Taxi Camera Approval Guide

for Mobile Camera Manufacturers

PASSENGER TRANSPORTATION BOARD

Taxi Camera Approval Guide

This Taxi Camera Approval Guide is mainly for companies that manufacture and sell mobile camera equipment for commercial fleets and want approval of one or more camera systems for use in taxicabs in British Columbia. The guide is your hub for the information and linked forms you need to submit a taxi camera approval request package to the Passenger Transportation (PT) Board.

The most current documents and information about taxi cameras in BC is posted on our taxi camera webpage.

October 2, 2018

Passenger Transportation Board
202 – 940 Blanshard Street, Victoria, BC
Mail: PO Box 9850 STN PROV GOVT, Victoria, BC, V8W 9T5

Phone: 250.953.3777 | Email: ptboard@gov.bc.ca | Web: www.ptboard.bc.ca

Table of Contents

1. Camera Approval Basics

How are taxi cameras regulated in BC? Who approves camera models?

The Passenger Transportation (PT) Board makes licensing decisions on applications to provide or change a taxi service that operates in one or more communities in British Columbia (BC). It sets terms and conditions of approved Passenger Transportation Licences which include requirements respecting the installation of approved taxi camera systems and image-usage.

This guide describes the pre-requisites, process and criteria by which a camera manufacturer may request approval for a taxi camera model and get a decision from the PT Board.

The BC taxi camera program is designed to achieve three objectives:

1. Deter attacks against taxi drivers and passengers
2. Assist police with the identification and prosecution of suspects if an attack occurs
3. Protect the privacy of drivers and passengers inside the taxi.

2. Company Prerequisites

Can any mobile camera manufacturer apply?

No.

The PT Board only considers approval requests from established manufacturers that have a mobile camera product being used in fleets of commercial, transit or first-responder vehicles. Specific pre-requisites for manufacturers are set out in the Taxi Camera Approval Request form.

3. Camera Requirements & Standards

Can any mobile camera get approved?

No.

The PT Board does not consider requests to approve *dashcams* or similar camera products that are marketed or sold on a retail basis to individual consumers. Before you submit an approval

Request form—or a BC camera field test plan—review the requirements and performance standards and in this guide and other program documents to make sure your company and camera model can meet applicable manufacturer pre-requisites, functionality requirements and performance standards.

4. Performance Standards

Overview of Camera Design and Standards, Tests & Approvals

Taxi cameras need to work continuously so image evidence from inside the vehicle is available to police when a crime has occurred. The BC taxi camera program is designed to provide evidence that can assist police in the identification of suspects and be accepted as evidence in Court for the prosecution on an offence. For this reason, the PT Board sets standards and approves taxi camera systems with input and evaluations of BC police agencies through the Forensic Video Analysts' Association (FVAA) of BC. The underlying goal is to meet the objectives of the taxi camera program: deter attacks, produce useful images and protect privacy. Evaluations of new camera models focus mainly on functionality and performance rather than specific designs so camera manufacturers have the flexibility to innovate and the taxi industry can benefit from the latest technological advances more quickly.

To illustrate how flexibility is designed into the taxi camera program, consider the following examples:

- **Integrated Camera Equipment** Taxi camera equipment may be integrated as a single system (camera head and recording medium). This is preferred over the separate camera head and recording unit design that was the only option until early 2018.

- **Video or Still Images** Both video and still-image recordings are permitted, although the camera must record at least some images during each person's trip that are at least 2 frames per second (FPS). Images that are recorded continuously (e.g. 2 FPS or faster) do not require the wiring of sensors to the door or taxi meter that trigger a more frequent image capture rate for a defined period. Images may be black & white, monochrome or colour.

- **Efficient File Access Options** Provided that digital files are encrypted and any other needed safeguards[1] are in place to prevent unauthorized access or tampering, a camera may provide access to the files via removable recording media, wired download port or wireless transmission.

- **Request & Testing Flexibility** A manufacturer can submit an approval request any time and field tests can take place in BC or outside the province. However, evaluations are final and the same model cannot be re-evaluated for at least a year, and only if the manufacturer demonstrates that it has addressed prior concerns.

