the LPA prepare the candidate's booklets, which contain instructions and information for the candidate, as well as the questions asked in different forms. The training institution also works with the LPA to prepare the examiner's guide with correct answers, which we call the grading key.

Duration of the tests

Each of the three tests for basic certification will take an average of three hours, for a total of nine hours of a 270-hour training program. Generally speaking, the time allocated to evaluation is about six percent of the duration of a program.[4] Taking into account the expectations of the various stakeholders, we have in this case reduced it to below four percent. For competence in ice, evaluation will take one hour, and for berthing, two hours.

Timing of the tests

The test sessions should be held at the conclusion of training for mandatory skills 1, 2, and 3. For the purposes of evaluating skills 1 and 2, two candidates prepare their respective passage plans on the first day. On the following day, each one executes his or her passage plan in the simulator. One candidate assisted by the other colleague performs the exercise in the morning and roles are reversed in the afternoon. When a candidate has successfully passed both tests, he or she may take the oral examination.

Tests for skills 4 (*Deciding which measures to take for ice navigation*) and 5 (*Carrying out docking manoeuvres*) will be held on request.

We would like to stress here the importance of continual evaluation during training, as well as the instructor's responsibility in this regard. This type of evaluation makes it possible to focus learning, identify the candidate's strong and weak points, and take corrective action as necessary. A candidate should not attempt certification until the instructor feels – on the basis of his or her continual evaluation of the candidate in the course of training – that the candidate has mastered the skills being evaluated.

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[4] Quebec department of education. *Guide général d'évaluation*. May 1993, p. 11.

Grading and results

For tests for certification, the candidate obtains either “0” or the total points for each grading unit, also known as “pass” or “fail” grading. In some of the criteria, a certain amount of leeway can be granted for exactness of responses. This flexibility should be determined in advance by the examiner or the selection board, as the case may be. The decisions should be noted in writing prior to the test in order to maintain reliability and objectivity.

The tests themselves are also graded as “pass” or “fail”, depending on whether the candidate achieved a passing or failing grade, depending on whether or not he or she reached the performance level, which is set at 70 percent for all tests.

Make-up tests

Candidates who fail any test have the right to take a number of make-up tests as stipulated in the regulations. The instructor will discuss areas for improvement with them and the candidates must demonstrate that they have satisfactorily corrected their weaknesses before being admitted to a new test. Candidates will have to repeat the entire test. The time of the make-up test will be set by arrangement between the instructor, the candidate, and the LPA. Different versions will have to be developed for each make-up test. The candidate’s grade on the make-up test will become his or her official result.

Certification

Once a candidate has successfully demonstrated his or her skills to the satisfaction of the examining board, the Laurentian Pilotage Authority awards a certificate. Tests should be kept in LPA files in compliance with Transport Canada recommendations.

Self-directed candidates who have not taken the training program

These individuals should make arrangements with the LPA for a test date.

3.4 Evaluation checklists – Introduction

In the second section of the Guide there are five evaluation checklists, one for each test/examination. They describe evaluation procedures and targets, as well as the grading system. They also contain instructions to examiners as well as evaluation forms.

In the instructions to examiners, seven components describe the test and its various aspects:

- the nature of the test – i.e., the type of test and its subject matter;
- the task of the candidate during the evaluation;
- the evaluation procedure – i.e., the examiner's tasks before, during, and after evaluation;
- the grade and rules applying to it;
- a note about safety;
- the duration of the test;
- the passing grade.

The evaluation forms differ slightly, depending on whether a practical skill or knowledge is being tested.

- For practical tests 1, 2, and 5 – passage plan, piloting in the simulator, and docking in the simulator – the examiner notes his or her assessments directly on the evaluation form, indicating whether the candidate has been successful or not, and circles the appropriate grade for each criterion set out under *Observations and Assessments.*

- For knowledge tests 3 and 4 – the comprehensive oral examination and piloting in ice – the evaluation forms serve as the basis for the questionnaire used in the test. The examiner or examiners should be provided with a grading key.

The evaluation forms are in three parts:

- candidate identification;
- verdict, showing pass, or fail;
- evaluation targets, assessment criteria, and the grade. The grade is weighted according to the value assigned to each criterion.

In this Guide, we have developed version A of the evaluation checklists. After the initial trial, changes may be required and version B would then be developed. The same will apply to the questionnaires and the scenarios for the various tests. Several versions should be produced to prevent copying of any kind.