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Paintings: Considerations Prior to Travel – Canadian Conservation Institute (CCI) Notes 10/15



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Originally published 1993
Revised 2015

Also available in French.
Également publié en version française.

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ISSN 1928-1455



Introduction

Paintings in transit are exposed to conditions that may promote deterioration or damage such as cracking, cleaving, and flaking of paint and ground layers. Common hazards include handling, shock, vibration and fluctuations in relative humidity and temperature (consult CCI Note 10/4 [Environmental and Display Guidelines for Paintings](#)). **(Please note:** A painting is more vulnerable to damage in cool temperatures, and should, therefore, not travel in an unheated vehicle in cold weather.) It is important to remember that damage can develop gradually and may not be immediately apparent.

A painting's suitability for travel will depend on its materials, construction, and past and present condition. The criteria for assessing its stability in relation to travel are more stringent than those used for on-site display. For example, a canvas support that is strong enough to allow a painting to be displayed in its home institution may be too weak for travel, especially if the travel is to multiple locations (requiring extra handling). Examination of a painting's current condition, with a review of its past condition reports, will indicate where weaknesses or particular vulnerabilities may exist.

This Note identifies potential problem areas to look for, followed by general recommendations for preparing for travel. For solutions to concerns or problems identified, seek the advice of a conservator.

Paint and Ground Layers

Closely inspect paint and ground layers for signs of instability (consult CCI Notes 10/6 [Condition Reporting – Paintings. Part I: Introduction](#), 10/7 [Condition Reporting – Paintings. Part II: Examination Techniques and a Checklist](#) and 10/11 [Condition Reporting – Paintings. Part III: Glossary of Terms](#)). Previous condition and treatment records will indicate if a work has a history of a recurring problem. If so, the painting may not be suitable for travel off-site. Paintings that have signs of instability in the paint and/or ground (such as cracks with elevated or curling edges, paint loss or powdering paint) should not travel unless they receive conservation treatment beforehand. Certain types of paint surfaces (e.g. uniformly matte surfaces with no variation in gloss or colour) are particularly easily marred. They will require extra caution to protect them from fingermarks or any other contact on their surfaces.

Paintings on Fabric Supports

Fabric strength

Aged and embrittled fabric has lost much of its strength and can tear when subjected to the handling, shocks and vibration involved in travel. Turn-over edges and tacking margins are the most stressed parts of a fabric support. They must be checked carefully for adequate strength. Examine the tacking margins for tears, especially around the tacks or staples, and examine the turn-over edges for small splits in the fabric. If a small, loose thread can be found along the edge of a tacking margin, try to break the thread apart with your fingernail. If it breaks easily, or powders or crumbles, the canvas may not be strong enough to travel.

It is best to give additional support to canvases that are large, have heavy impasto, or have a thick but stable paint layer in order to reduce canvas movement and stress during travel. A conservator can advise on appropriate methods (e.g. applying stretcher bar linings or securing temporary foam inserts) that can reduce movement of the canvas and provide this support.

Fabric tension

To evaluate overall tension, hold a painting vertically, with the bottom edge resting on a padded surface. Slowly and gently move the top edge back, then forth. The centre of the canvas should move only slightly and should not flop. Nor should the canvas be drum-tight.

If a painting is too loose on its auxiliary support (the stretcher or strainer), deformations or cracks in the paint are likely to result from contact with the inside edges of the stretcher or strainer bars. These stretcher marks may worsen as a result of handling and travel.

If a canvas is too tight on its stretcher or strainer, ground and paint will crack, or a weak canvas may tear.

Uneven tension of the canvas can sometimes result in ripples or draws. These can appear and disappear with changes in relative humidity (RH)—seasonal or otherwise—or remain fairly constant. Tears or holes around tacks or along the turn-over edges may result in uneven tension. Examine the tacking margins to determine if the tacks or staples are effectively anchoring the canvas.

Avoid attempts to correct tension simply by manipulating the corners of a stretcher—doing this at an inappropriate time in the yearly RH cycle can be damaging. If the auxiliary support is a **stretcher**, one solution to incorrect tension (but *only* under certain circumstances and at the correct time in the RH cycle) may be to have a conservator key out the painting (consult CCI Note 10/9 [Keying Out of Paintings](#)). If a canvas is mounted on a non-adjustable **strainer** or if the tacking margins are damaged, modifications to improve the canvas tension will be more complicated and are best done by a conservator.