[1] The camera should incorporate safeguards that prevent a data access or integrity vulnerability. For example, in addition to encryption, image viewing software should be protected by a password, hasp key or restricted distribution sufficient to block persons other than police from having the ability to view or use digital files that were recorded in a taxi.

- **Approval Targets** As a guideline, the PT Board aims to approve models produced by between two and four camera manufacturers. This target prevents an excess drain on PT Board and police resources. It also gives taxi companies choice, and promotes competition and innovation among manufacturers.

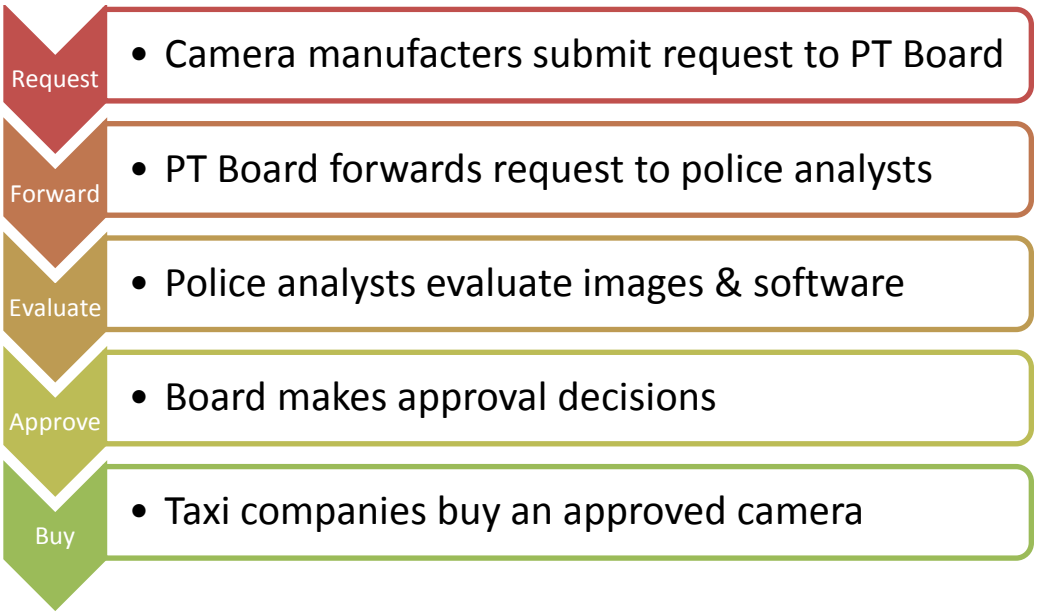
Other performance standards and requirements are set out in the BC Taxi Camera Rule and camera approval documents posted on the PT Board taxi camera webpage. As an example, camera systems must record quality images in normal night and day light conditions (as described in Appendix A), and store the recordings in a taxi for at least 168 continuous hours (1 week). Cameras should also be capable of installation and calibration in a short period of time by a qualified technician, and the capability of a remote inspection is preferred.

5. Approval Process

The PT Board Process for Approving a New Taxi Camera Model

The figure below identifies the main steps in the taxi camera approval process.

Figure 1: Overview of the Taxi Camera Approval Process



a. The Request Package

A camera manufacturer starts the process by sending the PT Board a complete approval request package. The Taxi Camera Approval Request form identifies information and items that must be part of the

package. These requirements relate to your company and camera model; images that have been recorded by your camera for evaluation; and any software, instructions and passwords that evaluators will need.

Camera performance is assessed by evaluating images of people inside a taxi that were recorded by your taxi camera system in an active, on-duty taxi for 10 to 14 days (at least 168 hours of operation). As the manufacturer, you are responsible for obtaining and delivering recordings for evaluation—including field test costs—and meeting applicable privacy and confidentiality requirements.

For testing, camera images may originate from outside BC. However, the non-BC taxi that is used must have the authorizations it needs from regulators with jurisdiction in its operating area, if any, to operate the taxi and use the taxi camera.

