Building Assessment & Master Plan

Ontario Museum of History & Art

City of Ontario CA | March 2019

Architectural
Resources Group

Client

The City of Ontario
Ontario Museum of History & Art
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Executive Summary

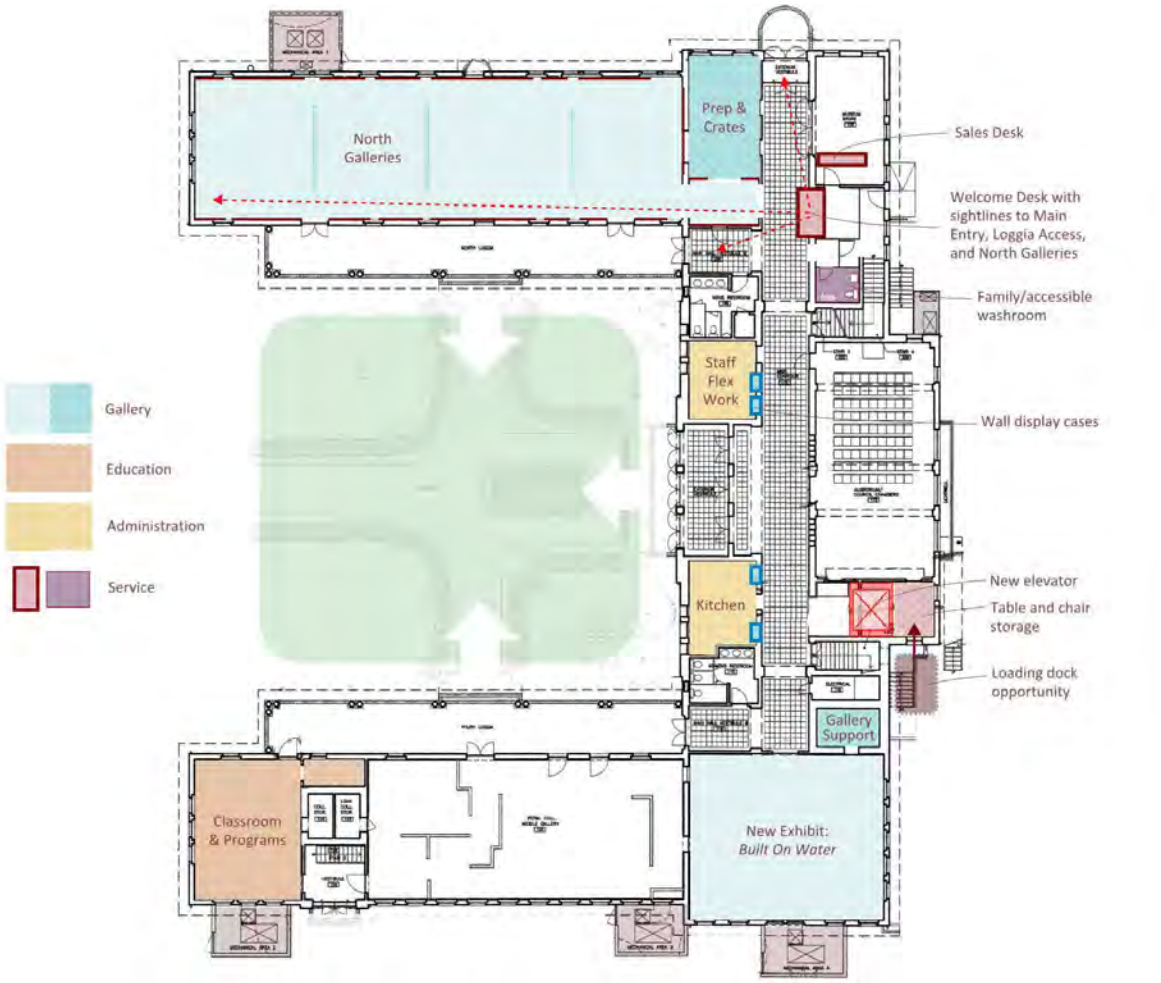
The Ontario Museum of History & Art (OMHA) is the custodian of Ontario's local history and an educational and cultural resource for its community. The museum's piecemeal adaptation of spaces in the 1937 City Hall over the past forty years has led to a less-than-optimal situation. In addition, upgrades for life safety, code, and curatorial standards are called for.

OMHA's primary goals in addressing these concerns are:

- Enhance the museum's value to its constituent communities
- Meet contemporary expectations for collections stewardship
- Obtain accreditation from the American Alliance of Museums

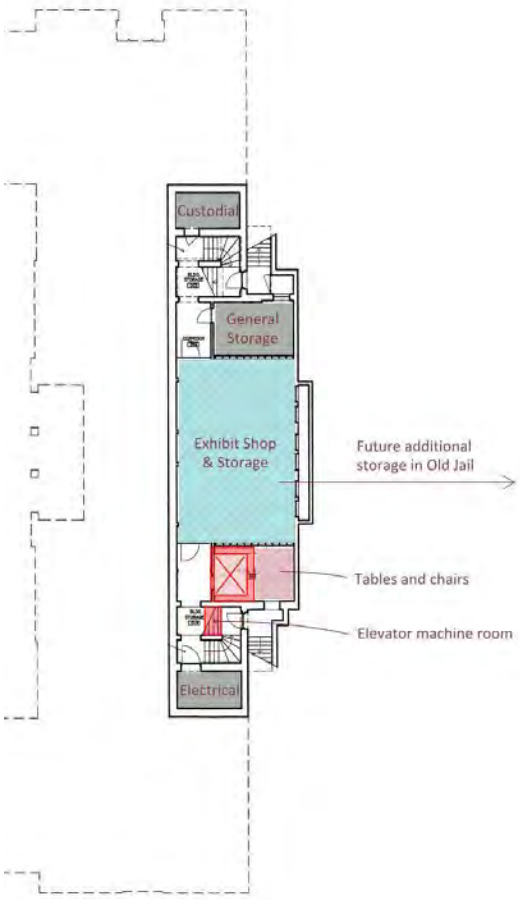
This report lays out current facilities conditions in Section 2 and, where appropriate, makes preliminary recommendations for remediation. These recommendations are then assessed for cost and potential work sequence. This analysis provides a framework for OMHA's decision making, both near- and long-term.

The core recommendations in Section 3 are for optimization of the museum's layout, shown in the plan diagrams on the next pages.



first floor

- Provide new Welcome Desk with direct oversight of Main Entry and potential Loggia and Courtyard access
- Relocate and improve North Galleries entrance
- Locate Exhibit Prep/Crate Storage near Main Entry loading,
- Reconfigure North Galleries to accommodate many different layouts
- Install new Elevator serving all floors
- Activate Main Hall with wall exhibit cases
- Make the Carlson Gallery a classroom/educational programs space
- Integrate the Garden Court into Museum programming
- Improve exterior screening of HVAC units



basement

- Enlarge and consolidate Exhibit Fabrication Shop and storage
- Create Elevator access

second floor

- Open up and rationalize Office areas
- Create Elevator access
- Provide direct access to exterior emergency stair
- Store collections off site and optimize Collections Intake and Workshop

Code and Accessibility

Section 4 assesses the Museum building's compliance with applicable codes and regulations, especially fire safety and barrier-free access.

Major considerations include:

- Installation of a sprinkler system. This is not code-required in the case of OMHA's existing building and will require the museum to make a decision that balances benefits against costs.
- Provision of accessible restroom facilities.
- Installation of an elevator serving all building floors.

Building Systems

Section 5 reviews the museum building's existing structural, mechanical, electrical, and plumbing systems and proposes upgrades as appropriate.

Particular attention is given to the mechanical systems (or HVAC: Heating Ventilation and Air Conditioning). Maintaining gallery environments at appropriate, consistent temperature and humidity levels is a critical part of collection stewardship and will be a major factor in obtaining American Alliance of Museums accreditation.

The museum's need for data and security systems is also addressed in this section.

Building Condition and Treatment

Section 6 details existing exterior conditions of the OMHA building, including deterioration and damage. Section 7 provides a corresponding rundown of recommended maintenance, repairs, and restoration measures.

Cost Projections

The overall project cost for the improvements recommended by this master plan has been estimated **$8,946,000.** This can be broken out into three general areas:

"Overall" — building-wide systems work	$2,083,800
"Area by Area" — focused interior upgrades	$5,819,400
"Exterior" — envelope maintenance and preservation	$1,042,800

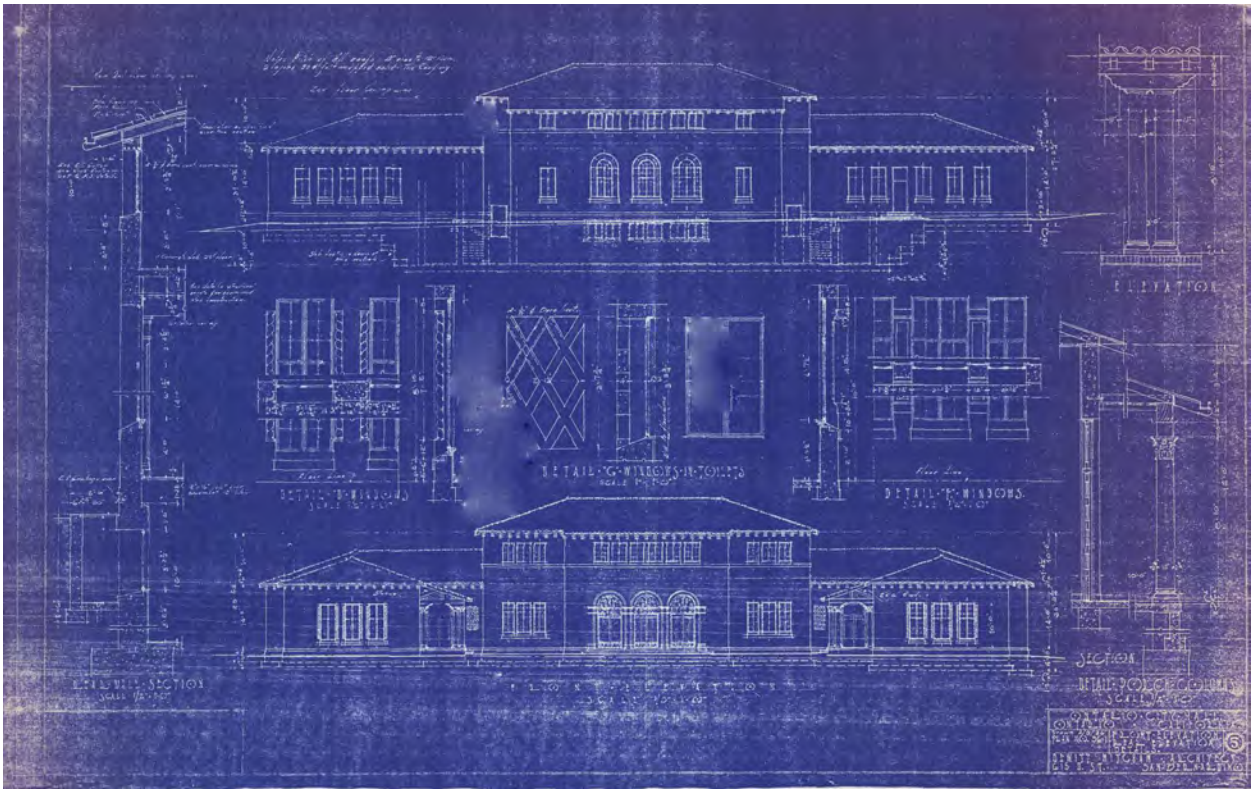
See Section 8 and Appendix C.1 for more detail on this estimate. Appendix C.2 provides a concept budget for the upcoming "Built On Water" exhibit.

The sequence in which work is done will depend on future availability of various kinds of funding. While the specifics here cannot be predicted, Section 9 provides an overview of phasing and implementation considerations that apply in most scenarios.

General Electric Hotpoint Flatiron
from OMHA collection

Part I

Introduction



1937 Construction Drawing

1.1 Project Overview

Architectural Resources Group, Inc. (ARG) has prepared this Building Assessment and Master Plan Report to guide facilities stewardship for the Ontario Museum of History & Art (OMHA or "the museum"). OMHA operates under the auspices of the City of Ontario, CA and this study was undertaken at the City's request.

OMHA was established in 1979 by the City of Ontario as "a public museum of natural and historical objects." Its permanent collections include historical artifacts, print archives, photographs, and regional artworks that document the history of Ontario and nearby communities. OMHA's identifies its institutional goals as follows (note: statements under review at time of report) :

> *Vision Statement*
>
> Ontario Museum of History & Art is a welcoming place that reflects pride in who we are, where we live and our legacy.
>
> *Mission Statement*
>
> Ontario Museum of History & Art enhances knowledge and understanding of our community through dynamic and vibrant experiences.

OMHA's physical facilities have been configured in a piecemeal fashion over the past forty years, resulting in a less-than-optimal arrangement that is now seen to detract from the museum's mission. In addition, the historic building housing the museum needs structural, MEP systems, and accessibility upgrades to bring it up to current life safety, code, and curatorial standards. OMHA's primary goals in addressing these concerns are:

- Enhance the museum's educational and cultural value for its constituents
- Meet contemporary expectations for collections stewardship
- Obtain accreditation from the American Alliance of Museums

This document lays out current facilities conditions and, where appropriate, makes preliminary recommendations for remediation. This analysis is meant to provide a framework for OMHA's decision making, both near- and long-term.

1.2 Existing Conditions Overview

Since is founding in 1979, OMHA has occupied a historic structure at 225 South Euclid Avenue that originally served as Ontario's City Hall. The building was designed by San Bernardino-area architect Dewitt Mitcham and constructed in 1937. It is U-shaped in plan, with cast-in-place concrete walls topped by hipped clay tile roofs. The design combines aspects of the Mission style (such as the low verandas framing an internal court) with the Mediterranean Revival (especially the paired Corinthian columns supporting the verandas). The building is a locally-designated historic landmark and has been determined eligible for the National Register of Historic Places. The adjacent landscape includes the city's rose garden; drought-tolerant and native species have recently been planted in other areas.

The Museum's ground floor is largely devoted to galleries for the permanent collections and temporary exhibits. Support areas on this level include a meeting room (the former Council Chambers), a gift shop, restrooms, offices, and miscellaneous spaces. The second floor houses museum offices, work spaces, and collections storage. While most collection items not on exhibit are stored on the second floor, some items are stored wherever room has been found in the building. A partial basement contains mechanical rooms, additional workspaces, and storage.

1.3 Scope

This document both assesses existing conditions and makes recommendations for remediation and improvement. The analysis is meant to provide a framework for decision making as OMHA moves forward over the next 20 years.

The scope of this report is:

- Assessment of current conditions and goals
- A long-term facilities strategy with specific recommendations by area
- Code and accessibility analysis
- Building systems review
- Building envelope assessment and treatment recommendations
- Cost projections
- Scheduling and implementation frameworks

1.4 Methodology

This document synthesizes previous reports, current site assessments, and proposals for the future that have been developed with input and insights from OMHA's staff and Board of Trustees.

ARG has reviewed the following background information in the preparation of this report:

> "Architectural Conservation Assessment", draft report dated December 1, 1993. Prepared by the Museum of History and Art, Ontario
>
> "Museum of History and Art, Ontario: Conservation Assessment", report dated March 4, 1994. Prepared by John Twiley, Conservation Scientist
>
> Museum of History and Art, Ontario", historic framework tech report dated November 3, 2003. Prepared by Chu + Gooding Architects
>
> "Strategic Outlook, Museum of History and Art, Ontario", reported dated December 17, 2004. Prepared by Chu + Gooding Architects
>
> "Conservation Consultation Report for the Museum of History and Art, Ontario," report dated February 2005. Prepared by the Western Region Field Service Office, Balboa Art Conservation Center

"Sustaining Cultural Heritage Collections, Final Report", report dated August 2013. Prepared by ARG Conservation Services (ARG/CS)

The 2013 ARG/CS report cited above was prepared under a planning grant from the National Endowment for Humanities for Sustaining Cultural Heritage Collections to examine potential threats to the museum's collection. ARG found that OMHA suffered from inadequate space to inventory, house, and store collection items and from inadequate building systems and environmental controls. The report also identified significant code compliance issues:

- Non-compliant second floor emergency egress
- No fire suppression system
- Concerns regarding the loading capacity of the second floor

As a result of these and other discussions, ARG recommended that the museum take a more holistic approach to building assessment and a conceptual master plan. Key issues include:

- Programming and space usage
- Collections handling and storage
- Life safety, including egress and fire suppression
- Building envelope integrity (in particular windows and doors)
- Structural integrity
- Building systems capacity (mechanical, electrical, plumbing, lighting, and energy use)
- Accessibility

Members of ARG's architecture and conservation staff have made site visits to OMHA to record the building's features and their condition. The subconsultants made similar visits over the same period so that cross-referencing among different specialties could take place in the field when possible. The team examined the interior and exterior and used notes and photographs to record the findings. Along with the site visits, multiple meetings were held with the museum staff and key stakeholders to discuss the project.

ARG's conditions assessment and the findings of the subconsultants were compiled and analyzed by a cost estimator to inform the preliminary, phased cost estimate in this report.

1.5 Pending Projects

At the time of writing, the museum has a number of pending initiatives. As these are approved/ funded they should be coordinated with the recommendations within this report.

Pending Capital Improvement Projects (currently unfunded)

- Window film and blinds in north galleries
- Wi-fi / Wi-fi-based security/video system
- Signage and wayfinding graphics

Pending Facilities Maintenance Projects

- Seismic/egress remediation
- Exterior painting and wood trim
- LED lighting in south galleries
- Replacement/additional south wing sub-panel
- Collection relocation to rental storage
- Basement flood damage repair

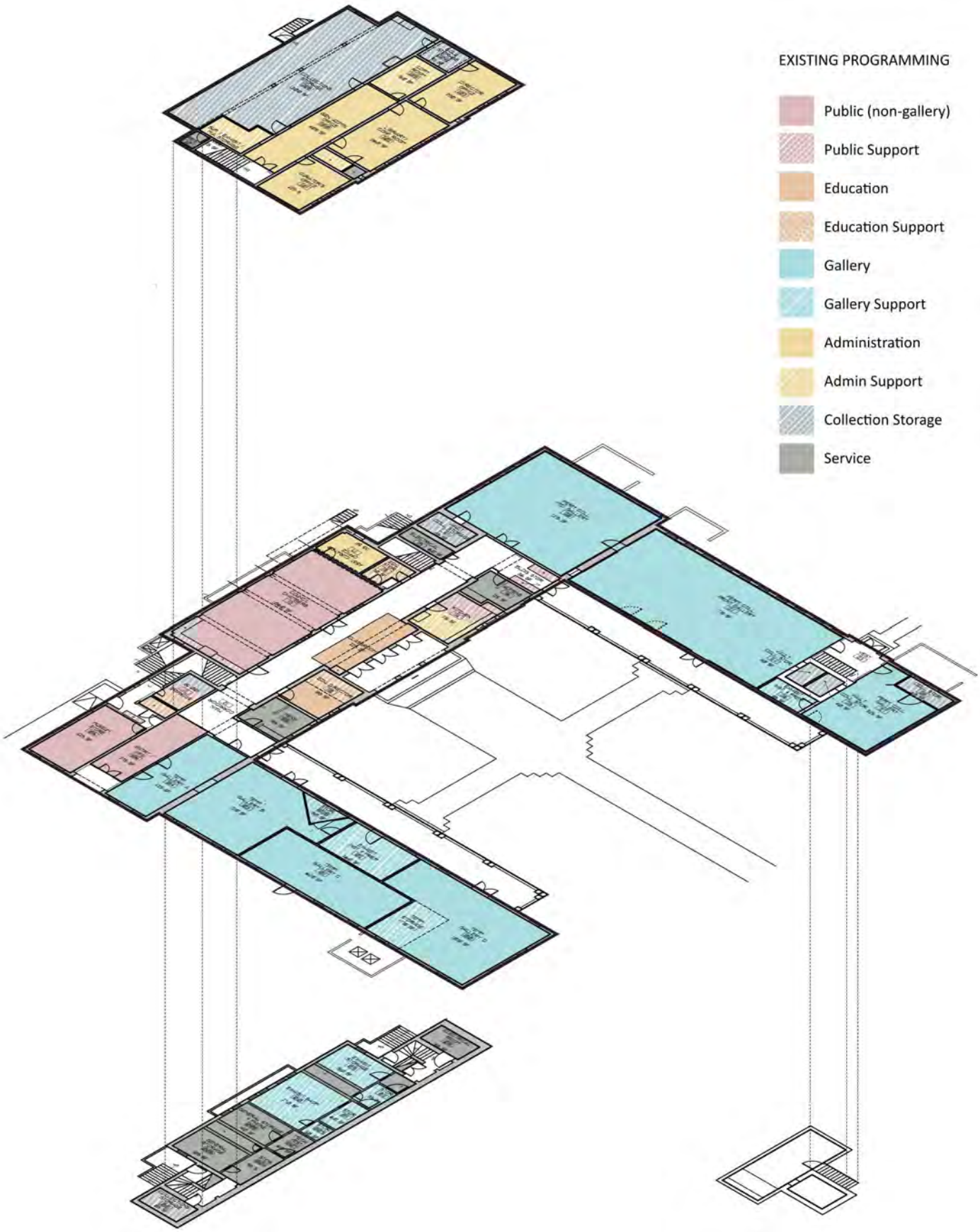
Future Grant Objectives

- Outdoor educational program space

Opening of the Ontario City Hall, 1937
from OMHA collection

Part 2

Existing Use Analysis and Goals


EXISTING PROGRAMMING
Public (non-gallery)
Public Support
Education
Education Support
Gallery
Gallery Support
Administration
Admin Support
Collection Storage
Service

2.1 Overview

OMHA's current use of space is intensive and responds by necessity to the physical conditions inherited from the museum building's previous life as Ontario's City Hall.

The defining aspect of the building is its U-shaped plan. Although this configuration is generally considered a difficult one for museums, OMHA has evolved a workable arrangement where the wings contain galleries (one wing for permanent exhibits, one for changing shows) and the "bottom" of the U is a main hall with various non-gallery spaces opening off it. Offices and collections are located in a partial second floor; a small basement contains additional service spaces.

This arrangement is fortuitously suited to the building's structural layout: the wings have almost no interior bearing elements and most partitions have been removed to create gallery-sized spaces. The central part of the building has an unusual density of concrete bearing walls (a result of the jail originally located on the second floor) as well as the most historically important interior spaces, and has been maintained in its original configuration.

The building's U-shape creates an attractive courtyard that is visible from many of the interior spaces. Security and environmental control concerns have limited access from the museum to the courtyard, but the space is potentially a great asset for programs and environmental education.

2.2 Public Spaces

Public Entry

OMHA's main entrance is at the northeast corner of the building. Its location is clearly signaled to visitors by recent site landscaping, although the museum reports some visitors mistakenly walk around to the old City Hall's courtyard entrance. The museum's ground level is virtually at grade, and entry can be made fully accessible without a ramp or lift.

> Goals: The entry should be verified as fully accessible per applicable regulations. Push-plate door openers should be added if force required to open historic entry doors exceeds 5lb. An additional cue to draw

visitors to the correct entrance (such as a pole-mounted exhibit banner or outdoor sculpture) could be considered depending on the level of concern about visitor wayfinding.

Welcome Desk

OMHA does not have an admission charge. The welcome desk is a point to greet and inform visitors, as well as maintain security oversight of who enters and leaves the museum. The current desk has a provisional character and is poorly oriented to surveil the Main Hall and gallery entries.

Goals: Provide a substantial-looking welcome desk that encroaches on the Main Hall as little as possible but has clear sightlines to the main entrance and along the Hall in both directions. The desk should accommodate at least one computer, screened by a high panel, and should incorporate an accessible-height counter. Associated cabinetry should include space for materials and brochures. The area behind the desk should be easy to keep in order and could feature exhibit or informational graphics.

Museum Store

The Museum Store is located immediately inside the entry and is operated in partnership with the Museum Associates, a not-for-profit organization. The space is entered through a wide arched opening that can be secured with an ornamental grill; the grill's floorstop has presented an accessibility issue for some museum visitors. Typically, one city employee operates the store from a checkout counter with a computer station; this counter is poorly positioned for visual security. Most of the store's back stock is kept in the adjacent storage room, along with unrelated items. Back stock of posters is kept in the upstairs Copy Room as there is no other place to store it properly.

Goals: The Museum Store provides a complementary amenity for OMHA and can be upgraded to enhance its value. The checkout counter and desk should be reconfigured to allow oversight of the entire store area, particularly its entrance. The potential for a single person to staff both the Store and the museum entry should be explored. The floor transition at the entry must be adjusted to provide barrier-free access. The store needs a dedicated stock room; based on discussions with store staff, this should be approximately 30 square feet with proper shelving for all stock items. Exterior signage might be considered.

Council Chambers

The former Council Chambers is heavily used for functions ranging from school tour orientations to lectures to staff meetings. It has also become overflow storage, with tables and easels at the back of the room and several collections items in the front. The configuration of fixed seating and council table is not ideal for current uses, but is integral to the Council Chambers' original state (several seats have been removed to provide an accessible audience area). Further, the room is considered a defining historic resource for Ontario and any significant alterations require explicit permission from the City Council (City Resolution 9587).

Goals: The Council Chambers' historic integrity should be upheld. Maintenance work should be coordinated to return detail aspects (such as paint colors and window blinds) to their historical condition. All overflow items should be moved to appropriate storage elsewhere.

Upgrades to AV and/or presentation systems would enhance the room's functionality; specific system recommendations are outside the scope of this report.

Kitchen

The Kitchen serves as breakroom and lunch space for the museum staff, a space for volunteer lockers, and a prep area for Museum Associates events. Counter space is limited and unusually shallow, and all kitchen work is done on the table in the center of the room. The electrical panel feeding this room is overloaded and multiple appliances cannot be used at the same time. Storage space is not sufficient for Museum Associates event items (serving trays, plates, napkins, etc.).

Goals: The kitchen should be reconfigured to optimize counter and storage space. Electrical service should be upgraded to meet both daily and event loads. New cabinetry finishes should be durable enough for moderate institutional use. For accreditation purposes, OMHA should institute a protocol to keep kitchen and general waste areas totally separate from exhibit loading areas.

Washrooms

The existing public washrooms are entered from side corridors off the Main Hall and are fortuitously located so they can be used whether or not the galleries are open (e.g. for evening events in the Council Chambers). The washrooms themselves are functional but worn and somewhat cramped; the compartment doorswings in the women's room also conflict. There are currently no accessible/ barrier-free toilet rooms in the museum, either for public or staff.

Goals: The washrooms cannot be altered for full accessibility without entirely changing their layout and reducing their fixture count. A reasonable, accessible equivalent would be a new code-compliant single-user, gender-neutral toilet room. This facility should be located off the Main Hall, but preferably not open right onto it. It can also serve as a family restroom and baby-changing station.

See Sections 4.6 and 4.7 for analysis of required fixture counts and accessibility.

