



Facility Assessment
for
Vernon Public Art Gallery
Regional District of North Okanagan
Vernon, BC

Final Report
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Irene F. Karsten
Preservation Development Advisor
Preservation Services

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1. Executive Summary

The Vernon Public Art Gallery cannot adequately ensure the preservation of art for North Okanagan's future generations in its current facility. The renovated retail space on the ground floor of a parking garage in downtown Vernon provides some protection for art. To the extent that the space cannot be fully adapted to museum purposes, however, an unacceptable degree of risk remains of damage or loss from theft or vandalism, water, fire, accidents, uncontrolled relative humidity and temperature, dust and pollutants, light and UV, and pests (listed in order of greatest to least risk).

Risks to art at VPAG could be better managed to some degree in the short term through improvements to the current facility and through strategic collections care. Substantial renovation of the existing facility is not recommended due to lack of adequate space and limited potential for risk reduction, particularly with regards to security and environmental control. Suggestions are given for improving security for art in storage and on display, for improving storage for non-collection materials, for preventing and preparing for emergencies, and for managing risks due to lack of environmental control and light fading risks.

In order to provide adequate protection for art and to fully meet its preservation mandate as a public art museum for the long term, however, VPAG would require a purpose-built facility. Steps that would guide the design of such a facility and thus reduce risks to art at VPAG are described in detail.

Secure collections: Provide a secure perimeter to prevent unauthorized entry. Equip building with adequate security systems. Secure collections on display. Control access to non-public functions.

Prevent water damage: Design to route water away from art. Locate art away from the impact of eventual building leaks. Design to facilitate maintenance. Prepare for emergencies.

Protect against fire: Design to limit fire risk and spread. Provide systems that detect and suppress fires. Support systems with fire prevention procedures.

Reduce the risk of accidental damage: Provide adequate space for the collection of tomorrow. Design for safe movement of art around building. Design to minimize art handling. Separate art from activities that could cause damage.

Provide a controlled environment: Provide ASHRAE Class A control with seasonal set point adjustments for all collection spaces. Provide cool or cold or dry storage if collecting priorities require it. Provide an enclosed or sealed loading dock. Monitor and keep records of the environment where collections are stored and displayed.

Control dust and pollution: Provide enhanced particulate filtration. Design rooms, finishes and furnishings to facilitate good housekeeping. Use display and storage fittings made of stable materials.

Manage light exposure: Design facility to limit light exposure in storage vaults. Provide flexible, economical track lighting for exhibition galleries. Provide just enough light for collections management, research and educational activities.

Integrate pest management into facility design: Design building and site to inhibit pest entry. Design for gradual integration of new acquisitions. Design to reduce the need for and facilitate good housekeeping around collections.

A building that meets these specifications would also meet the facility requirements for MCP Category A designation. In addition to providing good protection for art, such a facility could enhance VPAG's ability to attract donations, solicit funding, and bring in travelling exhibitions and loans for the North Okanagan community.



2. Introduction

At the request of the Tannis Nelson, Community Development Coordinator, Parks, Recreation and Culture for the Regional District of North Okanagan, Irene Karsten, Preservation Development Advisor with the Canadian Conservation Institute (CCI), conducted a facility assessment of the Vernon Public Art Gallery (VPAG) on 28 August 2014. The purpose of the assessment was:

- to assess the capacity of the current VPAG facility to meet the preventive conservation needs of its collection,
- to recommend short-term improvements for collections care in the existing facilities, and
- to provide specifications for a facility designed for the preservation of an art collection that would meet the requirements for Category A designation with the Movable Cultural Property (MCP) program in the Department of Canadian Heritage (Canadian Heritage 2013).

The assessment was done in conjunction with the development of an arts and culture master plan for the Regional District of North Okanagan which is intended to include a 10 to 20 year cultural facilities strategic plan.

2.1 Methodology

This facility assessment is based on a tour of the current gallery facility and discussions with Gallery staff. A tour of the facility was arranged by Tannis Nelson and led by Lubos Culen, Curator. Executive Director Dauna Kennedy-Grant was consulted as were other staff at the CCI, following the site visit.

The risks to the VPAG collection were assessed using the CCI Framework for Preservation and its ten agents that cause deterioration to collections (CCI 2013).

2.2 Scope

This assessment focuses on risks to the art stored and displayed in the VPAG facility and the ways in which facility improvements or new facility design could reduce those risks. A new facility can also be expected to enhance other gallery functions such as its capacity to provide programming and to attract tourists to the region. This report does not address such potential benefits unless there is a link to preventive conservation of art.

2.3 Report

The report that follows summarizes preservation issues identified during the site visit, reviews their impact on art in the collection. The report is organized around three sections. Section 3 describes the risks to art in the current facility. Section 4 provides suggestions for managing risks in the existing facility for the short term. Section 5 lists general recommendations for the design of a new facility that would better protect art. Many of these recommendations were discussed with staff while on site.



3. Risks to Art at the Vernon Public Art Gallery

A well-designed art gallery building is the most important and most-cost-effective means to preserving an art collection and making it accessible to the public. An inviting, cared-for building serves as the first line of defense against damage to the collection caused by what we in the field of cultural property conservation call the agents of deterioration: direct physical forces, theft and vandalism, fire, water, pests, pollutants, light and UV, incorrect temperature and incorrect relative humidity (CCI 2013). Even slight damage can substantially lower the value of a work of art since it rarely respects the artist's original intent. Prevention of damage is thus a key responsibility for the art gallery.

VPAG cannot adequately ensure the preservation of art for North Okanagan's future generations in its current facility.

The Vernon Public Art Gallery – the oldest art gallery in the interior of British Columbia – is located in retail space on the ground floor of a parking garage (Figure 1) in downtown Vernon. The Gallery has been in this location since 1995, upgrading and expanding as adjacent retail space became available to create what is today a facility of just over 6,000 square feet with 4 exhibition galleries (Figure 2), a small retail shop and art rental area, several offices, a kitchen, washrooms, and two behind the scenes storage rooms.



Figure 1. VPAG's current location at 3228 31st Avenue.

Unlike private galleries or artist-run centres, VPAG has the responsibilities of a *public museum*. Part of its mandate is to “exhibit, collect and *preserve* [emphasis added] local, regional, national and international art of the highest possible standards.” It holds in public trust a permanent collection of close to 600 artworks for future

generations in the North Okanagan and the rest of Canada. It mounts temporary and travelling exhibitions, showcasing the collections of other public art galleries as well as contemporary art.



Figure 2. Topham Brown Memorial Art Gallery.

The degree to which VPAG can meet its preservation mandate is limited by its current facility. Renovations to this commercial space protect art on the premises somewhat. To the extent that the space cannot be fully adapted to museum purposes, however, an unacceptable degree of risk remains. These risks are reviewed in detail below in order of the potential for loss or damage (greatest first).



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3.2 Water damage

Uncontrolled exposure to water can cause major damage to paintings, works of art on paper, electronic media and many types of sculpture, including:

- stains and tidelines,
- delamination of paint layers,
- distortion, buckling and cockling of materials,
- corrosion of metal sculpture and components, and
- loss of soluble materials in works of art.

