PRESERVATION ASSESSMENT

MISSION SAN GABRIEL, SAN GABRIEL CALIFORNIA
BOUND MATERIALS COLLECTION

F I N A L R E P O R T

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Introduction

In December of 2019 Holly Moore, Preservation Consultant, was commissioned by Terri Huerta, Director of Development and Communications, to conduct a preservation assessment of the Mission San Gabriel (MSG) antiquarian book collection (hereafter referred to as the bound materials collection). The assessment was conducted with the assistance of Ms. Huerta and a team led by Dr. Steven W. Hackel, Professor of History, University of California, Riverside that included Laura Stalker, Deputy Director of the Huntington Library, Art Museum and Botanical Gardens and the author. The core purpose of the project was to: 1) assess and document the bound materials collection condition, 2) assess the environmental conditions in which the collection is stored and exhibited, 3) provide recommendations for the long-term preservation of the collection, and 4) create a numbering system and inventory to support further work with and exhibition of the collection.

The preservation of these unique and irreplaceable materials is important, especially now as plans are being made to upgrade environmental systems and re-envision the MSG museum exhibition.

This report includes the results of the bound materials condition survey, the results of an external/internal hazards survey, and a prioritized list of recommendations. A section is included for exhibitions recommendations as this is an important project for the MSG going forward.

The author would like to thank the entire project team and especially Terri Huerta, who was unflagging in her support of the project and generous with her time and assistance. The Mission is fortunate to have such important historic collections and a staff who believe in the stewardship of those collections.

Bound Materials Condition Assessment

Condition surveys of cultural materials give collection stakeholders an overall impression of the health of the collection. Identifying information is logged as well as description and condition, noting damage to the physical object. Statistics from a condition survey can be

used to plan for treatment and housing but may change as the individual objects are assessed by conservators prior to treatment.

The first half of the bound materials survey took place from December 2019 to March 2020. The second half of the survey was completed after a pause due to the Covid-19 pandemic, and after the Mission fire in the summer of 2020, running from August 2020 to November 2020. At the conclusion of the survey, and due to the fire and subsequent recovery work, the volumes were moved off-site to an art storage company, along with other cultural materials in the MSG collections.

Bound Materials Condition Survey

Procedure

Due to the small size of the bound materials collection, an item-level survey was conducted, in which each volume with an imprint date of 1840 or earlier was included in the survey population. 159 volumes in all were surveyed.

In the first half of the survey, the books in the museum rooms were checked for imprint date and moved in batches to the conference room in the office wing of the MSG to be surveyed. Every volume was given a separate record in the FileMaker Pro™ database resulting in a database number. The survey database number begins with PR (Preservation Record) followed by a number (1, 2, 3…). The numbers were written in pencil on a strip of acid-free paper and placed in each volume. Measurements were taken with a MeasurePhase book measuring device and photographs were taken with an iPhone. If the volume was especially dirty, is was gently wiped down with a microfiber dust cloth. After being entered into the database, the volumes were returned to their original storage space.

As each volume was taken from the shelf or the truck and the exterior of the book was inspected for structural damage, such as torn spine coverings or detached/loose boards. The front and back covers were opened to inspect inner hinges and joints. Signs of broken leaf attachments or torn/loose pages were checked by leafing through the textblock. Both structural and inherent damage were included in the survey sample. An example of structural damage is mechanical damage to the sewing from heavy use. An

example of inherent damage is the chemical degradation of paper. However, minor structural damage was not included, such as dog-eared page corners and bent board corners.

From December 2019 to March 2020, Laura Stalker worked at the same time as Moore to research the materials and construct an inventory. She also gave the volumes a second number and took additional pictures. These pictures were later entered into the database.

In the second half of the survey, remaining materials in the museum and the server room closet were surveyed in the server room by Moore.

The bound materials survey database was designed and completed by Moore, a trained conservator who is familiar with the structure, condition, and treatment of rare bound materials having 23 years of experience in the preservation and conservation field. Any additional records should similarly be completed by a trained conservator.

Survey Form

The survey database forms were designed on a Macintosh MacBook Pro using FileMaker Pro™ 17 advanced software. This allowed the survey data to be input directly into the database, eliminating the use of hard copy forms. The information for each volume was recorded on a multi-layout form with text entry and checkoff selections. Identifying information was included to the extent that it could be gathered from preliminaries or a colophon[1]. Imprint date was included when available. Specific details were grouped by description, condition, and housing database tabs. Description includes information such as binding material and binding style. Condition includes specific problems and damage such as detached boards, broken sewing, and losses to paper. Bound volume dimensions were noted in the Housing layout. Specific treatment recommendations for each volume were not included as there are usually more than one treatment option and they often depend on the goals for each volume and the conservator. However, each volume was given a treatment rank recorded as one of five levels: 1 stable, 2 minor, 3 moderate, 4 major and 5 cannot be treated. These ranks

[1] Most frequently found at the end of the book, a publisher's statement containing information about the publication such as the place of publication, the publisher, and the date of publication.

represent a probable level of treatment need by each volume. Sample survey forms are included as *Appendix A: Sample Survey Forms*, p. 34.

A partial summary of the statistics from the survey is given in *Table 1: The Bound Materials Collection Condition,* p.7. Please note that any one volume may have multiple types of damage.

Table 1: The Bound Materials Collection Condition

Total population = 159	Frequency	% of Population	Notes
TREATMENT RANK			
1 Stable	62	39	Indicates **no** treatment due to the chemical and mechanical stability of the volume.
2 Minor	11	06	Indicates a **minor** or limited amount of treatment such as repair to loose joints/hinges with adhesive and/or Japanese tissue. May or may not need treatment for exhibit/use.
3 Moderate	26	16	Indicates **moderate** intervention and treatment such as board reattachment with Japanese tissue. May or may not need treatment for exhibit/use.
4 Major	50	31	Indicates **major** intervention and treatment such as re-sewing the textblock, re-backing, complex cover attachment, severely degraded paper. Indicates treatment needed for exhibit/use.
5 Cannot be treated	1	>1	Damage is so extensive, or materials degraded, that it cannot be repaired or safely exhibited/used.
TYPE OF DAMAGE			
Covering/binding, loose boards	7	04	Describes compromised board to textblock attachment or a partially detached board(s) resulting in compromised board movement.
Covering/binding, detached boards	50	31	Describes one or both boards completely detached.
Covering/binding, joints/hinges broken	40	25	Describes a splitting or broken hinge or joint. *Joint* is the term used for the connection between the spine and the boards on the outside of the cover. *Hinge* is the term used for this same connection on the inside of the cover.
Covering/binding, torn/losses to spine/cover	66	42	Describes covering material that is torn or has parts missing along spine, including caps, or boards.

Sewing, loose	5	03	Describes play in the thread joining the sections or leaves together in a textblock.
Sewing, broken	15	09	Describes the thread joining the sections or leaves together in a textblock that is broken in one or more places.
Sewing, leaves/sections detached	13	08	Describes the thread joining the sections or leaves together in a textblock that is broken resulting in complete detachment of a section or sections.
Paper, losses	22	14	Describes missing leaves or endpapers or areas of leaves or endpapers.
Paper, tears	23	14	Describes tears in leaves or endpapers
Paper, discoloration			Describes several types of color change that can be found in the paper of a textblock. Discoloration may be cause by chemical deterioration, printing ink stain, water damage, or may be of unknown origin.
Cover deteriorated or damaged	66	42	Indicates a range of damage to the cover including but not limited to: tears or losses to the covering material on the spine or boards, severe cupping of the boards.
Sewing deteriorated or damaged	31	19	Indicates a range of damage to the textblock sewing including but not limited to: sewing loose due to thread, adhesive or lining failure, partial or complete failure of the leaf connection including broken supports.
Paper deteriorated or damaged	58	36	Indicates a range of damage to the textblock paper including but not limited to: evidence of chemical deterioration, one significant or many tears.
Textblock to cover deteriorated or damaged	59	37	Indicates a range of damage to the textblock to cover attachment including but not limited to: one or both joints or hinges splitting or broken, partially or completely detached boards, entire cover detached.

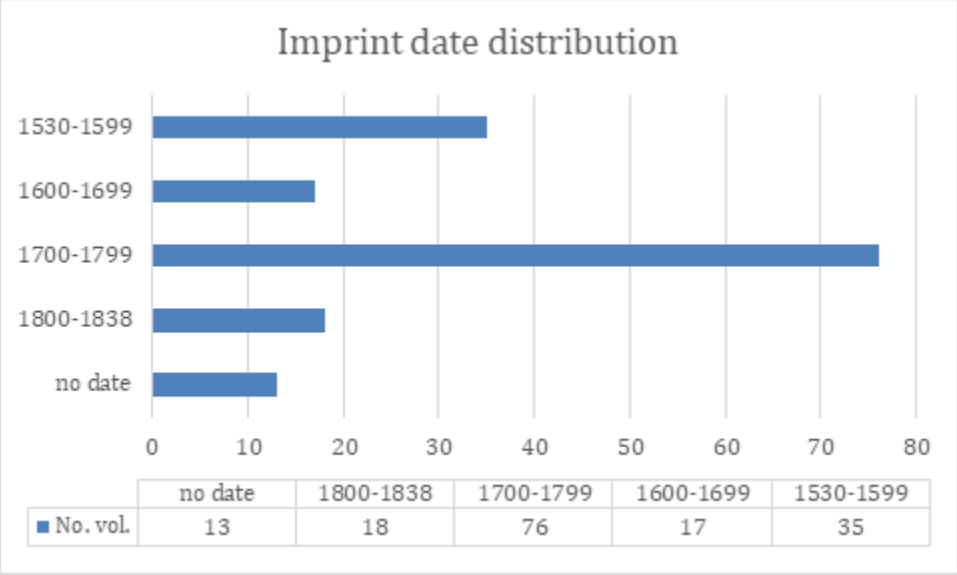
Survey Results

Moderate and Major treatment ranks combined, representing the most interventive treatment needed to address the most damaged items, total 76 items or 48% of the collection. This is a high number, almost half of the volumes, indicating that the collection is in poor condition overall. Detached boards (31%), torn/losses to spine/cove (42%) and text to cover attachment deteriorated or damaged (37%) are all mechanical damage that reflects a long life and heavy use of the materials.

Paper discoloration (59%) and foxing 50%), are most likely caused in pre-1835 paper by poor internal or external sizing and mechanical paper pulping, or sometimes mold. This degradation accelerates in poor environmental conditions. Prior to 1835, paper was generally made of cotton rag and linen with few additives apart from sizing. After 1835, discoloration and is more likely due to acidic wood pulp paper.