2.3 Exhibit Spaces

Permanent Collection Galleries

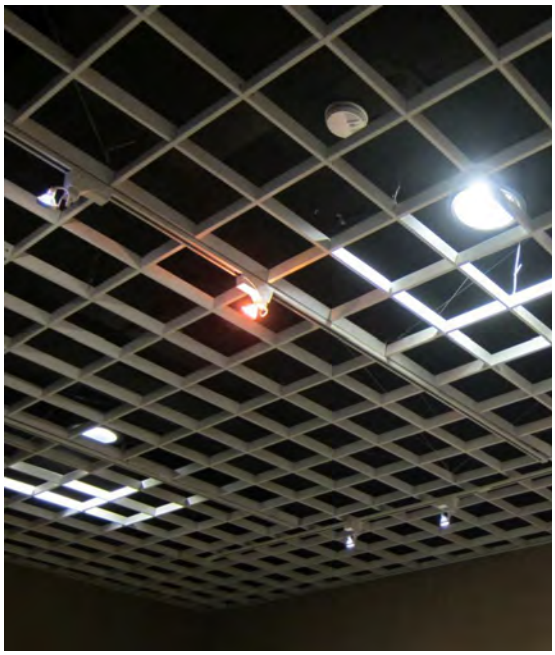
The Permanent Collection Galleries occupy the museum's south wing and are divided into two thematic local history exhibits: "Roadways" (southeast gallery) and "Gem of the Foothills" (south gallery). In both galleries, non-structural partitions have been built inboard of the exterior walls to block windows and increase display area. These partitions do not allow interior access to the windows for maintenance and repair. The ceilings are an open grid system that appears to be in reasonable repair and effectively masks the services above it, which are painted out black.

Goals: OMHA has received a three-year grant to change over the southeast gallery from "Roadways" to "Built on Water," an exhibit exploring local water use and conservation in historical perspective. During this process, perimeter partitions should be removed so windows can be repaired. Further, the new exhibit layout should maintain maintenance access to the windows. The museum also has a pending project for upgrading exhibit lighting in both the south and southeast galleries to LED

fixtures. While there are no current plans to change out the "Gem of the Foothills" exhibit, the museum intends to begin this process in the next few years. In both permanent collection galleries, OMHA plans to use a modular display system (to be determined) that can be reconfigured to stage future exhibits.

Detailed conditions above the grid system (duct integrity, dust accumulation, additional service elements) should be evaluated at the start of work on "Built on Water"

The building envelope should be upgraded in coordination with exhibit de-installation; see Section 6.4 Doors and Windows for scope. Doing window repair in phases, per gallery, is likely the most economically feasible option.



Typical grid ceiling in south galleries

Temporary Galleries

The four-room Temporary Galleries occupy the museum's north wing and host a broad range of both OMHA-curated and traveling exhibits. The galleries are entered through a conventional single door off the Main Hall that provides little sense of occasion. While the first gallery has a rectangular plan, subsequent rooms are laid out as interlocking shapes. This creates an effective labyrinth that problematizes both exhibit arrangement and security. An exhibit prep room located halfway through the galleries provides much needed workspace but further complicates the layout.

The gallery walls, including the exterior perimeter, incorporate a plywood backing for display attachments; their surface finish is trowel-textured plaster similar to the Main Hall, although not historical. The ceiling is 12x12 acoustical tile. Stridently-patterned carpet tile undercuts the galleries' role as a background for exhibits. Light and air infiltration from windows and doors is a major concern.

Goals: Upgrade Temporary Galleries to ASHRAE "Class B" environmental standards and applicable American Alliance of Museums standards for travelling exhibits (see Section 5.3). Rationalize gallery layout for display and security, and incorporate sufficient areas for prep work and crate storage.

New finishes should provide a neutral background appropriate for displaying art and cultural objects.

Refer to Section 6.4 Doors and Windows for additional upgrades to the windows. Refer to Section 2.4 Exhibit Prep and Support for related storage and prep issues.

Carlson Gallery

Located at the far west end of the south wing, The Carlson Gallery is used for small temporary shows of flatwork and moderately-sized objects. Between exhibits the space is used for educational programs; during the summer, it serves as a classroom for the spring children's program. A built-out enclosure on the south side of the room conceals ducting from the exterior AC unit and is used to store collections materials. A small room off the northeast corner is used for exhibit prep; it has a sink, but water service was cut off during installation of the courtyard landscaping and efforts to restore it have not yet succeeded. Along the east wall, a heavy door opens onto one of the old security vaults; this is concealed behind temporary partitions for safety reasons. Exterior windows and doors are covered by perimeter partitions similar to the rest of the south wing.

Goals: OMHA has no dedicated educational program space apart from the Council Chambers, which has limited functionality. The Carlson Gallery is the most reasonable candidate to fill this need, especially as its out-of-the-way location complicates its use as a gallery.

Reworking of the Carlson Gallery as a program space could be coordinated with removal of the room's perimeter partitions to access the historic windows. (This project should be coordinated with the recommendations in Section 6.4 Doors and Windows) Rehabilitation of the walls and windows could be treated as a "dry run" for similar work throughout the museum.

As part of the Carlson Gallery upgrades, the collections storage enclosure should be removed. This should be coordinated with replacement of the current HVAC unit with a VRV system that does not require a hard-ducted connection (see Section 5.3).

The prep space off the north east corner would be a useful adjunct to educational and arts programs. Unfortunately, water service to the sink in this room was disconnected during the Urban Greening Project for unknown reasons and attempts to restore it have not yet succeeded.

The Carlson identification should be maintained in any scenario.

2.4 Exhibit Prep and Support

As the Temporary Galleries frequently host traveling exhibits, loading and storage for crates (which must be kept within the galleries' environmental control zone) are a pressing concern. OMHA has no loading dock and shipments are accepted at the main entry; larger shipping crates cannot fit through the gallery door on the Main Hall and must be brought on an exterior route via the veranda. While a moderate number of crates can be accommodated in the prep room, in many cases OMHA has had to block off a portion of the galleries for crate storage.

Exhibit prep and prep storage is divided between the two gallery wings and a fabrication shop in the basement. Prep tools such as ladders, crate dolly, and paint are stored on the first floor; plexiglass, foam core, and work tables are located in the basement. There is no dedicated space for exhibit prep; at present, OMHA uses empty galleries between exhibitions or does work in public spaces, which is a safety concern.

Storage for pedestals and plexiglass cases is scattered across the basement and first floor,

as well as the offsite Jail Building. Most of the pedestals are located in the Jail, which has been an acceptable solution. Large plexi cases are stored in the first floor exhibit prep space because they are too fragile to be moved up and down stairs. Small cases are stored in the basement next to the exhibit shop area.

Goals: Crate storage and first floor exhibit prep areas should be consolidated in a space adjacent to the Temporary Galleries. When there is elevator access to the basement, storage and prep of large objects can be consolidated and moved there. This will require upgrading the basement HVAC system.

2.5 Education Spaces

School groups visiting the museum get a general orientation in the Council Chambers and are then divided into groups to visit the galleries, do an art project in the main corridor, or take a tour of the garden. During the visit, the Council Chambers is used to store backpacks and lunches. Education supplies are kept in the large multipurpose storage room, the main corridor, and some gallery spaces.

Many educational programs are staged in the Main Hall, but this has significant drawbacks. Tables and chairs must be frequently put up and taken down, and the potential to mount exhibits in the Hall is limited. Further, the acoustics are inappropriate and amplify noisy school group activities.

Goals: Educational activities should be accommodated in a dedicated area, freeing the Main Hall as a representational space and potential exhibit venue.

For long term planning, supplies and storage should be sorted and consolidated. Based on user group input, dedicated storage space could be consolidated into 100 square feet; the small cabinets within the galleries and art area should be retained for operational reasons.

2.6 Administration/Offices

The majority of administrative space is on the second floor, which accommodates offices for the Director and Collections Curator, a large room that serves as meeting space, work area and reference library, and a long 10'-wide hall with a desk for an administrative assistant, a station for the Museum Associates, and two floating stations for volunteers. There is a copy room and a very small toilet room accessed through the Collections Storage area.

The Exhibitions Curator and Education Director each have an office on the ground floor due to their frequent interaction with volunteers and exhibit preparers. Both these offices have a floating work station.

Goals: While the current amount of office space is sufficient for projected needs, it could be much more effectively arranged. The private offices on the second floor are each large enough to be divided in two if desired. The finishes and lighting should be improved and the toilet room must be accessible without passing through the Collections area.

Per OMHA, much of the material stored in the open office and conference room should be discarded or archived digitally or off-site. This decluttering would free up a significant amount of the second floor for better-organized storage and expanded work space. The separate copy room and office supply area should be consolidated.

Access to the exterior stair must be reconfigured so it does not pass through the Collections area or any other intervening room.

2.7 Collections Storage

Collections management is OMHA's most pressing operational priority. The museum does not have a complete inventory of its collections or space for proper intake of new items. A large portion of the collections are kept in unprocessed boxes that are difficult to access due to clutter. Storage space is extremely limited: the main collection room on the second floor provides only 1,300 square feet. Adding in the vault spaces, multipurpose storage room, and incidental storage areas, total on-site storage is estimated at 2,000 square feet. Some collection materials are stored nearby in the South Lemon Street jail building.

OMHA is currently working with a consultant, David Harvey, on planning how collections will be managed when a large portion of them are located off-site

Goals: Based on the user group meeting and guidance from the Sustaining Cultural Heritage Collection report, the current collection, when properly housed, will occupy approximately five times the current number of boxes, or roughly 10,000 square feet. An estimated additional 7,000 square feet may be needed within 10 years. These figures indicate that OMHA should plan for at least an eight-fold increase in storage area.

This space cannot reasonably be provided in the existing building and the museum is exploring offsite storage options. In the very near term, OMHA should secure approximately 3,000 square feet of interim offsite storage, with the goal of clearing out room for the staff to process and properly house the current collection while permanent off-site storage is investigated. This permanent space should be no less than 16,000 square feet and must provide proper humidity and temperature control, security, and shelving. It should also be within reasonable proximity to the museum for staff operations. Another immediate next step would be to get a collection needs assessment to help museum staff determine how to operate and manage the collection with a large portion of it being off-site.

As part of long term planning, approximately 170 square feet should be allocated for an isolation room, and approximately 300 square feet for a holding/processing room.

2.8 Non-Collections Storage

Museum Associates

In addition to event supplies in the kitchen, the Museum Associates keep large items such as pop-up tents and sandbags in the storage room by the staff stairs. They also have several large filing cabinets on the second floor containing their financial records.

Goals: The Museum Associates should review old files and discard or archive as much as possible. A dedicated space for event items should be provided either in the basement or the Jail Building.

Tables and Chairs

The museum has no dedicated furniture storage and furniture is scattered throughout the building, often in very visible public spaces. Furniture in hallways blocks egress paths.

Goals: Any furniture impeding required egress must be removed. Moving forward, furniture should have a dedicated storage space and none of it should be kept in public areas.

OMHA staff typically sets up for events, so furniture needs to be readily accessible and easily handled. The concept plan in Section 3 allocates an area within the building for furniture storage. If additional storage is needed, the nearby Jail Building is a potential location. Alternatively, part of the basement may be available for storage when the elevator is installed.

General Museum

OMHA's public relations materials and general museum items are stored in a cabinet in the staff entrance hallway. While the storage area provided is sufficient, the cabinet is impeding a required egress path.

Goals: This cabinet must be moved or modified to restore the egress path. An area for this material should be provided immediately adjacent to the welcome desk.

Jail Building

The Jail Building has no environmental control and is currently used only to store exhibit pedestals and collection items with minimal temperature and humidity requirements.

Goals: This building offers a practical solution for storing overflow furniture and larger Museum Associates items (tents, sandbags, etc.). Operational concerns should be explored with museum staff.

2.9 Stairs and Elevators

The main level of the museum building, which includes all public spaces, is essentially at grade and presents only minor accessibility issues. The original courtyard entrance and verandas have two shallow steps up, but these outdoor areas are not accessed from the museum's interior. The occupied basement is served by two interior stairs, which also connect at the half-level with egresses to exterior accessways; neither of these stairs has any fire separation from the ground level or basement.

The second floor is served by one interior stair, reached on the ground floor via a back-of-house corridor. This stair is separated from the floors it serves by doors/enclosures, but fire-rating of the existing construction has not been verified. A second means of egress is provided by an exterior escape stair on the east side of the building.

The building's vertical circulation does not meet current egress codes, especially as regards protection of stairs in fire-rated enclosures. Some non-compliant conditions may be allowed under California's Historic Building Code, especially in public areas. Careful consideration must be given to optimizing life safety measures, whatever configuration is allowed (see Section 4.5).

Goals: An elevator should be added to the building to make all levels accessible and facilitate movement of collections items and display elements.

2.10 Loading

The building does not have a loading dock or dedicated entry point for collections material or travelling exhibits.

Goals: A dedicated, secure entry point should be investigated. The most plausible location is discussed in Section 3.16, although reworking it as a loading dock is unlikely to be achievable in the near-term. For accreditation purposes, OMHA should institute a written protocol for handling and protecting all exhibit and collections material entering and leaving the building.

2.11 Landscape

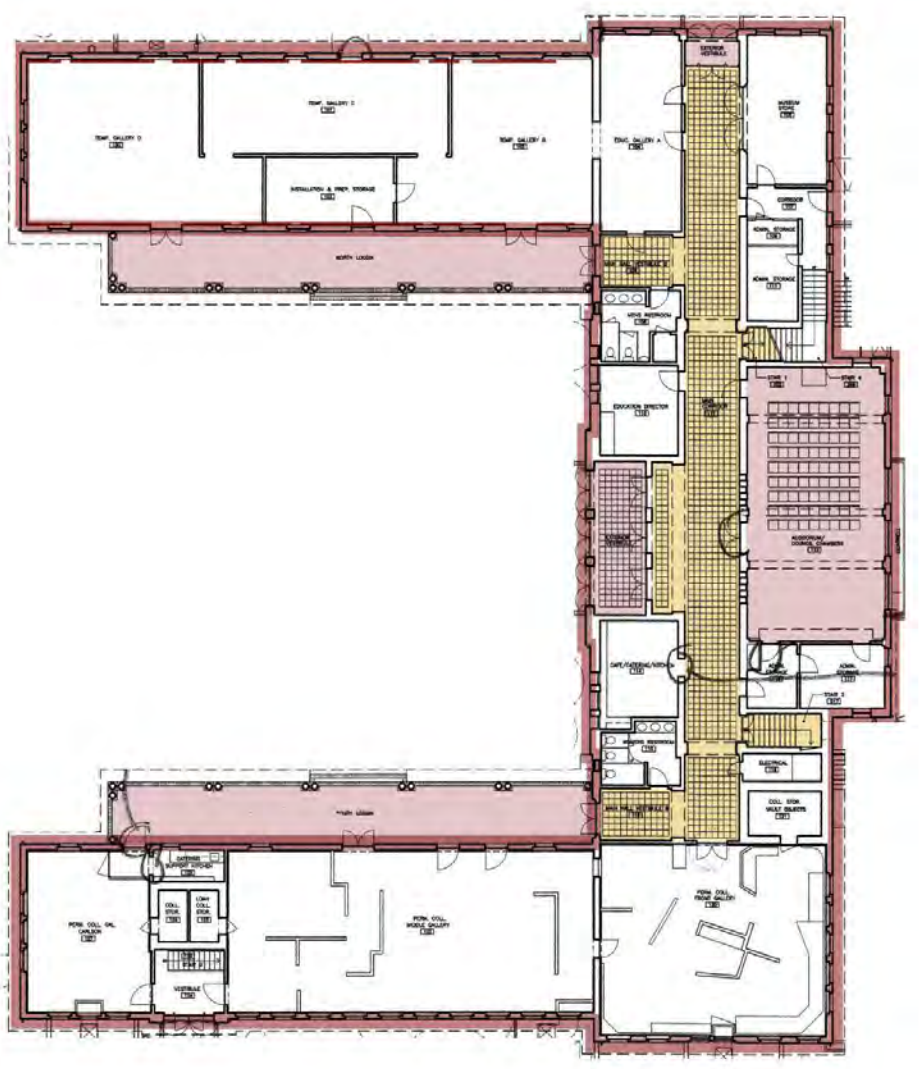
OMHA has recently completed a major relandscaping of its exterior areas, with emphasis on water conservation. While the museum has been approached about using the courtyard for private events, this has not been permitted since tents cannot be staked without risking damage to the new irrigation system. The City Rose Garden and the Nugent's Park Horseshoe Pitch are located on the same block, to the south and southeast respectively.

Goals: Increase connection between OMHA programming and landscape, possibly using courtyard and/or verandas for various programs. The dead end of Emporia Street to south may be considered for future site use, although that is beyond the scope of this report.

Shenzhen Port Medallion
from OMHA collection

Part 3

Space Optimization Recommendations



Building historic fabric priority

primary: preserve with minimum alteration

contributing: compatible adjustments for program needs only

3.1 Overview

The following proposals for space optimization are geared toward maximum positive impact without substantially changing the museum's physical organization (which already works well given the limits of the City Hall building's layout). Almost all program uses are left in their current locations, and improvements take the form of strategic upgrades and surgical interventions.

The proposed work can be understood as a series of discrete, independent projects as presented here, but with two caveats. First, the most effective sequencing of work should be carefully considered from both procedural and funding perspectives (see Section 9 for further discussion of implementation). Second, overall building systems such as electrical and fire safety are more suited to being addressed all at once, rather than space-by-space (see Section 5 for more on building systems).

All the proposals take into account the value of the old City Hall's historical fabric and are calibrated to avoid negative impacts on it. Fortuitously, the primary historical spaces are located in the central section of the building, while the gallery wing interiors have been extensively altered over the past decades and can thus be tailored more easily to OMHA's program needs. The diagram at left shows the location of primary and contributing historical fabric on the first floor. No historically sensitive interior spaces remain on the second or basement floors. See section 4.9 and Appendix D for more detailed information on preservation requirements.

Note: Section numbers following are keyed to locations on concept plans.

3.2 Welcome Desk

- Open wall for partially-inset Welcome Desk – minor impact on historic features; compatible result
- Desk and greeter should be clearly visible upon entry; maximize sightlines
- Durable materials, compatible with Main Hall finishes and historical features
- Incorporate ADA-height counter and raised area to shield computer screen
- Area behind desk with full-height cabinetry for Museum info and educational material

3.3 Museum Store

- New sales desk facing store and Museum entry
- Incorporate ADA-height counter and raised area to shield computer screen
- Potentially connected to entry desk
- New secure storage cabinetry in lieu of stock room

3.4 Family/Accessible Restroom

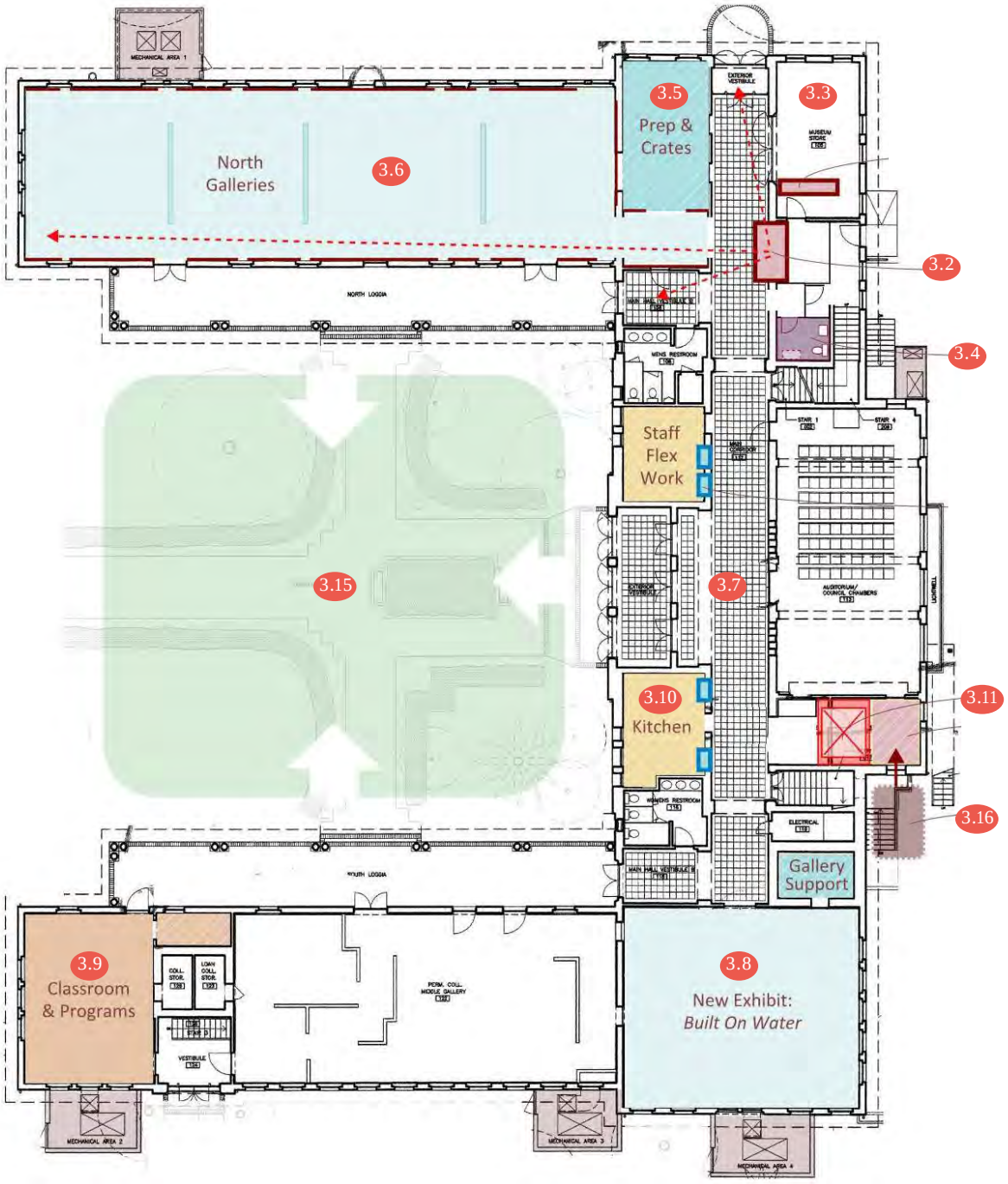
- Meet all applicable accessibility requirements
- Access from vestibule, not directly off Main Hall
- Provide changing table
- Note proximity of existing Men's Room plumbing and vent lines
- Will required ducted exhaust

3.5 Exhibit Loading/Prep Room

- Remake first room of north galleries as a prep room
- Immediate access from entry; coordinate pallet truck path clearance with new Welcome Desk footprint
- New double doors from gallery vestibule, retain single door at hall for secondary entry when room is full of crates
- In same climate control zone as north galleries
- Work counters and shelves at north end. Otherwise, movable tables to allow for storage of various amounts of crates
- Overflow work space in existing office off Main Hall

3.6 North Galleries

- Open up 6' entry from Main Hall and create vestibule for exhibit title and info graphics– minor impact on historic features; compatible result
- Glass doors between vestibule and galleries; direct sightline from welcome desk though galleries
- Remove all interior partitions west of concrete wall; keep perimeter wall partition buildout where practicable
- Build new full-height display walls perpendicular to axis of gallery; incorporate electrical outlets
- Fabricate 2-3 mobile exhibit walls
- Develop strategy for perimeter walls at windows and doors



First floor concept plan

- Remove carpet tile; concrete or wood floor; acoustics must be considered
- Remove acoustical tile, skimcoat ceiling, and paint
- New lighting: Overall grid of linear LEDs + track system; for budget savings, consider European approach of overall lighting with limited accents

3.7 Main Hall

- Retain historic features
- Remove clutter; keep historical seating
- Consider addressing acoustical issues with non-permanent, architecturally integrated sound-absorbent panels
- Incorporate exhibit displays
- Back-accessed cabinets along west side – requires demo through concrete wall and new lintels

3.8 Southeast Gallery

- Remove floor and wall carpeting
- Consider keeping gridded ceiling system
- Lay out new exhibits with greater visibility
- Develop strategy for perimeter walls at windows and doors
- See Appendix C.2 for "Built On Water" concept budget

3.9 Carlson Room

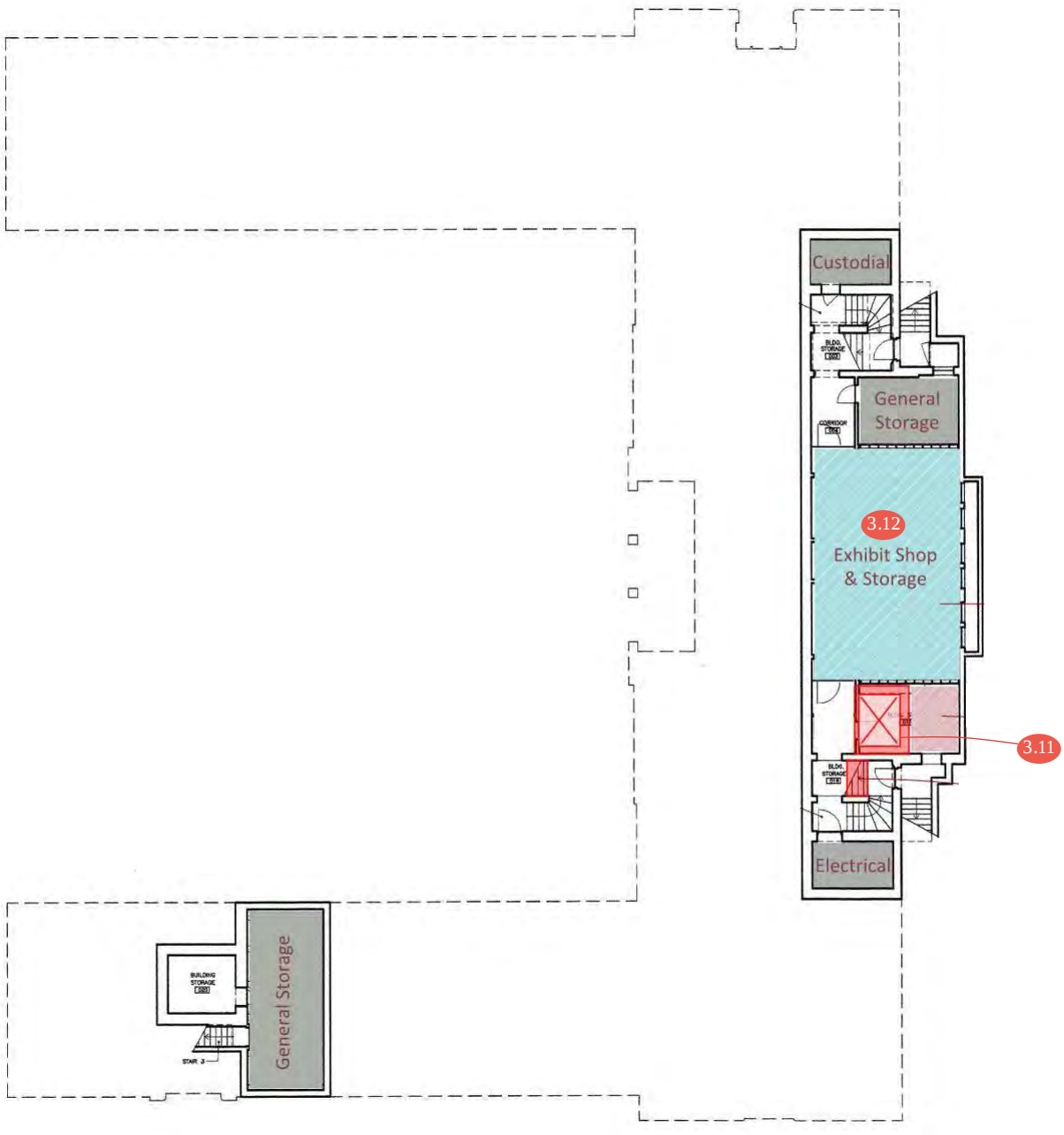
- Remove enclosure along south wall
- Reopen existing windows and restore damaged historical embrasures
- Easily maintainable floor and wall finishes
- Upgrade support room; possible pneumatic toilet
- Controlled access to the veranda for educational programs