Artwork is at risk of water damage from building leaks at VPAG.

No building is completely safe from occasional water leaks or floods even when adequately maintained. Situated in an adapted retail space under an open parking garage, the risk of damage due to water leaks is somewhat higher than might be the case in a purpose built museum facility:

- although partially covered, parking areas immediately above the Gallery are exposed to the elements;
- storm drains from upper parking lot abut the back storage room;
- utility pipes run through ceilings;
- main sprinkler pipe, rather than just branch lines, runs through storage area and back of Topham Brown Gallery (under suspended ceiling);
- not all rooms with sinks and plumbing have floor drains, only the washrooms;
- the water shutoff, situated in the ceiling near the washrooms, is not easily accessible; and
- gallery floors are almost level with the sidewalk and thus susceptible to flooding from the street.



VPAG staff is aware of the water leak risk given recent and ongoing incidents such as:

- leaks in back storage room due to the storm drain;
- flooding from broken water mains in December 2013 when water accumulated on all gallery floors; and
- small flood due to a defective humidifier hose.

Staff have taken some precautions against water leaks:

- most art in storage is wrapped in plastic (Figure 5); and
- a water detector was installed close to the art racks.

However, the risk of damage to art remains:

- frequent ongoing leaks seem inevitable due to poorly sealed concrete seams;
- many artworks were observed on the floor in storage – if only temporarily due to lack of space – where water tends to pool and the risk of water damage is highest;
- a single water detector may not detect flooding from the back of art storage or in any of the galleries.

VPAG is fortunately not located in a designated flood plain (BC Ministry of the Environment 2007) and is therefore not at high risk from natural overland flooding. Moreover, the entire facility is above grade. The Okanagan climate is moderate; therefore, the likelihood of extreme daily rainfall is lower than in places like Vancouver or Toronto. *Catastrophic* flood damage is therefore not expected.



Figure 5. Paintings covered in plastic to protect them from water leaks.

Staff emergency preparedness is not yet adequate with regards to collection protection and salvage.

At the time of the site visit, VPAG had no emergency response plan with procedures for collections salvage and recovery. Although staff manage emergencies as they arise and although the Gallery has collections insurance, greater damage to art on display or in storage (for example, mould following water leaks) can result if staff are unprepared. The curator has recently attended an emergency preparedness workshop in order to correct this problem.

3.3 Fire

Art is highly susceptible to damage from fires such as:

- total loss through combustion,
- staining by soot and smoke,
- deformation due to heat, and
- damage from extinguishers or water during suppression.

The facility provides adequate fire protection for life safety.

The VPAG facility is equipped with the fire protection systems required for life safety which will protect art objects to some extent:



- alarms, smoke detection and emergency lighting throughout;
- wet-pipe sprinklers throughout; and
- three fire extinguishers, one next to the loading dock door in the back storage area, one in the kitchen and one at reception.

Moreover, the facility is a fire-resistive, concrete structure. Response in the event of a fire is likely to be quick:

- the Vernon fire station is only a few blocks away, and
- there is a municipal fire hydrant out front.

Notably lacking are fire alarm pull stations which can speed response to fires detected by staff or visitors during open hours.

Limited compartmentation leaves art at risk.

The lack of fire-rated barriers between gallery spaces, however, makes fire damage – smoke damage in particular – more likely in the event of fire:

- no barrier between non-collection functions and art storage in back of house;
- no fire doors between three of the galleries and back of house;
- no barriers from Community Gallery to gift shop; and
- main doors on Topham Brown Gallery provide some protection, but glass has a low fire rating.

VPAG location adds additional fire risk from vehicle fires or arson.

The presence of the parking garage above and covered loading bay at back may introduce additional fire risk:

- presence of parked vehicles and potential for vehicle fires, and
- poor loading bay visibility even in the daytime as cover for arsonists.

3.4 Accidental damage

When handled or installed in spaces poorly designed for gallery activities, inadvertent damage will occasionally occur, such as:

- surface abrasion and scratches,
- dents or tears,
- marks or spills, or
- cracked glazing.

Damage is likely when art is stored or handled in crowded VPAG storage.

Even with good handling training, movement of materials through crowded spaces creates a higher risk of accidental damage. With insufficient space for its needs, back of house at VPAG is not ideal in this regard even though it currently has enough art rack storage for the size of its collection:

- no real separation of art storage from non-art storage;
- materials, tools and furniture stored along art movement path (Figure 6 left);
- art, frames and interpretive panels stored on floor in art rack area (Figure 6 centre);



Figure 6. Congestion in back storage room along path to loading bay door and art storage (left) and around art racks (centre) and on top of flat file cabinet.

- art racks are installed right up to the wall so that the wall side of the last rack has insufficient space for safe access (it is currently not used to store art);
- no dedicated space to set paintings on retrieval from or return to storage; and
- no space to set works of art on paper on retrieval from or return to flat file storage (Figure 6 right).

Lack of adequate programming space creates similar risk:

- activities and lectures are held in the galleries;
- visitors are involved in activities other than looking at exhibits and may accidentally bump into art;
- events require frequent movement of furniture in and out around art.

The lack of adequate space for the collection, other storage and programming needs may also inhibit collection use, and thus access to it, limiting its value for the region and discouraging donations.

Movement of art into VPAG is hampered by inadequate loading dock.

The loading bay to the rear of the Gallery (Figure 7) is designed for retail not museum needs:

- turning radius from alley is too tight for typical art transport trucks;
- although protected from precipitation, crates cannot be brought directly from trucks into temperature controlled Gallery space;
- entrance to Gallery is through small single door; and
- route from loading bay to galleries is through crowded storage and requires several turns.

Due to the inadequacy of the loading bay, crates are usually brought in through the larger, double main doors at front which provide more direct access to the galleries but provide only partial protection from inclement weather. Even these doors limit considerably the size of crates and artworks that can be collected by or exhibited safely at VPAG.