Figure 1, below, details the imprint date range of the bound volumes in the MSG collection. Only a small number of volumes in the survey were produced in the 1830s or after.

Figure1: Imprint Date Range



Treatment

Rationale for Treatment

The MSG does not regularly make bound volumes available for researchers or the public for use. However, the collection has artifactual value as a record of the reading life of the Mission's inhabitants and because they provide insight into the Franciscan's administration of the missions and their religious education of the Indigenous Californians. It is also valuable to the MSG for its exhibition potential and is most used for this purpose. Taking this into consideration, the most cost-effective treatment strategy would be to have the materials treated that are scheduled for exhibit, if needed, so that exhibiting them does not further degrade or damage them. The rest of the volumes could easily be boxed and stored on good shelving until they are scheduled for exhibit.

Conservation treatment of valuable collections is best left to professional conservators who have been program trained at universities or have been apprentices for many years in conservation businesses. Out-sourcing treatment is the best option for the MSG collections.

Out-sourcing Treatment

Two types of businesses for out-sourcing treatment are: 1) non-profit regional centers, and 2) for-profit private companies. Many of these establishments have been in business for some time and the services rendered may vary. Working with these regional centers and businesses is relatively easy because the staff is trained to help the customer who is unaccustomed to treatment considerations. However, it can be costly and slow, and collections usually must be shipped to the center/business. Options for sending collection material for treatment are included in *Table 2: Outside Contractors for Conservation Treatment,* p. 11.

TREATMENT RECOMMENDATIONS:
• Treat bound materials as they are scheduled to be exhibited.
• Out-source treatment to reputable regional centers or companies.
• See housing recommendations on p. 13

Table 2: Outside Contractors for Conservation Treatment

Contractor	Contact information	Type of organization	Appropriate collections	Considerations
Northeast Document Conservation Center (NEDCC)	100 Brickstone Square, 4th floor Andover, MA 01810 Telephone: (978) 470-1010 https://www.nedcc.org/contact	501(c)(3) nonprofit organization regional conservation center.	All paper and book collections.	Shipping charges will apply, usually via UPS. Can accommodate larger orders.
Conservation Center for Art and Historic Artifacts (CCAHA)	264 South 23rd Street Philadelphia, PA 19103 Telephone: (215) 545-0613 https://ccaha.org/	501(c)(3) nonprofit organization regional conservation center.	All paper and book collections.	Shipping charges will apply, usually via UPS. Can accommodate larger orders.
Zukor Art Conservation	3016 Filbert Street #10 Oakland, CA 94608 Telephone: (510) 625-1645 http://www.zukorartconservation.com/	Private for-profit business.	Flat paper collections such as unbound manuscripts or maps.	Shipping may apply but the distance is shorter.
Gawain Weaver Art Conservation	18 Greenfield Ave San Anselmo, CA 94960 Telephone: 415-446-9138 Fax☹ 415) 840-7333 https://gawainweaver.com/	Private for-profit business.	Photograph collections.	Shipping may apply but the distance is shorter.
Etherington Conservation Services/ ECS (HF Group)	East: 6204 Corporate Park Dr. Browns Summit, NC 27214 Telephone: (800) 444-7534 ecsconservation.com Midwest: 1010 North Sycamore St. North Manchester, IN 46962 Telephone: (800) 334-3628 ecsconservation.com	Private for-profit business.	All book and paper collections.	Shipping charges will apply, usually via UPS. Can accommodate larger orders.
ACME bindery (HF Group)		Private for-profit business.	ACME/Not for unique collections.	Not appropriate for unique, Victorian cloth, or some leather bindings.

Housing and Storage

None of the bound Materials in the MSG are housed. Housing in acid-free and lignin[2]-free boxes is an excellent way to protect collections. Housing provides a microclimate that mitigates spikes in temperature and relative humidity, and shields contents from light and atmospheric pollutants. Acid-free and lignin-free boxes are non-reactive and will not endanger their contents. Had the bound materials been housed at the time of the recent fire, they would have been protected from smoke and soot.

Several companies provide light-weight custom boxes at an affordable cost. For larger volumes, a heavier board or double board may be used making them sturdy and more supportive to the volume. See *Table 3: Companies for Custom Book Boxes and Storge Furniture*, p. 14, for companies that provide custom boxes.

The database has a layout tab that gives the dimensions in millimeters of each volume. This page can be used to order custom boxes. Because the collection is relatively small, about 159 volumes, every volume could easily be housed in an adequate box. But if this is not desirable for some other reason, volumes that have vellum covers or are very damaged would most benefit from boxing. These volumes could be easily sorted in the database and a list composed. Labels will have to be affixed to the box spine in order that the contents can be found on the shelf. The imprint date and the database number might be an easy way to identify each book in its box.

The collection is also in need of an adequate storage space at the MSG. Considerations include: 1) a dedicated space for collection materials only, 2) an environment with stable temperature and relative humidity, 3) adequate security, 4) low light levels, 5) free from water and fire hazard and 6) clean and pest free. Of the two areas that are known by the author to be available for this purpose, the convent and the office complex, the office complex is the most desirable from a preservation and security perspective. An office converted into a storage area would have the best environment, could be locked and often has staff nearby, as well as being suitable in other ways listed above.

[2] A class of complex organic polymer deposited in the cell walls of many plants, making then rigid and woody. As it deteriorates, lignin gives off acids that cause paper to become brittle and to discolor on exposure to heat and light. It can contribute to an acidic environment within a box.

When a space has been identified, the right furniture should be purchased to protect the boxed collection. Considerations for furniture include: 1) preferred powder-coat steel construction material, 2) first shelf at 6” of clearance from the floor, 3) adequate space to avoid overcrowding the materials, and 4) ability to secure for earthquake. Powder-coat steel is non-reactive and will not off-gas. A 6” clearance between the floor and the first shelf helps protect the first shelf contents from water leaks, dirt and dust, and pests. Please see *Table 3: Companies for Custom Book Boxes and Storge Furniture*, p. 14.

HOUSING AND STORAGE RECOMMENDATIONS:
• House materials in acid-free and lignin-free housing. House larger volumes in heavier boxes. Label boxes so that volumes can be found on the shelf.
• Designate a secure space and purchase furniture for storage of the collection.
• Purchase quality storage furniture, do not overfill the shelves, and brace for earthquake.

Table 3: Companies for Custom Book Boxes and Storge Furniture

Company	Contact information	Products	Notes
Custom Manufacturing, Inc. (CMI)	93 Lake Street Hammondsport, NY 14840 Contact: Carmen Waters Kramer Telephone: (607) 569-2738 Fax: (646) 349-1058 www.cmiboxes@archivalboxes.com	Custom book boxes	A good basic box for most quarto sized books. Order online. The boxes come flat and must be folded. Similar in construction to a "pizza box." Can order double-walled boxes for bigger books. Tan or grey color.
Etherington Conservation Services/ ECS (HF Group)	6201 Corporate Park Drive Browns Summit, NC 27214 Telephone: (800) 444-7534 www.ecsconservation.com	Custom book boxes	A bit sturdier and more expensive version of the book above. Can order thicker board boxes for bigger books.
Talas	330 Morgan Ave. Brooklyn, NY 11211 Telephone: (212) 219-0770 https://www.talasonline.com/archival-storage/custom-enclosures	Custom book boxes	Same as above.
Delta Designs Ltd.	P.O. Box 1733, Topeka, Kansas USA 66601 1-800-656-7426 https://www.deltadesignsltd.com	Sigh security furniture.	High quality furniture.
Spacesaver	1450 Janesville Avenue Fort Atkinson, WI 53538 800-255-8170 www.spacesaver.com	A range of shelving options	High quality furniture.

External/Internal Hazards Survey and Environment

The E/I Survey

The physical structure and environmental conditions in which a collection is stored are central concerns in any organized preservation effort. The sanctuary and museum are in the historic MSG built in the late 1700s. Currently, the entire mission campus, which includes modern era buildings, is managed by a MSG facilities manager. However, the historic Mission's facilities needs are managed by Teri Huerta and an outside building management company. The historic buildings could benefit from an on-staff facilities manager familiar with the preservation of historic buildings. Historic buildings have special considerations that should be at the center of all facilities decisions and onsite staff could bring this expertise to the MSG on a daily basis.

In February of 2021, an external/internal hazards survey was conducted for the sanctuary and museum rooms only. Terri Huerta, Director of Development and Communications, completed the survey and reviewed it with the author. The survey includes information on area climate and building surroundings, general building issues such as the roof, drainage, windows and skylights, and issues such as fire safety, staff training, electrical, HVAC and pluming issues, as well as protection from water, security, and construction projects. The completed survey is included in *Appendix B: External/Internal Hazards Survey,* p. 36. It is recommended that this survey be completed every two years and changes noted.

The survey indicates that many potential hazards do not apply, have been addressed, or are being managed well by the staff. A few items of concern from the survey are:

- The outside environment is prone to temperature and relative humidity changes especially in the spring and the fall indicating the need for environmental monitoring of collection areas.
- The museum roof is over 15 years old and is in poor condition needing replacement. The sanctuary roof is being replaced due to a recent fire.
- There is no fire detection in the attic above the museum, but it is on an upgrade list.
- Bound collection items are not housed and need adequate storage furniture.
- Integrated Pest Management (IPM) should be developed for the museum.

EXTERNAL/INTERNAL HAZARDS SURVEY RECCOMENDATIONS:
• The External/Internal Building Hazards survey should be completed every two years by the appropriate facilities staff as procedures and staff change.
• Re-consider on-staff facilities management for the historic MSG buildings.
• Monitor T/RH with dataloggers, especially in the museum, and address issues.
• Replace the museum roof.
• Move fire detection equipment for the museum attic higher on the upgrade list.
• Develop and institute IPM for bound collections.

Data Logger Monitoring

The museum and sanctuary environments were not monitored during the consulting period. To truly understand the environment in these areas for the health of the collections, it is imperative that datalogger monitoring be initiated and monthly graphs kept. The information should be shared with the appropriate buildings management staff to facilitate fine-tuning of the environment as well as addressing any occasional issues with equipment. Installing approximately 8-10 dataloggers in the museum and sanctuary would give a good picture of the environmental conditions across the calendar year. The sanctuary should have approximately 4 dataloggers installed due to its size.