3.10 Kitchen

- Redesign for usability
- Add storage and counter space
- Change out room finishes and lighting as budget permits

3.11 Elevator

- Approximate 5'x8' cab size
- Double-sided – opens to furniture storage at basement and ground floor, collections holding at second floor
- For Museum Offices and basement access; not needed for general visitors
- Reorient adjacent duct riser, or eliminate altogether with VRV system
- Pop-up at roof level for overrun likely (Acceptable impact on historical features)
- Machine room and emergency power room in basement
- See also 3.16 Loading Dock



Basement concept plan

3.12 Basement

- Clear out central space (no bearing walls); remove disused service lines; work around any service lines to remain
- Lay out as a workshop
- Assess need for a spray booth; see Section 5.3 for required exhaust
- Consider educational access
- Dampproof exterior walls
- Assumed no collection material will be brought to basement level, as environmental control is not guaranteed this area

3.13 Offices

- Limited reconfiguration of second floor; note that many walls are 6" concrete due to original use as jail
- Open up existing library area to central hall by removing wall in original location of interior windows (not concrete); creates a sizeable work/collaboration area
- Divide SW room into Director's Office and Conference Room
- Remove walls at south end of central hall for elevator access
- Potential to use in-situ plumbing at south wall for a staff kitchenette
- Open up an unobstructed egress path to the exterior stair door
- Create a copy room along the north wall with access to the existing washroom
- Replace existing flooring with carpet tile
- Remove ACT, skimcoat ceilings, and paint
- Install energy-efficient lighting fixtures

3.14 Collections

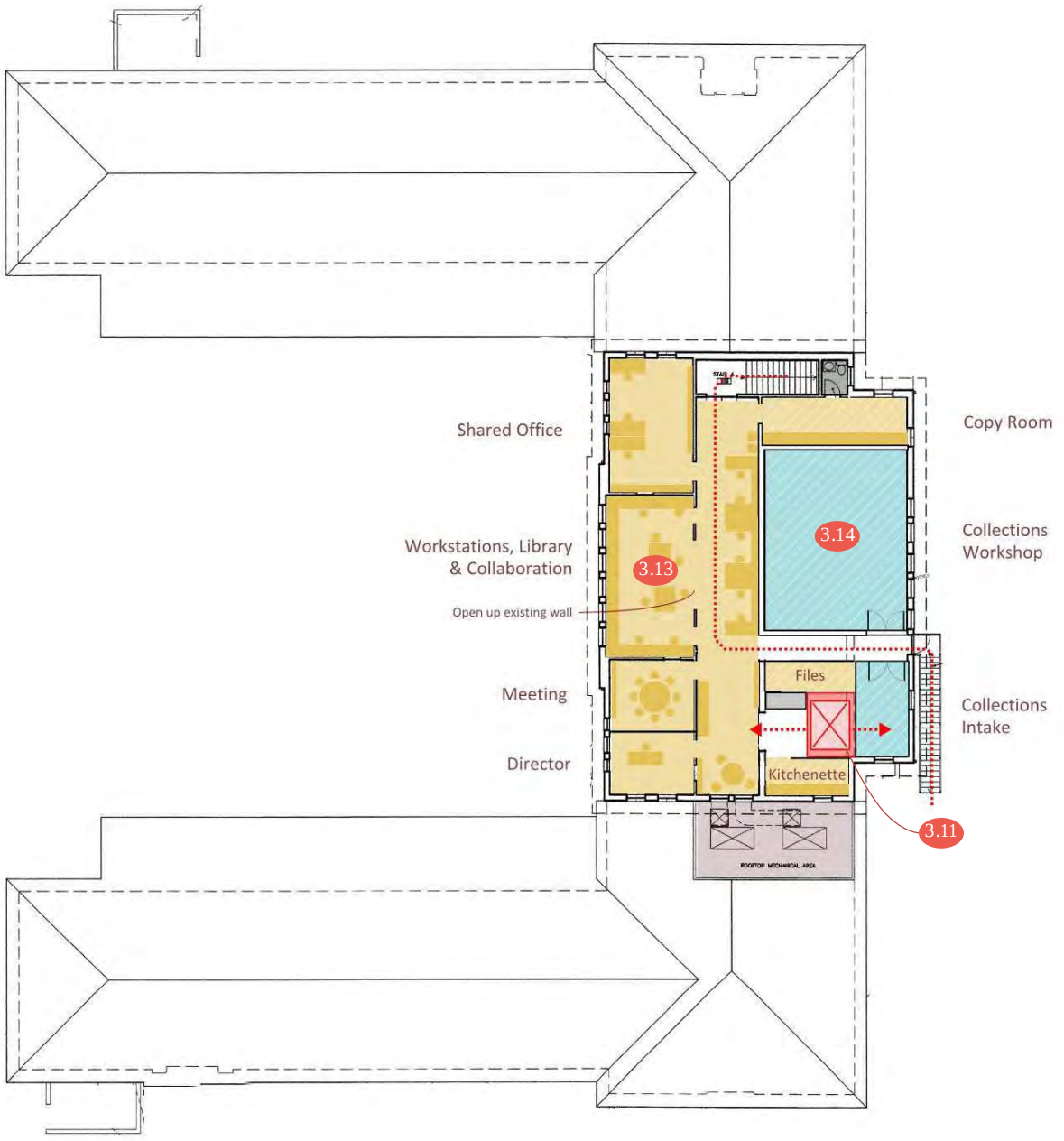
- Offsite storage allows collections space needs to be optimized for active and especially valuable items
- Receiving to secure room from rear door of elevator
- Assumed existing shelving will be reused

3.15 Connection to Courtyard

- Sightline from desk – potential to use door next to men's room
- Signature large scale sculpture?
- Use verandas for educational programming

3.16 Loading Dock

- Potential location along east side over south basement exit stair
- Accessible from parking lot
- Hold-open for double-sided elevator to bring shipments through – coordinate with accessibility requirements
- Elevator connection to collections receiving and basement workshop



Second floor concept plan

Derby Hat
from OMHA collection

Part 4

Code and Accessibility

4.1 Overview / Historical Building Code

See also Appendix B.6: Code Review Summary

Applicable building codes for OMHA as of March 2019 are:

- 2016 California Building Code (CBC), California Code of Regulations, Title 24
  - Part 2: 2016 California Building Code, vols. 1 and 2
  - Part 3: 2016 California Electrical Code (CElecC)
  - Part 4: 2016 California Mechanical Code (CMechC)
  - Part 5: 2016 California Plumbing Code (CPlumC)
  - Part 6: 2016 California Energy Code (CEngyC)
  - Part 8: 2016 California Historical Building Code (CHistC)
  - Part 9: 2016 California Fire Code (CFireC)
  - Part 10: 2016 California Existing Building Code (CExstC)
  - Part 11: 2016 California Green Building Standards Code (CalGreen)
- City of Ontario ordinances governing construction and site use

All code citations in this section are for the 2016 CBC and its component parts. Updated codes will almost certainly be adopted over the 20-year timeframe of this master plan. Currently applicable codes should be verified as work proceeds.

As a "Qualified Historical Building or Property" as defined by CA Health and Safety Code Section 18955, the former City Hall is subject to code as follows:

> All building alterations are to comply with the provisions of both the CHistC and the CBC except in cases where CBC compliance is not fully compatible with preservation of contributing historical features. In such cases, CHistC mandates that the approving agency accept solutions

that 1) provide a reasonable equivalent to CBC intent and 2) are compatible with CHistC (per CHistC 8-101.2).

CExstC may also be referenced for guidance where it provides more detailed direction than CHistC; however, specific requirements of the CExstC shall not be interpreted as overruling the CHistC's mandate to preserve historical features.

Note also CFireC Chapter 11: Construction Requirements for Existing Buildings, which directly addresses fire safety concerns.

Whenever the Historical Building Code is invoked to propose alternate solutions, there should be a clear narrative of the conflict with CBC requirements and the proposed equivalent measures.

4.2 Code-defined Occupancy

The current building uses as defined by CBC are as follows:

Basement

Group B - Exhibit Workshop

Group S-1 - Storage

Incidental - MEP and support rooms

First Floor

Group A-3 - Galleries & Council Chambers

Group M - Museum Store (<50 occupants)

Group B – Offices and support spaces

Group S-1 – Storage

Second Floor

Group B – Offices

Group S-1 – Collections Storage

Work proposed in this report is not anticipated to significantly change these categories.

4.3 Fire Life Safety: Construction

Occupancy Separations

The following occupancy separations (fire resistance rating in hours) are required per CBC Table 508.4:

Occupancy	*Separation*	
	Sprinklered	*Non-sprinklered*
A-3 to B*, M*, S-1	1	2
B to S-1	None	None

*The Group B and M occupancies on the first floor qualify as accessory occupancies to the primary A-3 occupancy and do not require a separation per CBC 508.2.3 since they do not take up more than 10% of the first floor building area.

A preliminary assessment indicates the following measures are required to achieve these separations:

- A continuous rated ceiling should be installed under the wood deck separating the basement and first floor.
- Storage adjacent to a gallery or public area that is not considered an accessory occupancy (if any) should be separated by rated partitions and/or ceilings.

Specific separation ratings will depend on whether a sprinkler system is installed; see Section 4.4 below. Note that CHistC does not necessarily obviate the requirement for occupancy separations but does permit fire rating reductions if an automatic sprinkler system is provided throughout the entire building.

While a rated separation is not required between the collections and office areas on the second floor, a 1 or 2 hour separation could be reasonably achieved by taking advantage of the existing concrete walls and floor. This would provide additional protection for collections material and is recommended for consideration.

Construction Type

Observed building conditions appear to be closest to the requirements of Construction Type IIIB as given in CBC Table 601. Elements of a Type IIIB building must have a fire resistance rating not less than the following:

Building Element	*Fire Rating Requirement*
Structural Frame	0
Bearing Walls	
Exterior	2
Interior	0
Nonbearing walls & partitions	
Exterior	0
Interior	0
Floor Construction	0
Roof Construction	0
Exit Stairs & Exit Passageways	1
Service and Elevator Shafts	1

The existing exterior walls, interior bearing walls, and the slab separating first and second floors are all cast-in-place reinforced concrete construction and, as such, are considered non-combustible. The existing exterior walls are expected to satisfy the provide 2-hour fire resistance requirement.

All interior partitions (nonbearing), roofs, and the ground floor deck directly over the basement are wood-framed. None of these elements are required to be fire resistant in Type IIIB construction. However, note required ratings between occupancies discussed above in this section.

Destructive testing would be required to determine if the enclosures of existing exit stairs and passageways provide continuous 1-hour fire resistance. However, per CHistC 8-402.2, upgrading a qualified historical building to 1-hour fire resistive construction and 1-hour fire resistive corridors shall not be required regardless of construction or occupancy when one of the following is provided:

a) An automatic sprinkler system throughout.

b) An approved life-safety evaluation.

c) Other alternative measures approved by the enforcing agency.

The elevator shaft enclosure is required to be 1 hour rated since it is new construction.

4.4 Fire Life Safety: Systems

Fire Alarm System

Per CHistC 8-409, every qualified historical building shall have a fire alarm system as required for the use or occupancy by the CBC, or an approved alternative. (Note also CFireC 1103.1.1 for fire protection plans in historical buildings) Alarm devices are extant in most areas of the museum building. The system functionality is not known and should be tested. Additional detection and alarm devices will likely be required. A complete assessment is beyond the scope of this report.

The fire alarm system is required for a Group A use by the CBC and for existing buildings by CFireC 1103.7. This system includes the following components:

- A manual alarm system (i.e. pull boxes at all required exits) that activates the occupant notification system.
- An emergency voice/alarm communications system (required due to Group A occupant load being greater than 1,000).
- Notification appliances consisting of speakers and strobes throughout the building.

The fire alarm system and egress routes should be tested regularly as required by code.

Sprinkler System

The museum building does not currently have a sprinkler system and installation of one is not required per CFireC Table 1103.1 / Section 1103.5. However, retrofitting the entire building with a system conforming to NFPA13R should be carefully considered, especially as it relates to protection of collections material.

(A system serving limited areas such as the offices and basement is also a possibility. Note, however, that most code-allowed reductions of fire ratings etc. require that the *entire* building be sprinklered.)

System installation would be relatively straightforward in areas with space above their architectural ceilings, such as the galleries. However, the most historically sensitive areas have little or no ceiling cavities, making sprinkler system components more difficult to integrate.

If a sprinkler system is installed, water service is readily available as evidenced by the three existing hydrants within 100-150' of the building footprint.

4.5 Egress

Any required egress doors that are not currently operational and any areas without sufficient egress signage should be remedied at the earliest opportunity.

First Floor as exists: All spaces either have required egress capacity or can be provided with it using existing doors.

Compliance measures:

- Provide appropriate door hardware for egress and security to eliminate the need to chain the doors together.
- Locked exterior doors that are not available for emergency egress must be clearly labeled "Not An Exit." These include the single door on north side of the temporary gallery and the three double doors to the courtyard from the main hallway.
- In the permanent galleries, exhibit partitions block views of exit signs from some areas. Adjust the location of the signs and/or add additional signs.

Second Floor as exists: Single interior egress, supplemented by exterior stair

Compliance measures:

- Upstairs path of travel through the collections storage is not unlocked during business hours and the door does not have proper panic hardware.
- Short term, provide proper panic hardware for egress and link it to the alarm system for collections security.
- Long term, provide a hallway so the path of egress is not through the collections storage.

Basement as exists: Two egresses, with connection to exterior areaways. Multiple instances of egress from occupied areas through intervening spaces. No rated separation from first floor, and none required per CFireC 1103.4.8.1.

Compliance measures:

- Reconfigure basement as one large space with exits at both ends.

Egress widths: Per CHistC 8-502.2, existing door opening and corridor widths of less than the dimensions required by the CBC shall be permitted where there is sufficient width and height for the occupants to pass through the opening or traverse the exit.

Existing Stairs: Per CHistC 8-502.3, existing stairs having risers and treads or width nonconforming to the CBC shall be permitted if determined by the enforcing agency to not constitute a distinct hazard. Handrails with nonconforming grip size or extensions are allowed if determined by the enforcing agency to not constitute a distinct hazard.

Exit signs: Locations must be confirmed based on egress plan and signage package.

4.6 Restroom Fixture Count

A preliminary evaluation was performed to assess restroom capacity. As the museum is an existing building and no changes in occupancy or type that would result in an increased occupant load are planned, conformance with current minimum facilities requirements may not be considered mandatory if the extent of work falls below certain thresholds (ref CPlumC Table 422.1 and Section 422.1.2; CHistC does not directly address fixture count requirements). Regardless, the museum should provide functionally sufficient facilities to the extent feasible. Museum staff has reported that there are backups at the restrooms, particularly the women's, when school groups are visiting.

A new building equivalent to OMHA would have the following plumbing occupant load and requirements:

Occupancy	*OLF**	*Area*	*Occupant Load*	
			male	*female*
Assembly	30 sf/oc	7,420	124	124
Business	200 sf/oc	3,805	10	10
Storage	5,000 sf/oc	1,890	1	1

* "Occupant Load Factor" per 2016 CPlumC Table A:
Exhibit rooms and similar: 30sf / occupant
Offices: 200sf / occupant
Storage: 5,000sf / occupant

Per CPlumC Table 422.1, the minimum required fixture count would be:

Occupancy	*WCs*		*Urinals*	*Lavatories*	
	m	*f*		*m*	*f*
Assembly	2	4	2	1	2
Business	1*		*n/a*	1	
Storage	*accessory to Business/Office use*				

*Per CPlumC 422.2 Exception (3)

This totals (8) fixtures for public/general use – (4) male and (4) female – and (1) fixture for office use. At present, the museum has (6) public fixtures -- (3) male and (3) female -- and (1) fixture for office use. The master plan includes a single-occupant accessible/family toilet room off the Main Hall, adding an additional, fully accessible fixture to make (7). If code officials determine that there must be (8) public fixtures, the most plausible option would be adding a public restroom in the basement.

Per CPlumC Table 422.1 a drinking fountain may be required on the ground floor, although the Kitchen's sink might be accepted as an alternative. A service sink is also required; the existing floor basin in the custodial closet (ground floor Men's Room) is likely to satisfy this requirement.

4.7 Accessibility

As a public cultural resource, OMHA should strive to make all new building work barrier-free. This effort is anticipated to be largely compatible with preservation of historic features. There appear to be few issues in the public areas; accessible routes must be confirmed in all new work, and all gallery installations should provide required clearances.

The museum's two pressing accessibility issues are restroom accommodation and accessible paths of travel to the basement and second floor. The existing restrooms are not fully accessible, and cannot be made so without extensive rearrangement and reduction of fixture count. In lieu of changes to the existing restrooms, CExstC 410.8.10 allows provision of one or more fully accessible single-occupant toilet rooms. These must be available to both public and staff, and located in an area no less convenient than the existing restrooms. See Section 3.4 for proposed measures to meet these parameters.

The museum building currently provides no accessible route to the basement or second floor. While a "limited-use, limited access" lift could be considered as a minimum accommodation, a full-scale elevator would have significant operational benefits for the museum and is strongly recommended. The proposed location for this elevator is shown in Section 3.11.

Other accessibility measures should be considered in the context of CHistC Chapter 8-6 – Accessibility and CExstC Section 410 – Accessibility for Existing Buildings. Note especially Section 410.6 and situational evaluation of "technically feasible" and "technically infeasible" measures.

4.8 Hazardous Materials

The extent of hazardous materials in the existing building has not been determined and a complete survey and report are needed. If hazardous materials are found, abatement must be finished before any work can proceed in the affected area.

Based on limited information from a previous report, the flooring mastic on the second floor contains asbestos. Flooring mastic on the interior stair to the second floor has been previously abated. OMHA believes the basement ductwork linings may contain asbestos.

The partial basement under the south wing has a strong moldy smell and staff have avoided going into this space. This almost certainly has a biological source, and options for cleaning and ongoing dehumidification should be investigated.

Paint sampling and lead testing is recommended.

4.9 Preservation Standards

The Old City Hall was one of the first buildings to be designated a Historic Landmark by the City of Ontario (in September 1993). Exterior work other than basic maintenance is subject to the City's Historic Preservation Ordinance (HPO), administered by the Advance Planning division of the Planning Department.

Planning staff, along with the Historic Preservation Sub-Committee and Historic Preservation

Commission, review all work affecting a designated property or district. Approval typically takes the form of a Certificate of Appropriateness. A Waiver to the Certificate of Appropriateness may be issued by the Planning Director if the proposed work is considered minor and does not adversely affect character-defining features.

In the case of the Old City Hall, all exteriors are subject to the HPO. In addition, any significant alterations to the former Council Chambers require explicit permission from the City Council (City Resolution 9587). The balance of the interiors are not subject to preservation requirements, but the intent of this master Plan is to retain original character-defining features wherever practicable, especially in public areas. Further, new work should be compatible with, but clearly distinguished from, historic fabric.

(See Appendix D for a matrix of planning approvals anticipated to be required for maintenance, rehabilitation, and new work at OMHA, by type.)

Given the building's status as a City Landmark, its importance to Ontario's history, and the large percentage of its historical fabric that remains intact, the Secretary of the Interior's Standards for Treatment of Historic Properties (SOI Standards) should be incorporated into all work, both exterior and interior. These standards lay out widely accepted best-practice guidelines for preservation and rehabilitation of historical properties in the United States. (Refer to ***nps.gov*** for latest version of SOI Standards at time of work.) In addition, the index of National Park Service Preservation Briefs should be consulted for publications offering specifically relevant guidance. (*nps.gov/tps/how-to-preserve/briefs.htm*)

The SOI Standards are generally not prescriptive; they will require thoughtful and appropriate interpretation in their application to specific situations. Note also that the SOI Standards do *not* mandate reconstruction of lost historic fabric. At OMHA, this means that redesign of the gallery and support spaces — already much altered from their historical condition — does not conflict with the Standards' intent.

4.10 Immediate Priorities

The following items should be addressed at once:

- Confirm egress door operation and signage are as required by code
- Test/verify fire alarm; remediate any non-compliant conditions
- Review accessibility, especially in, but not limited to, public areas. Remediate any issues to maximum feasible extent

Emergency Telephone Box
from OMHA collection

Part 5

Building Systems

5.1 Overview

Building systems at OMHA can be divided into four categories:

- Structure
- Services: Mechanical, Electrical, and Plumbing ("MEP")
- IT: Teledata and Security
- Life Safety: Fire Detection/Alarm and Sprinklers (discussed separately in Section 4.4)

Integrity of structure, services, and life safety systems is essential. At OMHA, the responsibility of collections stewardship puts added emphasis on the mechanical systems that regulate temperature and humidity (generally referred to as "HVAC," for "Heating, Ventilation, and Air Conditioning"). The museum currently functions with virtually no IT systems in place; adding them would significantly benefit institutional operations and programming.

Concerns about existing building systems performance have been raised in previous reports by ARG Conservation Services and others. Structural Focus was engaged to assess the anticipated seismic performance of the existing gravity load-bearing system and lateral force-resisting system. (See report by Structural Focus in Appendix B.) Hariton Engineering was engaged to assess the conditions of the current MEP systems (See report by Hariton Engineering in Appendix B.)

5.2 Structural

Gravity & Live Load

The 1937 City Hall is built of cast-in-place concrete and roofed with wood trusses spanning conventional distances. This structural system remains acceptable for most non-seismic loading conditions. However, the 2013 Sustaining Cultural Heritage Collections report cited a specific concern about the structural capacity of second floor at the Collections Storage area. Actual strengths of the second floor concrete deck were determined by materials testing, and live loads (including Collections Storage contents) were assessed as approximately 70 lb/sf. Calculations based on this

information indicate that the floor deck at the Collections Storage area has no excess loading capacity. At the time of review, no excessive deflection or cracking was observed at the floor deck or beams; variations in the existing floor level are likely irregularities of the original construction. While the current situation has not been deemed to present an immediate risk, if loading of this floor is increased the deck must be strengthened to the code-mandated live load capacity of 125 lb/sf. Conversely, if OMHA relocates much of the stored material offsite, loading will be reduced and no future action may be required. In any scenario, the museum should periodically assess the condition of the deck and avoid concentrated loads (such as equipment or heavy artifacts) on the second floor. Where such loads cannot be avoided, they should be positioned as close to a bearing wall as possible.

Seismic

As a mostly single-story building of monolithic construction, the old City Hall is not at an elevated risk of seismic damage. However, the roof must be connected to the structural walls more robustly to resist separation in a seismic event. The following measures are necessary:

- Provide out-of-plane anchorage at the top of the interior concrete walls on the second floor. Provide steel anchors, reinforcing dowels, or straps with positive attachment at the tops of these walls and attach to diaphragm as necessary to develop expected seismic forces.
- Supplement existing out-of-plane anchors at the lower roof. At the lower roof and the concrete walls at the two-story central wing (near grid line D and grid line I), provide additional anchors to reduce the load on the existing anchors.
- Strengthen the load transfer hardware at roof diaphragm to concrete shear walls. Provide additional anchor bolts to supplement the existing ledger connection between the lower roof and the concrete walls at the two-story central wing (near grid line D and grid line I).

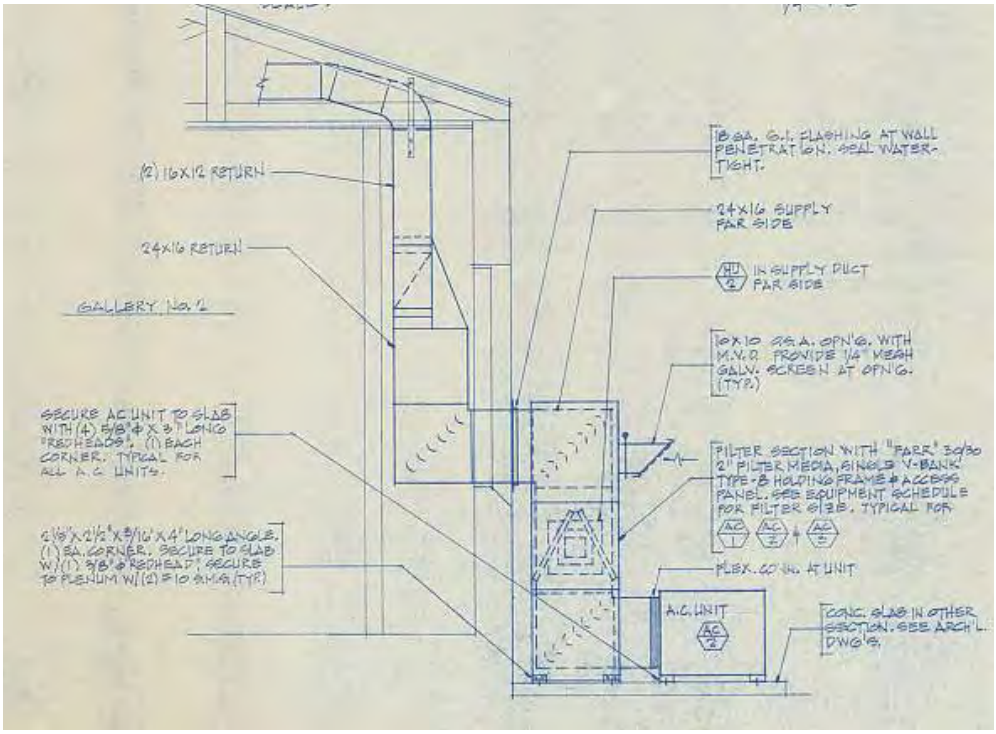
5.3 Mechanical

Collection Environment Standards

As a facility for care and preservation of cultural heritage items, the museum building must meet elevated standards for environmental control. The basic factors here are air temperature and relative humidity (rH), as maintained by the HVAC system. (The National Parks Service Museum Handbook, Chapter 4: Museum Collections Environment provides a comprehensive outline of relevant concerns here.)

The most widely referenced US framework for collections environment standards is Chapter 23 of the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) Handbook. ASHRAE defines two tiers of environmental control for galleries and collections areas: Class A is the strictest; Class B less so, but adequate for the range of exhibits and programs OMHA has engaged in to date. Class B sets targets for temperature and rH with an emphasis on maintaining stability of both within an acceptable range.