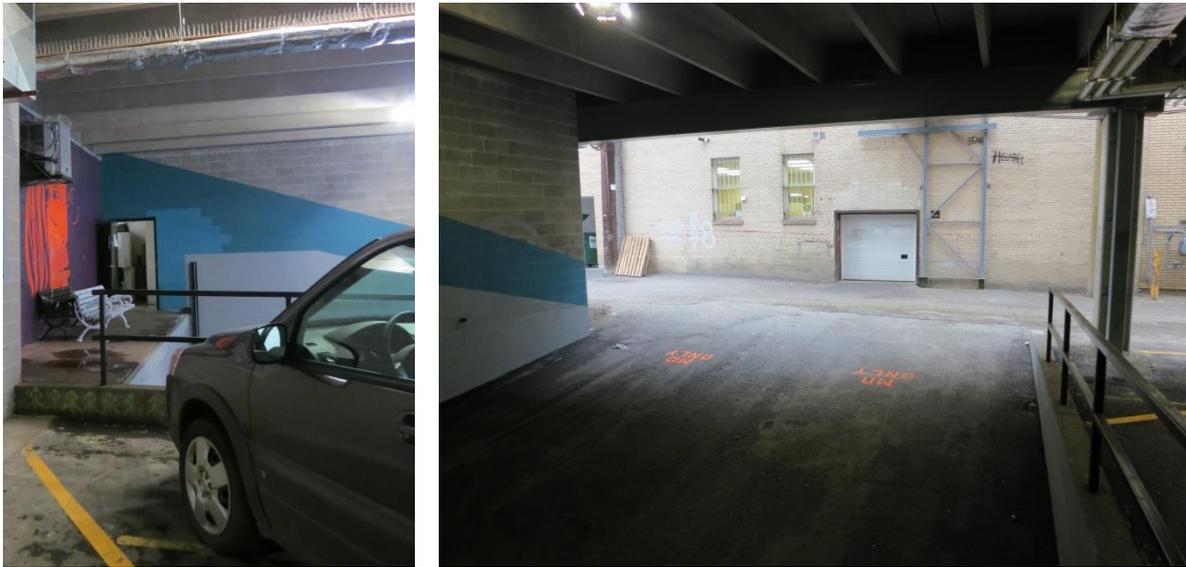


Figure 7. VPAG loading bay with single door access (left) and small turning radius for trucks (right).

The collection is not at risk of earthquake damage.

Although some areas of British Columbia require special seismic provisions to protect buildings and contents, VPAG and its collection is at low risk in this regard. Vernon lies in a low risk earthquake zone (Earthquakes Canada 2010; Kovacs and Sweeting 2004) where the *largest* earthquake likely in 500 years is expected to have a magnitude of around 5.4. Small tremors occur but few are felt. No seismic provisions are specified in the national building code for buildings in this area (Homeowner Protection Office, 2012, p. 4).

3.5 Uncontrolled relative humidity and temperature

Art objects that are displayed or stored in a poorly controlled environment can suffer damage over time:

- cracking, delamination or buckling of oil paintings due excessive relative humidity fluctuation, particularly drops in relative humidity to lower than 30% or repeated cycling of $\pm 10\%$ RH or more over many decades;
- cockling of works of art on paper in high relative humidity; and
- corrosion of metal sculpture in high relative humidity.

Most changes accumulate very slowly but may be difficult if not impossible to treat after the fact. The damage may lower both the appraisal value of an artwork and its usefulness for exhibition.

Lack of good relative humidity control at VPAG puts sensitive art objects at risk.

An HVAC system, upgraded in February 2014, provides some control over the temperature and relative humidity at VPAG in the Topham Brown Gallery:



- temperature well controlled year round at $20 \pm 2^{\circ}\text{C}$;
- winter relative humidity somewhat controlled by a VAPAC humidification system,
 - keeps the relative humidity above 30% in winter,
 - avoids the very dry extremes that otherwise occur when cold outdoor air is heated;
- air conditioning keeps summer relative humidity usually below 70%,
 - damp avoided; therefore low risk of mould;
- short-term relative humidity fluctuations usually within the 5% to 10% range.

Portable humidifiers are used to further modify the relative humidity if required by lenders. Conditions in other galleries and in collection storage will be less controlled although extremes of temperature and relative humidity are not expected due to the moderate Okanagan climate. Temperatures are likely to remain below 25°C most of the time and to remain below 30°C even in summer. Relative humidity in the 20-70% ranges is expected for most of the year. Values in storage of 24°C and 52% were measured during the site visit on a summer day.

The risk posed by the environment to art on display or in storage can be characterized through the level of environmental control as classified by ASHRAE (ASHRAE 2011; Grattan and Michalski 2013). Based on hygrothermograph charts from the Topham Brown Gallery for August 2013 to August 2014, the current level of overall environmental control in that gallery can be characterized as ASHRAE B (Table 1):

Table 1. ASHRAE Classes of Control (ASHRAE 2011; Grattan and Michalski 2013)

Maximum fluctuations and gradients in controlled spaces			
Short-term* fluctuations and space gradients	Seasonal adjustments in system set points§	Class of control	Risk to Paintings and Objects
$\pm 5\%$ RH $\pm 2^{\circ}\text{C}$	RH no change. Up 5°C and down 5°C .	AA Precision control, minimal seasonal changes to temperature only.	none
$\pm 10\%$ RH $\pm 2^{\circ}\text{C}$	RH no change. Up 5°C and down 10°C .	A Good control, seasonal change to temperature only.	none to small
$\pm 5\%$ RH $\pm 2^{\circ}\text{C}$	Up 10% RH and down 10% RH. Up 5°C and down 10°C .	A Good control, some gradients or seasonal changes.	none to small
$\pm 10\%$ RH $\pm 5^{\circ}\text{C}$	Up 10% RH and down 10% RH. Up 10°C (but not above 30°C) and down as low as necessary to maintain RH control.	B Control, some gradients plus winter temperature setback.	tiny to moderate
Within range 25–75% RH year-round. Rarely over 30°C , usually below 25°C .		C Prevent all high risk extremes.	moderate to high
Reliably below 75% RH.		D Prevent damp.	high

*Short-term fluctuations are any fluctuations less than the seasonal adjustment; however, some fluctuations are too short to affect some less-sensitive artifacts and those that are enclosed.

§RH and temperature set points: historical annual average for permanent collections or 50% RH with the temperature between 15 and 25°C .



- precision temperature control, $20 \pm 2^{\circ}\text{C}$ (equivalent to ASHRAE A class of control);
- annual average relative humidity set point of 45%;
- seasonal adjustment for relative humidity of 10% up in summer (average 55%), 10% down in winter (average 35%); and
- short-term relative humidity fluctuations usually within $\pm 10\%$ but often greater than $\pm 5\%$.

Artworks such as oil paintings on canvas or board, photographs, gouache paintings on paper are at tiny to moderate risk of cracking and delamination in such an environment. Acrylic paintings and most works of art on paper are at low to no risk of damage (Michalski, “Incorrect Relative Humidity” 2013).

The class of control for the rest of the building cannot be determined reliably without actual data but since winter relative humidity is very likely to drop below 25% from time to time, ASHRAE class D control is probable. The risk of damage such as cracking to some art objects stored in this facility over the long term could be high.

Improving environmental control in the galleries or collection storage in the facility is not possible without significant upgrading of vapour barriers in the building envelope. Without good control of air leakage and vapour diffusion, damage to the building structure due to moisture condensation in the walls in winter is likely. Moreover, the cost of maintaining the controlled environment could be prohibitive.

3.6 Dust and pollutants

Inappropriate levels of dust and pollutants may eventually damage certain artworks due to:

- soiling of exposed surfaces,
- permanent discolouration of hard to clean fragile, porous or soft surfaces such as those of acrylic paintings, and
- alteration of some colourants by pollutant gases.

Cleaning of the surfaces of paintings is generally not recommended, unless done by a conservator; therefore prevention is important.

HVAC air filtration controls dust levels fairly well.

VPAG spaces were not noticeably dusty; nor did staff report problematic dust levels. Recently upgraded, the HVAC system has a good capacity to filter particulates in air:

- the air intake was raised from the loading bay to the upper level of the parking garage (Figure 8) after smoke from a vehicle fire aspirated into Gallery;
- the system is equipped with medium efficiency Camfil Farr pleated filters that have a Minimum Efficiency Reporting Value (MERV) of 8.