The Onset Corporation HOBOs model BLE MX1101 continually sampling data loggers are economical, user friendly, unobtrusive. A free cell phone application and desktop software allows for easy data download and analysis.[3] Because of these reasons, Onset HOBO dataloggers are used by many libraries. More information is included in *Appendix C: Hobo Data Logger Specifications,* p. 41, and *Appendix D: Supplies and Suppliers*, p. 43, for purchasing information.

[3] A note about the data graphs: The cell phone generated graphs have only the recorded data as a top and bottom axis point, making the data ranges on the graphs appear more dramatic. Onset Corporation offers a free desktop software program, HOBOware, that can be downloaded and used to manipulate the data graphs. Viewing the data on the graphs with wider axis points will make it easier to analyze the data.

Temperature and Relative Humidity

In general, the cooler archival materials are, the slower they will deteriorate as higher temperatures accelerate degradation mechanisms. In preservation literature, desirable temperature levels for collections are usually given in a range and the ranges can vary a few degrees. Ideally, the range should be between 68 to 70 degrees Fahrenheit (F). In practice, most institutions accept a wider range in temperature, adopting 68 degrees + or – 5 degrees as their goal. These temperatures do not always provide people with the most comfortable environment, especially during winter months. However, keeping close to this standard all year will help the relative humidity levels from drifting out of range and will also reduce heating and cooling costs. In summer months, the temperature can be slightly higher with a gradual drift between seasons.

Relative humidity (RH) is the quantity of water vapor present in the air. It is expressed as a percentage of the amount of vapor needed for saturation at a given temperature. Many materials are hygroscopic, releasing and absorbing moisture in response to changes in the ambient relative humidity. High humidity facilitates mobility of degradation products within a material or between materials potentially accelerating chemical deterioration, which is called hydrolysis. In addition to this, relative humidity over 70% encourages mold growth, especially when combined with inadequate air circulation. Low humidity can reduce the flexibility of organic materials. Vellum and parchment are especially sensitive to fluctuations in relative humidity in both directions. Photographs can curl and the emulsion develops small cracks called crazing. Other artifacts may contain multiple materials (e.g., leather, paper, adhesives, plastics) bonded together with differing sensitivities to RH, and different expansion and contraction rates, resulting in deformation, delamination, and cracks.

Most paper-based materials require a stable 40-50% RH. Gradual RH changes within this range are usually not a concern, even for susceptible materials. Historically, the preservation literature has supported the idea that short rapid and extreme changes (spikes) are more harmful to hygroscopic materials than moderately high or low stable relative humidity. However, recent research focused on material equilibration rates and energy efficiency, has introduced new ways of thinking about library and archives environments. This thinking includes a more lenient

attitude towards sharp peaks in temperature and relative humidity, within reason[4]. However, it is obvious that such temperature and RH spikes indicate that there may be an equipment problem and should be addressed immediately.

As stated above, low humidity has the following effects on library collections materials causing mechanical damage:

- Paper: breakage when folded or crumbling when handled due to increased brittleness from desiccation.
- Photographs: curling due to the emulsion layer contracting and crazing (small invisible or visible cracking.)
- Glass plate negatives: delamination or flakiness of the emulsion layer due to stress between the glass layer and the emulsion.
- Bound vellum: contraction in dry conditions leading to curling covers on books producing a "yawn" in the binding. This yawn will allow more air and light into the volume having an adverse impact on the textblock.
- Flat vellum: contraction of the vellum will cause stress to any pigment applied to it causing cracking and friable pigment.

Two ways to address relative humidity in collections areas are actively or passively. Active humidification and dehumidification refers to additional and separate humidification and dehumidification systems, respectively. Passive dehumidification refers to cooling hot damp air by running it over a cold coil or some other cold surface, thereby producing condensation and removing the humidity, and then reheating the air. Passive dehumidification uses the existing HVAC system. For the most control of the environment, active humidification and dehumidification is recommended. When considering the new HVAC system for the museum, choose active humidity systems for a stable environment. Work with an historic buildings preservationist to determine the appropriate humidity control for the building materials and structure.

[4] Image Permanence Institute, Rochester Institute of Technology. *IPI's Guide to Sustainable Preservation Practices for Managing Storage Environments*. Rochester: IPI, RIT, 2012.

TEMPERATURE AND RH RECOMMENDATIONS:
• Purchase and install HOBO dataloggers to monitor temperature and relative humidity throughout the museum and sanctuary as a regular preservation activity.
• Download and archive graphs very month. The graphs should be analyzed regarding spikes and seasonal shifts.
• The sanctuary should have at least four dataloggers installed.
• Use free HOBOware software to adjust T/RH graphs for better analysis. Download here: https://www.onsetcomp.com/products/software/hoboware
• A Mission staff member should have HBO logger duties added to their job description.
• Strive for 68 to 70 degrees (F) temperature + or -5 degrees, and 40-50% RH in collections areas, both the museum and storage.
• Choose active humidification and dehumidification for the new HVAC system.

Light

The following excerpt from the preservation literature clearly describes the problems with light's impact on collection materials and the concept of intensity/duration reciprocity:

"All wavelengths of light are damaging to library and archival materials. Ultraviolet light, which is light at wavelengths below 400 nanometers, cannot be seen by the naked eye and causes the most damage. Sunlight has the highest proportion of UV radiation, followed by fluorescent and incandescent lighting. Light causes bindings, ink and dyes to fade; darkens and yellows paper; and weakens cellulosic fibers by bleaching and oxidation.

The damage caused by light is dependent on intensity, the type of light, and the duration of exposure. Light damage is cumulative. Exposure levels are monitored by calculating total exposure which is the product of the intensity of the light source multiplied by the length of exposure. For example, 10 hours of light exposure at the intensity of 5 foot-candles (fc) equals 2 hours at 25 fc intensity; both total 50 fc hours." [5]

Standards for visible light levels in libraries and archives indicate 30 to 60 foot-candles (fc) are sufficient for reading/work areas, 5 to 15 fc are the maximum for the display of light sensitive

[5] Environmental Specifications for the Storage of Library & Archival Materials. LYRASIS Preservation Services Leaflet. Atlanta, GA: LYRASIS, N.d.

materials, 2 fc of vertical illumination are sufficient for reading book spines in stack areas, and 1-5 fc are appropriate for storage areas. It is generally recommended that ultraviolet light exposure be limited to 75 µW/Lumen or 2-4% of total light, except for exhibitions where 0 µW/Lumen should be the goal.

Fluorescent lamps (long bulb and compact fluorescent) are glass tubes filled with an inert gas and mercury which emit photons when electricity flows through the tube. Fluorescent lamps emit both UV (ultraviolet) and IR (infrared) radiation, and therefore will cause fading of materials in cultural collections. Some fluorescent lamps have coatings on the glass or can be fit with sleeves that filter some UV, but they become exhausted over time. Halogen lamps are similar to incandescent lamps, but they contain halogen gas which allows the filament to burn at a higher temperature with a higher light output. Halogen lamps emit both UV and IR radiation. LED (Light Emitting Diodes) contain a pair of semiconductors which produce photons when an electric current is passed over them. LED lights produce little to no UV or IR radiation, are the new industry standard for museums, and should be the first choice to light areas containing cultural materials. Advances have been made in the temperature and color rendering of LED lamps producing light that is more pleasing to the human eye.

No light levels were recorded in the museum rooms because the lighting will be replaced when the museum is renovated. The museum renovation will present an opportunity to install lighting throughout the museum rooms that is appropriate for paper-based materials on exhibit.

Because of the long life and electricity cost savings associated with LED lamps, some utility companies have incentive programs or work with technology aggregators that support LED replacement or retrofitting projects. Your facilities staff could already be working on such a project.

There are eleven windows to the outside throughout the museum rooms. These windows should have the incoming light reduced to the minimum. There are several ways to do this with shades, UV reducing filtering films, or other mechanisms. If filtering film on the exterior of the windows is desired, some research should be done to determine the risks of applying filtering film to historic glass. The UK Historic Trust cautions against applying filtering film to pre-nineteenth century pot-ash glass due to its fragility and the risk of breakage when the film is

exhausted and needs to be replaced. There may be other considerations for the type of glass in the museum windows. Work with an historic buildings preservationist to determine if filtering films are appropriate or for the right kind of mount for any type of shade. Another avenue for window light mitigation, that would be easier than fitting the windows with a filter or blocker, would be to work with your exhibit designer to explore exhibit design elements such as half walls that could be placed in the room's interior in front of the window leaving the window undisturbed.

See Exhibitions section on p. 25 for a discussion on case lighting and lighting duration specific to exhibits.

LIGHT RECCOMENDATIONS:
• Use LED spot lighting throughout the museum rooms.
• Strive for light not to exceed 5 fc in exhibits and 2fc in storage areas (or house every volume). 0 µW/Lumen UV.
• Research LED replacement/retrofitting programs.
• Consider the range of light filtering or blocking options for the museum windows.
• Consider working with the exhibit designer to install an easy exhibit fix for the windows.
• See Exhibitions section, p. 25, for a discussion on case lighting and exposure duration.

Preservation Activities

Housekeeping

Good housekeeping procedures include keeping collection areas free of dust and dirt and floors and pathways free of boxes and other materials. Keeping shelves, materials and adjacent surfaces clean and dust fee is important to the health of the collections. Dust and dirt can be ground into the bindings and pages when they are handled, encourage pests, and accelerate degradation by attracting moisture and airborne pollutants such as sulfur dioxide and nitrogen dioxide to the surfaces of the materials. Dust is also a hazard to the staff working with the materials as continuing research has linked library dust to allergies, asthma, and possibly more

serious health conditions due to the combination of pollutants and dust[6]. A clean environment will also contribute to good Integrated Pest Management (IPM) as rodents and insects are attracted to accumulated dirt and dust. A regular cleaning schedule in storage areas and the museum should be implemented by the MSG staff.

Keeping non-collection items out of collection storage areas, and storing them in a separate space or spaces, reduces dust and tripping hazards and increases space for collections storage. Non-collection items are anything that is not a collection item, such as old furniture, supplies, etc. Having all such items in one place will make it be easier to find them when needed.

Integrated Pest Management

Integrated Pest Management (IPM) refers to several strategies to monitor, prevent, and address insect infestation that relies, whenever possible, on non-chemical means.

The External/Internal Hazards Survey indicated that IPM is not currently being done in the MSG museum. Although the Los Angeles County area climate is often dry, there are times of the year that relative humidity can be over 60%. And all year long, insects are a concern for cultural collections. Pests such as silverfish, firebrats, carpet beetles and cloth moths are very common throughout California and cause serious damage to cultural collections. Booklice are not as prevalent in a dry environment but will sometimes thrive indoors in higher humidity.