Deformations of fabric

Small deformations, ripples or draws (without any paint cracking) may not pose a problem during travel. However, major deformations should be assessed by a conservator before travel, particularly if there is associated cracking or cleavage of paint.

Bulges along the bottom edge of a painting are often caused by dirt and debris that have fallen between the canvas and stretcher or strainer bars. Debris such as wooden keys, nails or plaster can be removed. Consult a conservator for specific advice on avoiding damage when removing these items.

Tears or holes

Problems associated with tears and holes in a painting can become more severe with handling and travel. Usually, the paint and ground surrounding such damage are unstable and are prone to flaking. In this case, a painting should not travel. Keep such a painting immobile until it can be treated. Tears should be treated as soon as possible, before the canvas threads become misaligned and more complex to treat.

Auxiliary Support (Stretcher or Strainer)

Corners

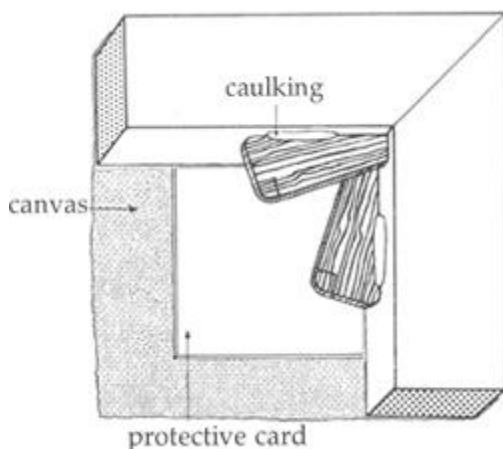
Weak or loose corner joints may allow the stretcher or strainer to twist, which can cause the canvas support to ripple and promote damage to the ground and paint. Especially for a painting unprotected by a frame, weak joints on the stretcher or strainer can be reinforced before travel. Use an appropriately sized corner plate, secured over the joint, to reinforce it. Applying a suitable backing board to the stretcher or strainer (in addition to its other benefits) will help provide better rigidity (consult CCI Note 10/10 [Backing Boards for Paintings on Canvas](#)). Take care not to screw into a mortise or tenon of a joint because the wood may split. As well, ensure that the screws are short enough so that they will not protrude beyond the wood and into the canvas.

Attaching reinforcing battens to the stretcher bars, before attaching a backing board, is another possible solution to prevent twisting. Remember that working on an auxiliary support for a canvas must be done with great care—shield the front and back of the painting, and avoid damaging the painting by inappropriately manipulating the canvas or auxiliary support (consult CCI Note 10/9 [Keying Out of Paintings](#)).

Stretcher keys

Before travel, all keys (corner wedges) should be present and secured to the stretcher. Keys that are not secured in the slots of the stretcher's joints may work loose and become lodged between the canvas and a stretcher bar. This will deform the canvas, and can lead to further damage of the canvas, ground and paint. An open corner joint without keys may close, causing the canvas to ripple and the paint and ground to crack.

A simple method of securing keys, which requires only minimal manipulation, involves using a tube of good-quality silicone or acrylic indoor caulking, available at hardware or building stores. Lay the painting face down on padded protective corner pads or on a padded surface, as appropriate (consult CCI Note 10/7 [Condition Reporting – Paintings. Part II: Examination Techniques and a Checklist](#)). Protect the back of the canvas from the caulking material and from an accidental blow by carefully laying a thin piece of card on the canvas directly behind the key to be secured. Make sure the keys' surfaces are dust free. Apply caulking from the tube as dabs or as a thin line neatly along the edge of the key and stretcher where they meet (Figure 1). Remove the card. Allow the caulking to cure for at least 24 hours to allow moisture and any volatile components to escape before attaching a backing board (consult CCI Note 10/10 [Backing Boards for Paintings on Canvas](#)).



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Figure 1. Apply caulking to secure keys.