Figure 8. HVAC air intake at the rear of the parking garage.



MERV 8 filters remove from the air (NIOSH 2003):

- more than 70% of large particles:
 - 3-10 microns,
 - most dust and spores, lint and hair, etc.; but
- no smaller particles:
 - less than 3 microns, including
 - smoke and soot, etc.

This level of filtration is generally adequate for offices but may not provide enough protection for paintings in collection storage over the long term.

Dust generated by indoor activity is less well controlled for art in storage.

Much indoor dust is generated by human activity (Cassar et al 1999; Yoon and Brimblecombe 2000) and may not be fully filtered through the HVAC system. This source of dust may have little impact on art on display at VPAG due to:

- sealed concrete, vinyl (imitation hardwood) and tile floors which are easier to clean than carpet (removed from galleries last winter after flooding), and
- short temporary exhibition times of 8-10 weeks.

Indoor generated dust may be more of a problem in collection storage due to:

- lack of separation between general storage and collection storage leading to higher levels of activity in the room than would be the case in a dedicated storage room;
- overcrowding, making it difficult to keep the space clean;
- long-term storage which gives sufficient time for dust to settle even onto vertical surfaces.

Much of the collection in storage is currently protected from dust by:

- plastic wrapping,
- glazing, or
- storage in cabinets and boxes.

The plastic wrapping is a precaution against possible water leaks in the space and is generally not recommended for long-term art storage due to the danger of creating damp microclimates.

3.7 Light and UV

Although essential for appreciating art, excessive exposure to light or ultraviolet (UV) radiation can result in damage to artworks:

- fading, yellowing or discoloration of pigments and materials; and
- reduction in strength or gloss of materials due to chemical degradation.

Because colour is often an essential component of the artist's vision, art damaged by light may no longer represent the artist's intent if colours have changed.



Track lighting in some galleries permits good light exposure management for art on display.

The Topham Brown and Caroline Galbraith galleries are equipped with conventional halogen track lighting. Such fixtures permit adjustment of light levels to those generally recommended for art display:

- 150 lux for paintings on canvas;
- 50 lux for works on paper,
- UV below 75 microwatts per lumen

Given the short length of most exhibitions at VPAG – 8 to 10 weeks – light exposure in these galleries can be adequately managed.

Large windows in other galleries expose art to high UV and visible light levels.

Large windows in the Community Gallery (Figure 8) and Up Front Gallery combined with fluorescent fixtures create lighting conditions that are not recommended for museum display of art:

- visible light levels up to 900 lux near the windows,
- visible light at almost 200 lux on the back wall of the Community gallery, and
- UV over 250 microwatts per lumen.

These windows do draw the attention of passersby to the Gallery’s exhibits (see Figure 4), which the building itself struggles to do. The windows are north facing, which means direct sunlight is avoided.

Because art is displayed for only short period under these conditions, only the most sensitive, pristine colourants (ISO 1) displayed close to the windows will exhibit any noticeable fading within one exhibition (Table 2). Since fading is cumulative, each exhibition “uses up” more colourant than would identical display period at recommended museum settings (Table 2). For example, sensitive works displayed at 450 lux with high UV will fade:

- about 4-9 times faster than if displayed in UV-filtered light at 150 lux, and
- 12-26 times faster than if displayed at 50 lux.

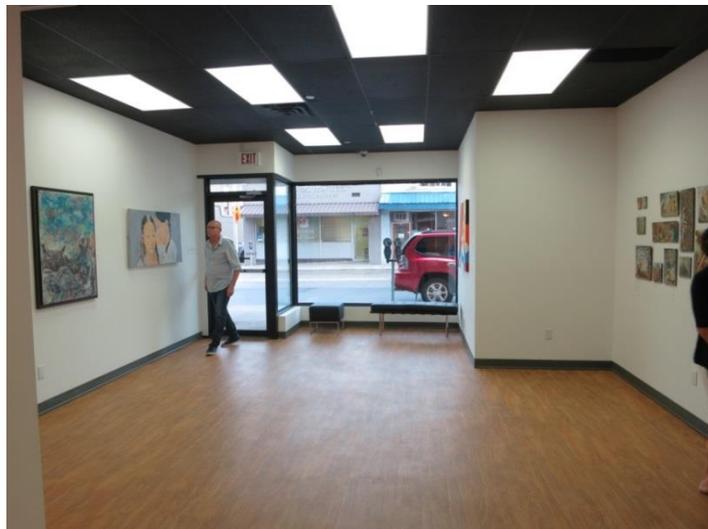


Figure 8. Windows and fluorescent lighting in the Community Gallery.

Art in storage is unnecessarily exposed to light.

Because VPAG does not have a separate storage vault, art storage is lit even when no one needs access to it. The lights in this single room go on if people need access to any of the materials stored there,



much of which is not art. For most art, this unnecessary exposure is minimal:

- the area is rather dimly lit by two fluorescent fixtures,
- only one fixture is located directly over the art racks where most paintings are hung,
- art racks shade most of the works, and
- lighting is intermittent.

Nevertheless, much of this exposure could be avoided if the collection was stored in a dedicated vault.

Table 2. Estimated number of exhibitions (10 weeks, 400 hours) to just noticeable fade of sensitive colourants at various light levels (based on Michalski, “Light, Ultraviolet and Infrared” 2013)

Lux Level	Light Dose (Mlux hr)	UV Level	Number of exhibitions to just noticeable fade			
			ISO1 (e.g. most plant extracts (dyes), lake pigments, carmine, cheap synthetic colourants, felt tip pens, red and blue ball point ink, many colour photographs)	ISO2	ISO3	ISO4 (e.g. alizarin dyes and lakes, many colour photographs)
50	0.02	low	15	50	150	500
150	0.06	low	5	17	50	167
450	0.18	high	1.3	3.3	8	19
600	0.24	high	1.0	2.5	6	15
900	0.36	high	0.7	1.7	4	10

3.8 Pests

Museum pests, whether insects, rodents, birds or microorganisms, damage collections by:

- grazing, consuming, or gnawing on materials,
- staining materials with urine or faecal matter, or
- using materials for nests.

Infestations, once established, can be highly damaging and difficult to eradicate or control; therefore prevention and pest management is encouraged.

Lack of adequate storage increases risk of pest damage.

Pest management is compromised by the lack of adequate storage space in the current VPAG facility.

Protection of the collection from potential pest damage is problematic due to:

- lack of physical barriers between collection storage, non-collection storage and the rest of the facility increasing the likelihood of pest transfer to artworks;
- overcrowding in storage which makes prevention of infestation through good housekeeping difficult;
- cluttered storage spaces, which can delay the identification of infestations, potentially resulting in greater damage; and
- lack of separate space in which new artworks can be examined carefully or quarantined before integration with the rest of the collection.



The adapted commercial building – in good condition with few gaps at exterior doors and windows – provides a relatively good enclosure to block pest entry from outside (Strang and Kigawa 2009) but not an impermeable one. Mouse droppings have been found in the back storage room in the past, indicating the potential for pest problems. Pigeons congregate in the loading bay area despite the use of bird spikes to inhibit them. Although the risk of direct damage to art from these birds is low, bird nests are known to be a breeding ground for certain insect species that may damage art objects.