It is important that the museum and collection storage areas be monitored for pests. Routine monitoring for insects can alert MSG staff to developing infestations. Sticky traps placed at points of entry and damp or dark corners should be checked and replaced monthly and results documented in a spreadsheet to log spikes in insect population. Pest infestations in these areas could damage irreplaceable materials. See *Appendix E: Bibliography*, p. 44, for more information and *Appendix D: Supplies and Suppliers*, p. 42, for sticky traps.

[6] Bolourchi, Hassan. Pay Attention to Books' Deadly Dust, 2003. A paper presented at the 6th Indoor Air Quality 2004 Meeting (IAO2004) Padova, Italy.

Following good housekeeping procedures, sealing the building as tightly as possible, using positive air pressure inside rooms, and eliminating insect food and water sources will discourage and prevent pests from entering the building. Large infestations may necessitate the use of chemicals but if pest problems are caught in the beginning stages, they may be controlled by other means including eliminating pest friendly conditions, freezing infested items, or the use of modified atmospheres (anoxia treatment). A preservation professional should be contacted for these treatments.

A good place to start can be found at the UK website museumpests.net. Although this website is primarily for museum staff it can also be used for libraries and archives. See the site here: https://museumpests.net.

Mold Mitigation

Mold is everywhere and always present. Certain types of molds can make people seriously ill. The generally dry environment in the MSG buildings would not readily support mold growth on collections except in the late summer and fall. An active dehumidification system, if installed, would mitigate internal high humidity during these seasons. But a moisture incident, from leaking pipes or the roof, could also temporarily raise the RH or result in wet collections, triggering an incident by activating desiccated mold on the collections. It takes only 72 hours at an RH above 70% to encourage mold growth. If such a leak occurs, dry out the impacted collections as soon as possible and contact a conservator.

Emergency Preparedness and Planning

All depositories for cultural materials should have a Collections Emergency Response Plan (CERP). This plan augments a typical overall emergency plan in which there is information for emergencies concerning people and buildings. As the recent sanctuary roof fire in 2020 demonstrates, disaster can strike at any moment and a good CERP plan will speed response and recovery. This plan should contain specific information regarding MSG collections which are especially vulnerable to being lost in emergency situations. This plan should not conflict with the overall emergency plan but should complement it.

A good CERP would not only be specific to MSG's collections but practical. It is advisable that it be read and discussed by all Mission staff, reviewed and updated annually, and that it be used as the basis for annual emergency training sessions. The recent fire presents a good opportunity to record the information gathered and learned from it in a plan for future use.

To ensure that the existing plan prepares the staff to recover and salvage the collections in the event of an emergency, the plan should include the following information: 1) discovery and notification procedures, 2) collections priorities, 3) prevention strategy/pre-emergency response, 4) salvage of damaged collections, and 5) rehabilitation procedures. Contacts with phone numbers for the staff should be included at the front of the plan for quick reference. Specific emergency scenarios and appropriate responses should follow the phone numbers. It is important to document past problems, such as water leaks, to establish patterns within the building areas. The date of the problem, area affected, and action taken to resolve the problem should be noted. Include floor plans of the building showing exits, fire extinguishers, phones, etc. And finally, the plan should include a list of local vendors offering appropriate emergency supplies and services. An abridged copy of the CERP with contact information and salvage procedures should be given to all staff, facilities management, and the local Fire Department. Consider what contact information may be private and the possible sensitivity of prioritized collections when disseminating the abridged plan. Please see *Appendix E: Bibliography*, p. 44, for further reading on preparing a plan.

PRESERVATION ACTIVITIES RECOMMENDATIONS:
• A regular cleaning schedule in storage areas and the museum should be implemented by MSG staff.
• Move all non-collection materials out of collection areas and store them in a separate space.
• Develop an Integrated Pest Management (IPM) program. Use https://museumpests.net and resources in the Bibliography section of this report as a guide.
• Develop a Collections Emergency Response Plan (CERP) specific to the MSG cultural collections, review and update annually. Conduct annual emergency training sessions.

Exhibitions

The MSG museum is now being reconsidered and redesigned. A good exhibitions team will include a designer that is aware of preservation considerations. Three very important considerations for exhibitions are: 1) casework construction and materials, 2) book supports, and 3) lighting.

Casework and Supports

Exhibit casework construction is vitally important because the materials used to construct the case can off-gas into the closed environment of the vitrine. Wood and pressed wood products, paints and finishes can all contribute to an environment that degrades cultural materials over time by releasing corrosive agents. A partial list of these contaminants includes sulfur compounds, carbonyl sulfides, organic acids, aldehyde, acidic gases, chloride, oxide. It is easier to avoid bad materials in exhibit casework if casework is purchased pre-made from reputable companies and made from non-reactive materials such as powder coat steel, acrylic and glass. If you choose to have exhibit casework custom made, review your casework designs with a trained conservator to make sure the safest materials are used.

Correct support for bound materials on exhibit is crucial. Proper book supports restrict the opening of the boards and textblock limiting the stress put on book joints and spines by display. When a book is laid on a flat surface and the front cover opened to rest on the surface, the front joint is bent back at an extreme angle putting undue stress on this part of the book leading to split and broken joints and hinges. When a book is laid on a flat surface and opened further into the textblock, the textblock sewing, spine consolidation and covering material are stressed and begin to break down leading to preferential openings or sprung bindings. This is especially true if the volume is open for an extended period (See *Table 4*). Supports must be made to the size and opening of each exhibited volume. Some reusable and adjustable book supports can be purchased online. The best supports are custom made, by experienced exhibit preparators.

Please see *Table 4: Companies for Exhibition Casework and Supports*, p. 26.

Table 4: Companies for Exhibition Casework and Supports

Company	Contact Information	Products	Notes
Gaylord Archival	PO Box4901 Syracuse, NY 13221-4901 1-800-448-6160 www.gaylord.com	Prefabricated and custom exhibit casework.	Catalog available.
University Products	517 Main Street Holyoke, MA 01040 1-800-628-1912 www.universityproducts.com	Prefabricated and custom exhibit casework.	Catalog available.
SmallCorp	19 Butternut Street Greenfield, MA 01301 1-800-392-9500 www.smallcorp.com	Prefabricated and custom exhibit casework.	Online catalog.
Curatorial Inc.	113 East Union Street Pasadena, California 91103 626-577-9696 info@curatorial.com 1933 South Broadway Los Angeles, California 90007	Custom exhibit casework.	

Lighting

LED track ceiling lighting can be used to easily highlight exhibited materials in the case without internal case lighting. Internal case lighting is not flexible and may contribute to heat buildup inside the case. Prefer ceiling lighting to internal case lighting.

For exhibited materials, light exposure can further be reduced by limiting exposure duration to 3 months or using high quality facsimiles. Longer exposure times may be used considering specific collection materials. See *Table 5: Guidelines for Light Exposure of Materials on Exhibit*, p. 29, for recommendations on light levels and exhibit exposure duration.

Table 5 is a tool for use by MSG staff or contract staff (including exhibit staff and conservators) to set maximum light levels and exposure duration limits for materials on exhibit to prevent cumulative light damage. Each individual item's unique composite composition, condition, and other variables should be considered when determining light levels and exposure durations. These guidelines agree with industry standards and best practices and reflect The American Institute for Conservation (AIC) Code of Ethics.

Lower light levels and/or duration limits should be assigned to materials due to physical and chemical composition, poor condition, adjacencies, reflected light, or other variables. The permanent display of any object is discouraged, and the use of facsimiles/reproductions is encouraged when appropriate. The visible light level guidelines are given below in *Table 5*; ultraviolet levels should be kept at 0 µW/Lumen or as low as possible. Light readings should be taken during and after exhibit installation using a light meter.

Other Considerations

There are additional considerations for the exhibition of bound materials. When exhibiting bound material in an open position, the strength of the binding must be assessed. The length of time a binding is exhibited open should not exceed 18 months before resting the volume off-exhibit in a closed position (See *Table 5*). The interval of page-turns will be dependent on the page materials, such as inks and pigments, and condition of the text block. Materials in the case

should have adequate distance from the acrylic vitrine around the deck and above, usually 3". Adequate space between materials is also important; do not overcrowd exhibit casework.

Exhibits are complex projects, and it is difficult to mount an exhibit that is safe for the exhibited collections without professional help. Work with exhibit specialists to choose the right exhibit casework, safely support bound materials, and reduce light exposure for collections on exhibit.

EXHIBITIONS RECOMMENDATIONS:
• Use pre-built casework made of non-reacting materials to prevent damage to the materials from off-gassing chemicals.
• Use appropriate book supports.
• To reduce wear from light exposure and long duration openings, track bound materials on exhibit. Do not exhibit materials for more than three months and use guidelines in Table 5 to change out materials on a regular basis.
• Prefer track ceiling lighting to internal case lighting for exhibits.
• Purchase a light meter(s) and monitor museum areas to assure proper lighting conditions.
• Turn pages on a regular basis for bound materials and do not exhibit for more than 18 months before deinstalling and resting. The interval of page-turns will be dependent on the page materials, such as inks and pigments, and condition of the text block. See Table 5.
• Maintain adequate space, 3-4 inches or more, between materials and the acrylic vitrine and between materials in the case.
• Work with exhibit professionals to design, mount and maintain exhibits according to best practices.

*Table 5: Guidelines for Light exposure of Materials on Exhibit**

*Categories in bold represent materials found in MSG's bound collections.