In addition to the ASHRAE targets, the American Alliance of Museums (AAM) may require specific environmental control measures for accreditation based on their assessment of OMHA facilities. These may not be significantly more onerous



Section detail of existing hard-ducted condition showing undesirable impact on window and interior space

than Class B parameters – and may even make allowances for the particular challenges of OMHA's historical building – but regardless it will be advantageous to get AAM's input as soon as practicable so it can be incorporated into systems planning.

Note that both north and south gallery wings are to be upgraded to meet the collections environment standards that are ultimately determined.

Maintaining separate climate zones for collections areas and non-collections uses is highly recommended.

Existing Conditions

Current HVAC systems are space by space, with exterior combination heating/cooling units serving individual zones of various sizes throughout the building. (For specific information on units, see pp.11-12 in the 2013 ARG/SC report, Appendix B.4)

Most exterior units are located in stuccoed masonry enclosures around the perimeter of the building that detract from its architectural coherency; units on the east side at both ground and rooftop levels are exposed to view.

In all cases, the exterior units are hard-ducted though altered window openings (see detail above)

and encroach on interior spaces before rising up to distribution level, typically above the ceiling.

There is no HVAC in the Main Hall, which can become uncomfortably hot for staff and visitors. While the Museum Store is served by the same system as the North Galleries, it can also become too warm as it is entirely open to the Main Hall. Window AC units serve the kitchen and office off the Main Hall.

Per the 2013 ARG/SC report (pp.12-13), OMHA's galleries and collections areas maintain Class B temperature levels year-round, but exceed both seasonal averages and max/mins for rH.

Recommendations

Given that OMHA's current HVAC units are operating beyond their lifespan and do not support the environmental requirements of gallery spaces, sequenced replacement of all existing units with more efficient and effective equipment is recommended.

A Variable Refrigerant Volume (VRV) system (also known Variable Refrigerant Flow, or VRF) would effectively address OMHA's HVAC issues. In a VRV system, exterior compressors with variable motor speed produce a calibrated flow of refrigerant that is distributed to interior spaces by small-diameter piping. This arrangement would eliminate the existing hard-ducted connections, allowing altered windows to be returned to their original configuration and getting rid of the clunky interior enclosures for connections to ceiling level distribution.

A pure VRV system is entirely ductless, with refrigerant pumped to each individual air handler. As OMHA already has ducting in place, the potential cost benefits of centralized air handling using existing distribution should be investigated.

In this scenario, the fans that are now provided in the exterior units would need to be replaced by new fans at the interior air handlers.

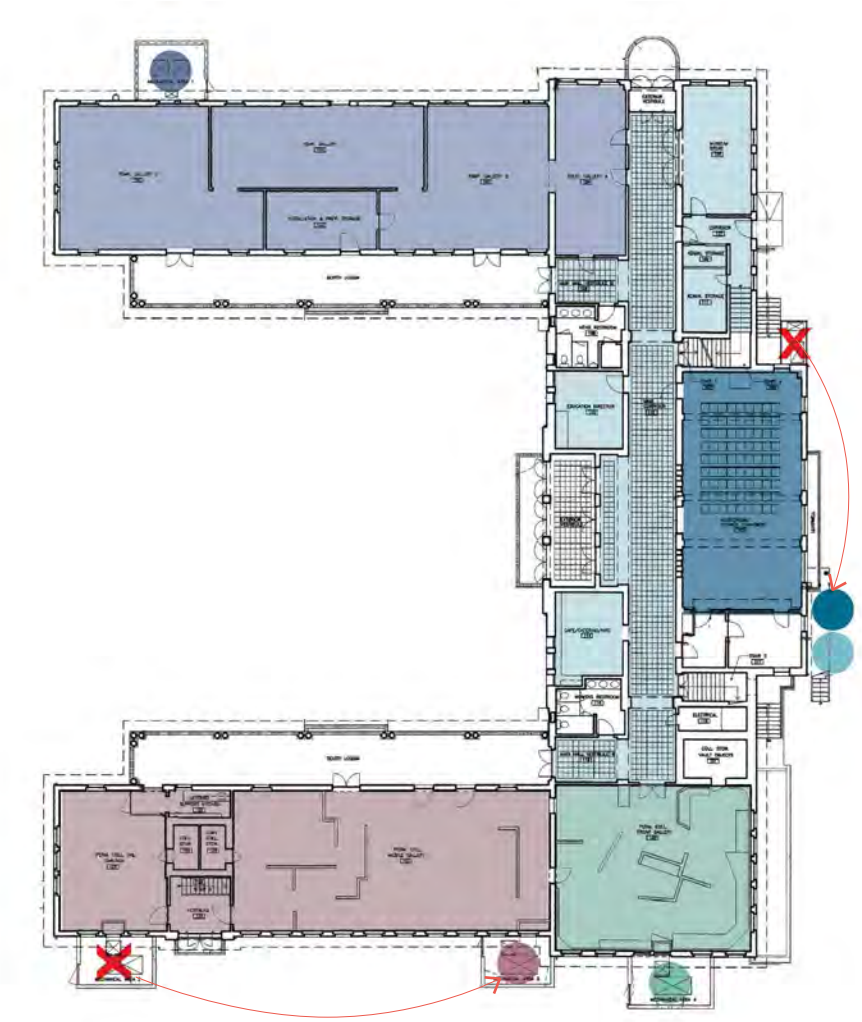
VRV systems have other features well-suited to OMHA's needs. By operating at varying speeds, VRV units work only at the needed rate allowing for substantial energy savings. Heat recovery allows individual indoor units to heat or cool as required, resulting in greater control of interior temperatures.

Most VRV systems have optional humidity control accessories; however, these accessories are typically designed for lower humidity levels than appropriate to gallery spaces. Their suitability to OMHA's needs should be assessed when specifying a system. A partially ducted arrangement could allow for humidification independent of the base VRV system if this proves to be advantageous.

VRV systems can be installed space by space, as the current HVAC arrangement, and are suited to incremental rehabilitation of the museum building. At the same time, they present opportunities for consolidating and minimizing the number of exterior units and their architecturally intrusive enclosures. For instance, the entire south wing could be served by one unit, with zoned loops.

Related recommendations are:

- Generate air balance report for the entire building's current HVAC configuration and adjust existing systems as indicated; update report as new systems are installed
- Follow National Air Filtration Association (NAFA) recommended best practice for recirculated and outside make-up air in collections areas
- Consider adding entry doors at North Galleries to maintain a stable environment



HVAC zoning concept

Circles indicate exterior units; colors match interior areas served.

- Test and verify system first in Built On Water gallery (green)
- Combine other south gallery HVAC and eliminate westernmost equipment enclosure (violet)
- Keep north galleries and prep room on one system (purple)
- Consolidate non-gallery HVAC and relocate unit under exterior stair (light blue)
- Relocate Council Chambers unit under exterior stair (dark blue)
- Single basement zone
- Separate office and collections area zones on second floor

- Replace all window AC units with architecturally integrated AC
- Provide HVAC service for Main Hall
- Add exhaust at basement workshop; if a spray booth is installed, it must have a separate, code-compliant exhaust
- Eliminate vertical duct near proposed elevator shaft

5.4 Electrical

OMHA's electrical system has been pieced together as the museum has incrementally taken over the City Hall building. While no immediate safety concerns have been observed, the electrical system should be assessed and rationalized, with all elements clearly labeled as to their service areas.

Service originates in the basement electrical room and branches to eight sub-panels throughout the building. This basic arrangement is to remain, with the distribution breakers clearly labeled to identify the sub-panels they serve. While the majority of the sub-panels are in acceptable condition, several are not in good repair and do not serve identifiable loads. In all cases, connected loads shall be confirmed and checked for potential overloading; load distributions shall be optimized. Sub-panels in unacceptable condition must be eliminated, with any connected loads transferred to viable existing or replacement subpanels.

All existing and new panels shall be mounted with required setback clearances. (Note especially the sub-panel in Education Storage 109)

Sub-panels serving the north galleries should be remounted in an appropriate location for museum operations when the north galleries are reconfigured.

Existing electrical service to the Kitchen off the Main Hall is not adequate for standard appliance loads and must be upgraded.

Overall load calculations should take the future impacts of upgraded mechanical systems, LED lighting, and the new elevator into account. Even though general load reduction is likely, service redistribution may be required and/or advantageous.

All new electrical outlets must meet code and accessibility requirements for height and spacing frequency. Existing outlets should be made compliant throughout the museum as work proceeds per area. GFI outlets should be provided in locations specified by code; note especially kitchen counters and plumbing fixture areas.

Outlets on gallery walls should be located to minimize their visual impact, preferably near corners or the ends of walls. For permanent installations, outlets should be coordinated with exhibit needs. Gallery floor outlets are likely to be cost-inefficient, as they would entail cutting conduit runs across the existing concrete slabs.

OMHA should evaluate needs for three-phase/ heavy-duty service in prep areas or workshops so appropriate outlets can be provided.

Occupancy sensors for lighting should be provided as required by CElecC in spaces as they are upgraded.

Egress lighting should be upgraded to meet current code for lumen levels and emergency service.

Per CFireC 604.1.4, 604.2.1, and 607.2, the new elevator will require a standby power system with a minimum two-hour load duration. (Note that 2016 CBC states, in contradiction, that the minimum duration is 90 minutes. Code reviewers typically—

although not invariably – apply the more stringent requirement.) This power system will require a dedicated space, likely in the basement.

5.5 Plumbing

Existing plumbing service is limited to the central, two-story zone of the building, with the exception of a convenience sink in the Carlson Gallery. The supply line to this sink was compromised during recent landscaping and has not yet been restored.

In the basement, the two long banks of connections for restrooms that no longer exist should be demolished and all lines cut back to their source. This work may require local demolition and reconstruction of the basement floor slab.

Proposed new/reinstated plumbing fixtures are located near or along existing supply and waste lines. These fixtures include the proposed kitchenette and accessible/family toilet room.

The absence of a basement under the wings makes new waste lines outside the central zone infeasible. One potential option for the wings is a pneumatic toilet. Assess any collections risks from plumbing lines.

5.6 Teledata

Currently, OMHA has telephone service but no dedicated data. Extension of in-ground data utilities to the museum's block is said to be pending, but installation is at least a year in the future, if not longer. For the present, the museum uses a connection to a nearby wi-fi hub for administrative business, but this is unreliable.

The museum hopes to follow current trends toward incorporating wireless access to digital content into exhibits, including the planned "Built On Water" gallery. Most of these measures will require an internet connection, and OMHA should vigorously pursue data service and advocate for utilities to be extended to its site.

5.7 Security

OMHA's gallery layouts restrict staff oversight and incidents of exhibit theft have been reported. The Museum is responding with increased personnel presence in the galleries and is investigating potential security systems.

Options fall into two categories: wireless and hard-wired. Wireless systems are typically less expensive, but have several drawbacks: they rely on uninterrupted wi-fi connections and are usually administered by providers who store data on their own servers (that is, beyond the client's direct control). Given OMHA's needs, a system of cameras and security devices hard-wired to a museum-controlled server is recommended. Basic components of a hard-wired system could be installed regardless of whether the museum has data service; however, remote notification and other offsite communications would be significantly limited.

Number of cameras is a cost point for any system. Sightlines should be considered when designing new exhibit layouts to the extent they are compatible with the display concept.

Vino Sano Grape Brick
from OMHA collection

Part 6

Building Conditions Assessment

The following architectural conditions assessment primarily addresses distress conditions at the building envelope. Existing features have been grouped into the following categories: roofing and drainage, exterior walls and features, wood framing and trim, windows and doors, exterior stairs, exterior lighting, landscape features, and building systems.

Methodology

Sarah Devan, ARG architect and conservator, performed a visual survey of the property on February 11, 2018. The building exterior was surveyed from the grounds and habitable interior spaces were inspected. Existing conditions including observed distress were noted and documented with digital photographs.

Survey Limitations

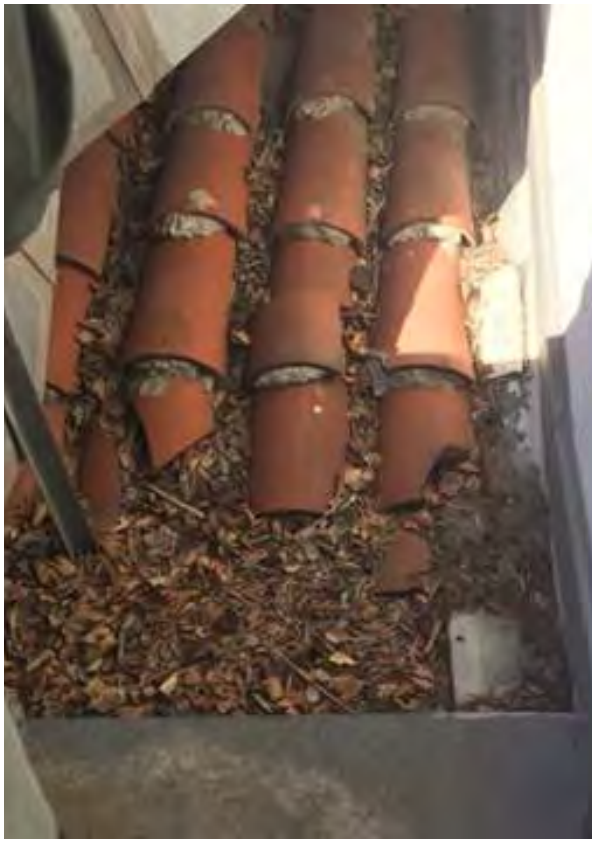
The survey was visual only, and focused on the exterior building envelope. Observation of roofing and drainage systems was limited to areas that could be viewed from the ground and from available windows; no up close access was provided. Survey of existing structural framing was performed only as it relates to materials and finishes, not for soundness of either gravity load-bearing or lateral force-resisting aspects. Building systems (MEP, fire suppression, etc.) as such were not surveyed by ARG. Where available, information related to structural and building systems has been provided for reference.

6.1 Roofing and Drainage

The building roofs are hipped and covered with red clay straight mission (aka "barrel mission") tile. The roof structure is wood-framed with trusses and rafters. The rafter tails form an 18-inch wide overhang, with decorative ends and board decking exposed at the eaves (see "Wood Framing and Trim" section below for information). The rafters are notched to support the copper gutter, and there are painted sheet metal (likely also copper) downspouts and conductor heads.

In general, the clay tile roof appears to be in good condition overall; documentation indicates the building was reroofed ca. 2001. ARG noted localized areas of broken tile, with general soiling and debris accumulation overall. The condition of the underlayment and decking is unknown but is likely to be acceptable since the sheathing assembly was replaced as part of the 2001 project (with the exception of sheathing on the south wing roof, which dates from ca. 1982). Visible areas of the decking at the eaves appear in good condition. There may be localized areas of decay at previous leak locations, etc. Most drainage system elements are intact. The copper gutters appear to be in good condition, although in need of general maintenance and debris removal. The copper downspouts and conductor heads have been painted similar to the building. In some areas, ARG noted loose fittings, with drip stains where downspouts fit to gutters. We also noted an area where a downspout has been cut short, and a PVC end fitting installed; the PVC end was detached from the downspout.

A small concrete pad at the second floor level supports mechanical units. The pad is accessed from a window in the collections storage room and appears to be covered with a waterproof membrane or coating. The sloping tile roof is immediately adjacent, and reportedly there is a leak in this location. ARG noted broken tile and heavy accumulations of debris in this area. Sheet metal wall flashing set into a reglet at the concrete wall is visible, but other flashing or waterproofing cannot be observed. Tile and debris removal and further up-close inspection will be needed to confirm the condition of the underlayment and flashings in this area, and determine the leak location. Additional flashing and/or drainage may be required.



View from mechanical pad to clay tile roof at reported leak location. Note broken tile, heavy debris, and flashing.

View of clay tile roofing from second floor window; note debris accumulation.

Typical eave condition showing overhang, decorative rafter tails, and copper gutter.

Gutter-to-downspout connection; note drip stains at loose fitting.

Typical painted downspout and conductor head.

Roof mechanical pad seen from second floor window.

Replacement PVC extension disconnected from downspout at northwest corner of building.

6.2 Exterior Walls and Features

Concrete Walls

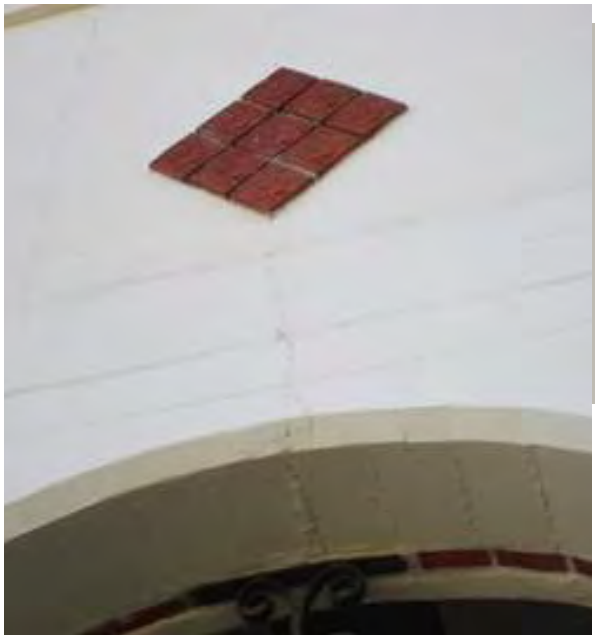
The exterior walls of the building are constructed of cast-in-place reinforced concrete. Horizontal form-board impressions are visible throughout; as well as localized ridges (resulting from gaps between form-boards) and honeycombing (small voids and air gaps from poor compaction). These are characteristic of the original construction and contribute to the building's historic appearance. Concrete surfaces are generally painted with an elastomeric paint coating. In some areas, such as the original main entrance, the walls are adorned with terra cotta tile. The tile features a molded floral design, and was most likely mass-produced (manufacturer unknown).

In general, the concrete walls are in good condition. Minor cracks (hairline to 1/16-inch wide) are present throughout. Wider cracks (greater than 1/16-inch) and spalls (material losses) occur in localized areas. The elastomeric coating is generally intact, but peeling in localized areas, particularly near the base of walls. Ferrous stains were also observed from surface runoff from adjacent metals. The tilework is generally in good condition, with some minor cracking of grout joints, paint splatter, and a few missing units.

Cracks in concrete at west elevation.

Peeled paint coating at base of wall, west elevation.

Spalled concrete at east elevation (south return).



Terra cotta tile details at east courtyard elevation. Note crack at concrete wall and arch below.

Typical terra cotta tile details flanking entrance bays at east courtyard elevation.

Missing tile between windows at east courtyard elevation.

Basement Walls

The museum has a partial basement at the central portion of the building. The basement is divided into various storage rooms and mechanical spaces, and can be accessed from both internal and external stairs. The walls are reinforced concrete and generally painted with an elastomeric coating or faced with plaster or other finish materials. The floors are concrete slab-on-grade. Most are bare concrete; some areas have vinyl floor tile which may contain asbestos (testing is needed to confirm). In other areas, such as the workroom, the tile has been removed. There are floor drains throughout the basement.

Historically, the basement has been prone to dampness and water infiltration and has not been used for collections storage or other uses requiring environmental control. ARG noted numerous areas of damaged interior finishes and staining consistent with water infiltration through the basement walls. The basement windows are heavily deteriorated and a likely source of some portion of the water infiltration. Most windows have been provisionally closed up with plywood. One window has been infilled with ductwork, with ill-fitting infill panels and poor sealant work. An active water leak has been reported in this location. The wall finishes below this window are heavily deteriorated.

Ductwork installed in basement window opening. Note plywood infill, sealant, and heavy deterioration of wall below.

Basement workroom; note vinyl tile has been removed from concrete floor slab.

Peeling paint and deteriorated wall finishes at basement storage room.

Typical floor drain at concrete floor slab in basement.

Deteriorated/damaged windows at basement. Windows covered with plywood at exterior.

6.3 Wood Framing and Trim

Exposed Rafters

The roof structure is wood trusses and rafters. At the eaves, the rafters extend as an 18-inch overhang with exposed decorative ends or "tails" and board decking. The rafter tails are notched to support the copper gutter. Surfaces treatment appears to be a combination of dark-stained wood (most likely original) and wood painted brown. For example, rafters at the courtyard verandas have been painted (see photos below).

In many locations throughout the building, the ends of the rafter tails are decayed (wood rot). The decay varies from minor splitting and checking to moderate loss (small voids) to heavy decay with large areas of loss. The heavy decay was noted primarily at building corners. ARG was unable to survey the rafter tails up-close to confirm the depth of decay. There may be additional areas of decay immediately below the gutter where the tails are notched.

Verandas

The north and south verandas at the courtyard elevations are framed with heavy wood timber. The shed roofs of the verandas also feature exposed rafter tails, similar to the rest of the building. Both the beams and rafter tails have been painted in these areas, but may have had a dark-stained finish originally. The verandas also have a board ceiling, which may or may not be the original condition.

The rafter tails at the verandas are generally in slightly better condition than those elsewhere, likely due to their protective paint coating. The heavy timber beams, on the other hand, are in poor condition, with numerous heavy checks and splits along their length. In some areas, the splits are very deep, almost entirely through the member, with some displacement or racking observed. Further inspection by a structural engineer is recommended.

Typical decayed ends of exposed rafters. (northeast corner shown)

Typical deep checking/splits at veranda wood beams. (south courtyard elevation shown)

6.4 Windows and Doors

Exterior Doors

Exterior doors around the building vary greatly in size and configuration. They are generally solid wood stile-and-rail doors with decorative inset panels or glass vision panels. Some have fixed wood sidelights and transoms. In general, the doors are in fair condition. All are operable, and have signs of wear from repeated use. Damage includes abraded or weathered stain finishes, surface gouges, minor splits, minor wood decay (particularly at the bottom of doors), and broken glazing. Surfaces are soiled throughout. Hardware is generally intact but there are concerns regarding locking of doors and fire egress (see Section 4.5).

Decorative Gates

Most building entrances have decorative iron gates. The gates are supported by iron frames which are anchored to the concrete walls and threshold slabs. In general, the gates are in good condition. ARG noted peeling paint and minor corrosion in localized areas, as well as some missing fasteners. The corrosion was particularly noted at the base where the frames are anchored into the concrete slab. The corrosion has resulted in cracking and damage of the concrete (see "Landscape Features, Building Entrances and Verandas" section below for more information).

Door and transom at east elevation.

Door, sidelights, and transom at north elevation.

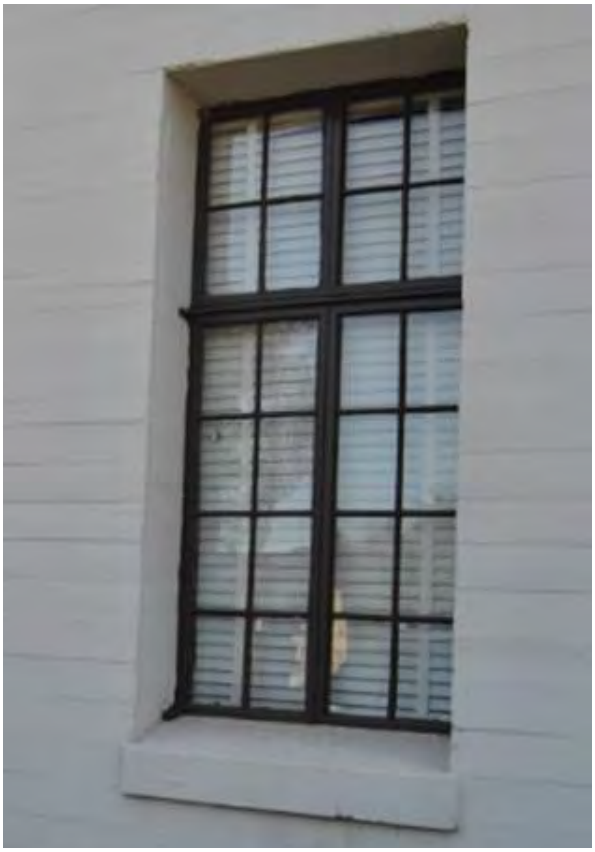
Door and transom at north elevation.

Door, sidelights and arched transom at south elevation.

Gate at main entrance, north elevation.

Gate (1 of 2) at south elevation mechanical enclosure.

Three gates at west courtyard elevation.



Typical window requiring basic maintenance only.

Typical window at gallery blocked with interior partition; note insulation fill and back-painted glass.

Typical condition at windows requiring basic maintenance; note cracked glazing putty.

Typical condition at windows requiring more extensive repair; note corrosion of steel components.

Steel Windows

The original windows throughout the building are primarily steel paired-casement frames with clear single-pane glazing. Window sizes and configurations vary somewhat; in some cases fixed rectangular or arched sashes are added above operable casements. In many areas, particularly at gallery spaces, the windows have been modified to improve their performance and control daylighting. In the north gallery, the windows have interior venetian blinds; black foamcore sheets are sometimes been placed between the blinds and the windows for additional daylighting control. At the south galleries, windows have been completely blocked by interior partition walls, with most glass back-painted black and loose insulation placed up against the windows.

The windows vary greatly in observed condition and deterioration. Windows at offices, meeting rooms, corridors, etc. tend to be in relatively good condition, requiring limited remediation of peeling paint, cracked/deteriorated glazing putty, and a few broken panes. In other areas, windows are in worse condition, displaying corrosion of metal components, heavily deteriorated or missing glazing putty, and heavily weathered paint films. At windows that have been blocked by interior partitions, condensation build-up has contributed to deterioration and corrosion. Paint and UV-films on the interior side of glazing are deteriorated. Some windows have also been modified for air conditioning units and hard-ducted connections, with muntins cut and removed or relocated, changing the original sash configuration.

6.5 Exterior Stairs

At the east elevation, an emergency egress stair leads from the second floor down to the parking lot. The stair is comprised of painted steel components, with checker-plate treads and pipe handrails. The stair is supported by two steel tube columns with base plates anchored to concrete footings.

In general, the stair appears to be in good condition; however, some repairs are needed. The painted steel surfaces are weathered, with localized corrosion and peeling paint. Base plates and anchor bolts are similarly corroded. The pipe handrail at the base of the stair has been damaged, reportedly during recent construction activities.

Exit stair at east elevation; note second floor landing and column support.

View of steel stair; note damaged rail post.

View of steel stair; note damaged rail post.

Base plate at steel column support; note corrosion at anchor bolts.

Checker-plate steel stair tread; note surface corrosion and peeling paint.

6.6 Exterior Lighting

There are a number of existing bronze light fixtures around the building exterior that appear to be original. These are lantern-like wall sconces and pendant fixtures, both of which feature patterned amber-colored glass. The sconces are typically found in pairs to either side of building entrances. The ceiling pendants are typically found in the courtyard, in the north and south verandas and the original City Hall main entrance. In general, the fixtures are operational and in fair condition. Surfaces are heavily soiled throughout, with localized areas of paint splatter. Bronze surfaces are oxidized, with some bright green corrosion products observed. Copper alloy or brass finishes are tarnished. Some fixtures have missing components, including rounded clear lenses at the bottom and missing fasteners.

Typical bronze pendant fixture at courtyard veranda soffit.