Frequent infestation and severe pest damage to the collection is nevertheless unlikely. Staff members report few issues despite little regular pest monitoring. VPAG is at lower risk for collection damage from pest infestation due to the nature of its collection and the local climate:

- materials like skin, fur or wool that are high attractants for insect pests are not present;
- artwork where the major component is wood, which is at risk for wood borers, are few; and
- the relatively dry Vernon climate reduces the likelihood of many museum pests, such as silverfish and furniture beetle, that thrive in damp places.



4. Managing Risk in the Existing Facility

VPAG and the Region of North Okanagan have managed to transform a retail space into a reasonable working art gallery despite the constraints that come with a building not designed for museum purposes. Compared to most other small public art galleries across Canada, however, the VPAG facility is poorly designed. If the risks described in Section 3 are to be addressed adequately for the long-term preservation of the collection, additional improvements are needed. This section explores the feasibility of reducing risks within the existing facility through two approaches:

- improvements to the facility, and
- targeted strategies for collections care.

Although such changes could be beneficial for the short-term, they would still not enable VPAG to fully meet its preservation mandate or the facility requirements for MCP Category A designation. In some cases, modifications could result in reduced service to the community.

4.1 Reduce risks through facility improvements

Significant upgrading of the current facility is not recommended for several reasons:

- the existing space is insufficient for current gallery functions and expansion on site would be challenging, if not impossible;
- increasing security to a level adequate for art of high monetary value within such a long structure with numerous exits directly onto the street would be costly;
- upgrading collection storage to provide adequate protection from environmental fluctuations may not be possible to the standard accepted by most galleries (ASHRAE class A) given that upgrades to date in the Topham Brown Gallery have not provided this level of control.

Until a better designed facility is available, however, VPAG is responsible for managing the risks to its collection. Smaller improvements may be possible but should be considered carefully in terms of cost-benefit and their impact on gallery functions other than art preservation.

4.1.1 Improve security for art in storage and on display

Review key and access control and limit further if possible.

Security for the collection is enhanced if all access to collection spaces is supervised by staff:

- schedule work in collection spaces by contract staff or other non-VPAG staff, including floor cleaning, during hours when staff are present;
- limit keys to staff and the regional facilities manager.

Review and possibly increase the level of intrusion detection.

A full security review by a qualified professional could provide ideas for cost-effective improvements to the security system, such as:

- [REDACTED]
- [REDACTED]
- [REDACTED]



- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

Improve separation between galleries and back of house.

Currently there are no physical barriers between the Community and Caroline Galbraith galleries and back of house. This may confuse some visitors as well as lowering security and increasing fire risks due to poor compartmentation. The installation of doors between these galleries and the small hall area in front of the kitchen, if feasible, would be beneficial but only if such doors can be large enough to permit movement of art between collection storage and the galleries without damage. Reworking the entire hallway between the galleries and the kitchen may be necessary and would likely result in loss of valuable gallery space.

Consider separating collections storage from the rest of back of house.

Installation of a wall and lockable door to separate collection storage from the rest of back of house would improve security for the permanent collection while also improving compartmentation and permitting even better control of light exposure. Although any locked barrier would improve security, other risks to the collection might increase if the separation is poorly designed. Ideally this upgrade would include:

- a wall fire-rated for at least 60 minutes that rises to the ceiling slab;
- a door larger enough for removal of large paintings;
- a solid door secured with non-removable hinge pins and mortised 6-pin deadbolt lock and a contact switch;
- addition of a separate switch for light fixtures in storage; and
- adequate ventilation to prevent creation of damp or hot microclimates in storage.

Because of the shortage of space for gallery functions, enclosure of collection storage could only be effective if planned in conjunction with improvements in storage for non-collection materials such as chairs and display plinths. Given the difficulty in providing adequate space on site, this upgrade may not be advisable.

4.1.2 Improve non-collection storage

Provide better storage for non-collection materials.

Safer storage of the collection requires spacious, uncluttered transit routes from back of house into the galleries. Thoughtful reorganization of back of house, perhaps combined with small renovations, could give more room to items such as chairs, display plinths, easels and programming materials that are currently stored in the same room as the collection. Addition of a significant amount of convenient storage space may not be cost-effective. Nevertheless, ideas to consider include:



- installation of a secure, portable storage container in the loading dock if the entire space is not required for deliveries;
- enlarging the hall space between the Community and Caroline Galbraith galleries and the kitchen; and/or
- repurposing the small Up-Front Gallery for chair and plinth storage.

Implementing any of these options will not add much additional space and thus does not really address VPAG’s space needs. In addition, the impact on other activities may not be desirable. Parking for the facility is already at a premium. Co-opting front of house spaces for back of house purposes would result in the loss of valuable gallery and public programming space.

4.1.3 Practice proactive maintenance.

Continue to maintain the building and building systems proactively.

Although a key component of collections risk management in any facility, good building maintenance is critical when the structure has not been designed to protect collections. Attentive, proactive maintenance of HVAC, plumbing, fire protection and security systems and particularly of the building structure combined with speedy repairs should limit the extent of damage from incidents expected in this adapted retail space.

Because of the frequency of problems and potential for damage to art should systems fail in the current facility, VPAG building maintenance should be a high priority for the Region of North Okanagan and is likely to require more frequent attention than a new, well designed facility.

4.2 Reduce risks through strategic collection use and management

When facility improvements are not possible or insufficient, risk can also be reduced somewhat through careful management of art within the building. Some of these suggestions are advisable regardless of the nature of the facility. Others, which involve limiting the use and growth of the collection to account for inadequate protection in the current facility, are offered as possible short-term strategies only. These options overly restrict VPAG’s ability to meet its collecting mandate and to deliver service to the North Okanagan community.

4.2.1 Account for security weakness

[REDACTED]

- [REDACTED]
- [REDACTED]
- [REDACTED]

[REDACTED]



Exhibit and collect in a manner that accounts for security risks.

[REDACTED]

- [REDACTED]
- [REDACTED]

[REDACTED]

4.2.2 Prevent and prepare for emergencies.

Complete emergency plan and train response team.

No facility completely protects a collection from emergency incidents. Staff have the training and information needed to develop a good emergency preparedness program for VPAG. Completing an emergency plan and training a response team that includes both VPAG and regional staff will make it easier for VPAG and the Region of North Okanagan to limit damage to the facility and the collection when incidents occur and to expedite collection salvage and recovery when necessary. Although the emergency plan would need to be modified for a new building, any effort to develop a preparedness program now will make the transition easier.

4.2.3 Manage risks due to inadequate collection spaces

Risks to art due to lack of environmental control or lack of storage space can be dealt with over the short-term through careful collections management.

Adopt protective storage methods.

Because of the nature of the building envelope, renovating the existing structure to provide a museum environment in all collection spaces in terms of relative humidity and pollutant control, if feasible, is not likely to be cost-effective and is, therefore, not recommended.