Stretcher and strainer bars

The presence of stretcher or strainer bars behind a canvas eventually results in lines of deformation or cracks in the paint referred to as “stretcher marks.” The canvas will touch these bars’ edges if the stretcher or strainer bars are not bevelled, or if the tension of the canvas is not adequate (consult the section [Fabric tension](#)). To see if there is a bevel, measure the depth of the outer and inner edges of the stretcher or strainer bars. If the inner depth is the same as the outer depth, there is no bevel.

Preventing contact between the canvas and the inner edges of non-bevelled stretcher or strainer bars can be accomplished in various ways. Modification of the stretcher or strainer by a conservator is the best long-term solution. Other methods, such as applying stretcher bar linings or padded panels (inserts), will restrict movement of the canvas during travel. A conservator can advise on appropriate methods. Organic materials used for (and enclosed with) the paintings can support mould growth. Therefore, avoid high RH conditions, which encourage biological activity and warping of the ivory. If the RH is too low, the ivory can warp and/or crack. Low RH will also make the ivory and paint more brittle, which will also make the painting more susceptible to mechanical damage.

Paintings on Rigid Supports

Many rigid materials used as painting supports (e.g. wood, hardboard, paper-based card, ivory) will expand and contract (and possibly warp or crack) in response to fluctuations in RH. Make sure that adequate space is provided in a frame’s rabbet to allow for expansion when a material swells (consult CCI Note 10/8 [Framing a Painting](#)). A careful wrapping and sealing before packing a painting into a case or container, using a buffer material (e.g. paper- or wood-based material such as cardboard or fibreboard) inside the wrapping, will help moderate any changes in RH during travel (consult CCI Note 10/16 [Wrapping a Painting](#)).

Although all paintings are vulnerable to damage from handling, shock and vibration, the resulting damage can be greater for some types of paintings than for others. For example, some paintings on glass may not be stable enough to travel due to the generally poor adhesion of paint to glass, and the fragility of the glass itself. If travel is unavoidable, ensure that the frame offers sturdy support and that the rabbet is adequately padded. Supports made of several pieces, such as joined wooden panels, are prone to certain damages during travel—shock, inappropriate handling and vibration can cause joints to crack, loosen and separate. The components of a rigid support can each react differently in response to fluctuating RH, resulting in the same effects

(consult CCI Note 10/17 [Know Your Paintings – Structure, Materials, and Aspects of Deterioration](#)). Special care must be taken when wrapping and packing these types of paintings (consult CCI Notes 10/14 [Care of Paintings on Ivory, Metal, and Glass](#) and 10/16 [Wrapping a Painting](#)). The correct use of foam cushioning inside a packing case will also help reduce shock and vibration to a painting (consult CCI article [Use Cushioning Material Effectively](#) under [Six Steps to Safe Shipment](#)).

Mixed-media Paintings

Mixed-media pieces can pose various problems. Often, they are not framed and their surfaces can be particularly vulnerable during handling and travel. The various materials used in these paintings will have different responses to fluctuations in RH, and component parts may loosen or detach. Any poor adhesion can become worse with the handling, shock and vibration of travel. Custom support, wrapping and cushioning will be necessary.

Large Paintings

The safe handling issues, dimension restrictions, and other logistical difficulties imposed by size can complicate the support, wrapping, packing and transportation arrangements for large paintings. Foresight of any special arrangements for positioning and other precautions may be required.

Preparation and Recommendations for Travel

If a painting is found to be suitable for travel, the following preparations are recommended.

Documentation

The current condition of a painting should be carefully documented in written notes and images before travel. For travelling exhibitions, consider the number of times a painting will be handled. For each venue, at the minimum, a painting will be unloaded from a vehicle, loaded at the venue, unpacked and unwrapped, placed temporarily, installed, uninstalled, wrapped and packed, unloaded from the institution, loaded and strapped into a vehicle, and shipped in a vehicle.

A cumulative condition report form or checklist provided by the lending institution will allow a brief condition report for each painting to be added on arrival and departure at every location (consult CCI Note 10/7 [Condition Reporting – Paintings. Part II: Examination Techniques and a Checklist](#)). Now that digital photography has become

commonplace, digital images can be taken and included with the reports at each venue. This practice ensures that a condition history is created, the condition of each painting is monitored, and damage is reported when and where (and why) it occurs, indicating where measures or additional protection are required to prevent further damage.