Bronze sconce at exterior entrance, south elevation; note heavy soiling.

Bronze sconce at exterior entrance, east courtyard elevation; note missing lens at bottom, missing fasteners and localized corrosion products (green).

6.7 Landscape Features

Building Entrances and Verandas

Building entrance paving generally consists of concrete slab-on-grade with brick pavers used as borders or divider strips. At entrances with decorative iron gates, the gate frames or hardware are typically set directly into the concrete paving. The courtyard verandas have a raised cast-in-place concrete slab floor with brick edge detailing. At mid-point entrances to the verandas, there are steps also comprised of concrete and brick.

The concrete and brick paving elements are generally in fair condition. The veranda flooring was originally constructed with very few control joints and no expansion joints. As a result of thermal expansion/contraction and possible differential settlement or earth movement, there are numerous cracks throughout. The cracking is typical at both verandas, with cracks spanning the full width of the floors and occurring at somewhat regular intervals. Cracking and some spalling (concrete loss) was also observed adjacent to veranda entrance doors. The joints between brick and concrete are typically eroded, with the joint materials deteriorated. In some edge locations of the verandas, it appears that the brick units are pulling away from the concrete (minor displacement). Some previous repairs were also observed using cementitious repair materials and sealants. Veranda concrete surfaces have developed a nice aged patina. In general, concrete and brick surfaces are soiled, with localized stains and areas of efflorescence (salts deposition). At one entrance at the south veranda, there are remnants of a rubber doormat and adhesive residue.

At other building entrances, the concrete paving is cracked and spalled in localized areas. In some locations, such as the east courtyard entrance, the cracks have been previously repaired with cementitious repair materials; however, the repairs have failed in most areas. At entrances with decorative gates, the gate frames and hardware are typically corroded where in contact with concrete, resulting in ferrous staining, cracking and spalling of the concrete. Other ferrous staining was noted at areas where signage or other objects were placed on the concrete.

Detail view of damaged concrete.

Typical concrete spalling at entrance thresholds, north and south courtyard elevations.

Main Entrance Garden (Courtyard)

The courtyard space within the U-shaped building plan was originally the Main Entrance Garden for the Ontario City Hall. It contained various landscape features and walkways, for travel between the main entrance and verandas. Currently, the main entrance to the museum is located at the northeast corner of the north elevation, near the parking lot. The original courtyard entrance is no longer used except for special events, and the courtyard is generally under-utilized. Plant materials have also changed over time, including tree removal. The original flagstone walkways and benches remain.

The flagstone walkways consist of irregularly shaped and sized pieces of slate set in a random fashion into a concrete slab-on-grade medium. The slate varies in color, tending toward warm hues in a range of red, gray, and purple. In localized areas, diamond shapes are inscribed in the concrete and infilled with slate. At the east end of the courtyard there are two concrete benches with seat surfaces similar to the slate paving.

In general, the walkways are in fair condition. Control and expansion joints were not provided in most areas, and there are numerous cracks through both the slate pavers and the concrete bed. These are likely due to differential settlement and expansion/contraction. It is not known if the concrete walkway has steel reinforcement; the damage observed appears to be movement-related, rather than associated with corrosion of internal ferrous metal, suggesting that the walkways are unreinforced. At crack locations, there are numerous losses to stone. There are also previous repairs using various cementitious mortars and epoxies. In some areas, missing stone has been infilled with concrete, and locations near the western end appear to have been largely reset or otherwise modified: the materials look less aged, and the stone units are generally smaller than those on the east end.

The benches are generally in good condition. They were recently relocated as part of the courtyard landscaping project, and have been retained intact. There is some minor localized cracking at the concrete bench seat edges where they project beyond the support legs.

Cracking and spalling at slate paver walkway.

Courtyard bench. (Photo taken Feb. 2016, prior to relocation).

City Rose Garden

The City Rose Garden is located on the east side of the building. Early documentation indicates the garden contained thirty-three varieties of roses. The garden was established in 1939. It features a terraced flower beds, small concrete benches, and arbors for climbing roses. The walkways are red brick, set in a basket weave pattern with mortar. Some areas of walkway have concrete curbs, whereas others have brick edging. The setting bed materials are unknown at this time.

The brick paver walkways are generally in fair to poor condition. The terraced site is eroded, with differential settlement throughout. The walkway surfaces are generally uneven, with some areas lifted by invasive root systems and others depressed from settlement and soil erosion. The damage and displacement appears to be worse nearest the building; the lower terraced walkways are in somewhat better condition. In one area, tree roots have heavily damaged the walkway, and portions of brick are missing. Mortar joints between units are typically eroded and cracked. Some individual bricks are loose from the setting bed. Others are eroded and spalled at the face. Loose bricks have reportedly been used as projectiles to damage the museum building. At the end of one walkway adjacent to the building, there are the remains of a concrete bench; only the two support legs remain, the seat portion is no longer extant.

Damaged brick pavers at rose garden.

Walkway extension with missing brick pavers and tree root damage.

Uneven/deteriorated brick pavers and mortar joints.

Falcon by John E. Svenson
from OMHA collection

Part 7

Building Treatment Recommendations

Building Treatment Recommendations

The following are architectural repair and treatment recommendations for the conditions described in the previous section, “Building Conditions Assessment.” As in the previous section, recommendations are grouped into the following categories: Roofing and drainage, exterior walls and features, wood framing and trim, windows and doors, exterior stairs, exterior lighting, and landscape features.

7.1 Roofing and Drainage

- Clean leaves/debris from all roofs and gutters regularly.
- Inspect roofs for damage annually at minimum, and after heavy rainstorms or seismic events.
- Repair existing downspouts. Reattach loose components and re-solder open joints. Prep and paint as needed.
- Consider replacing non-matching PVC downspout end with new painted copper.
- Repair second floor mechanical pad and adjacent clay tile roof to address leak. Remove and salvage existing clay to expose underlayments and flashings. Amend waterproofing and flashing as required, then reinstall clay tile. A long-term solution may require drainage alterations (TBD).

7.2 Exterior Walls and Features

Concrete Walls

- Repair localized cracks. Inject cracks (min. 1/16-inch or wider) with an epoxy-based grout. Finish flush with surface, and touch-up paint coating. Monitor hairline cracks and repair if they widen.
- Patch localized concrete spalls. Remove loose material and debris down to sound concrete substrate. Patch loss area with a proprietary concrete patching compound (polymer-modified mortar) and finish to match surrounding surface, including tooling to resemble board-formed pattern as required. Touch-up paint coating to match existing.
- Touch-up paint coating at base of walls and other localized areas. Clean and prepare surfaces to remove loose/peeling paint coatings, and repaint to match existing.
- Clean and remove paint splatter at terra cotta tiles.
- Consider taking a mold of the existing tile, and having replica tile produced to replace the missing units.

Basement Walls

- Repair basement window at mechanical area to address active leak/water intrusion. Remove existing infill panel and poor sealant at window opening. Prep window masonry opening, and install new flexible flashing. Provide new painted sheet metal infill panel at exterior, with new flashing at ductwork penetration. Seal around ductwork penetration. Provide new painted plywood infill at interior, and seal around window opening. Repair existing concrete wall below window (see below).
- Test remaining vinyl floor tile for asbestos, and abate/remove as necessary.
- Replace basement-level windows, adding flexible flashing at concrete masonry openings.
- Remove all existing coatings and finishes at walls and floor slabs down to concrete. Inject all cracks or voids with polyurethane grout to prevent moisture intrusion.
- Ensure all floor drains are clean and operational. Maintain stored items raised on pallets or away from floor drains to ensure free flow of surface water to drains. If needed, provide sump pumps.
- Inspect/ensure there are no leaks or damage to building piping in or adjacent to basement

areas.

- Limit irrigation of plantings adjacent to basement walls. Replace sprinklers with a drip system, plant drought-tolerant native species, etc.

If basement level rooms continue to be used for their present functions or similar (mechanical rooms, basic storage and work spaces), perform the following minimum work:

- Following removal of all interior finishes, apply a waterproof coating or sealer to interior walls and floor slabs.

In the event that the basement level is used for any collections storage, we recommend the following more extensive measures:

- Excavate exterior of basement walls down to footings and install exterior waterproofing and a French drain system. Associated work would include removal and reinstallation of adjacent plantings, walkways, etc. This is a much more invasive and costly project, but necessary if collections-level climate control is desired in the basement.

7.3 Wood Framing and Trim

Exposed Rafters

- Repair/rebuild deteriorated ends of exposed rafter tails. Remove loose/decayed wood material with hand tools. Treat wood surfaces with a wood preservative/fungicide. Repair loss areas with a wood-compatible epoxy patching compound (Abatron WoodEpox or similar). Tool and finish surfaces of patch to match surrounding wood, and paint entire rafter tail to match existing.

Verandas

- Engage a structural engineer to inspect the wood beams at the verandas.
- Repair heavily split wood beams per structural engineer's recommendations. ARG assumes the repair will likely include installing iron straps at intervals along the beams length, and/or epoxy injection of deep splits/checking with a wood-compatible epoxy.

7.4 Windows and Doors

Exterior Doors

- Repair existing wood doors, sidelights and transoms, including the following:
- Clean and refinish exterior wood surfaces. Fill splits or gouges/losses with a wood-compatible filler. Renew wood stain where abraded or weathered, and apply a protective clear varnish.
- Replace cracked or otherwise damaged glazing.
- Replace glazing putty where required.
- Clean and refinish existing hardware to remain. Adjust to ensure proper operation.
- Upgrade hardware as required to meet egress and accessibility requirements.
- Provide new weatherstripping.

Decorative Gates

- Clean and prep metal surfaces to remove loose/peeling paint and corrosion.
- Treat areas where corrosion was removed with a rust reformer and rust-inhibitive primer.

- Repaint all surfaces with a high quality direct-to-metal paint coating (Tnemec or similar).
- Replace fasteners where missing.

Steel Windows

Basic Maintenance: For windows that are intact and to remain as-is (no upgrades), and have minimal to no corrosion of steel components, we recommend the following:

- Clean and prep metal surfaces to remove loose/peeling paint.
- Remove cracked/deteriorated glazing putty (full removal not required, only where loose)
- Replace cracked or otherwise damaged glazing.
- Reapply glazing putty where required.
- Repaint metal surfaces.
- Remove interior insulation.
- Remove old films, stray paint, etc. and clean glass. At areas where windows will be blocked by interior walls or partitions, glass can be painted black on interior side.
- Clean and adjust hardware; ensure proper operation.
- Provide new weatherstripping.
- Replace perimeter sealant at joint between window and wall.

Window Repairs: For more heavily corroded or damaged windows, we recommend the following, in addition to the above scope of work:

- Replace heavily corroded, damaged or missing individual steel components, such as muntins, with new to match.
- Correct modified individual steel components, such as muntins that were previously relocated for window air conditioning units, etc. Cut out and re-weld in original locations.

Window Upgrades: For windows at first floor gallery spaces and second floor collection spaces, where tighter temp/rH controls and daylighting requirements are desired, we recommend the following additional scope of work:

- Replace clear single glass with new clear laminated glass. Laminated glass performs better with solar and light transmittance, and offers higher levels of noise control and security/safety against breakage. This will also help with mitigation of sound/vibration from the adjacent rail line. Supply laminated glass with a low-e coating for better thermal performance.
- Provide clear, UV-absorbing film on glass panes to reduce amount of UV light transmitted.
- Provide interior roll-down fabric shades to limit visible light (light intensity) to exhibition spaces.

7.5 Exterior Stairs

Steel Exit Stair

- Clean and prep metal surfaces to remove loose/peeling paint and corrosion.
- Treat areas where corrosion was removed with a rust reformer and rust-inhibitive primer.
- Pay particular attention to base plates and fasteners at support columns. Replace corroded hex nuts as required.
- Cut out section of damaged handrail post, and replace with new. Grind all welds smooth.

- Repaint all surfaces of stair and railing with a high quality direct-to-metal paint coating (Tnemec or similar).

7.6 Exterior Lighting

- Clean metal and glass surfaces of existing sconces and pendant fixtures.
- Chemically passivate areas of active corrosion.
- Apply coat of protective wax or lacquer to bronze surfaces.
- Polish brass surfaces as required.
- Re-lamp and/or re-wire as needed. Replace any cloth-covered wire, etc. with new.
- Replace missing fasteners, lenses, and other components in kind.

7.7 Landscape Features

Building Entrances and Verandas

- Clean overall surfaces of concrete and brick paver trim to remove surface soiling.
- Clean to reduce/ visually minimize localized stains at concrete surfaces.
- Remove failed or deteriorated previous patch repairs.
- Epoxy-inject cracks at localized areas (min. 1/16 in. or wider). Finish flush with surface. Color and surface texture to match existing.
- Patch voids/losses in concrete at localized areas. Prep surfaces, and fill with polymer-modified repair mortar. Finish to match surrounding surface (color and texture).
- Replace damaged concrete flatwork adjacent to entrance bay at central west courtyard elevation.
- Repoint open or deteriorated joints at brick units.
- Consider replacing joint between brick units and concrete with new sealant joint (better expansion/contraction control, but requires cyclic maintenance).
- Where required, coordinate concrete repair work with treatment of decorative gates (see above).

Courtyard Paving

- Repair slate pavers at localized areas to correct tripping hazards and repair heavier damage or loss areas.
- Inject cracks in mortar setting bed with comparable color-matched mortar.
- Inject cracks in slate with epoxy-modified, color matched repair mortar (integrally pigmented, red to purple shades).
- Infill areas of slate loss with setting bed type mortar (similar to previous repairs).
- Consider sawcutting new control joints at regular intervals to limit/localize future cracking or damage. Locations to be selected by Architect in the field based on existing walkway layout and flagstone locations.

Rose Garden Paving

- Reset loose/ displaced brick pavers to correct tripping hazards and accessibility issues; repair heavier damage or loss areas.

- Remove units and mortar down to sub-grade. Clean off mortar residue from units, salvage and stack for reuse.
- Regrade and replace soil/sub-grade layers as required to provide level walkway (assumes new crushed stone or gravel base). Correct surface drainage as required.
- Consult arborist and where possible cut back tree roots.
- Reset salvaged brick pavers in new mortar setting bed and point joints flush.
- Replace missing units with new to match or with units salvaged from other abandoned areas, such as walkway extension to bench that is no longer extant.
- Remove remains of bench (two concrete supports). Salvage for future reuse.

Fruit Industries' Aristocrat Brandy, Guasti 1936
from OMHA collection

Part 8

Cost Projections

8.1 Overview

An outline cost projection for the scope described in the previous sections has been prepared by KPJ Consulting and is included in its entirety in Appendix C. This section distills the basic information in KPJ's report; please refer specifically to the full report for important framing information about the costing process and intent.

As the proposed work at OMHA breaks down for the most part into discrete projects, cost projections are presented *á la carte*, and in three categories:

"Overall": systems or efforts that are essentially building-wide, such as installing sprinklers or abating hazardous material.

"Area-by-Area": work that is confined to a specific area of the building, such as a gallery or workshop.

"Envelope": work that is primarily concerned with exterior building elements.

It is important to keep in mind that all cost estimates in this report are based on conceptual design; they provide a preliminary framework for general budgeting purposes only. Development of more detailed plans and specifications will be needed to further refine these estimates.

8.2 Funding

Securing funding will be a major part of realizing the goals described in this report. The proposed projects tend to be suited to one of three funding vectors:

Municipal budget: Maintenance, preservation, and capital projects such as MEP systems; back of house uses and code upgrades

Grants: Exhibits and educational spaces

Donations: Galleries and high-profile upgrades

8.3 Cost Adjustments

The cost projections prepared by KPJ are based on hard construction costs. In order to round out the budgeting picture, this section marks up KPJ's estimates to include soft costs such as:

Collection-related costs, such as insurance, interim relocation, etc.

Project management

A/E design fees

Legal and regulatory expenses

Based on recent similar projects, we have used a 50% markup estimate (x1.5) to arrive at a project budget.

8.4 "Overall" Scope Items

Building-wide systems upgrades

	Construction Estimate KPJ net	*Project Budget x1.5 net*
Hazardous material abatement	$298,500	$447,800
Sprinkler system	$380,900	$571,400
Fire alarm system	$303,000	$454,500
Security/video system	$163,600	$245,400
Telecommunications system	$208,300	$312,500
Seismic upgrades	$34,800	$52,200
Subtotal 1	$1,389,100	$2,083,800

8.5 "Area-by-Area" Scope Items

Interior improvements for specific areas

	Construction Estimate KPJ net	*Project Budget x1.5 gross*
Elevator	$556,600	$834,900
Local accessibility adjustments	$9,800	$14,700
Front desk/accessible washroom	$58,500	$87,800
Museum Store	$68,900	$103,400
North Gallery and prep room	$794,600	$1,146,900
Southeast Gallery – "Built on Water"	$294,800	$441,000
South Gallery – "Gem of the Foothills"	$413,000	$619,500
Carlson Gallery	$128,000	$192,000
Kitchen	$138,100	$207,200
Council Chamber/Hall HVAC	$534,600	$859,800
Offices	$460,700	$690,300
Washrooms	$146,500	$219,800
Main Hall and office	$98,800	$148,200
Basement	$208,000	$312,000
Subtotal 2	$3,879,600	$5,819,400

8.6 "Envelope" Scope Items

Exterior maintenance, repair, and preservation work

	Construction Estimate KPJ net	*Project Budget x1.5 gross*
Windows	$272,800	$409,200
Loggia restoration	$91,500	$137,300
Exterior doors	$49,300	$74,000
Exterior walls	$7,700	$11,600
Roofing	$20,400	$30,600
Steel exit stair	$40,300	$60,500
Sitework	$201,500	$302,300
Exterior historical fixtures	$2,000	$3,000
Basement waterproofing	$9,800	$14,700
Subtotal 3	$695,300	$1,042,800

8.7 Total Estimated Costs

The total estimated budget for all master plan work is:

$2,083,800 + $5,819,400 + $1,042,800 = **$8,946,000**

Uniform Coat, Chaffey High School Band
from OMHA collection

Part 9

Implementation

9.1 Overview

Much of the work proposed in this Master Plan can be implemented as a series of more or less independent projects. This allows for incremental phasing as funding becomes available, but also raises the question of what order these projects should be done in. The primary considerations are:

- Urgency of need
- Extent of benefit, especially versus cost
- Setting standard procedures (eg, rehabilitating one gallery as a roadmap for others)
- Keeping the museum open to the public as much as possible
- Minimizing area affected by a project and impact on adjacent spaces

In addition, the actual order of projects will depend heavily on funding availability. We recommend OMHA be proactive in seeking funding for work in a logical sequence.

9.2 Concept Budget Breakout

- Systems and Life Safety Improvements: ~$2 million
  - Sprinkler System (see Section 4.4 for code discussion)
  - Fire Alarm System
  - Seismic
  - Door Hardware/Egress
  - Hazardous Materials Abatement
  - Electrical
  - Telecom
  - Security/IT
- South Wing Galleries: ~$1.25 million

  (note that Southeast Gallery rehabilitation is already slated for "Built On Water")
- Central Wing / Accessibility: ~$3.5 million
- North Wing Galleries: ~$1.25 million
- Exterior Envelope Maintenance and Preservation: ~$1 million

9.3 Sequencing

The order in which work is done will depend heavily on available funding and evolving Museum priorities. However, given that some items are best scheduled earlier or later in the process, a potential sequence of projects is diagrammed to the right to guide further thinking. This diagram synthesizes input from the Museum's Board and staff into a logical progression of work.

Initial priorities are the “Built On Water” gallery (already in development), building systems and life safety, and basic accessibility. The decision whether or not to install a sprinkler system is of particular importance since it will have the greatest impact on OMHA's operations and public access to galleries (see Section 9.4). Combined work at the Museum's entry on an accessible restroom and welcome desk has been included in initial priorities for two reasons: the Museum is sorely lacking barrier-free toilet facilities for visitors and staff, and a new welcome desk would provide a significant impression of change for the better at a relatively small cost.

Work following the initial priorities can be roughly divided into gallery and operational upgrades. Discussions with the Museum indicate that OMHA hopes to focus primarily on gallery upgrades to further its public mission. At the same time the Museum should keep in mind the importance of operational improvements, including addition of an elevator, as a backbone for public spaces and programs.

Exterior maintenance and preservation work is not shown in the diagram since it is largely independent from interior projects and can funded over time by the Museum’s annual facilities budget (augmented, if necessary, by additional funding). The exceptions are exterior windows and doors, which will require coordination with interior work.

The costs cited in the diagram are rough figures for assessing magnitude only. Refer to the estimates in Appendix C for more comprehensive information.

Initial Priorities

Southeast Gallery "Built On Water" (~$400K)

- Develop and verify general strategies for HVAC, lighting, and non-exhibit fitout, as well as window refurbishment and maintenance access

Building-wide Systems and Life Safety (~$2M)

- Sprinkler System (~$570K)
- Fire Alarm System (~$450K)
- Seismic (~$50K)
- Door Hardware/Egress (~$25K)
- Hazardous Materials Abatement (~$450K)
- Electrical (~$50K)
- Telecom (~$300K)
- Security/IT (~$250K)

Accessible/Family Restroom and Welcome Desk (~$90K)

- Critical for public accessibility

Gallery Upgrades

North Gallery (~$1.25M)

- Includes exhibit prep room

Carlson Gallery (~$190K)

- Independent of other work, except HVAC

"Gem of the Foothills" Gallery (~$600K)

- Coordinate with Carlson HVAC

Main Hall (~$150K)

- Wall display cases

Museum Store (~$100K)

Operational Upgrades

Elevator, Basement, and Offices (~$2.25M)

- Do as single, comprehensive project
- Use Carlson Gallery as temp office
- Investigate how construction area could be accessed directly from outside

Kitchen and Misc Ground Floor (~$800K)

- Independent of other work, except HVAC

Loading Dock (TBD)

- Long-term goal

9.4 Access Coordination

OMHA intends to remain open to the public as much as possible throughout this work. However, some projects affect not just their own area but also access to other spaces. Specific concerns for each project are:

Southeast Gallery

The museum wishes to maintain access to its core "Gem of the Foothills" exhibit over the 2-3 year period that the southeast gallery is closed for reinstallation. This requires a temporary enclosure either on the south veranda or through the southeast gallery. The first option is implausible; ARG has suggested partitioning off a corridor along the edge of the southeast gallery to an existing, unused door opening onto "Gem of the Foothills." Note that this is a preliminary concept and may require relocation of exhibits.

Building-wide Systems

System installations vary greatly in their potential impact on museum operations. A sprinkler system (if pursued) would have the most wide-ranging effect, requiring gallery closures and temporarily shifting exhibit elements away from work areas. Multiple holes would need to be drilled in interior concrete walls for new piping; any proposed layout should minimize this. Electrical, telecommunications, and security systems are essentially wiring and will have less impact. However, ARG recommends coordination with new work wherever possible to avoid surface-mounted conduit and inappropriate device locations. Seismic and hazardous materials work is anticipated to affect limited, mostly non-public areas.

Elevator, Basement, and Offices

This is an issue for OMHA operations, but has limited impact on public access. Construction noise and dust issues will need to be addressed, including temporary shielding where the basement stairs open on the Main Hall.

North Gallery

The north gallery can easily be closed off during renovation work, allowing the rest of museum to remain open.

Museum Entrance Area

If not carefully planned, work at the entry could seriously limit public access. Elements such as the desk and other casework should be designed to be fabricated offsite for efficient installation. Potentially, much of the new layout could be completed before breaking through the wall into the Main Hall.

Carlson Gallery

Due to its location, the Carlson Gallery can be closed for renovation with minimal impact on the rest of the museum. This should be coordinated with educational program schedules.

Work affecting very limited areas, such as the Kitchen upgrade and Main Hall display cases, can take place at any point, but must be coordinated with museum operations.

Appendix A

Programming Documents

Appendix B

Reports

B.1 Draft Structural Evaluation

B.2 Seismic Evaluation

B.3 Material Testing Report (Concrete and Steel)

B.4 ARG Conservation Services Report

B.5 MEP Condition Assessment Report

B.6 Code Review Summary

Appendix C

Cost Projection

C.1 Cost Plan Report

C.2 “Built On Water” Concept Budget

Appendix D

Historic Preservation

D.1 Preservation Approvals Matrix

Preservation Approvals Matrix

As detailed in Section 4.9, work on OMHA's building is subject to Ontario's Historic Preservation Ordinance (HPO), as administered by the Advance Planning division of the City's Planning Department.

Approval of work typically takes the form of a Certificate of Appropriateness. A Waiver to the Certificate of Appropriateness may be issued by the Planning Director if the proposed work is considered minor and does not adversely affect character-defining features.

The following matrix of anticipated approvals per work type is based on input from Ontario's Planning Department. It is advisory, not definitive: requirements for work other than regular cleaning and maintenance should be confirmed with the Planning Department on a case-by-case basis.