Appropriate storage methods can reduce the impact of environmental fluctuations or dust accumulation and are recommended, even in a good facility:

- glazed framing, especially if well sealed,
- backing boards on paintings on canvas (Daly-Hartin 1993), which also protect against handling damage,
- storage of works on paper in cabinets or boxes (preferably matted to provide further buffering and protection for handling), and
- glazing or covers over acrylic paintings that would otherwise be exposed to dust.



Collect with the facility in mind.

Certain art media are sensitive to poorly controlled environments (Michalski, “Incorrect Relative Humidity” 2013). The risk is lower if such materials are not accepted into the collection until a better facility is provided:

- large paper sheets adhered to stretchers or prints adhered at four corners,
- paintings on wood panel or ivory or the smooth side of fibreboard,
- thick oil-resin images on paper or canvas,
- wooden objects with inlay (metal, shell, etc.) that spans the wood grain,
- polychrome wood sculpture,
- audio or videotape, or
- sculptures made of rubber, polyvinyl chloride (PVC) or polyurethane.

Acrylic paintings, many types of works of art on paper, ceramics and glass are at low risk at VPAG. Metal sculpture would be fine if damp is avoided.

Similar, VPAG does not have sufficient storage space for large paintings or sculpture. Art that cannot be safely stored in the current facility is put at risk if acquired.

Although advisable, such restrictions make it impossible for VPAG to fully meet its collecting mandate and thus cannot be seen as part of a long-term strategy. Complying with such restrictions in the face of potential donations that best belong in the North Okanagan – such as works by Joyce Devlin – would be difficult. Acquisitions may be justified if art comes from similarly uncontrolled environments and would be at no greater risk at VPAG.

4.2.4 Manage light fading risks

Exhibit art strategically to account for light fading risk.

Short exhibition periods already prevent visible fading of most artworks displayed at VPAG. Strategic installation in the Community and Up-Front galleries would mitigate the remaining risk. Sensitive materials, such as watercolours and dyed textiles as well as all high value art, could be exhibited only in the Caroline Galbraith and Topham Brown galleries. Installation near windows, where lux and UV levels are highest, could be limited to materials of lower sensitivity, such as recent works painted with professional artists’ colours, black and white prints or drawings, ceramics or uncoloured metal.

Consider improving light and UV control in Community and Up-Front galleries.

Light exposure management could be improved in the Community and Up-Front galleries by:

- replacing fluorescent lighting with halogen or solid state (LED) track lighting, and
- installing solar blinds or UV filters on windows.

Since the fading risk can be effectively managed through appropriate exhibition practices, these improvements are lower priorities than those that improve security and may not be necessary if a new facility is being planned.



5. Recommended Art Gallery Design Specifications

The Vernon Public Art Gallery provides some protection for art. The risks to art in its facility, however, indicate the degree to which VPAG fails to fully meet its preservation mandate in the current facility. Further risk reduction within this commercial retail space is highly limited by:

- lack of adequate space for all VPAG activities, and
- a building envelope and systems not designed for art museum needs.

Provide a facility designed to adequately protect art.

This section describes the steps VPAG needs to take to provide adequate protection for art in its collection and on display for the long term. To do so requires a better designed art gallery facility, a facility that, with good maintenance, will help ensure that VPAG can provide Vernon and the North Okanagan with access to regional, national and even international art for generations to come. Such a facility would support the mandate of the Gallery through:

- long-term preservation of works of art in the permanent collection;
- donation of works of art from artists and collectors who know that the VPAG can provide for long-term preservation of any art media;
- access to MCP Program donation incentives and funds (Canadian Heritage 2014);
- loan of works of art from institutions and collectors who will entrust their art only to institutions that can maintain a high level of care; and
- provision of beautiful, comfortable, clean and safe spaces that encourage repeat visits and attract rental income.

5.1 Secure collections

Because of art's market and cultural value, collections and exhibitions need high security to protect from theft or vandalism. Overall security requires a complementary blend of systems and procedures (see ASIS and AAM 2008 for detailed suggested practice).

Provide a secure perimeter to prevent unauthorized entry.

Thoughtful art gallery design can inhibit unauthorized entry through the following characteristics:

- site designed for good visibility with security lighting and landscaping that provides no cover for intruders
- ground level access points limited to as few necessary for access and emergency evacuation
- solid steel doors with non-removable hinge pins and mortised 6-pin deadbolt locks
- high security keyways and key control
- no external door hardware on doors that are emergency exits only
- ground level glazing restricted to lower security zones

Equip building with adequate security systems.

Security systems are designed to detect unauthorized entry and initiate and/or aid response.

Recommended systems include:



- an intrusion alarm system that is continuously monitored and fully tested regularly using qualified personnel:
 - contact alarms on all exterior, collection storage and loading dock doors
 - motion detection in all collection spaces (exhibition, storage) and any perimeter spaces that might be access from outside (e.g. lobby, loading dock)
 - glass break detectors on ground floor windows
 - alarms on any accessible air ducts and vents larger than 25 x 25 cm
 - dedicated emergency exits alarmed at all times
 - collection storage alarmed separately if possible so that it can remain alarmed during open hours when staff are not present
- recorded video surveillance for high security areas (exhibit galleries, collection storage, loading dock)
- uninterruptible power supply (UPS) for the alarm system

Secure collections on display.

Theft by outsiders will more likely occur from exhibition galleries; therefore, secure methods for displaying art are critical:

- use of security hangers for portable, valuable framed art
- display cases with impact resistant glazing and tamper-proof closures for smaller, fragile objects
- object and proximity alarms for very high value art or art not protected by cases
- barriers to control visitor distance from art on display

Control access to non-public functions.

Security is enhanced and controlled access facilitated – particularly for smaller institutions with limited staff – if the facility is designed with distinct security zones:

- distinct public and non-public areas
- few points of entry from public to non-public zones
- dedicated collection storage vault that does not serve as office space or an access route to other spaces
- utility panels and mechanical rooms in a non-public zone separate from collections zone
- individually controlled key or card access to each non-public area for only those who need it
- monitored after-hours entry
- gallery entrances that can be locked or easily blocked for exhibition installation without impeding access to other galleries

5.2 Prevent water damage

Careful building design combined with proactive maintenance can reduce the likelihood of water reaching art on display or in storage.

Design to route water away from art.

New facilities provide an opportunity to locate essential water-bearing systems away from art.

Recommendations for site and building include:



-
- locate on higher ground, not in a flood plain
 - drain water away from building through sloped ground surface, pitched roof and appropriate roof gutters or drain pipes
 - locate plumbing, steam, roof drainage and main sprinkler pipes – pressurized pipes in particular – outside of storage vaults and galleries
 - design HVAC to place condensate drip pans outside of collection spaces
 - insulate cold water pipe to prevent condensation

Locate art away from the impact of eventual building leaks.

Designing a building with eventual maintenance issues in mind can reduce the impact on the collection or other art in the building:

- locate storage vaults and galleries above grade
- provide adequate storage furniture to ensure that the entire collection is off the floor at all times
- avoid placing collection rooms under roof penetrations or joints; if possible avoid rooms directly under roof
- avoid placement of mechanical rooms, washrooms or kitchens above or next to collection spaces
- avoid skylights or windows in collection spaces
- provide floor drains in rooms with sinks and dams around mechanical rooms

Design to facilitate maintenance.