Alternatively, images may be obtained by installing the camera model in a BC taxi for a field test. However, before installing the camera, the BC Taxi Camera Field Test Plan form must be completed and emailed to the Passenger Transportation Board, Registrar of Passenger Transportation and field test participants.

If the camera system provides remote access to recorded files, the manufacturer must give evaluators access to a live camera system or tell the PT Board that you want to set up a staged demonstration.

The PT Board aims to approve taxi camera models from between 2 and 4 manufacturers at any one time, and we may limit or suspend camera approval requests when the target has been met. At any time, manufacturers can get information on the status of this approval target on our taxi camera webpage.[2]

b. Forward Request Package to Police for Evaluation

When a complete request package has been received, the PT Board forwards it to the Forensic Video Analysts' Association of BC with a request to evaluate the camera functions, recordings and software.

The initiation and timing of camera evaluations are subject to factors such as the completeness of the request package, clarity of information in the package, availability of forensic video analysts, and resources needed to evaluate a camera.

[2] The list of approved cameras is set out in Appendix B of the BC Taxi Camera Rule. Also, a manufacturer may contact the PT Board office at ptboard@gov.bc.ca or 250-953-3777 to request more information about approvals, evaluations and the status of the "approval target."

c. Police Analyst Evaluations

The PT Board asks police analysts to review camera system performance and functionality against criteria in Table 1, plus any other criteria they consider relevant.

Table 1: Camera Evaluation Criteria

Criteria Type	Considerations
Critical	1. Resolution of Interior Images (emphasis on facial detail at night) 2. Data Integrity 3. Image Retention Time 4. Image Frequency
Important	5. Workflow
Useful	6a. GPS 6b. Emergency Button 6c. Driving Behaviour Analytics (e.g. G-Force events) 6d. Reliable Colour Representation
Other	7. Criterion identified by the Evaluator

Resolution of Interior Images Police video analysts assess the resolution of images that have been recorded in normal conditions during the day and night (both with the dome light on and off). The facial detail in night-time images is a focus of their evaluation.

Trained analysts apply their experience and applicable benchmarks such us those set out by the Scientific Working Group on Imaging Technologies (SWGIT). They look at the resolution and usefulness of images collected as a whole. Evaluations may be informed by a variety of visible and technical issues including image distortion (field of view), object size in the picture (i.e. the size of faces), light sources, colour consistency, frames per second, file dimensions, file sizes and file compression methods. See Appendix A for an illustration of how "object size" affects facial detail.

Data Integrity A camera model—including its hardware, software and storage systems—must:

- encrypt digital files and, as needed, use other safeguards:
    - so only authorized police can access and view images, and
    - protect against a privacy breach or tampering with digital files by an unauthorized person
- provide sufficient and accurate metadata for images

- be designed in a way that does not pose an undue risk of inadvertent or unexpected data loss

Image Retention Time Evaluators review recording media and system settings to measure the time images are retained before they are overwritten. The camera must retain images for 168 hours (1 week) of continuous taxi operation. Additionally, images should be overwritten within 336 hours (2 weeks) of continuous taxi operation.

Image Frequency At a minimum, the camera must record images at 2 frames per second (FPS) for a portion of each passenger's trip. At any time, the minimum is 12 frames per minute (1 image per 5 seconds). The minimum must be maintained for at least 30 minutes after the vehicle has been turned off.

Other Functionality & Features Evaluators assess functions that are not critical on their own but which may affect their overall assessment or a PT Board's camera approval decision. The ease of learning and using software on police computers ("workflow") is a criterion that is important but not necessarily critical on its own. Other functions may include GPS, an emergency button that drivers may use, and driver analytics (e.g. systems that provide audible warnings of danger). Further, evaluators may opt to review functions such as audio recordings and exterior images that are not regulated under the BC Taxi Camera Rule.

d. Review Outcome

After a police FVAA-BC analyst evaluates a camera against the criteria in Table 1, the PT Board considers the evaluator's findings and any other relevant circumstances or factors[3] to determine whether or not it approves the camera model for use in BC taxis. We inform the manufacturer of the decision and share the evaluation result for criteria that were critical to the decision. For other parties, we may confirm whether a camera has been tested or approved. When we approve a camera, we update our list of approved cameras in the BC Taxi Camera Rule. Information we receive about a camera system is subject to the *Freedom of Information and Protection of Privacy Act*.