Deterioration

Glass responds minimally to changes in RH and, therefore, does not contribute greatly to movement in the painting, unlike supports such as canvas and wood. However, because glass is non-porous and slick, the adhesion of paint to glass is generally poor. Therefore, cleavage (separation of the paint from the glass) and flaking on these paintings are very common.

If there is paint cleavage, the appearance of the painting changes. Areas affected by this separation, when seen through the glass, appear lighter in colour than the well-attached paint. These areas are sometimes easier to detect when viewed at an angle rather than straight on.

If a varnish or glue was applied to the glass before painting, the image may be disfigured because the layer has yellowed or darkened.

The fragility of glass also means that cracks and breaks from handling are quite common.

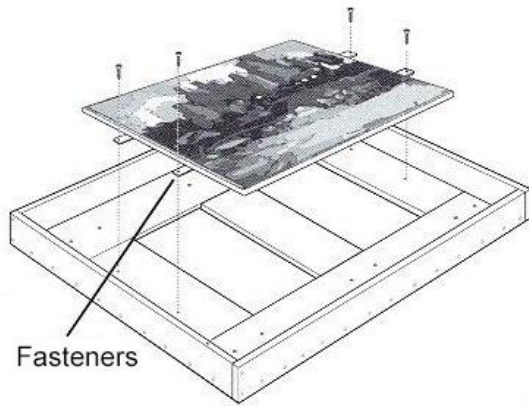
Framing for travel

When a painting is in transit, the framing system plays an important part in its protection. A sturdy frame helps protect against damage related to handling and shock.

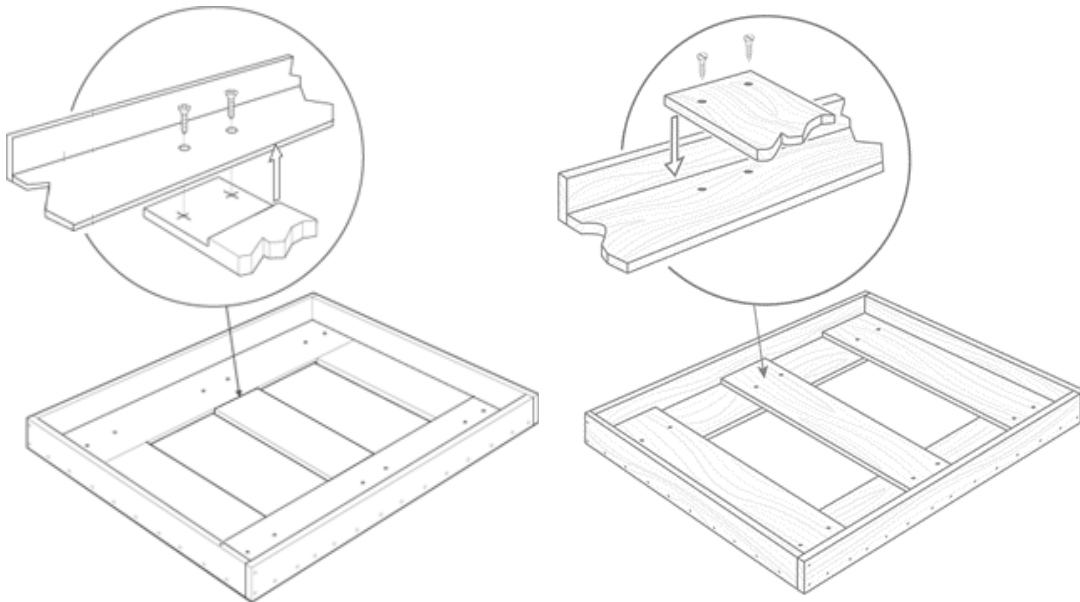
Examine the frame itself for stability. Loose elements should be treated to prevent loss, and weak corner joints and liners should be strengthened. Padding the frame rabbet can prevent abrasion to the front and side edges of a painting (consult CCI Note 10/8 [*Framing a Painting*](#)).