Roofing and Drainage	
Regular inspection and cleaning	No review required
Repair existing downspouts	No review required
Remediate second floor mechanical pad	Administrative approval required
Exterior Walls and Features	
Remediate localized concrete cracks and spalls	Administrative approval required
Touch-up painting	No review required
Replicate and replace historic tiles	Administrative approval required
Remediate and waterproof basement walls	No review required
Repair or replace basement windows	Administrative approval required
Basic steel window upkeep	No review required
Steel window frame repairs and reconstruction	Administrative approval required
Glazing upgrades (laminated, UV film, etc.)	Administrative approval required
Windows and Doors	
Maintain wood doors	No review required
Refinish and repair wood doors	No review required
Upgrade door hardware for egress/accessibility	Administrative approval required
Conserve and repaint metal gates	No review required
Repair or replace basement windows	Administrative approval required
Basic steel window upkeep	No review required
Steel window frame repairs and reconstruction	Administrative approval required
Glazing upgrades (laminated, UV film, etc.)	Administrative approval required

Wood Framing and Trim

Repair/rebuild rafter tails	Administrative approval required
Remediate wood structural beams at veranda	Administrative approval required

Steel Exit Stairs

General maintenance	No review required
Repairs	No review required

Exterior Lighting

Conservation of historical fixtures	Administrative approval required
Relamp/rewire fixtures	Administrative approval required

Landscape Features

Clean concrete and brick surfaces	No review required
Repoint brick paving	Administrative approval required
Remediate cracks and losses in pavement	Administrative approval required
Repairs to slate paving in courtyard	Administrative approval required

Interiors

General maintenance and cleaning	No review required
Painting	No review required if same color
Replacement of non-historic interior finishes *(for instance, carpet, bathroom tile, acoustical ceilings)*	No review required
Work requiring selective opening and patching *(for instance, installation of sprinkler system or electrical wiring)*	No review required
Alterations in areas without contributing historic fabric *(gallery wings, office, basement)*	No review required
Alterations in areas with contributing historic fabric *(front desk, main hall)*	Administrative approval or Certificate of Appropriateness required
Work with any impact on Council Chambers	Administrative approval or Certificate of Appropriateness required
Conservation of historical fixtures and fittings	Administrative approval required

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arg-pnw.com

Appendix A

Programming Documents

KEY

- PUBLIC
- PUBLIC SUPPORT
- EDUCATION
- EDUCATION SUPPORT
- EXHIBIT
- EXHIBIT SUPPORT
- ADMINISTRATION
- ADMIN. SUPPORT
- COLLECTION MGMT
- COLLECTION SUPPORT
- SERVICE

8 0 8 16
1/8" = 1'-0"

N

ARCHITECTURAL RESOURCES GROUP, Inc.
Architects, Planners & Conservators
Pier 9, The Embarcadero . San Francisco, California
415.421.1680 fax 415.421.0127

NO.	DESCRIPTION	DATE
REVISIONS		

ONTARIO MUSEUM

MASTER PLAN & BUILDING ASSESSMENT

225 S. EUCLID AVE.
ONTARIO, CALIFORNIA

SHEET TITLE

BASEMENT FLOOR PLAN

ISSUANCE: PROGRAMING

DATE: JANUARY 2018

PROJ. NO.: 14046

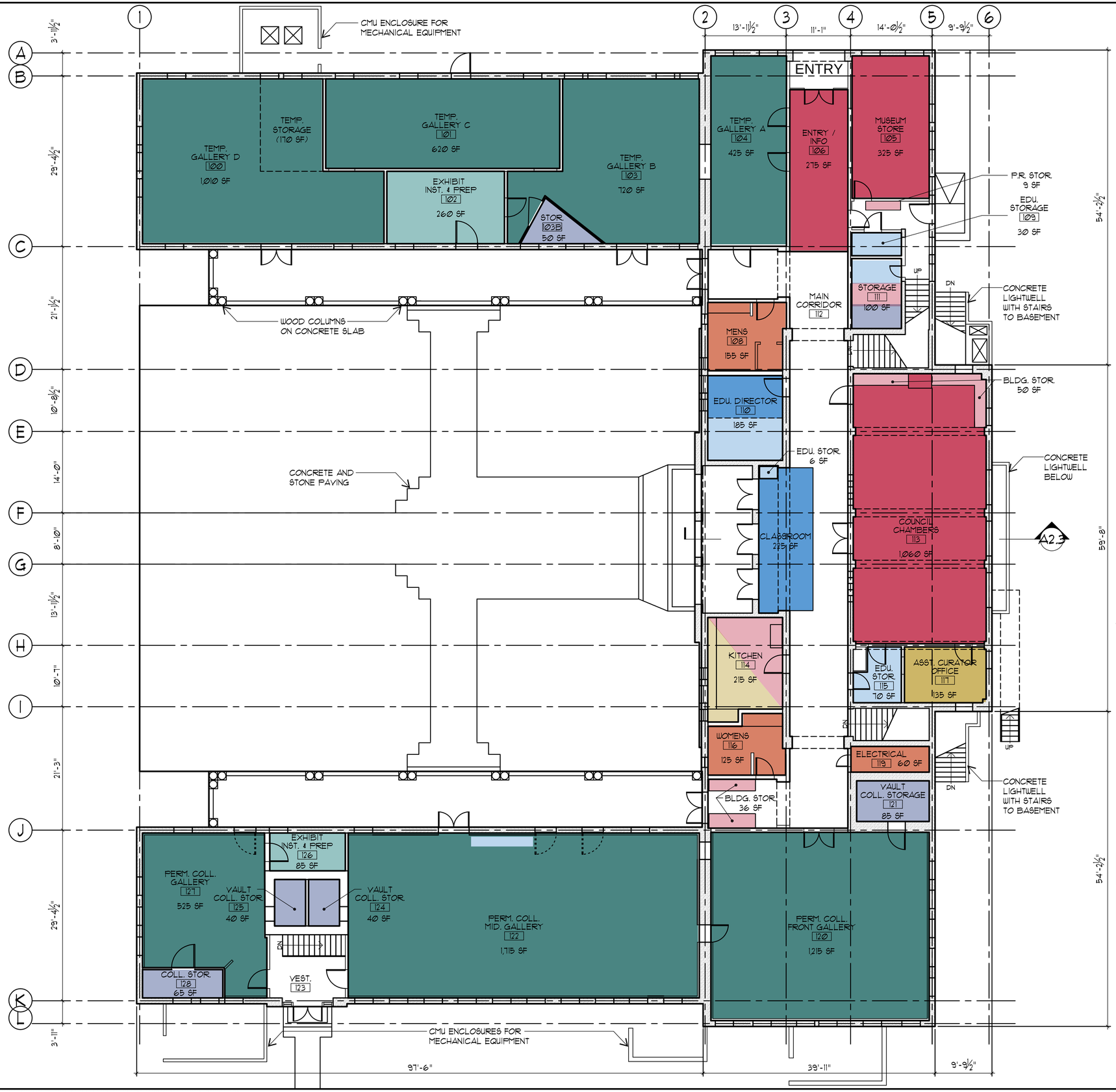
DRAWN: AP/GU

CHECKED: JD

DRAWING NO.

A1.0

24"x36" OR 22"x34" SHEET SIZE. IF SHEET SIZE IS SMALLER, THEN DRAWING HAS BEEN REDUCED.



KEY

- PUBLIC
- PUBLIC SUPPORT
- EDUCATION
- EDUCATION SUPPORT
- EXHIBIT
- EXHIBIT SUPPORT
- ADMINISTRATION
- ADMIN. SUPPORT
- COLLECTION MGMT
- COLLECTION SUPPORT
- SERVICE

8 0 8 16
1/8" = 1'-0"

N

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Pier 9, The Embarcadero . San Francisco, California
415.421.7680 fax 415.421.0127

NO.	DESCRIPTION	DATE
REVISIONS		

ONTARIO MUSEUM

MASTER PLAN & BUILDING ASSESSMENT

225 S. EUCLID AVE.
ONTARIO, CALIFORNIA

SHEET TITLE

FIRST FLOOR PLAN

ISSUANCE: PROGRAMING

DATE: JANUARY 2018

PROJ. NO.: 14046

DRAWN: AP/SU

CHECKED: JD

DRAWING NO.

A1.1

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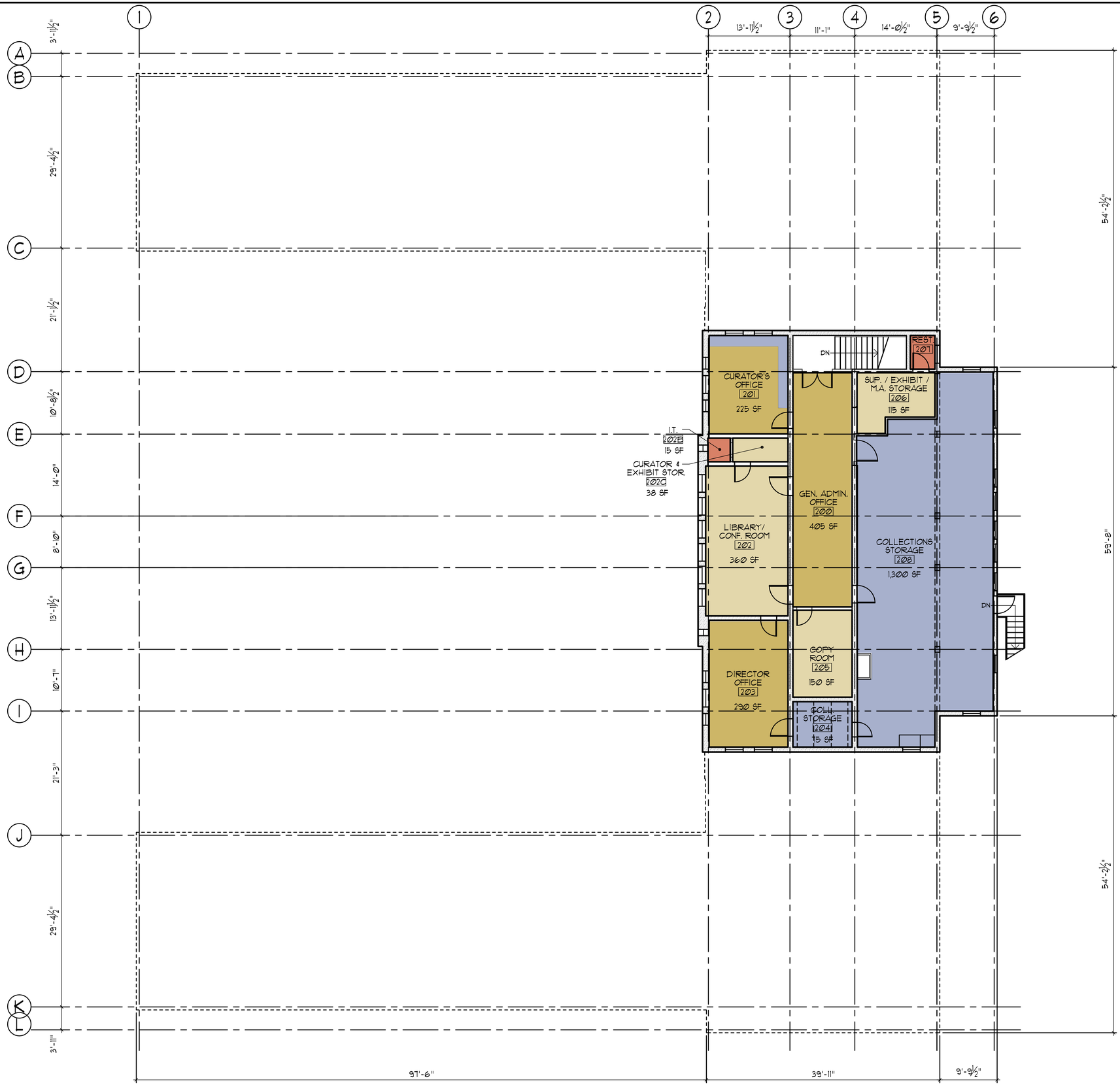


KEY

- PUBLIC
- PUBLIC SUPPORT
- EDUCATION
- EDUCATION SUPPORT
- EXHIBIT
- EXHIBIT SUPPORT
- ADMINISTRATION
- ADMIN. SUPPORT
- COLLECTION MGMT
- COLLECTION SUPPORT
- SERVICE

8 0 8 16
1/8" = 1'-0"

N

ARCHITECTURAL RESOURCES GROUP, Inc.
Architects, Planners & Conservators
Pier 9, The Embarcadero . San Francisco, California
415.421.1680 fax 415.421.0127

NO.	DESCRIPTION	DATE
REVISIONS		

ONTARIO MUSEUM

MASTER PLAN & BUILDING ASSESSMENT

225 S. EUCLID AVE.
ONTARIO, CALIFORNIA

SHEET TITLE

SECOND FLOOR PLAN

ISSUANCE	PROGRAMING
DATE	JANUARY 2018
PROJ. NO.	14046
DRAWN	AP/SU
CHECKED	JD

DRAWING NO.

A1.2

SET-SHEET-NO.

24"x36" OR 22"x34" SHEET SIZE. IF SHEET SIZE IS SMALLER, THEN DRAWING HAS BEEN REDUCED.

Ontario Museum of History and Art
Print Date: 3/14/2018

PROGRAM ESSENTIALS MATRIX

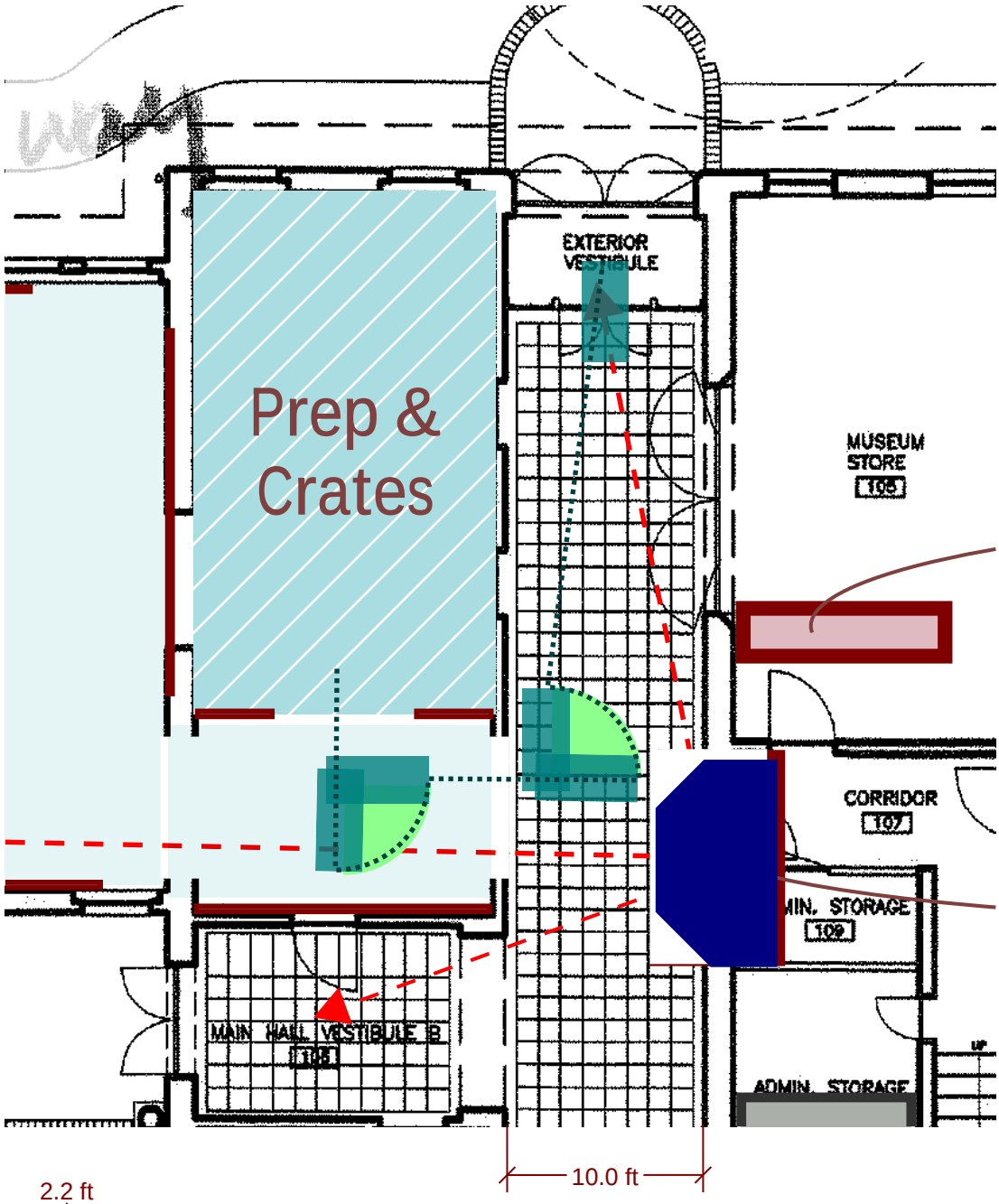
		Room Name	Existing NSF	Existing* FT/PT/V	ESSENTIAL Proposed NSF	Comments
1.0	**Public Serving**					
		Entry/Lobby/Info	275	2 PT	275	
		Museum Store	325	1 V	325	
		Council Chambers	1,060		1,060	Orientation Room; Classroom (9 at council table; 70 at audience)
	Support					
		Storage	-		100	
		Warming Kitchen			100	to serve special events (potential revenue stream)
		Subtotal:	1,660		1,860	
2.0	**Education**					
	Offices					
		Educational Director/Coordinator	185	1 PT	150	
		Education Assistants		2 V	100	share with docents?
		Docent Office			100	share with ed assistants? Provide lockers
	Classrooms					
		Education & Orientation (Gallery A)	425		425	
		Classroom			-	use Council Chambers
	Support					
	(N)	Storage			120	
		Subtotal:	610		895	
3.0	**Exhibit**					
	Permanent Collection				3,530	
	120	Front Gallery	1,215			no change
	122	Mid Gallery	1,715			no change
	127	Rear Gallery	600			no change
	Temporary Collection				2,405	
	103	Gallery B	775			no change
	101	Gallery C	620			no change
	100	Gallery D	1,010			no change
	Support (Prep & Design)					
	102	Installation & Prep / Storage	345		500	
	010	Exhibit Workshop	275		275	
		Subtotal:	6,555		6,710	
4.0	**Administration & Curatorial**					
	Offices					
		Director	290	1 FT	240	
		General Administration (Open Office)	405	4 V	200	incl. reception for admin and collections
		Curator of Collections	112.5	1 PT	160	
		Curator of Exhibits	112.5	1 PT	160	
	Support					
		Breakroom	215		30	kitchenette in open office area
		Library / Conference / Research Room	360		300	shared with Collection Management
		Copy / Workroom / Supplies	150		125	shared with Collection Management
		Storage	815		200	files, etc.
		Subtotal:	2,460		1,415	

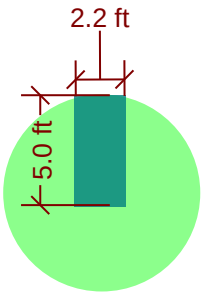
Ontario Museum of History and Art
Print Date: 3/14/2018

PROGRAM ESSENTIALS MATRIX

	Room Name	Existing NSF	Existing* FT/PT/V	ESSENTIAL Proposed NSF	Comments
5.0	**Collection Management**				
	Reception	-		-	shared w/ admin.
	Resource Library	-		-	see Admin Library
	Study Area	-		-	see Admin Library
	Collection Storage	1,625		6,500	
	Support				
	Digital Archive Room			100	
	Copy/Supplies			-	shared w/ admin.
	Purse/Bag Storage			25	
	Storage & Packing Supplies			100	
	Loading Dock			100	
	Intake / Processing & Receiving			250	
	Subtotal:	1,625		7,075	
	TOTAL NSF:	12,910		17,955	
6.0	**Museum Building Support**				
	Custodial			50	
	Loading & Receiving				
	Trash & Recycling				
	Restrooms				
	Utilities				
	IT			80	

* Per 2004 Strategic Outlook Short Term Spaces Needed; Prepared by Chu + Gooding Architects / M. Goodwin Associates, Inc.

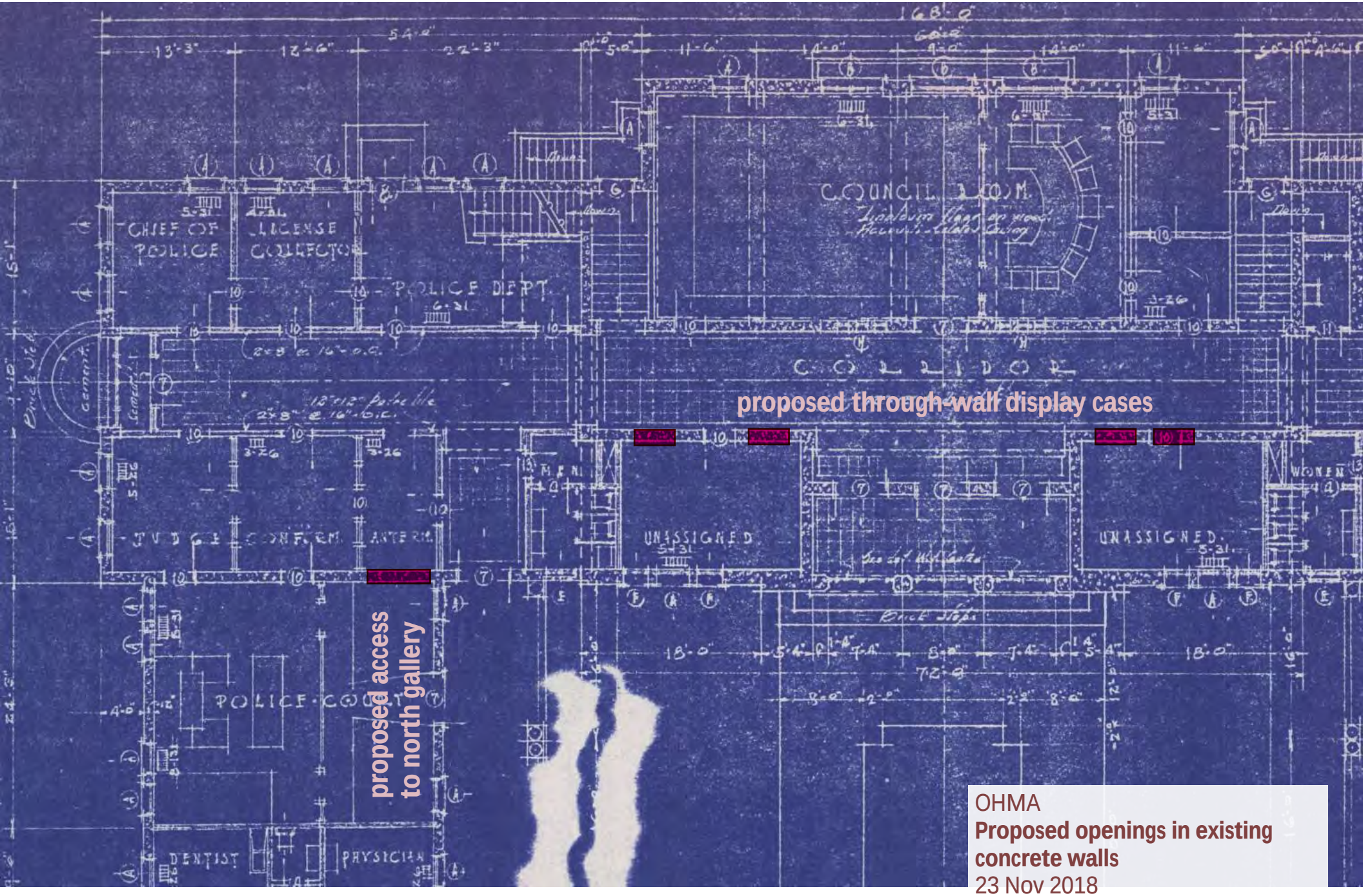




Typ pallet truck with
4'6" turning radius

Per this diagram, a typ pallet truck can be simply maneuvered from the front entry to the proposed prep & crate area. The leading corner of a projecting desk would be tapered to ensure clearance

OMHA
Pallet Truck Access
29 Oct 2018
ARG/KFrutiger



OHMA

Proposed openings in existing concrete walls

23 Nov 2018

ARG/KFrutiger

Appendix B

Reports

B.1 Draft Structural Evaluation

B.2 Seismic Evaluation

B.3 Material Testing Report (Concrete and Steel)

B.4 ARG Conservation Services Report

B.5 MEP Condition Assessment Report

B.6 Code Review Summary

April 28, 2015

James McLane
Architectural Resources Group, Inc
8 Mills Place
Pasadena, CA 91105

Reference: **STRUCTURAL ASSESSMENT REPORT & RECOMMENDATIONS**
ONTARIO MUSEUM OF HISTORY & ART
ONTARIO, CALIFORNIA
[SF PROJECT #14081]

Dear James:

We have completed our structural assessment of Ontario Museum of History & Art located at 225 South Euclid Avenue in Ontario, California.

The purpose of this assessment is as follows:

- Provide a description of the building's structural systems based on our field observations and review of available drawings and other documents;
- Provide an overall assessment of the condition of the building's structure;
- Evaluate and provide existing live load capacity ratings of the second floor office and storage areas, and for the first floor assembly spaces;
- Provide conceptual structural strengthening recommendations to improve live load capacity at the second floor for proposed future storage space;
- Provide the results of a Tier 1 Seismic Evaluation of the building, following the *ASCE 41-13 – Seismic Evaluation and Retrofit of Existing Buildings*, published by the American Society of Civil Engineers, identifying potential structural deficiencies with respect to seismic loading;
- Provide conceptual structural strengthening recommendations to mitigate identified deficiencies and improve the building's overall expected seismic performance.

This report does not take into account specific renovation plans for the building. However, the scope, type and priority of structural strengthening schemes may ultimately be impacted by proposed renovations to the building, if, for example, planned renovations increase building mass or modify existing vertical or lateral-load resisting systems to a degree that further study and possible retrofits are triggered by the California Building Code.

19210 S. VERMONT AVENUE, BUILDING B, SUITE 210, GARDENA, CALIFORNIA 90248
PHONE 310-323-9924 FAX 310-323-9925

We have based our study on information gathered during our March 20, 2015 site visit, and our review and interpretation of the following drawings provided by Architectural Resources Group:

- Original structural and architectural drawings for the Ontario City Hall, prepared by Dewitt Mitcham Architect, dated March 8, 1936;
- As-Built drawings for Ontario Museum prepared by Architectural Resources Group, dated March 9, 2015;
- Partial structural drawings for the renovation of the History Wing & Carlson Room, prepared by Taylor & Gaines Structural Engineers, dated August 27, 1982;
- Architectural drawings for renovation of the CCAA/North Wing, prepared by HMC Group, dated January 17, 1994; and,
- Structural drawings for re-roofing of the building, prepared by Peter Arencibia Structural Engineer, dated April 10, 2001.

Building Description

The Ontario Museum is a two-story u-shaped building with two partial basement areas. The entrance of the building faces Euclid Avenue to the west. The single-story north and south wings are each approximately 30 feet wide, and extend approximately 97 feet to the west from the central portion of the building. The north and south wings are approximately 20 feet from grade to the top of roof ridge. The ground floor of the central wing is approximately 50 feet by 168 feet long. The second level of the central wing is positioned over the main corridor and the council chambers, and is approximately 50 feet wide by 72 feet long. The central wing is approximately 33 feet from grade to top of roof ridge. There is a basement area below the eastern side of the central wing, approximately 25 feet by 101 feet. Additionally, there is a small basement area near the western end of the south wing, and is approximately 15 feet by 20 feet in plan.

Gravity Load Resisting System

Central Wing

The roof of the central wing consists of ½-inch thick plywood sheathing over 1x6 straight sheathing, spanning over 2x6 built-up wood trusses spaced at 24 inches on center. The roof trusses span between the exterior reinforced concrete bearing walls on the west side, to built-up (sistered joist) wood beams on the east end. A roof overhang extends to the east beyond the end of the truss, comprised of 4x6 joists at 24 inches on center, spanning from the built-up wood beams to the perimeter concrete wall.

The second floor of the central wing consists of one-way reinforced concrete slab spanning between reinforced concrete beams and girders. The reinforced slab in the collections storage area (room 208) is 6 inches thick and spans between reinforced concrete beams that vary in size from 10 inches wide by 14 inches deep to 12 inches wide by 16 inches deep. The beams are supported by reinforced concrete girders that are 16 inches wide by 30 inches deep, and span from the exterior concrete wall to the concrete wall forming the west wall of the council chambers below. At the interior second floor corridor, an 8-inch thick reinforced concrete slab spans between the interior reinforced concrete walls, and a reinforced concrete girder spanning above the entry hall.

In the library / conference room (room 202) the reinforced concrete slab varies between 4 inches to 8 inches in thickness, and is supported by reinforced concrete beams that are 14 inches wide and 16 inches deep. These beams span between reinforced concrete walls below. At the second floor office areas (rooms 201 and 203), the slab is 4 inches thick, and is supported by 14-inch wide by 16-inch deep concrete beams, also spanning between reinforced concrete walls below.

The first floor of the central wing is mostly supported by a reinforced concrete slab-on-grade. The center / east area of the first floor, over the partial basement, consists of diagonal sheathing spanning between 2-inch wide by 15-inch deep wood joists, spanning between perimeter reinforced concrete basement walls.