PT Board decisions are final. The same model cannot be resubmitted for evaluation unless at least one year has passed and the manufacturer has taken steps to address shortcomings.

e. Taxi Companies Choose an Approved Camera

Ultimately, taxi companies choose which PT Board-approved taxi camera system they purchase and use in their taxis. Taxi companies are responsible for the costs of keeping a working camera in each taxi in its fleet. This includes the cost of purchase, installation, inspection and maintenance. The PT Board does not warrant or guarantee that taxi companies will purchase a camera model it has approved.

[3] The PT Board may consider other relevant factors. This may include the number of other cameras that have already been approved and the PT Board target to approve camera models by between 2 and 4 manufacturers.

4 Questions & Answers

Additional Information about BC Taxi Camera Approvals

More information about taxi camera programs is posted on the PT Board's taxi camera webpage. The following questions and answers provide additional information that you should be aware of if you are participating in a taxi camera approval process.

a. Why does the PT Board approve cameras?

The PT Board regulates taxi camera programs in BC by setting rules that must be adhered to as a term and condition of the passenger transportation licence that companies must have to operate taxis in the province. The PT Board recognizes the safety benefits and efficacy of taxi cameras from its experience with taxi cameras used in BC, and from external research on taxi cameras.

The approval process is used to identify taxi camera models that meet the requirements and advance the objectives of the PT Board's taxi camera program. It is not a bid process that, if approved, results in a certain purchase of taxi camera products.

b. Can a non-approved camera be used in a BC taxi for testing?

Yes. However, the company must meet pre-requisites identified in the Taxi Camera Approval Request form, and the camera must encrypt the digital files it records. Also, before a test camera is installed in a BC taxi, the manufacturer must email a BC Taxi Camera Field Test Plan to the Passenger Transportation Board, the Registrar of Passenger Transportation and other participants in the field test. Further, the licensed taxi company must receive acknowledgement from the PT Board that it received the notice. The camera must be removed when the field test is complete.

c. What evaluation information is public?

The PT Board publishes a list of taxi camera models that are approved for use in BC. For internal use, the PT Board may share some information about evaluation outcomes with participants in a BC Taxi Camera program (police, taxi associations, taxi camera installers, passenger transportation compliance staff). Information the PT Board receives is subject to requests under the Freedom of Information and Protection of Privacy Act

d. Can a manufacturer appeal an evaluation?

No appeal process is available.

e. Can a manufacturer resubmit an approval request?

Not for a year. If a camera is re-submitted, the manufacturer must address critical shortcomings identified in the prior evaluation. Decisions to evaluate any camera model is subject to PT Board discretion and FVAA-BC availability.

f. Can a camera approval be cancelled?

Yes. The Passenger Transportation Board may cancel its approval of a taxi camera model at any time without notice to the manufacturer. It may also establish requirements and deadlines for taxi licensees to replace all or part of a taxi camera system. A cancelation may relate to the age of the equipment, the functionality or performance of cameras used in BC taxis, the approval of alternative equipment or other matters or circumstances that justify a cancellation.

Appendix A: Facial Detail

Evaluation of Facial Detail in Daytime and Nighttime Images

The evaluation of image resolution encompasses a number of qualitative and technical issues. The aim is to determine whether images recorded by a taxi camera are of sufficient quality to assist an investigating police officer in the identification of suspects and prosecution of offenders. Thus, evaluations focus on the facial details of passengers in the back seat of a taxi—the passengers furthest from the camera.

To illustrate, Figure 1 compares images of a closed circuit television camera. Images on the left show satisfactory facial detail. Images on the right are unsatisfactory in terms of facial detail.