One way to protect a painting from quick changes in RH is to encase it in a sealed frame (McKay 1990, 1991) or display box, which contains an RH buffering material such as acid-free matboard. This can moderate the RH in the painting's immediate environment (consult a conservator for information, construction details, or information on alternatives).

An unframed painting, or one that may experience torsion or twisting during handling or travel, should be provided with a well-fitted travel frame (see examples in Figures 2a, 2b and 2c). The condition and type of paint surface will dictate how a painting should be protected and wrapped (consult CCI Note 10/16 [Wrapping a Painting](#)).



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Figure 2a. Handling-travel-storage (HTS) frame can be used for handling, travel and long-term storage of most paintings.



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Figures 2b & 2c. Two variations on construction of an HTS frame.

Backing and glazing

Enclosing the back of a painting with a backing board helps buffer harmful fluctuations in RH, reduces entry of pollutants, wards off blows or scrapes to the back of the painting, and reduces vibration of the canvas (consult CCI Note 10/10 [Backing Boards for Paintings on Canvas](#)). Glazing the front with a sheet of acrylic or glass increases this protection and reduces or nearly eliminates vibration of the canvas during travel.

Both glass and acrylic glazing offer advantages and disadvantages. Acrylic glazing protects without the danger of breakage. However, because of the electrostatic property of most acrylic glazing, it is not recommended for powdery media such as pastel and charcoal. Nonetheless, a good quality anti-static acrylic, with negligible off-gassing, is available and may be suitable for this use.

For a painting glazed with glass, there is a danger that the glass might break during handling or travel and possibly damage the painting underneath. Breakage is less of a risk if the glazed painting has been appropriately framed and packed. According to Green et al. (2005), risk is reduced when the spacer in the framing (between the painting surface and glass) allows room for the glass to flex and rebound in response to an impact (consult also CCI Note 10/8 [Framing a Painting](#)). Using laminated glass provides more protection than ordinary non-reflective glass, but it is heavier and costlier.

For extra assurance, a special low-tack protective film tape¹ can be applied, as a sheet or in strips, to the outside glass surface before packing the work of art (apply the smaller tape widths in a close grid pattern). This should keep most shards of glass in position and away from the artwork, in case of breakage.

Please note: Gently and slowly remove this protective film or tape **as soon as possible** at destination. Even after a short time, tape can become more difficult to remove cleanly. The cleaner required to remove tape residue may damage an anti-reflective or ultraviolet coating on the glass. Quick removal of the tape may damage the glass coating and may cause the glass to vibrate.

Do not use ordinary tapes on coated or non-reflective glass if they will be left in place for even a short period of time. Check with glass manufacturers, suppliers and local framing shops for information on available types or brands of glass and compatible film or tapes, and any special cleaning instructions.

Wrapping, cushioning and packing

Once a painting has been judged fit for travel and has been prepared with appropriate framing and backing, it must be properly wrapped, cushioned and packed for transit before it is picked up by the art shipper (consult CCI Note 10/16 [Wrapping a Painting](#) and CCI article [Use Cushioning Material Effectively](#) under [Six Steps to Safe Shipment](#)). Be aware that, in most cases, a shipper does not pack or protect your painting any further before installing it in the vehicle. Heated air-ride trucks are recommended for paintings travelling in cold weather because painting materials become more brittle and easily damaged in low temperatures. Request an air-ride vehicle with air conditioning so that the painting is kept at a temperature that is not too cool or too warm. **(Please note:** Shipping vehicles with air conditioning are normally equipped to maintain temperature, not RH.) Knowing the likely environmental conditions to be encountered during travel and exhibition will alert you to any additional protection required.

Although some companies say they are experts in moving fine art, it is best to ask a major institution or gallery for the names of reputable firms before selecting a carrier. Inquire about the firm's carrying and shipping procedures in advance, and contact references to ensure that they are acceptable.

For additional information and advice on shipping paintings, consult conservators in institutions who are actively involved in preparing a travelling exhibit and/or consult [Six Steps to Safe Shipment](#).

If you have further questions, please [contact CCI](#) for information.

¹CCI has used [3M™ Polyethylene Protective Tape 3112](#).

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