Building design that facilitates system inspection and repair is more likely to limit the impact of eventually maintenance issues:

- keep plumbing accessible; avoid suspended ceilings
- provide easy internal access to mechanical room and roof to facilitate inspections and maintenance
- install water sensors where water leaks are likely

Prepare for emergencies.

Protection of art from water damage in a new facility, as in an older one, requires staff guided by an emergency response plan specific to that facility that includes appropriate collections salvage procedures. The trained response team should include facility managers as well as collection staff.

5.3 Protect against fire

Appropriate building construction and fire protection systems will protect the art collection as well as human life.

Design to limit fire risk and spread.

Research has shown that museum fires are not likely to start in collection spaces (Tétreault 2008); therefore, building materials and layout can reduce the likelihood that fire reaches the collection should one occur. Recommendations include:



-
- locate the building in an area at low risk from wildfire or industrial accidents
 - use non-combustible or fire-resistant building construction
 - install fire-rated walls and doors (60 minutes or more) in collection spaces, mechanical rooms and workshops
 - separate collection spaces from functions with higher fire risk (workshops, kitchens, etc.)
 - install electrical systems that will adequately support the needs of contemporary art practice

Provide systems that detect and suppress fires.

Design fire protection systems with property protection in mind, even if that means going beyond code:

- fire alarms and automatic fire detection systems (smoke detection in collection spaces)
- separate zone for collection storage
- fire extinguishers
- fire suppression throughout including collection storage and galleries

CCI recommends wet-pipe sprinklers despite the slight risk of locating water-holding pipes in collection spaces. These systems are more reliable and less costly to install and maintain. Water damage, although undesirable, is more likely to respond to conservation treatment than fire or soot damage. Systems that limit the water risk – pre-action, water mist, clean agent – are also acceptable if resources are available, particularly for ongoing maintenance.

Support systems with fire prevention procedures.

For systems to be effective when needed, good fire safety procedures must be developed for the facility, including:

- regular fire system inspections by certified personnel
- regular fire safety inspections
- regular fire drills
- staff training on use of fire extinguishers
- open flame and hot work not permitted or controlled
- fire response procedures in the emergency response plan

5.4 Reduce the risk of accidental damage

Art is at risk of accidental damage when building design does not account for the size and use of art in the collection and loaned for exhibitions.

Provide adequate space for the collection of tomorrow.

As VPAG continues to collect in accordance with its mandate, its collection will grow. Guidelines for design include:

- provide sufficient vault space and appropriate storage furnishings to accommodate existing collections without crowding
- accommodate collections growth in terms of number and object types over the next 20-30 years
- provide adequate floor loading capacity for compact storage methods to maximize use of space
- provide walls that can support heavy works of art



Design for safe movement of art around building.

An effective art gallery design anticipates how art will be moved and used throughout the facility. The following characteristics are recommended:

- doors, corridors, ceiling height and freight elevators sized to accommodate the size of art objects and installations
- corridors with few if any turns between loading dock, galleries and vaults
- entrance to storage vault(s) and galleries directly off corridors kept clear of clutter
- separate, dedicated storage vault(s) to minimize activity where art is stored
- adequate, separate space for storage of non-collection items (display cases, crates, light fixtures, tables, publications, business records, etc.)

Design to minimize art handling.

A new facility provides the opportunity to select storage techniques that facilitate access while reducing handling risks. Suggestions in this regard include:

- store framed art on art racks to provide visual access without handling
- size and install art racks for ease of access to all surfaces and to permit use of rolling ladders for art hung at top
- mat and store smaller works of art on paper in solander or other archival boxes on open shelves
- use flat file cabinets only for unframed, oversized works of art on paper

Separate art from activities that could cause damage.

Activities or programmes that involve materials or processes that could accidentally damage artworks need dedicated space:

- clean preparation space for matting and framing
- separate workshop space for construction of crates and display cases, etc.
- separate areas for food preparation / consumption by staff or visitors or for receptions
- separate space for educational programming

5.5 Provide a controlled environment

Relatively stable, moderate environmental conditions minimize the risk of damage from fluctuating or incorrect temperature and relative humidity levels for many types of art objects, including paintings, works of art on paper and photographs.

Provide ASHRAE Class A control with seasonal set point adjustments for all collection spaces.

MCP Category A designation and many art lenders require environmental control that meets the requirements of ASHRAE Class A control for exhibition galleries and collection storage. Ideally, all spaces where art is displayed, stored or transported (exhibition galleries, storage vaults, preparation rooms, quarantine rooms, and connecting corridors) are controlled.

In the Canadian climate, we recommend seasonal set point adjustments combined with tighter control over short-term fluctuations:



- temperature set point between 15°C and 25°C
- ± 2°C short term temperature fluctuations
- maximum seasonal set point adjustments of 5°C up in summer and 10°C down in winter (although constant year round temperature is often feasible)
- relative humidity set point near 50%
- ± 5% short term relative humidity fluctuations
- maximum seasonal set point adjustments of 10% up in summer (as high as 60%) and 10% down in winter (as low as 40%)
- incremental set point adjustment (e.g. steps of 0.1%) over two months in spring and fall (can be programmed into HVAC systems with direct digital control)

Building design features that help ensure reliable, sustainable environmental control include:

- separate zones for collection and non-collection functions so that only collection spaces need to be tightly controlled
- location of collection spaces away from exterior walls
- double or triple glazed windows but minimal use of windows and skylights in collection spaces
- well-insulated building envelope
- vapour barriers in walls and roof
- multiple units for humidification/dehumidification so that relative humidity control is not lost when units fail
- sensors located in rooms where art is kept, not only in ductwork
- sensors located to prevent interference from windows, open doors, ventilation ducts, exterior walls, etc.

Provide cool or cold or dry storage if collecting priorities require it

Certain art media require specialized storage environments to prevent damage. Magnetic media, such as audio or video tape, colour photographs and some modern polymers (e.g. rubber, polyvinyl chloride (PVC) or polyurethane) are chemically unstable and deteriorate relatively quickly at room temperature; these require cool or cold storage (Michalski, “Incorrect Temperature 2013). Certain metals – particularly steel or iron – may corrode at moderate relative humidity levels and are better preserved at relative humidity below 30%.

The VPAG collection currently does not include many such materials. Specialized storage need only be considered if future collecting is expected to include them, particularly if such art might be certified as cultural property.

Provide an enclosed or sealed loading dock.

The best protection for incoming and outgoing art is an enclosed loading dock with a separate HVAC zone. Loading dock seals, shelters or truck curtains on exterior doors are acceptable alternatives for MCP Category A designation.

Monitor and keep records of the environment where collections are stored and displayed.