Category	Materials	Exposure Duration Limit	Visible Light level
Extraordinarily Light Sensitive	*Only facsimiles to be displayed • Autochromes and other early dye processes • Experimental photographic processes; e.g., early unfixed salted paper or stabilized gelatin silver prints	N/A	N/A
Extremely Light Sensitive	• Architectural plans or photo reproductions; e.g.: blueprint (cyanotype), diazotypes, brownines, van dykes, photostats, pellet prints. (3 months at 3fc maximum; consider using facsimile.) • Fugitive colorants found in watercolor, pastel, colored pencil, certain colored bindings, hand coloring and hand colored photographs • Modern inks; ballpoint, felt tip, purple manuscript inks • Highly degraded paper • Colored paper and mounts • Textiles; silk and velvet • Albumen and tinted photographs • Color photographs and computer-generated prints (digital ink jets, etc.) • Direct thermal transfers, e.g. faxes	3 months per 5 years	3-5 fc (33-50 lux)
Moderately Light Sensitive	•Textiles in poor condition or with organic dyes **• Lignin-containing paper** **• Iron gall ink**	**6 months per 5 years**	**5fc (50 lux)**
Less Light Sensitive	**• Leather, color dyed** **• Vellum and parchment** **• Book cloth** **• Uncolored rag or alpha cellulose paper** **• Carbon-based media and stable mineral pigments** • Black and white photographs	**12 months per 5 years**	**5fc (50-100 lux)**

Least Light Sensitive	• Ivory and bone • Wood • **Leather, brown, black** • Enamels • Plastics 5-15fc (50-161 lux)	**24 months per 5 years**	**5-15fc (50-161 lux)**
	• Traditional oil paintings • Traditional egg tempera paintings • Frescos • Acrylic paintings	Case-by-case	15-20fc (161-215 lux
	• Stone • Metal • Glass • Ceramics • Jewels	Case-by-case	Up to 25fc (269 lux)

Conclusion and Prioritized Recommendations

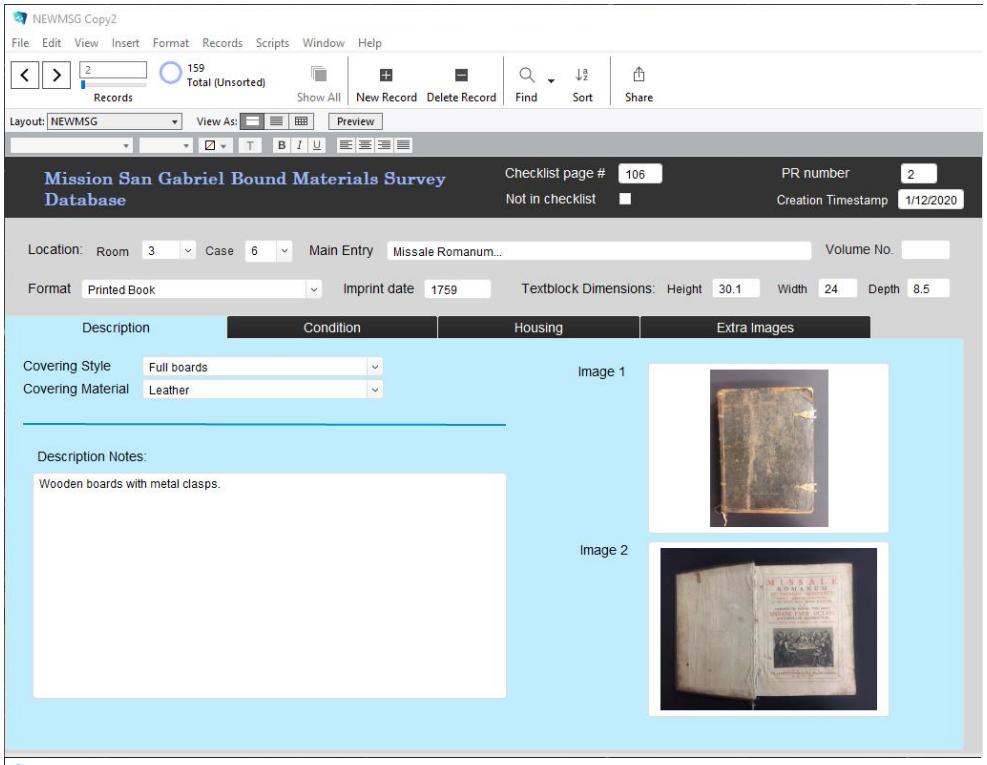
Mission San Gabriel has a significant resource in their cultural collections. Currently, the bound materials collection is in poor condition overall, but steps can be taken to protect, treat, house, and exhibit this collection in a way that preserves the volumes for future generations. Without better stewardship of this resource, the risk of further degradation leading to eventual loss, remains.

The recommendations throughout this report have been compiled and prioritized below. A Preservation Prioritization Matrix was used to group the recommendations into three priority levels: Priority 1, Priority 2, and Priority 3. In addition to the Preservation Priority Matrix, the following general considerations were used in prioritization: 1) the new museum exhibit is being planned and is imminent, 2) environmental conditions are important because they have a considerable impact on the greatest number of collection items, 3) proper housing is significant because it protects fragile and vulnerable collection items from poor environmental conditions, fire, theft, and disasters, 4) the unique nature of special collections makes them irreplaceable. These factors have greatly increased the number of Priority 1 recommendations. Please see *Appendix F: Preservation Prioritization Matrix*, p. 47, for an explanation of the matrix.

Priority 1 recommendations (High Impact, High Feasibility) should be considered first. Because of the importance of the impending building remodeling and new museum exhibit design, Priority 1 is split into two groups. The first group (Priority 1.1) relates specifically to remodeling and the new museum exhibit. The second group of actions (Priority 1.2) are more general in nature. They are both important, but Priority 1.2 can be done as time permits around the planning and mounting of the exhibit. Priority 2 (Low Impact, High Feasibility) and 3 (Low Feasibility, High Impact) recommendations could be competed after Priority 1 as need, staff time, and funding allow. No Priority 4 (Low Feasibility, Low Impact) recommendations were identified. Conditions and resources change over time so rethinking the priorities should be done annually.

Priority 1.1 Recommendations for Exhibits (High Impact, High Feasibility)	
Exhibitions	Work with exhibit professionals to design, mount and maintain exhibits according to best practices.
	Prefer pre-built casework made of non-reacting materials to prevent damage to the materials from off-gassing chemicals and appropriate book supports.
	To reduce wear from light exposure and long duration openings, track bound materials on exhibit. Do not exhibit materials for more than three months and use guidelines in Table 4 to change out materials on a regular basis.
	Turn pages on a regular basis for bound materials and do not exhibit for more than 18 months before deinstalling and resting. The interval of page-turns will be dependent on the page materials, such as inks and pigments, and condition of the text block. See Table 5.
	Maintain adequate space, 3-4 inches or more, between materials and the acrylic vitrine and between materials in the case.
	Prefer can track ceiling lighting to internal case lighting for exhibits.
	Purchase a light meter(s) and monitor museum areas to assure proper lighting conditions.
Treatment	Treat bound materials as they are scheduled to be exhibited.
	Out-source treatment to reputable regional centers or reputable companies.
E/I Hazards Survey	Monitor T/RH with dataloggers, especially in the museum, and address issues. (See Temperature and RH, below)
	Develop and institute IPM for bound collections. See Preservation activities, below.
Temperature and RH	Strive for 68 to 70 degrees (F) temperature + or -5 degrees, and 40-50% RH in collections areas, both the museum and storage.
	Use active humidification and dehumidification for the new HVAC system.
	Purchase and install HOBO dataloggers to monitor temperature and relative humidity throughout the museum and sanctuary as a regular preservation activity. Graphs should be downloaded and archived every month. The graphs should be analyzed regarding spikes and seasonal shifts. The sanctuary should have at least four dataloggers installed. Use free HOBOware software to adjust T/RH graphs for better analysis. Download here: https://www.onsetcomp.com/products/software/hoboware
Light	Use LED spot lighting throughout the museum rooms.
	Strive for light not to exceed 5 fc in exhibits and 2fc in storage areas (or house every volume).