The partial basement of the central wing consists of reinforced concrete retaining walls that are supported on reinforced concrete strip footings.

North Wing

The roof of the north wing consists of ½-inch thick plywood sheathing over 1x6 straight sheathing, spanning over wood trusses that are spaced at 24 inches on center. The roof trusses span between exterior 12-inch thick reinforced concrete bearing walls. The floor of the north wing consists of reinforced concrete slab-on-grade. The exterior reinforced concrete bearing walls are supported on reinforced concrete continuous strip footings.

South Wing

The roof of the south wing consists of 3/8-inch thick plywood over 1x6 diagonal sheathing spanning over wood trusses that are spaced at 24 inches on center. The roof trusses span between exterior 12-inch thick reinforced concrete bearing walls. The floor of the south wing consists of reinforced concrete slab-on-grade. The exterior reinforced concrete bearing walls are supported on reinforced concrete continuous strip footings.

The partial basement of the south wing consists of reinforced concrete retaining walls supported on reinforced concrete continuous footings. The floor above the partial basement consists of reinforced concrete slab.

Lateral Force-Resisting System

The lateral force-resisting system of the building consists of plywood sheathing over 1x6 straight sheathing transferring loads into the exterior reinforced concrete walls. Note that plywood sheathing was added to the roof of the south wing in 1982, and to the roof of the north and central wings in 2001. The lateral force-resisting system for the second floor of the central wing consists of reinforced concrete slab transferring loads into the exterior reinforced concrete walls.

General Building Condition

The Ontario Museum is in generally good condition, and shows little indication of prior earthquake damage or significant settlement. Minor cracks were observed along the exterior walls of the north and south wings, frequently occurring below windows extending toward the ground.

We understand there has been concern regarding possible settlement at the west end of the north wing, particularly since local site drainage tends to bring water toward the north end of the building. However, we feel the cracking patterns on the wall of the north elevation are not conclusively a result of building settlement, and are more likely a result of concrete shrinkage over time. Nevertheless, it is important that drainage patterns draw water away from the building to preserve foundation integrity. We understand there is a landscape design development underway, and we do recommend that grade modifications be made that ensure water drains away from the building at all locations.

Seismic Evaluation Methodology

We have performed a seismic evaluation of the building based on the American Society of Civil Engineers Standard ASCE 41-13, *Seismic Evaluation and Retrofit of Existing Buildings,* using two performance objectives, described below. The evaluation includes a "Tier 1" screening of the building – completion of a series of checklists that allow for a rapid evaluation of the building's expected performance. The checklists are designed to reflect performance and vulnerabilities of similar buildings in past earthquakes. The purpose of the Tier 1 analysis is to identify any potential structural deficiencies. This evaluation utilizes the Basic Safety Earthquake for existing buildings (BSE-1E) as the reference seismic hazard level. The BSE-1E corresponds to the earthquake with a 20% probability of exceedance in 50 years, or a mean return period of 225 years. Depending on the potential deficiencies identified in the Tier 1 analysis, a more detailed Tier 2 analysis may be required to eliminate potential deficiencies or confirm that a deficiency exists.

Overall Building Seismic Performance & Summary of Deficiencies

Based on our experience with buildings of similar vintage, our visual inspection of the building, and our review of the original structural drawings, it is our opinion that with selective structural upgrades, the building could perform well under moderate to strong seismic loads. The following statements, shown in bold, are set forth by ASCE 41-13 "Tier 1" as general requirements for a structure to meet given performance objectives. We have included only those checklist items where a potential deficiency has been noted, and following each statement is a description of the nature of the deficiency specific to Ontario Museum.

1. ***REINFORCING STEEL: The ratio of reinforcing steel area to gross concrete area shall not be less than 0.0012 in the vertical direction and 0.0020 in the horizontal direction.*** The wall reinforcement that is provided in the concrete walls does not meet the minimum requirements for this preliminary check. However, based on our experience with buildings of similar vintage, and the relatively low stress value calculated in the reinforced concrete shear walls, this deficiency may be eliminated though a more detailed investigation in an ASCE 41-13 Tier 2 Evaluation.
2. ***WALL ANCHORAGE AT FLEXIBLE DIAPHRAGMS: Concrete or masonry walls that are dependent on flexible diaphragms for lateral support are anchored for out-of-plane forces at each diaphragm level with steel anchors, reinforcing dowels, or straps that are developed into the diaphragm. Connections have adequate strength to resist the connection force calculated in the Quick Check procedure.***

We were unable to confirm anchorage between the top of the interior reinforced concrete walls and the bottom chord of the roof trusses. Anchors provide resistance against out-of-plane failure of the walls and provide overall continuity of the structure. Drawings show that exterior concrete walls are anchored to the roof diaphragm.

3. ***TRANSFER TO SHEAR WALLS: Diaphragms are connected for transfer of seismic forces to the shear walls.*** Shear transfer anchors between the diaphragm and the concrete shear walls are typically present, however, their capacity to adequately transfer expected loads at all locations is uncertain.
4. ***OPENINGS AT SHEAR WALLS: Diaphragm openings immediately adjacent to the shear walls shall be less than 25 percent of the wall length.*** At the north end of the second floor, the length of the stair opening is 31 percent of the shear wall length.

Recommendations for Seismic Strengthening

In the course of our evaluation, we have formulated recommendations and identified potential options for structural strengthening to mitigate the deficiencies identified. In general, we have attempted to put forth schemes that we feel minimally impact the programming, aesthetic and configuration of the building. The schemes proposed here are meant to satisfy this goal and provide cost-effective solutions, but they do not represent the only solutions available.

- **Conduct a full seismic evaluation of the building.** A full seismic evaluation involves conducting a Tier 2 analysis, more thorough and possibly destructive exploration, and materials testing as necessary in order to confirm or eliminate potential deficiencies identified in the Tier 1 phase. We feel most of the identified deficiencies can be resolved by conducting a Tier 2 analysis.
- **Verify or provide out-of-plane anchorage at top of interior, second floor concrete walls.** Provide steel anchors, reinforcing dowels, or straps with positive attachment at the tops of interior concrete walls and attach to diaphragm as necessary to develop expected seismic forces.
- **Investigate strength of load transfer hardware at roof diaphragm to concrete shear walls.** During the 1982 roof strengthening, hardware was added between the lower roof system and the south end wall of the second floor. This hardware should be evaluated and supplemented as necessary to confirm adequacy under expected seismic forces. Similar hardware was added between the low roof diaphragm and the north end wall of the second floor during the 2001 strengthening. It is likely this strengthening meets expected seismic loads.

Second Floor Gravity Load Capacity

We have evaluated the existing second floor framing system for gravity load-carrying capacity and have determined that the existing structure is capable of supporting its self-weight and the live load values that are shown on the Live Load Rating Plan in Appendix A. These capacities are calculated based on the assumptions that the compressive strength of the original concrete is 2,000 psi and the yield strength of reinforcing steel is 33,000 psi.

The live load ratings provided in Appendix A are based on the stated assumptions for materials strength, which are generally lower bound values based on building vintage. Materials testing can provide more certainty regarding actual strengths, and potentially improve the overall live load ratings. If materials testing is desired, we generally recommend drawing 4-inch diameter cores from selected locations, including fully penetrating concrete beams and walls. In addition, samples of reinforcement can be extracted from the structure in selected locations, and tested for yield strength.

Please note, the collections storage area was found to have very limited live load capacity, particularly as a result of limitations on the strengths of beams and girders. This could be a result of engineering analysis methods that have changed since the Museum was designed and constructed. The structure has demonstrated that it can sustain the live loads currently in place; however, we cannot expect the structure to provide additional capacity without conducting targeted materials testing in this area.

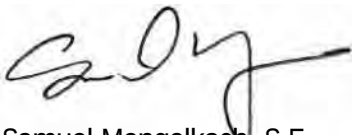
Various methods exist to strengthen reinforced concrete beams and girders. Often, steel channels or plates are added to the sides or bottoms of concrete beams, and secured to them using through-bolts or epoxy dowels. Alternately, fiber reinforced polymer can be added to the sides of the beam to increase strength. Either of these options could provide additional load-carrying capacity at the second floor.

Additional Observations

The roof edge at the Ontario Museum is supported by timber eaves. Some of these eaves were observed to have apparent termite damage. The extent of this damage is very limited, and does not represent a significant structural concern.

It is our sincere pleasure to be a part of this exciting and challenging project. If you have any questions or comments regarding our findings and recommendations, please feel free to contact us. Thank you.

Sincerely,
Structural Focus



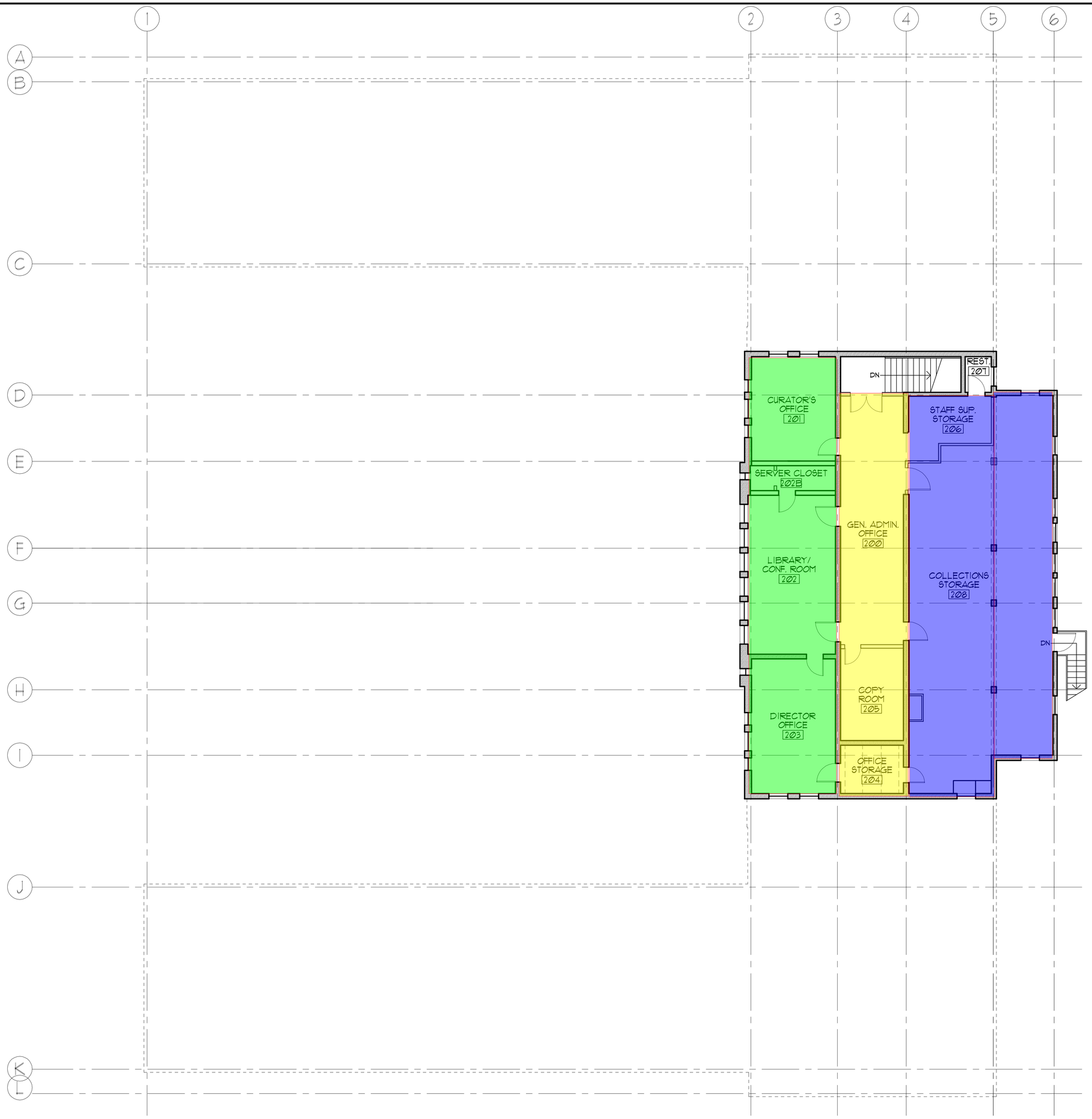
Samuel Mengelkoch, S.E.
Associate

David W. Cocke, S.E.
Managing Principal

STRUCTURAL FOCUS

APPENDIX A

SECOND FLOOR LIVE LOAD RATINGS



LIVE LOAD CAPACITY LEGEND:

- 90PSF

- 50PSF

- NO EXCESS CAPACITY IS AVAILABLE IN THIS AREA WITHOUT THE STRENGTHENING OF GIRDERS AND BEAMS. SEE DETAIL A FOR GIRDER STRNEGTHENING SCHEME.

8 0 8 16
1/8" = 1'-0"

N

APPENDIX B

PHOTOGRAPHS

Image 1. West elevation, Museum entrance at center of photograph.

Image 2. North elevation of south wing.

Image 3. Roof framing above second floor. Note straight sheathing.

Image 4. Roof framing above second floor.

Image 5. Council chambers floor framing viewed from basement, note diagonal sheathing.

Image 6. Common crack pattern below exterior window.

February 23, 2019

Ashley Powell
Architectural Resources Group, Inc
8 Mills Place
Pasadena, CA 91105

Reference: **STRUCTURAL ASSESSMENT REPORT & RECOMMENDATIONS**
ONTARIO MUSEUM OF HISTORY & ART
ONTARIO, CALIFORNIA
[SF PROJECT #14081]

Dear Ashley,

We have completed our ASCE 41-13 Tier 2 seismic evaluation of Ontario Museum of History & Art located at 225 South Euclid Avenue in Ontario, California. Our earlier Tier 1 evaluation identified potential deficiencies in certain elements of the building; this more detailed Tier 2 analysis has been performed to eliminate potential deficiencies or confirm that a deficiency exists. Please refer to our Structural Evaluation Report dated April 28, 2015 for further information regarding our Evaluation Methodology.

Structural Evaluation

We have based our Tier 2 evaluation on the following information:

- Our Tier 1 evaluation report dated April 28, 2015
- Our initial March 20, 2015 site visit and subsequent site meetings.
- Original structural and architectural drawings for the Ontario City Hall, prepared by Dewitt Mitcham Architect, dated March 8, 1936;
- As-Built drawings for Ontario Museum prepared by Architectural Resources Group, dated March 9, 2015;
- Partial structural drawings for the renovation of the History Wing & Carlson Room, prepared by Taylor & Gaines Structural Engineers, dated August 27, 1982;
- Architectural drawings for renovation of the CCAA/North Wing, prepared by HMC Group, dated January 17, 1994; and,
- Structural drawings for re-roofing of the building, prepared by Peter Arencibia Structural Engineer, dated April 10, 2001.
- Material Testing and Investigation Report, prepared by Twining, dated September 12, 2017.

The potential deficiencies, taken from our April 28, 2015 report, are re-listed below for your convenience, along with our Tier 2 evaluation findings and recommendations:

1. **REINFORCING STEEL: The ratio of reinforcing steel area to gross concrete area shall not be less than 0.0012 in the vertical direction and 0.0020 in the horizontal direction.**

   Tier 1 Evaluation: The wall reinforcement that is provided in the concrete walls does not meet the minimum requirements for this preliminary check.

   Tier 2 Evaluation: We were able to eliminate the reinforcing steel deficiency that was noted in our Tier 1 report through a more detailed Tier 2 analysis, the capacity of the existing shear walls is sufficient to resist the seismic demand prescribed in Tier 2 deficiency-based evaluation.

2. **WALL ANCHORAGE AT FLEXIBLE DIAPHRAGMS: Concrete or masonry walls that are dependent on flexible diaphragms for lateral support are anchored for out-of-plane forces at each diaphragm level with steel anchors, reinforcing dowels, or straps that are developed into the diaphragm. Connections have adequate strength to resist the connection force calculated in the Quick Check procedure.**

   Tier 1 Evaluation: We were unable to confirm anchorage between the top of the interior reinforced concrete walls and the bottom chord of the roof trusses. Anchors provide resistance against out-of-plane failure of the walls and provide overall continuity of the structure. Drawings show that exterior concrete walls are anchored to the roof diaphragm.

   Tier 2 Evaluation: We checked the existing wall anchors that were added during the 2001 re-roofing at the lower roof and the concrete walls at the two-story central wing (near grid line D and grid line I). These out-of-plane holdown anchors need to be supplemented. We are still unable to confirm anchorage between the top interior concrete walls and the bottom chord of the roof trusses at the upper roof. These anchors need to be provided.

3. **TRANSFER TO SHEAR WALLS: Diaphragms are connected for transfer of seismic forces to the shear walls.**

   Tier 1 Evaluation: Shear transfer anchors between the diaphragm and the concrete shear walls are typically present, however, their capacity to adequately transfer expected loads at all locations is uncertain.

   Tier 2 Evaluation: We checked the existing ledger connection between the lower roof and the concrete walls at the two-story central wing (near grid line D and grid line I). The existing anchor bolts in this ledger connection also need to be supplemented.

4. **OPENINGS AT SHEAR WALLS: Diaphragm openings immediately adjacent to the shear walls shall be less than 25 percent of the wall length.**

   Tier 1 Evaluation: At the north end of the second floor, the length of the stair opening is 31 percent of the shear wall length.

   Tier 2 Evaluation: We checked the existing concrete slab capacity at the opening along the north end of the second floor, the concrete diaphragm adjacent to the opening has sufficient capacity to transfer loads into the existing concrete wall.

Recommendations for Seismic Strengthening

In the course of our evaluation, we have formulated recommendations and identified potential options for structural strengthening to mitigate the deficiencies identified. In general, we have attempted to put forth schemes that we feel minimally impact the programming, aesthetic and configuration of the building. The schemes proposed here are meant to satisfy this goal and provide cost-effective solutions, but they do not represent the only solutions available.

- **Provide out-of-plane anchorage at top of interior, second floor concrete walls and supplement existing out-of-plane anchors at the lower roof.** At the top of interior second floor walls, provide steel anchors, reinforcing dowels, or straps with positive attachment at the tops of interior concrete walls and attach to diaphragm as necessary to develop expected seismic forces. At the lower roof and the concrete walls at the two-story central wing (near grid line D and grid line I), provide additional anchors to reduce the load on the existing anchors.
- **Strengthen the load transfer hardware at roof diaphragm to concrete shear walls.** Provide additional anchor bolts to supplement the existing ledger connection between the lower roof and the concrete walls at the two-story central wing (near grid line D and grid line I).

Second Floor Gravity Load Capacity

We have evaluated the existing second floor framing system for gravity load-carrying capacity and have determined that the existing structure is capable of supporting its self-weight and the live load capacities that are shown on the Live Load Rating Plan in Appendix A. These capacities are calculated using compressive strength of 3,000 psi for the original concrete and yield strength of 40,000 psi for the reinforcing steel. These values are determined from the Material Testing and Investigation Report, prepared by Twining, and dated September 12, 2017. As shown in Appendix A, the existing floor in the Collections Storage area does not have any excess capacity. Additionally, we have determined that the current loading for the Collections Storage is approximately 70 pounds-per-square-foot based on the amount of materials stored in the room. The existing floor slab and beams do not show signs of excessive deflection or cracking as a result of this current loading. The variations in the floor levelness are most likely caused by construction irregularities and not by the current loading. This amount of loading can remain in the area on a test of time metric. If substantial more loading is planned to be added in the Collections Storage, we recommend strengthening the

existing floor to achieve the code prescribed live load requirement of 125 pounds-per-square-foot for light storage. Various methods exist to strengthen reinforced concrete beams and girders. Often, steel channels or plates are added to the sides or bottoms of concrete beams, and secured to them using through-bolts or epoxy dowels. Alternately, fiber reinforced polymer can be added to the sides of the beam to increase strength. Either of these options could provide additional load-carrying capacity at the second floor.

It is our sincere pleasure to be a part of this exciting and challenging project. If you have any questions or comments regarding our findings and recommendations, please feel free to contact us. Thank you.

Sincerely,
STRUCTURAL FOCUS

Samuel Mengelkoch, S.E.
Associate

David W. Cocke, S.E.
Managing Principal

APPENDIX A

SECOND FLOOR LIVE LOAD RATINGS

LIVE LOAD CAPACITY LEGEND:

- 125PSF
  CALCULATION-BASED
- 75PSF
  CALCULATION-BASED
- 70 PSF
  BASED ON EVALUATION OF CURRENT LOADING AND "TEST OF TIME" PRINCIPLE

STRUCTURAL FOCUS

TWINING

Engineering a Better Tomorrow

Material Testing and Investigation Report

Ontario Museum of History and Art
225 South Euclid Avenue
Ontario, CA 91762

September 12, 2017
Project No.: 170427.3

2883 East Spring Street
Suite 300
Long Beach CA 90806

Tel 562.426.3355
Fax 562.426.6424

August 28, 2017
Project No. 170427.3

TWINING

Mr. John Worden
Ontario Museum of History and Art
225 South Euclid Avenue

Subject: Material Testing and Investigation per Structural Focus Project No 14081

Dear Mr. Worden,

In accordance with your request and authorization, we are presenting our Material Testing and Investigation Report for the subject project. The purpose of this project was to determine concrete compressive strength of concrete, and reinforcing steel tensile and yield strength of reinforcing steel at select locations specified in the RFP dated May 13, 2017 issued by the Structural Focus

We appreciate the opportunity to be of service on this project. Should you have any questions regarding this report or if we can be of further assistance, please do not hesitate to contact the undersigned.

Sincerely,

TWINING, INC.

Eugene Raymundo
Manager, Condition Evaluation Services

2883 East Spring Street
Suite 300
Long Beach CA 90806

Tel 562.426.3355
Fax 562.426.6424

TABLE OF CONTENTS

Appendices

2883 East Spring Street
Suite 300
Long Beach CA 90806

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1. INTRODUCTION

This report presents the results of Twining, Inc.'s (Twining) material testing and evaluation performed for Ontario Museum of History and Art located at 225 South Euclid Avenue, Ontario, CA. The purpose of this investigation was to determine material properties of existing concrete and reinforcing steel at select locations specified by Structural Focus per ASCE-41-13 Tier 2 of Seismic Evaluation

1.1. Concrete

As per the Proposed Material Testing Program by Structural Focus (Project No 14081), a total of ten cores were extracted from various elements of the building as specified by Structural Focus on the plans. Core extraction was performed per ASTM C42. Prior to coring, each area was surveyed via ground penetrating radar (GPR) to avoid cutting the steel reinforcement. The cores were transferred to our Long Beach laboratory in sealed plastic bags where they were documented and trimmed.

Per ASTM C39, the cores were sealed in nonabsorbent containers for a minimum of five days before being tested for compressive strength.

The detailed laboratory test reports are provided in Appendix 1.

1.2. Reinforcing Steel

A total of two reinforcing steel coupons, were extracted from walls of the building. Prior to coupon extractions, the elements were surveyed using GPR to determine the reinforcement layout. The steel samples were tested per ASTM A615/A706. The laboratory test results, Rockwell hardness testing, Chemical composition and carbon Equivalent for the reinforcing bars are presented in Appendix 2.

2. LIMITATIONS

The results presented in this report are based on information obtained from field observations, and Twining's laboratory testing. It should be noted that this study did not evaluate the possible presence of hazardous materials in the building.

Twining performed its evaluation using the degree of care and skill ordinarily exercised under similar circumstances by reputable laboratories with experience in this area. No other warranty, either express or implied, is made as to the results provided in this report.

2883 East Spring Street
Suite 300
Long Beach CA 90806

Tel 562.426.3355
Fax 562.426.6424

TWINING

APPENDIX 1
CONCRETE CORES
LABORATORY TESTING

Twining, Inc.- Long Beach Lab
3310 Airport Way, Long Beach, CA 90806
Ph: 562.426.3355
Fax: 562.426.6424
www.twininginc.com

Concrete Core Report

Report No: W01-17-11018-C1

Customer:	City of Ontario / Mgmt Svcs Dept 1425 S. Bon View Ave, Ontario	**Project No:**	170427.3
Project:	Ontario Museum of History and Art 225 South Euclid Avenue Ontario, CA 91762	**Permit No:** **OSHPD:** **DSA File #:** **DSA AP #:**	
Jurisdiction:			
Distribution List:		**Approved by:**	E Raymundo

Sample Details

Twining Lab ID:		**Date Received:**	8/7/2017
Concrete Mix ID:	NI	**Date Trimmed, Wet Sawcutting:**	8/7/2017
Required Strength (psi):	NI	**Date Sealed in a Plastic Bag:**	8/7/2017
Date Cast:	NI	**Conditioning till Testing:**	Sealed in plastic bags after wet saw-cutting
Sampled By:	E Raymundo	**Location of Sampling:**	Shear Wall
Date Sampled:	8/1/2017	**Coring Direction:**	Perdpendicular to wall (horizontal)
Storage after sampling:	Nonabsorb. Container	**Nominal Max. Size of Concrete Agg:**	1-inch

Compressive Strength of Concrete Cores, ASTM C42, C39

Member	First Flr-Shear Wall	First Flr-Shear Wall	First Flr-Shear Wall		
Core ID	1-CW-1	1-cw-2	1-CW-3		
Date Tested	8/14/2017	8/14/2017	8/14/2017		
Diameter (in)	3.72	3.72	3.72		
Drilled Length (in)	6.25	8.00	7.34		
Uncapped Length, Trimmed (in)	3.50	6.01	5.33		
Capped Length (in)	3.75	6.20	5.55		
L/D	1.01	1.67			
Correction factor	0.87	0.97	0.96		
Cross Section Area (in²)	10.87	10.87	10.87		
Type of Cap	bonded	bonded	bonded		
Ultimate Load (lbf)	39100	50720	49100		
Fracture Type (See Remarks)	1	1	1		
Calculated Density (pcf)	129.5	144.2	147.1		
Compressive Strength (psi)	**3600**	**4670**	**4520**		
Corrected Comp.Strength (psi)	**3130**	**4550**	**4330**		

Remarks:

1. Fracture Type 1 = C39: Cones on both ends; C1314: Conical Break, 1 = T1-Reasonably well-formed cones on ends, >1in. of cracking thrgh caps, 2 = Cone & Shear, 2 = T2-Well-formed cone on one end, vertical cracks running thrgh caps, 3 = C39: Vert cracking/no cones; C1314: Cone & Split, 3 = T3-Columnar vertical cracking thrgh both ends, no well-formed cones, 4 = C39: Diagonal fracture; 4 = C39: Diagonal fracture; C1314: Tension Break, 4 = T4-Diagonal fracture w/no cracking thrgh ends; tap w/hammer to distinguish.