One year of environmental data for each collection space and evidence of ongoing monitoring is required for MCP Category A designation. Access to loans for exhibitions in the new facility may also be contingent on being able to provide lenders with recent graphs that demonstrate good environmental



control. Hygrothermographs or data logger data are acceptable. If data loggers or the building management system are used to collect and report data, graphs can be interpreted more easily if they:

- reflect data gathered within the rooms close to where objects are located (not in ductwork)
- are based on data points every 15-30 minutes
- show data by month
- have consistent temperature axes, 0-30°C
- have consistent, preferably separate relative humidity axes, 0-100%
- use colours consistently to represent temperature and relative humidity
- are archived for future reference

Independent monitoring of collection spaces by collection staff is encouraged. Building sensors and stand-alone data loggers or monitoring equipment need periodic calibration to ensure that readings are accurate. HVAC problems can be identified and addressed most quickly if both facilities and collections staff are involved.

5.6 Control dust and pollutants

Building systems and collection fittings designed to minimize dust and airborne pollutants are not only good for human health but also maximize collection preservation.

Provide enhanced particulate filtration.

Better than average air filtration is required for MCP Category A designation. The level of filtration commonly used for offices and classrooms may effectively remove coarse particles but not fine small particles (less than 3 microns) which are most likely to embed permanently into soft or fibrous surfaces.

The HVAC system should be able to meet the requirements of at least the Level D specification class described by Tétreault (2003, p. 44):

- MERV 8 first-stage particle filter (equivalent to dust spot efficiency of 30-35%)
- MERV 12 final-stage particle filter (equivalent to dust spot efficiency of 70-75%)
- positive pressure to minimize the infiltration of pollutants and to optimize climate control
- filters on return air and gaseous filtration recommended but not required

Appropriate exhaust or filtration must also be provided for workshops or kitchens where dust or cooking or use of chemicals is expected, for health and safety reasons as well as to protect the art.

Design rooms, finishes and furnishings to facilitate good housekeeping.

Room shape, layout, finishes and furnishings should facilitate effective, periodic housekeeping (dusting, floor cleaning) to keep collection spaces clean:

- separate collection storage from other activities (research, teaching, collections management, offices) to minimize dust deposition from human activity in vaults
- provide separate workshop space for “dirty” activities that use paints, chemicals, adhesives, etc. or that generate dust
- choose easy to clean tile, sheet vinyl, sealed concrete or hardwood flooring, not carpeting
- ensure that all floors and corners are accessible for cleaning



Use display and storage fittings made of stable materials.

Interior finishes, display cases and storage furnishings can provide additional protection from dust and, if selected and used carefully, from other pollutants:

- choose powder-coated metal furniture if possible, but wood sealed with appropriate coatings (Tétreault 2011) is acceptable
- use boxes, containers and enclosures made of archival grade cardboard or paper, polyethylene, polypropylene, polyester, polystyrene, acrylic, or polycarbonate; avoid ordinary cardboard and polyvinyl chloride
- use enclosures that pass the Photographic Activity Test (PAT) to reduce risks to photographs
- allow for adequate drying of coatings: 4 days for walls finishes; 4 weeks for airtight case interiors

5.7 Manage light exposure

Light fixtures will vary according to the functions of different spaces. Systems that preserve yet facilitate appreciation of art are best for collection spaces. Although natural light adds to the ambience of buildings and can cut lamping and energy costs in offices and non-collection areas, light from windows can be difficult to control in exhibition galleries and should be avoided in storage vaults.

Design facility to limit light exposure in collection storage vaults.

Dedicating storage vaults to collection storage only will keep light exposure to a minimum, in addition to decreasing dust levels and improving security. Storage rooms are best kept dark unless someone is in the room. Light exposure in storage can be further managed by:

- use of low UV fluorescent room lighting at levels just high enough for safe access to collections (500 lux or less is usually adequate)
- installing pull-out art racks rather than racks that move side to side with light fixtures in front of rather than over the racks
- use of boxes or cabinets that block light, where appropriate
- providing individual switches for banks of fluorescent lights so that only those needed can be turned on
- installing motion detectors that control banks of light in larger rooms or automatically turn lights on and off in spaces that are accessed intermittently

Provide flexible, economical track lighting for exhibition galleries.

All display areas will need light fixtures that provide excellent control over light level and direction. The track lighting at VPAG, although appropriate, is beginning to fail and will soon be obsolete.

Selection criteria for new lighting include:

- lamps dimmable to at least 50 lux
- lamps with a colour rendering index (CRI) of at least 85, but preferably above 90
- flexible, adjustable lamp placement (i.e. track lighting) so that objects can be illuminated only as much as needed
- no UV (preferable) or low UV (less than 75 microwatts per lumen)
- low operating costs (combination of energy usage, lamp lifetime and relamping cost)



Since incandescent lamps are gradually being phased out due to their energy inefficiency, selection of museum-quality solid state (LED) systems is recommended. The use of these lamps also eliminates problems with UV. Care is needed to ensure that low enough light levels can be achieved if the distance from fixture to object is small.

Provide just enough light for collections management, research and educational activities.

Because light exposure is for short periods, light levels can be higher in spaces where collections are used for activities other than display. Lighting systems and procedures that permit control of light exposure are recommended:

- overall light levels not greater than 500 lux at work table height
- use of task lighting where higher light levels are needed
- temporary storage cabinets or covers (e.g. Tyvek sheets) for objects retrieved for use but not being looked at

5.8 Integrate pest management into facility design

Art collections that consist primarily of traditional media like paintings and works of art on paper, like that of VPAG, include few materials that are highly attractive to most museum pests. Nevertheless, a well-sealed building combined with good housekeeping and food management could make an elaborate integrated pest management program with building-wide insect trapping unnecessary.

Design building and site to inhibit pest entry.

Several characteristics of the building and site can inhibit pest infiltration and are thus recommended (MuseumPests.net 2015; Strang and Kigawa 2009):

- stone or brick exterior
- double sets of doors to exterior; tight door seals
- exterior light fixtures mounted away from building, particularly by entrances and air intake grills
- high-pressure sodium vapour exterior lighting rather mercury vapour
- no ledges and nooks that could serve as roosting sites for birds
- vegetation-free boarder around building (e.g. about 1 metre of pea gravel over landscape fabric)
- only non-flowering vegetation and no water features
- rodent proof garbage receptacles on concrete pads for away from doors and windows

Design for gradual integration of new acquisitions.

Pests are most likely introduced into clean, food-free collection facilities through infested new acquisitions or materials for exhibitions. To prevent such infestation, we recommended providing:

- space for quarantine or inspection of new acquisitions separate from storage vaults
- chest freezer for freezing of infested materials (but not paintings – quarantine or low oxygen methods preferred)
- separate space for receiving and storing non-collection materials and crates



Design to reduce the need for and facilitate good housekeeping around collections.

Accumulation of food wastes, dust and clutter can attract pests. Design that provides for eating and drinking away from collection spaces will encourage compliance with rules that prohibit use of food around collections. Room finishes and furnishings should facilitate effective, periodic housekeeping (dusting, floor cleaning) to keep collection spaces clean and thus inhibit pests and improve early detection. To lower risk of pest infestation:

- provide suitable space for catered receptions outside of collection spaces
- provide staff workspaces outside of collection areas so that staff can eat at or close to their desks without increasing pest risks
- choose easy to clean tile, sheet vinyl, sealed concrete or hardwood flooring, not carpeting
- choose light-coloured finishes to aid pest detection
- ensure that all floors and corners are accessible for cleaning



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