	Consider working with the exhibit designer to install an easy exhibit fix for the windows. Consider the range of light filtering or blocking options for the museum windows.
Preservation Activities	Develop an Integrated Pest Management (IPM) program. Use https://museumpests.net and resources in the Bibliography section of this report as a guide.
Priority 1:2 General Recommendations (High Impact, High Feasibility)	
Housing and Storage	House materials in acid-free and lignin-free housing. House larger volumes in heavier boxes. Label boxes so that volumes can be found on the shelf.
	Designate a secure space and purchase furniture for storage of the collection.
	Purchase quality storage furniture, do not overfill the shelves, and brace for earthquake.
E/I Hazards Survey	The External/Internal Building Hazards survey should be completed every two years by the appropriate facilities staff as procedures and staff change.
	Move fire detection equipment for the museum attic higher on the upgrade list.
Preservation Activities	A regular cleaning schedule in storage areas and the museum should be implemented by MSG staff.
	Develop a Collections Emergency Response Plan (CERP) specific to MSG cultural collections, review and update annually. Conduct annual emergency training sessions.
Priority 2: General Recommendations (Low Impact, High Feasibility)	
Preservation Activities	Move all non-collection materials out of collection areas and store them in a separate space.
Light	Research LED replacement/retrofitting programs.
Priority 3: General Recommendations (High Impact, Low Feasibility)	
E/I Hazards Survey	Re-consider on-staff facilities management for the historic MSG buildings.
Priority 4: General Recommendations (Low Impact, Low Feasibility)	
No low impact, low feasibility recommendations were identified.	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PR number 2
Creation Timestamp 1/12/2020
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Main Entry Missale Romanum...
Volume No.
Format Printed Book
Imprint date 1759
Textblock Dimensions: Height 30.1 Width 24 Depth 8.5
Description
Condition
Housing
Extra Images
Covering Style Full boards
Covering Material Leather
Description Notes:
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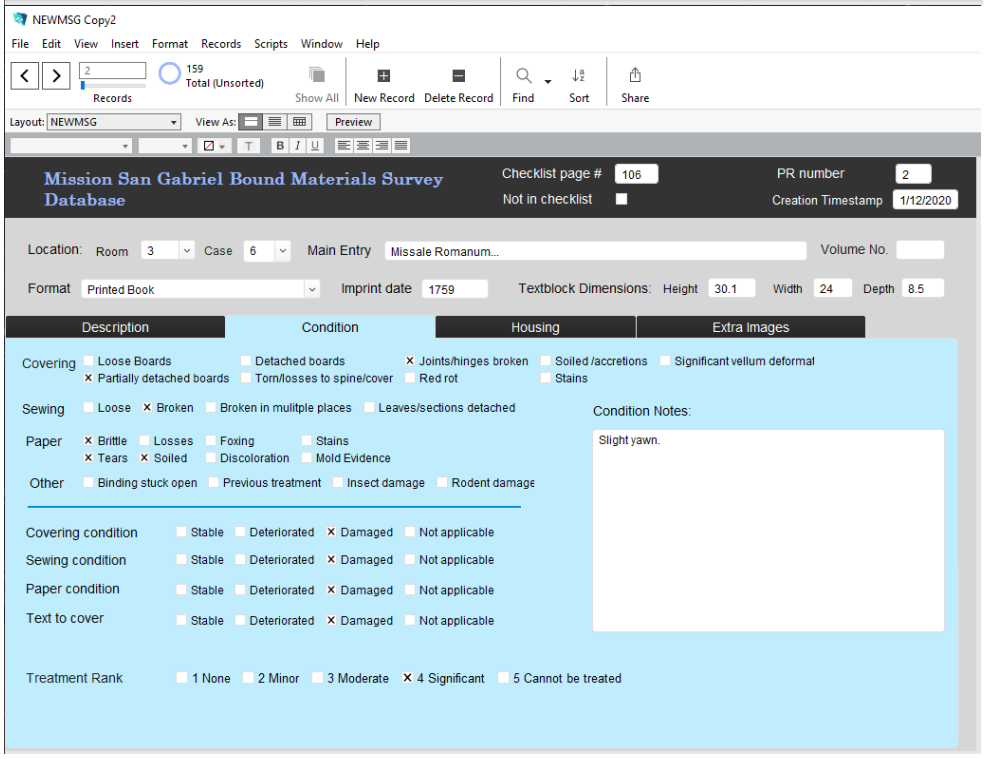
Image 1
Image 2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Mission San Gabriel Bound Materials Survey Database
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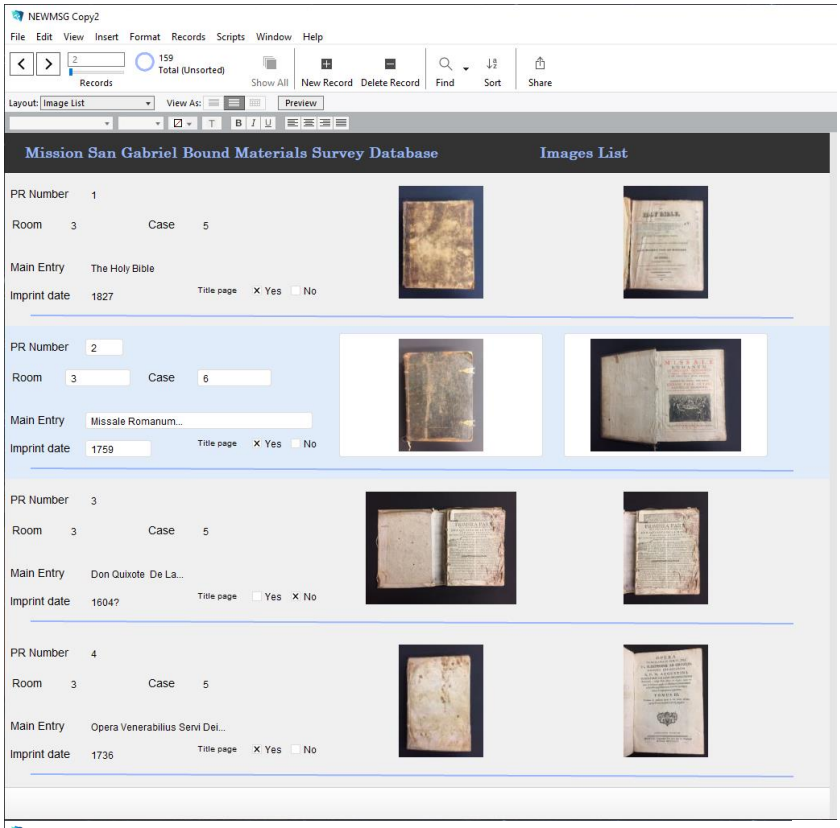
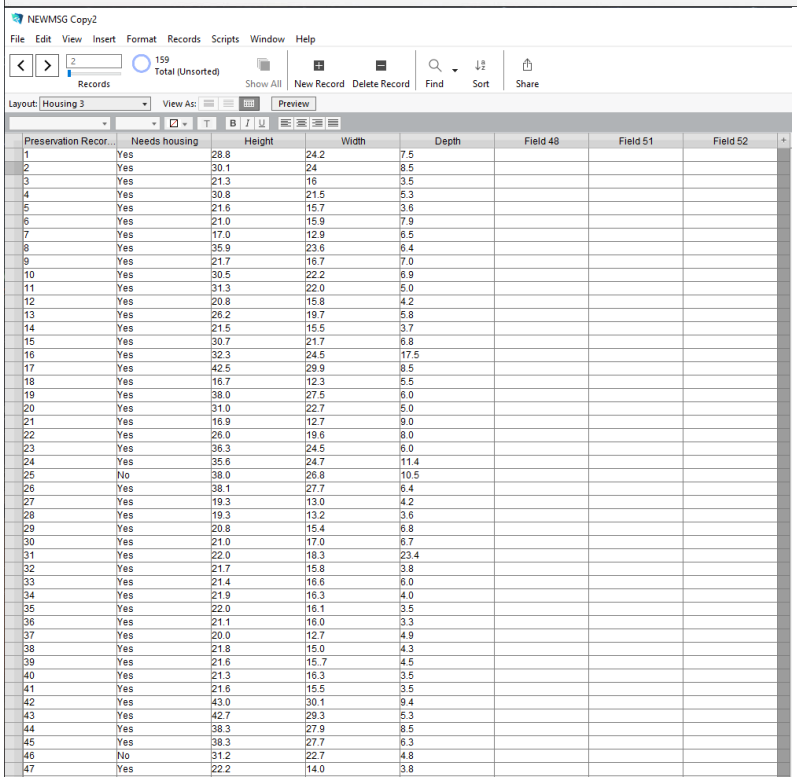
Creation Timestamp 1/12/2020
Location: Room 3 Case 6
Main Entry Missale Romanum...
Volume No.
Format Printed Book
Imprint date 1759
Textblock Dimensions: Height 30.1 Width 24 Depth 8.5
Description
Condition
Housing
Extra Images
Covering Loose Boards Detached boards Joints/hinges broken Soiled /accretions Significant vellum deformal
Partially detached boards Torn/losses to spine/cover Red rot Stains
Sewing Loose Broken Broken in mulitple places Leaves/sections detached
Paper Brittle Losses Foxing Stains
Tears Soiled Discoloration Mold Evidence
Other Binding stuck open Previous treatment Insect damage Rodent damage
Condition Notes:
Slight yawn.
Covering condition Stable Deteriorated Damaged Not applicable
Sewing condition Stable Deteriorated Damaged Not applicable
Paper condition Stable Deteriorated Damaged Not applicable
Text to cover Stable Deteriorated Damaged Not applicable
Treatment Rank 1 None 2 Minor 3 Moderate 4 Significant 5 Cannot be treated





Preservation Recor...	Needs housing	Height	Width	Depth	Field 48	Field 51	Field 52
1	Yes	28.8	24.2	7.5			
2	Yes	30.1	24	8.5			
3	Yes	21.3	16	3.5			
4	Yes	30.8	21.5	5.3			
5	Yes	21.6	15.7	3.6			
6	Yes	21.0	15.9	7.9			
7	Yes	17.0	12.9	6.5			
8	Yes	35.9	23.6	6.4			
9	Yes	21.7	16.7	7.0			
10	Yes	30.5	22.2	6.9			
11	Yes	31.3	22.0	5.0			
12	Yes	20.8	15.8	4.2			
13	Yes	26.2	19.7	5.8			
14	Yes	21.5	15.5	3.7			
15	Yes	30.7	21.7	6.8			
16	Yes	32.3	24.5	17.5			
17	Yes	42.5	29.9	8.5			
18	Yes	16.7	12.3	5.5			
19	Yes	38.0	27.5	6.0			
20	Yes	31.0	22.7	5.0			
21	Yes	16.9	12.7	9.0			
22	Yes	26.0	19.6	8.0			
23	Yes	36.3	24.5	6.0			
24	Yes	35.6	24.7	11.4			
25	No	38.0	26.8	10.5			
26	Yes	38.1	27.7	6.4			
27	Yes	19.3	13.0	4.2			
28	Yes	19.3	13.2	3.6			
29	Yes	20.8	15.4	6.8			
30	Yes	21.0	17.0	6.7			
31	Yes	22.0	18.3	23.4			
32	Yes	21.7	15.8	3.8			
33	Yes	21.4	16.6	6.0			
34	Yes	21.9	16.3	4.0			
35	Yes	22.0	16.1	3.5			
36	Yes	21.1	16.0	3.3			
37	Yes	20.0	12.7	4.9			
38	Yes	21.8	15.0	4.3			
39	Yes	21.6	15.7	4.5			
40	Yes	21.3	16.3	3.5			
41	Yes	21.6	15.5	3.5			
42	Yes	43.0	30.1	9.4			
43	Yes	42.7	29.3	5.3			
44	Yes	38.3	27.9	8.5			
45	Yes	38.3	27.7	6.3			
46	No	31.2	22.7	4.8			
47	Yes	22.2	14.0	3.8			

Appendix B: External/Internal Hazards Survey

This survey covers the Mission San Gabriel sanctuary and the museum rooms only. Check the box to the left to indicate an affirmative answer. If the answer is no, leave the check box blank. Provide any relevant information to the right under details. It is recommended that this survey be completed every 3 years and updates noted.

Item		Details
Climate		
☑	Area subject to temperature and relative humidity change?	Especially in the winter and fall.
☐	Area subject to heavy storms or precipitation?	
Building surroundings		
☐	Building located near body of water?	
☐	Nearby body of water has history of flooding?	
☐	Water level or water table is above basement of building?	No basement.
☑	Railings, benches, planters, light/flag poles well anchored?	
☑	Overhanging trees/branches trimmed?	
☑	Neighboring buildings in close proximity?	
☐	Neighboring buildings exhibit exterior fire hazards?	
Building--General		
☐	Internal finishes or furnishings that burn easily (dry or highly varnished wood, imitation wood, veneer paneling, etc.?)	
☐	Interior finishes or furnishings that give off toxic smoke when burning?	
☑	Large open spaces, high ceilings that conceal spaces?	The sanctuary has no concealed spaces. There is an attic above the museum rooms.
☐	Windowless area that would make firefighting access and smoke removal difficult?	
☐	Interior basement walls treated with water-resistant sealer before painting; resealed periodically?	N/A. No basement.
☐	No sign of cracks/seepage visible in exterior interior walls?	In the museum rooms.