Figure 1: Sample Images with Different Object Sizes and Facial Details

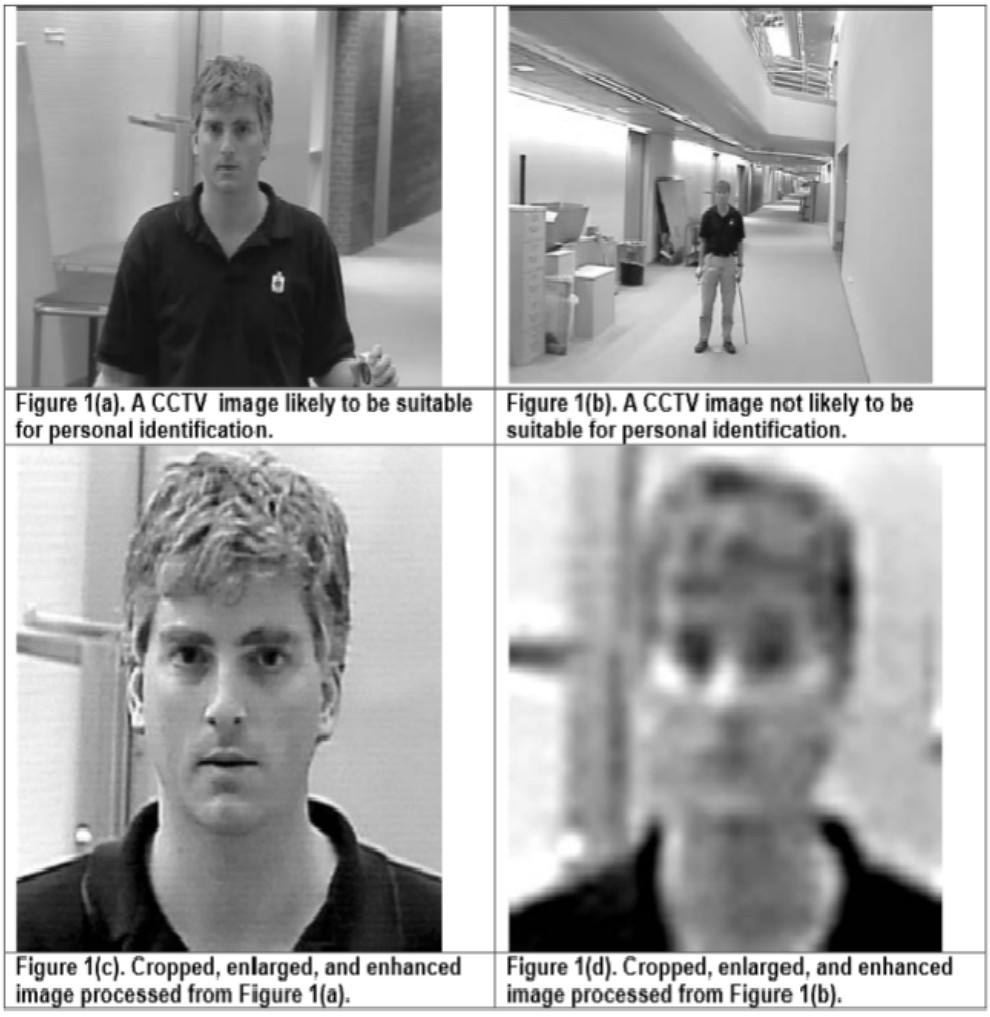


Figure 1 also shows how the size of the face in the original ("object size") affects the facial details in the close-up image. Object size is measured by the vertical space occupied by the object (a face from bottom

of the chin to top of the head) relative to the height of the picture. Figure 1(a) illustrates an object size of more than 25%. Taxi cameras should produce images with an object size of 25% or more.

Figure 1(b) illustrates an object size of less than 10%. In that example, the small object size (using the same camera) results in a degradation of facial detail that renders the image unsatisfactory.

Object size is one of the factors that is considered when a taxi camera is evaluated. It is an important factor that affects facial detail, but not the only factor.

Information about object size and personal identification is based on standards documents produced by the Scientific Working Group on Imaging Technology (SWGIT). This international organization sets standards for digital and multimedia evidence used in judicial, administrative, legislative, and adjudicatory hearings and other proceedings. Images in Figure 1 were copied from page 3, section 4 of the SWGIT *Guidelines for the Forensic Imaging Practitioner* version 3.0 2012.06.08.