☑	Compliance with fire, electrical and other codes?	
Building--Roof		
☑	Over 15 years old?	Sanctuary roof n/a due to recent fire. Museum roof is over 15 years.
☑	"Sloped" or "Pitched"?	Both.
☐	Regularly inspected and maintained?	
☐	Roof covering sound? No buckling/bubbles/leaks/cracks/standing water?	Museum roof needs replacement. Current condition of the roof is poor.
☑	Flashing/caulking intact?	
☐	Equipment on roof prohibited?	
☑	Easily accessible; entrances and exits unobstructed?	
☑	Has lightning arresters?	
☑	External/internal drains clear?	
☐	Standpipes and sprinkler roof tanks in good condition?	N/A. No sprinkler system.
Building-–Drainage (Eves, gutters, downspouts, drains, interior columns)		
☑	Connected into sewer system? Water directed away from building footings?	
☑	Draining freely?	
☑	Good drainage around doors?	
Windows and skylights		
☐	Skylights? Screened?	N/A. No skylights present.
☑	Caulking/sealants sound?	
Fire safety		
☑	Fire resistant structure?	
☐	Concrete flooring with no air passages between floors?	N/A. Sanctuary and museum are one level.
☑	Concealed spaces (e.g., false ceilings) identified?	There is an attic in museum.
☐	Fire walls and fire doors around vertical access areas and equipment rooms?	N/A. Historical building.
☐	Collection areas separated from other areas by fire walls and doors?	N/A. Historical building.
☐	Fire doors closed and unobstructed and locked?	N/A. Historical building.

☐	Internal book drops reinforced with fore-resistant material or otherwise protected?	N/A. No circulating collection, no book drops.
☑	Fire exit signs visible and illuminated?	Visible but not illuminated.
☑	Fire detection systems appropriate?	Smoke and heat detectable.
☑	Fire detection systems wired to 24-hour monitoring station?	
☑	Fire detection system tested regularly?	Tested daily.
☐	Fire detection in all concealed spaces?	None currently in attic but on upgrade list.
☐	Automatic suppression system (e.g., sprinklers) present and operating?	None present.
☐	Appropriate extinguishers present? Inspected regularly?	None present.
☐	Stairway and pipe shafts enclosed?	N/A.
☑	Electrical wiring in good condition?	Museum wiring is good. The sanctuary will receive new electrical soon.
☐	Appliance cords in good condition?	N/A. No appliance present.
☐	Appliances unplugged nightly?	N/A.
☐	Do staff have keys to mechanical rooms and janitorial closets?	Nothing is locked.
☑	Regular Fire Marshall visits used productively? (e.g., floor plans given to Fire Department; high-priority collection areas noted; appropriate follow-up n observed violations?	Annually.
Staff trained in:		
☑	Sounding alarms?	
☑	Interpreting annunciator panels?	
☑	Notifying Fire Department and other as called for?	
☐	Using extinguishers?	No extinguishers present.
☐	Turing off power, HVAC, sprinklers, gas main?	
☐	Overseeing evacuation?	
Electrical, HVAC, and plumbing systems		
☐	Electrical and plumbing systems regularly inspected and maintained?	
☐	Emergency lighting operable?	Emergency lighting is serviced annually.
☐	Automatic shut-off capacity for HVAC in event of fire?	N/A. No HVAC system currently.

☐	Effective drainage from air-conditioning condensation-collection pans? Mold?	N/A. No HVAC system currently.
☑	Ventilation ducts clean?	Ducts recently cleaned.
☐	Air conditioning capable of operating on exhaust to reduce smoke?	N/A. No HVAC system currently.
☐	Automatic fire dampers (metal) on ventilation ducts?	N/A. No HVAC system currently.
☑	Circuit breakers and electrical controls accessible; locations marked?	
☐	Water shut-offs accessible and marked?	N/A.
☐	Water pipes or drains running through collection areas? Special Collections areas?	No pipes in collection areas.
☐	Collection environment stable?	Unstable environment.
Storage areas		
☐	Shelves well braced?	N/A. Collections currently offsite and other campus locations. No stacks.
☑	No water sources located above collections?	
☐	Shelving 4”-6” off floor?	N/A. No shelving.
☐	“Canopies” on top of shelving units?	N/A. No shelving.
☐	No valuable materials in basement?	N/A. No basement.
☑	Exits unobstructed?	
☑	Important collections away from windows?	Yes, but shades possibly needed.
Housekeeping		
☐	Collections materials stored on floor?	
☐	Collections materials retuned to proper housing after use?	N/A. Collections not housed.
☐	Books shelved improperly; packed too tightly, hanging over edges of shelves?	N/A. Storage recommendations needed.
☑	Aisles, exits, and stairwells unobstructed?	
☐	Electrical extension cords over six feet; cords run under carpeting?	
☐	Cleaning supplies and other flammables stored properly?	N/A.
☐	Trash removed nightly?	N/A. No trash in sanctuary or museum.
☐	Staff break room cleaned daily and well?	N/A. No break room in survey area.

☑	Smoking prohibited?	
☑	Food and drink prohibited?	
☐	Pest management strategies in place and effective?	Integrated pest management (IPM) recommendations needed.
Protection from water damage		
☐	Pipes and plumbing well supported?	N/A. No pipes or plumbing in survey area.
☐	No pipe/plumbing leaks?	Sump pump 15' away from museum.
☐	Water detectors present?	N/A.
☐	Sump pump and back-ups present?	See above. No backup.
☐	Appropriate dehumidifiers available?	
☐	No leakage/seepage though walls?	
☐	Valuable and fragile media stored above ground and in protective enclosures?	Stored above ground, but no enclosures.
☑	Do Mission staff have keys, authority, and knowledge to shut-off water main?	
Security		
☑	Building exterior well lighted?	
☑	Locks/alarms on all windows and doors?	
☑	Intrusion detectors /alarms present and monitored 24-hours?	
☑	Effective closing procedures to ensure building is vacant?	
Construction Projects		
☑	Responsibility for fire safety precautions clearly specified in contract?	
☑	Fire guards used in all cutting/welding operations?	
☑	Debris removed nightly?	
☐	Fired-resistant partitions used?	N/A.
☑	Extra fire extinguishers on hand?	

Appendix C: HOBO datalogger specifications

The country of origin for this product is the United States. To see the full specifications for this product, please see our product manual found under the documentation tab if available.

Temperature Sensor	
Range	-20° to 70°C (-4° to 158°F)
Accuracy	±0.21°C from 0° to 50°C (±0.38°F from 32° to 122°F)
Resolution	0.024°C at 25°C (0.04°F at 77°F)
Drift	<0.1°C (0.18°F) per year
RH Sensor*	
Range	1% to 90%, non-condensing
Accuracy	±2.0% from 20% RH to 80% RH typical to a maximum of ±4.5% including hysteresis at 25˚C (77˚F); below 20% RH above 80% RH ±6% typical
Resolution	0.01%
Drift	<1% per year typical
Response Time	
Temperature	7:30 minutes in air moving 1 m/s (2.2 mph)
RH	20 seconds to 90% in airflow of 1 m/s (2.2 mph)
Logger	

Radio Power	1 mW (0 dBm)
Transmission Range	Approximately 30.5 m (100 ft) line-of-sight
Wireless Data Standard	Bluetooth Smart (Bluetooth Low Energy, Bluetooth 4.0)
Logger Operating Range	-20° to 70°C (-4° to 158°F); 0 to 95% RH (non-condensing)
Logging Rate	1 second to 18 hours
Logging Modes	Fixed interval (normal, statistics) or burst
Memory Modes	Wrap when full or stop when full
Start Modes	Immediate, push button, date & time, or next interval
Stop Modes	When memory full, push button, date & time, or after a set logging period
Restart Mode	Push button
Time Accuracy	±1 minute per month at 25°C (77°F)
Battery Life	1 year, typical with logging interval of 1 minute. Faster logging and/or statistics sampling intervals, entering burst logging mode, and remaining connected with the app will impact battery life. Excessive readouts, audible alarms, and paging all impact battery life. Visual alarms and other events can have a marginal impact on battery life.
Battery Type	Two AAA 1.5 V alkaline batteries, user replaceable
Memory	128 KB (84,650 measurements, maximum)
Full Memory Download Time	Approximately 60 seconds; may take longer the further the device is from the logger
LCD	LCD is visible from 0° to 50°C (32° to 122°F); the LCD may react slowly or go blank in temperatures outside this range
Size	3.66 x 8.48 x 2.29 cm (1.44 x 3.34 x 0.9 in.)

Appendix D: Supplies and Suppliers

Inclusion does not imply endorsement. A variety of vendors should be consulted.

Use the first table to find the product or service and the second table to find the contact information.

Product	*Price*	*Suppliers*
Book supports	Varies	See Table 4, p. 26
Custom book boxes	~$6.00-20.00, per box	See Table 3, p. 14
Exhibit Casework	Varies	See Table 4, p. 26
Furniture, storage	Get quotes as needed.	See Table 3, p. 14
HOBO data loggers	$135.00 per logger; free software	Onset Corporation
Light meter(s)	2 separate meters ~$300.00 total	Talas
	1 meter ~ $1,200.00 (Elsec model 765)	Gaylord
Mold mitigation	Get quotes as needed.	Belfor Property Restoration
Traps / IPM Trapper sticky traps and moth pheromone traps	$74.00 per box of 100 traps, sticky ~$21.97 per 6, moth pheromone	Insectslimited.com
		Amazon.com
Treatment for bound volumes	Get quotes as needed.	See Table 2, p. 11

SUPPLIER CONTACT INFORMATION	
Belfor Property Restoration 50 Artisan Means Way Suite B Reno, NV 89511 (775) 424-3200 https://www.belfor.com/en/us/belfor-usa-offices/nevada/reno	**Onset Corporation** 470 MacArthur Blvd. Bourne, MA 02532 1-800-564-4377 www.onsetcomp.com)
Gaylord Bros. PO Box 4901 Syracuse, NY 13221-4901 (800) 448-6160 www.gaylord.com	**Talas** 330 Morgan Ave Brooklyn, NY 11211 (212) 219-0770 www.talasonline.com
Insects Limited 16950 Westfield Park Road, Westfield, IN 46074 USA (317) 896-9300 www.Insectslimited.com	**Amazon** www.amazon.com

Appendix E: Bibliography

The following Bibliography highlights publications that may be of interest for further information on topics contained in this report.

GENERAL PRESERVATION ADMINISTRATION

Canadian Council of Archives. Basic Conservation of Archival Materials. Ottawa: CCI, 2003. Easy to use information on general care, environment, and emergency preparedness. Includes chapter with section organized by collection material. A good list of American National Institute (ANSI) standards for photographic materials. Available from their website in hardcopy or as a free download.

Harvey, Ross and Martha R. Mahard. The Preservation Management Handbook: A 21st Century Guide for Libraries, Archives, and Museums. Lanham: Rowman & Littlefield, 2014. A broad overview of preservation principles and the care of many types of library materials.

Person-Harm, Angela and Judie Cooper. The Care and Keeping of Cultural Facilities. Lanham: Rowman & Littlefield, 2014. An excellent book for facilities managers and those responsible for cultural collections.

John N. De Pew. A Library, Media and Archival Preservation Handbook. Santa Barbara: ABC-CLIO, 1991. Includes chapters on paper making and paper acidity, storage environment, mold and pests, care and handling, disaster preparedness, exhibits and more. While the preservation sources may be dated, there is useful information in this 2-volume set. Out of print but may be available through libraries and Interlibrary Loan (ILL).

GENERAL CARE OF BOOKS

Canadian Conservation Institute (CCI). Basic Care of Books, 1995. CCI Notes 11/7. Available online.

EMERGENCY PREPAREDNESS AND PLANNING

Kahn, Miriam, B. Disaster Response and Planning for Libraries. Chicago: American Library Association, 2012. A good overall planning guide with extensive checklists and forms.

Museums Alberta. HELP! A Survivor's Guide to Emergency Preparedness. Museum Excellence Series: Book 3. Edmonton, Alberta: Museums Alberta, 2001. A 3-ring binder format with sections on prevention, preparedness, response, and recovery.

EXHIBITS

Buck, Rebecca A. and Jean Allman Gilmore, Eds. The New Museum Registration Methods. Washington: American Association of Museums, 1998.

American National Standard Institute/National Information Standards Organization. ANSI/NISO Z39.79-2001. Environmental Conditions for Exhibiting Library and Archival Materials. Do not depend on the materials list contained in this standard. It is dated (2001) and formulas for materials constantly change. Otherwise, a valuable resource.

Canadian Conservation Institute (CCI). Display Methods for Books, 1994. CCI Notes 11/8. Available online.

SECURITY

Wilkie, Everett C., Jr., compiler and editor. Guide to Security Considerations & Practices For Rare Book, Manuscript, and Special Collection Libraries. Chicago: Association of College and Research Libraries, 2011. A good overview of the issues in special collections libraries security. See the chapter on procedures.

STORAGE ENVIRONMENT: TEMPERATURE, RELATIVE HUNIDITY AND LIGHT

See chapters on environment in resources listed under General Preservation Administration.

Image Permanence Institute, Rochester Institute of Technology. IPI's Guide to Sustainable Preservation Practices for Managing Storage Environments. Rochester: IPI, RIT, 2012.

Reilly, James M. New Tools for Preservation: Assessing Long-Term Environmental Effects on Library and Archives Collections. Washington, DC: Commission on Preservation and Access, [1995]. Introduces the new research on sustainable environments for collections.

HOUSEKEEPING, INTEGRATED PEST MANAGEMENT AND MOLD

The National Trust. The National Trust Manual of Housekeeping: Care and Conservation of Collections in Historic Homes. Wiltshire, UK: The National Trust, 2008. An excellent source on caring for collections in historic properties. Indispensable.

Baas, Valerie. "Know Your Enemies." History News 35 (7) (July 1980): 40-41.

Canadian Conservation Institute (CCI). Preventing Infestations: Control Strategies and Detection Methods, 1996. CCI Notes 3/1. Available online.

Canadian Conservation Institute (CCI). Psocids or "Book Lice": A Warning of Dampness, 1998. CCI Notes 3/4. Available online.

Harmon, James D. Integrated Pest Management in Museum, Library and Archival

Facilities: A Step by Step Approach for the Design, Development, Implementation, and Maintenance of an Integrated Pest Management Program. Indianapolis, IN: Harmon Preservation Pest Management, 1993.

Parker, Thomas A. How to recognize and eliminate Silverfish, Beetles, Cockroaches, Moths, Termites, Rats and Mildew in Libraries and Archives. Upland, PA: DIANE Publishing, 1998.

Pinniger, David. Integrated Pest Management in Cultural Heritage. London: Archetype Books, 2015.

University of Illinois. Mold identification page. http://www.library.illinois.edu/prescons/disaster_response/mold_identification.htl

HVAC FILTRATION

National Air Filtration Association (NAFA). Guidelines, Recommended Practices for Filtration in Libraries, Archives, and Museums. Madison, WI: NAFA, 2016.

American /Society of Heating and Refrigeration and Air Conditioning Engineers (ASHRAE). Handbook. Peachtree Corners, GA: ASHRAE, 2020.

ONLINE RESOURCES

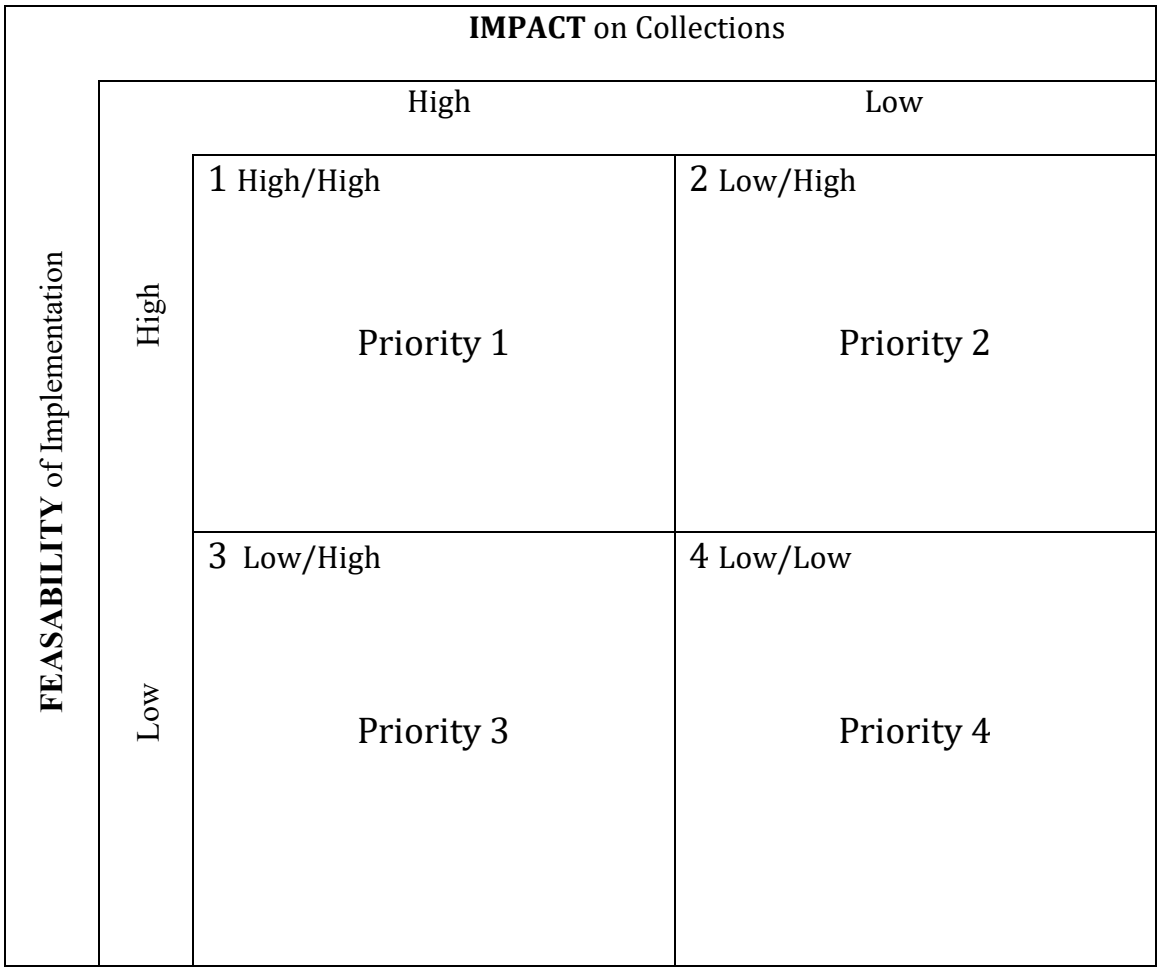
American Institute for the Conservation of Historic and Artistic Works (AIC). See Publications and Resources. http://www.conservation-us.org/

Canadian Conservation Institute (CCI). Notes and Technical Bulletins. A wonderful series of informational pamphlets and many are free to download. The CCI notes are arranged under the following headings: Care of Collections, Preventative Conservation, Museum Environment, Paper and Books, Planning for Disaster Management, Care of Photographic Materials. CCI Notes are good as a short primer on many topics. http://www.cci-icc.gc.ca/resources-ressources/ccinotesicc/index-eng.aspx

Canadian Council of Archives. Resources include those free to download. http://www.cdncouncilarchives.ca/intro.html.

Conservation Online (Cool) See Conservation Topics. http://cool.conservation-us.org/

Appendix F: The Preservation Priority Matrix[7]



Impact = The extent to which the recommended action will improve the institution's preservation activities; includes activities that will result in dramatic improvement in the present condition of materials, substantial decrease in the rate of deterioration, substantial increase in efficiency of current preservation activities, or considerable savings of time, energy, or money.

Feasibility = The difficulty entailed in implementing the recommended action, particularly in terms of time, energy, and resources required to implement the action.

In the above matrix, impact on the collections and feasibility are considered in tandem as ranking either low or high. Priority 1 actions would provide high impact and would be relatively easy to implement. Priority 2 and 3 recommendations can be done as funds and staff time allow. Priority 4 may be considered last or not done at all. Priorities are intended to be a guide only, as over time feasibility may change.

[7] Adapted by Karen Motylewski from, *Preservation Planning: An Assisted Self-Study Manual for Libraries*, by Pamela W. Darling, with Duane E. Webster, expanded 1987 edition, Washington, D.C. Association of Research Libraries, Office of Management Studies, 1987. Pp. 29-30.

Appendix G: A Brief Note on HVAC Filtration

Proper air filtration provided by HVAC systems for Libraries and Museums is an important factor in the preservation of collections. While building envelopes and use patterns can limit what is possible in this area, some basic information may be helpful when working with HVAC professionals.

It is recommended that a three-stage filter be used consisting of the following stages: 1) particulate filter of MERV 8, 2) a gas filter, and 3) a second particulate filter of between MERV 13-16. The MERVs (Minimum Efficiency Reporting Values) rating indicates size and percentage of particle capture, and gas filters are activated charcoal and chemisorbant products. A final UV light filter, for high value collection areas, would eliminate molds, bacteria, and similar viable particles.

Please see *Appendix E: Bibliography*, p. 46, for resources on HVAC air filtration.