Comments:

Twining, Inc.- Long Beach Lab
3310 Airport Way, Long Beach, CA 90806
Ph: 562.426.3355
Fax: 562.426.6424
www.twininginc.com

Concrete Core Report

Report No: W01-17-11018-C1

Customer:	City of Ontario / Mgmt Svcs Dept 1425 S. Bon View Ave, Ontario	**Project No:**	170427.3
Project:	Ontario Museum of History and Art 225 South Euclid Avenue Ontario, CA 91762	**Permit No:** **OSHPD:** **DSA File #:** **DSA AP #:**	
Jurisdiction:			
Distribution List:		**Approved by:**	E Raymundo

Sample Details

Twining Lab ID:		**Date Received:**	8/7/2017
Concrete Mix ID:	NI	**Date Trimmed, Wet Sawcutting:**	8/7/2017
Required Strength (psi):	NI	**Date Sealed in a Plastic Bag:**	8/7/2017
Date Cast:	NI	**Conditioning till Testing:**	Sealed in plastic bags after wet saw-cutting
Sampled By:	E Raymundo	**Location of Sampling:**	Shear Wall
Date Sampled:	8/1/2017	**Coring Direction:**	Perdpendicular to wall (horizontal)
Storage after sampling:	Nonabsorb. Container	**Nominal Max. Size of Concrete Agg:**	1-inch

Compressive Strength of Concrete Cores, ASTM C42, C39

Member	2nd Flr - Slab	2nd Flr - Slab	2nd Flr - Beam	2nd Flr - Beam	
Core ID	2-CS-7	S-CS-9	2-CB-6	2-CB-10	
Date Tested	8/14/2017	8/14/2017	8/14/2017	8/14/2017	
Diameter (in)	2.76	2.76	2.76	2.76	
Drilled Length (in)	4.50	3.50	3.75	4.00	
Uncapped Length, Trimmed (in)	3.39	2.91	3.22	3.29	
Capped Length (in)	3.61	3.10	3.47	3.49	
L/D	1.31	1.12	1.26	1.26	
Correction factor	0.94	0.90	0.93	0.93	
Cross Section Area (in²)	5.98	5.98	5.98	5.98	
Type of Cap	bonded	bonded	bonded	bonded	
Ultimate Load (lbf)	30310	39470	39210	47790	
Fracture Type (See Remarks)	1	1	1	1	
Calculated Density (pcf)	144.4	147.5	143.6	148.6	
Compressive Strength (psi)	**5070**	**6600**	**6550**	**7990**	
Corrected Comp.Strength (psi)	**4750**	**5930**	**6100**	**7440**	

Remarks:

1. Fracture Type 1 = C39: Cones on both ends; C1314: Conical Break, 1 = T1-Reasonably well-formed cones on ends, >1in. of cracking thrgh caps, 2 = Cone & Shear, 2 = T2-Well-formed cone on one end, vertical cracks running thrgh caps, 3 = C39: Vert cracking/no cones; C1314: Cone & Split, 3 = T3-Columnar vertical cracking thrgh both ends, no well-formed cones, 4 = C39: Diagonal fracture; 4 = C39: Diagonal fracture; C1314: Tension Break, 4 = T4-Diagonal fracture w/no cracking thrgh ends; tap w/hammer to distinguish.

Comments:

Twining, Inc.- Long Beach Lab
3310 Airport Way, Long Beach, CA 90806
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www.twininginc.com

Concrete Core Report

Report No: W01-17-11018-C1

Customer:	City of Ontario / Mgmt Svcs Dept 1425 S. Bon View Ave, Ontario	**Project No:**	170427.3
Project:	Ontario Museum of History and Art 225 South Euclid Avenue Ontario, CA 91762	**Permit No:** **OSHPD:** **DSA File #:** **DSA AP #:**	
Jurisdiction:			
Distribution List:		**Approved by:**	E Raymundo

Sample Details

Twining Lab ID:		**Date Received:**	8/7/2017
Concrete Mix ID:	NI	**Date Trimmed, Wet Sawcutting:**	8/7/2017
Required Strength (psi):	NI	**Date Sealed in a Plastic Bag:**	8/7/2017
Date Cast:	NI	**Conditioning till Testing:**	Sealed in plastic bags after wet saw-cutting
Sampled By:	E Raymundo	**Location of Sampling:**	Shear Wall
Date Sampled:	8/1/2017	**Coring Direction:**	Perdpendicular to wall (horizontal)
Storage after sampling:	Nonabsorb. Container	**Nominal Max. Size of Concrete Agg:**	1-inch

Compressive Strength of Concrete Cores, ASTM C42, C39

Member	2nd Flr-Shear Wall	2nd Flr-Shear Wall	2nd Flr-Shear Wall		
Core ID	2-CW-4	2-CW-5	2-CW-6		
Date Tested	8/14/2017	8/14/2017	8/14/2017		
Diameter (in)	3.71	3.7	3.71		
Drilled Length (in)	7.75	7.00	6.75		
Uncapped Length, Trimmed (in)	5.59	5.52	5.12		
Capped Length (in)	5.76	5.74	5.36		
L/D	1.55	1.55	1.44		
Correction factor	0.96	0.96	0.95		
Cross Section Area (in²)	10.81	10.75	10.81		
Type of Cap	bonded	bonded	bonded		
Ultimate Load (lbf)	48140	34460	37420		
Fracture Type (See Remarks)	1	1	1		
Calculated Density (pcf)	147.3	143.5	141.9		
Compressive Strength (psi)	**4450**	**3200**	**3460**		
Corrected Comp.Strength (psi)	**4290**	**3070**	**3300**		

Remarks:

1. Fracture Type 1 = C39: Cones on both ends; C1314: Conical Break, 1 = T1-Reasonably well-formed cones on ends, >1in. of cracking thrgh caps, 2 = Cone & Shear, 2 = T2-Well-formed cone on one end, vertical cracks running thrgh caps, 3 = C39: Vert cracking/no cones; C1314: Cone & Split, 3 = T3-Columnar vertical cracking thrgh both ends, no well-formed cones, 4 = C39: Diagonal fracture; 4 = C39: Diagonal fracture; C1314: Tension Break, 4 = T4-Diagonal fracture w/no cracking thrgh ends; tap w/hammer to distinguish.

Comments:

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TWINING

APPENDIX 2
REINFORCING STEEL
LABORATORY TESTING

TWINING

Table 1 - Reinforcing Steel Material testing

ID No.	Location	Member	Type	Diameter (in)	Cross Sectional Area (in^2)	Deformation Maximum Ave. Spacing (in)	Deformation Minimum Ave. Height (in)	Peak Load (lbs)	Tensile Strength (psi)	Yield Load @ 20% Offset (lbs)	Yield Strength (psi)	Gage Length (in)	Elongation (%)	Modulus of Elasticity	Rockwell Hardness
1-RW-1	Ground	Wall	Round	0.50	0.20	0.95	0.04	12,180	60,900	8,860	44,300	2	19.38	$23.7x10^6$	48
2-RW-2	Second Floor	Wall	Round	0.50	0.20	0.87	0.04	16,540	82,700	11,080	55,400	2	16.25	$35.1x10^6$	42

Notes:

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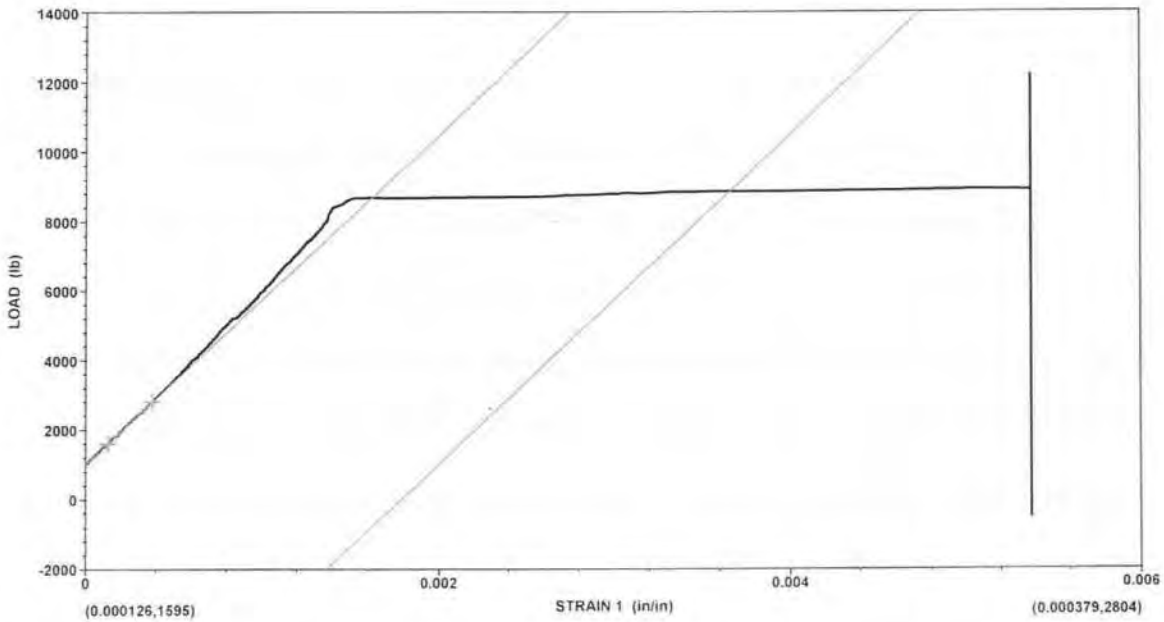
3310 AIRPORT WAY,LONGBEACH,CA 90806

Specimen #:
OPERATOR:
JOB NAME:
JOB NUMBER:
HEAT NUMBER:

Geometry:	Area
Gage Length:	2.0000 in
Area:	0.2000 sq in



Date: 08/14/17

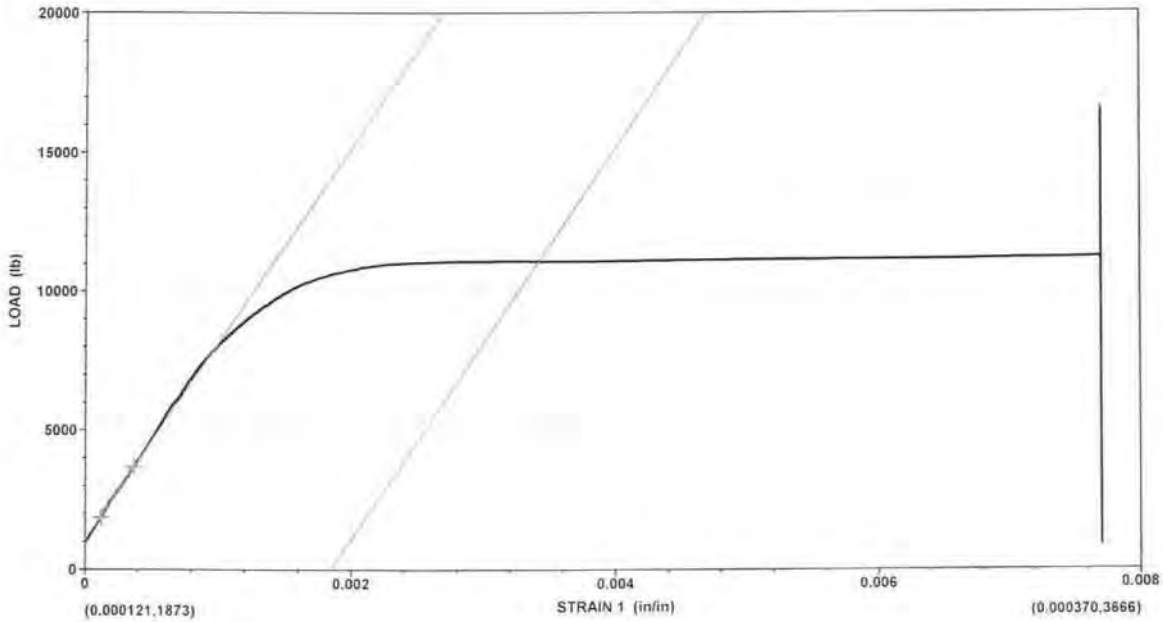
Time: 13:20:50
Elapsed: 00:01:52

Peak Load	12180 lb
Peak Stress	60900 psi
Modulus of Elasticity	23676204 psi
Yield @ 0.20% Offset	44300 psi
Yield @ 0.20% Offset	8860 lb
Man. Elong. @ Break	19.38 %

TWINING INC
3310 AIRPORT WAY,LONGBEACH,CA 90806

Specimen #:
OPERATOR:
JOB NAME:
JOB NUMBER:
HEAT NUMBER:

Geometry:	Area
Gage Length:	2.0000 in
Area:	0.2000 sq in



Date: 08/14/17

Time: 13:27:52
Elapsed: 00:01:51

Peak Load	16540 lb
Peak Stress	82700 psi
Modulus of Elasticity	35106200 psi
Yield @ 0.20% Offset	55400 psi
Yield @ 0.20% Offset	11080 lb
Man. Elong. @ Break	16.25 %

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Contact: Luis De Los Reyes
Twining Laboratories Of So. Ca
3310 Airport Way
LONG BEACH, CA 90806

TEST CERTIFICATE — EAR-CONTROLLED DATA

Date: 8/15/2017
Purchase Order Number: 090717
Work Order Number TWI004-08-08-23783-1

Desc.:	#4 SIZE REBAR
Project Name:	ARC-ONTARIO MUSEUM OF HISTORY AND ART STRUCTURAL ASSESSMENT
Project No.:	170427-3
Lab#:	1-RW-1

CHEMICAL ANALYSIS

Element		Result %
C	=	0.16
Mn	=	0.52
P	=	0.009
S	=	0.042
Si	=	0.09
Cr	=	0.04
Ni	=	0.10
Mo	=	0.01
Cu	=	0.50
V	=	0.000
Cb	=	0.002
Ti	=	0.000
Zr	=	0.001
Carbon Equivalent	=	0.27
Fe	=	Balance

Note: Carbon Equivalent calculated per ASTM A706/A706M-14 (para. 6.4)
Chemical Analysis performed by Optical Emission per SOP 2.02, Revision 19
Carbon and Sulfur by Combustion per SOP 7.00, Revision 14

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Respectfully submitted

Colleen Henehan
Quality Administrator

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TEST CERTIFICATE — EAR-CONTROLLED DATA

Date: 8/15/2017
Purchase Order Number: 090717
Work Order Number TWI004-08-08-23783-2

Desc.:	#4 SIZE REBAR
Project Name:	ARC-ONTARIO MUSEUM OF HISTORY AND ART STRUCTURAL ASSESSMENT
Project No.:	170427-3
Lab#:	2-RW-2

CHEMICAL ANALYSIS

Element		Result %
C	=	0.32
Mn	=	0.51
P	<	0.010
S	=	0.033
Si	=	0.08
Cr	=	0.14
Ni	=	0.10
Mo	=	0.01
Cu	=	0.23
V	<	0.001
Cb	=	0.001
Ti	<	0.001
Zr	=	0.001
Carbon Equivalent	=	0.43
Fe	=	Balance

Note: Carbon Equivalent calculated per ASTM A706/A706M-14 (para. 6.4)
Chemical Analysis performed by Optical Emission per SOP 2.02, Revision 19
Carbon and Sulfur by Combustion per SOP 7.00, Revision 14

FOR INFORMATION ONLY

Respectfully submitted

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Quality Administrator

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TWINING

APPENDIX 3
PLAN – LOCATION OF SAMPLES

MEMO

To	From	
Jim McLane **Architectural Resources Group** 8 Mills Place Pasadena, CA 91105 P: (626) 583-1401 F: (626) 583-1414	**Samuel Mengelkoch, SE** Associate	**May 13, 2015**

Project

14081 | Ontario Museum of History & Art

Subject

Proposed Materials Testing Program

Comments

This memo and accompanying diagrams outline our recommendations for materials testing to be conducted as part of the current study of the Ontario Museum of History and Art, located at 225 South Euclid Avenue in Ontario, California. This memo and accompanying documents may be furnished to the testing laboratory for their use.

The goal of the materials testing program is to confirm the strength of original concrete used in various areas of the building, including slabs, beams and walls, and to sample and test steel reinforcement used in the original construction. We will compare data received via the testing program to information from available copies of original structural drawings we have received from you. We anticipate the information will be useful in determining overall properties of the building necessary for an ASCE 41-13 Tier 2 Seismic Evaluation, and ultimately any effective rehabilitation strategies.

Structural Focus visited the site with you, Ashley Powell of ARG, and museum Director John Worden on March 20, 2015 to tour the building and discuss potential strategies for rehabilitation. Together we walked through the basement, ground floor, and upper floor, examining general configuration and condition of structural elements.

General Building Description

The Ontario Museum is a two-story, u-shaped building with two partial basement areas. The entrance of the building faces Euclid Avenue to the west. The north and south wings are single-story and approximately 30 feet wide and extend 97 feet to the west from the central portion of the building. The north and south wings are approximately 20 feet from grade to the top of roof ridge. The ground floor of the central wing is approximately 50 feet by 168 feet long. The second level of the central wing is positioned over the main corridor and the council chambers, and is approximately 50 feet wide by 72 feet long. The central wing is approximately 33 feet from grade to top of roof ridge. There is a basement area below the eastern side of the central wing, and a second small basement area near the western end of the south wing.

Roof systems typically consist of plywood sheathing over straight sheathing, spanning between wood trusses. The roof trusses span between the exterior reinforced concrete bearing walls in most areas, and to built-up (sistered joist) wood beams on the east end of the second floor, where a roof overhang extends to the east beyond the end of the truss, spanning from the built-up wood beams to the perimeter concrete wall.

The second floor consists of one-way reinforced concrete slabs spanning between reinforced concrete beams and girders. The reinforced slab in the collections storage area is 6 inches thick and spans between reinforced concrete beams that vary in size from 10 inches wide by 14 inches deep to 12 inches wide by 16 inches deep. The beams are supported by reinforced concrete girders that are 16 inches wide by 30 inches deep. At the interior second floor corridor, an 8-inch thick reinforced concrete slab spans between the interior reinforced concrete walls, and a reinforced concrete girder spanning above the entry hall. In the library / conference room (room 202) the reinforced concrete slab varies between 4 inches to 8 inches in thickness, and is supported by reinforced concrete beams that are 14 inches wide and 16 inches deep. These beams span between reinforced concrete walls below. At the second floor office areas (rooms 201 and 203), the slab is 4 inches thick, and is supported by 14-inch wide by 16-inch deep concrete beams, also spanning between reinforced concrete walls below.

The first floor of the central wing is mostly supported by a reinforced concrete slab-on-grade. The center / east area of the first floor, over the partial basement, consists of diagonal sheathing spanning to wood joists, which in turn span between perimeter reinforced concrete basement walls.

The lateral force-resisting system of the building consists of plywood roof sheathing transferring loads into the exterior reinforced concrete walls. At the second floor, the rigid reinforced concrete diaphragm transfers loads to the reinforced concrete walls, which transfer loads the to the reinforced concrete foundation system.

Information Needed

The information to be determined through the testing program is described below. Refer to the attached plans which show the existing space and suggestions of where to conduct the field testing.

1. Concrete strengths at bearing walls. Concrete compressive strength is indicated to be 2000 psi on original structural drawings. Please confirm the compressive strength of the concrete in bearing walls at select locations. This test may include taking a concrete core sample at locations indicated, and then testing for compressive strength in the laboratory.

2. Concrete strength at suspended slabs. Concrete compressive strength is indicated to be 2000 psi on original structural drawings. Please confirm the compressive strength in select areas of the concrete suspended slabs. This test may include taking a concrete core sample at locations indicated, and then testing for compressive strength in the laboratory.

3. Concrete strengths at beams. Concrete compressive strength is indicated to be 2000 psi on original

structural drawings. Please confirm the compressive strength of the concrete in beams at select locations. This test may include taking a concrete core sample at locations indicated, and then testing for compressive strength in the laboratory.

4. Reinforcement yield strength. Steel yield strength is not specified in available structural drawings. Please extract a coupon sample of reinforcement from a reinforced concrete bearing wall as indicated on accompanying diagrams, and conduct necessary testing to determine yield strength. This may involve testing for hardness and chemical composition, and inferring the yield strength from that data.

All areas where exploratory testing or sampling has occurred shall be patched by the testing lab to the satisfaction of the Museum. We request the testing laboratory submit recommended patching procedures prior to the start of the work.

With this memo, we are providing plan diagrams showing preferred testing locations. The testing locations shown are approximate and may be slightly adjusted by the testing agency in the field at their discretion, provided the information required may be obtained at the test location. While performing tests in the field, if the testing agency feels additional testing is necessary to fully gain the information requested, they should notify you for approval prior to proceeding.

Please do not hesitate to contact us if there are any questions regarding the project or this testing program.

ONTARIO MUSEUM OF HISTORY & ART

PROPOSED MATERIALS TESTING PROGRAM

STRUCTURAL FOCUS #14081

5/13/15 DIAGRAM 1/2

CMU ENCLOSURE FOR MECHANICAL EQUIPMENT

ONE (1) WALL CORE SAMPLE AND ONE (1) REINFORCEMENT SAMPLE, CORE TO BE LOCATED BELOW ELEVATION OF TOP OF CMU ENCLOSURE WALL, MINIMUM 1 FT ABOVE GRADE

TEMP. GALLERY D 100

TEMP. GALLERY C 101

INST. & PREP STORAGE 102

TEMP. GALLERY B 103

EDUCATION GALLERY A 104

MUSEUM STORE 105

STORAGE 109

STORAGE 111

UP

DN

CONCRETE LIGHTWELL WITH STAIRS TO BASEMENT

WOOD COLUMNS ON CONCRETE SLAB

MENS 108

EDU. DIRECTOR 110

ONE (1) WALL CORE SAMPLE

CONCRETE AND STONE PAVING

CONCRETE LIGHTWELL BELOW

1-C-W-2 (core wall)

A2.3

MAIN CORRIDOR 112

COUNCIL CHAMBERS 113

KITCHEN 114

ADMIN. STOR. 115

ADMIN. STOR. 117

ONE (1) WALL CORE SAMPLE

WOMENS 116

ELECTRICAL 119

VAULT COLL. STORAGE 121

CONCRETE LIGHTWELL WITH STAIRS TO BASEMENT

New Location of sampling to be performed at the exterior face
1-C-W-1 (core wall)
1-R-W-1 (rebar wall)

1-C-W-3 (core wall)

PERM. COLL. GALLERY 127

PERM. COLL. MID. GALLERY 122

PERM. COLL. FRONT GALLERY 120

CMU ENCLOSURES FOR MECHANICAL EQUIPMENT

97'-5¾"

39'-11"

9'-9½"

54'-2½"

54'-2⅝"

59'-1¾"

3'-1½" 29'-4½" 21'-1½" 10'-8⅜" 14'-0⅛" 8'-10" 13'-11⅝" 10'-6¾" 2'-4½" 3'-11"

13'-1½" 11'-1" 14'-0½" 9'-9½"

1 2 3 4 5 6

A B C D E F G H J K L

NOTES

1. TESTING AGENCY SHALL EXTRACT MINIMUM SAMPLE SIZE NECESSARY AND EMPLOY EXTRACTION AND HANDLING METHODS TO RELIABLY ESTABLISH INFORMATION REQUESTED.

2. ALL COMPRESSION CORE TEST SAMPLES SHALL BE LOCATED SO THAT NO EXISTING REINFORCEMENT IS DAMAGED OR DESTROYED. PROVIDE SCAN AS NECESSARY TO AVOID EXISTING REINFORCEMENT.

3. PROVIDE SCAN AS NECESSARY TO LOCATE REINFORCEMENT FOR REINFORCMENT TEST SAMPLES.

N

0 8 16

1/8" = 1'-0"

ONTARIO MUSEUM OF HISTORY & ART

PROPOSED MATERIALS TESTING PROGRAM

STRUCTURAL FOCUS #14081

5/13/15 DIAGRAM 2/2

ONE (1) WALL CORE SAMPLE, CORE TO BE LOCATED BELOW ELEVATION OF ADJACENT ROOF LEDGER

2-C-W-5 (core beam)
2-R-W-2 (rebar wall)

2-C-W-4 (core wall) below ledger

ONE (1) WALL CORE SAMPLE AND ONE (1) REINFORCEMENT COUPON SMAPLE

2-C-B-6 (core beam)
2-C-S-7 (core slab)

ONE (1) SLAB CORE SAMPLE AND ONE (1) BEAM CORE SAMPLE FROM THIS AREA

ONE (1) SLAB CORE SAMPLE AND ONE (1) BEAM CORE SAMPLE FROM THIS AREA

2-C-S-9 (core slab
2-C-B10 (core beam)

2-C-W-6 (core wall)

ONE (1) WALL CORE SAMPLE, CORE TO BE LOCATED BELOW ELEVATION OF ADJACENT ROOF LEDGER

NOTES

1. TESTING AGENCY SHALL EXTRACT MINIMUM SAMPLE SIZE NECESSARY AND EMPLOY EXTRACTION AND HANDLING METHODS TO RELIABLY ESTABLISH INFORMATION REQUESTED.

2. ALL COMPRESSION CORE TEST SAMPLES SHALL BE LOCATED SO THAT NO EXISTING REINFORCEMENT IS DAMAGED OR DESTROYED. PROVIDE SCAN AS NECESSARY TO AVOID EXISTING REINFORCEMENT.

3. PROVIDE SCAN AS NECESSARY TO LOCATE REINFORCEMENT FOR REINFORCMENT TEST SAMPLES.

4. DIAMETER OF BEAM SAMPLES SHALL NOT EXCEED 25% OF DEPTH OF BEAM, SHALL BE LOCATED WITHIN THE MIDDLE THIRD OF THE BEAM SPAN, AND SHALL BE LOCATED WITHIN THE MIDDLE THIRD OF THE TOTAL BEAM DEPTH (INCLUDING SLAB DEPTH.)

1/8" = 1'-0"

N

SUSTAINING CULTURAL HERITAGE COLLECTIONS

Final Report

Prepared for:

Museum of Art and History, Ontario

Prepared by:

ARG Conservation Services

San Francisco, California

August 2013

CS11001

Table of Contents

1. Executive Summary

The Museum of History and Art, Ontario (MHAO), located at 225 South Euclid Avenue in the City of Ontario, California, occupies an historic building that originally served as Ontario's City Hall. Constructed in 1937 and funded by the Works Progress Administration (WPA), it is a locally designated historic landmark and has been determined by the California State Office of Historic Preservation as eligible for the National Register of Historic Places. Since 1979 it has served as the Museum of History and Art, Ontario.

The museum collections are primarily historical artifacts, printed archives, photographs, regional paintings, drawings and sculpture that document the economic, social and cultural history of Ontario and nearby communities.

A planning grant from the National Endowment for Humanities for Sustaining Cultural Heritage Collections provided the Museum with an opportunity to examine current threats to the collection and develop a Master Preservation Plan. The study and plan are based on a risk assessment approach that takes into consideration a comprehensive examination of issues that impact collections preservation including governance, resources, the physicality and functions of the site and buildings housing the collections, and environmental factors such as lighting, pollutants, and climate systems. The building as a container for the collections was assessed with regard to space use, capacities, adjacencies, and functionalities. Contributing to the complexity of the Museum's collections preservation goals is that they occupy an historic building. The Museum functionalities must be appropriately balanced with preservation goals for both the collections and the historic building.

The project team, consisting of the Museum Director and curator with consulting collections conservator, historic preservation architects and an engineer, were tasked with objectives as described below.

Objectives

- Determine collections needs for preservation.
- Develop priorities in consultation with museum professionals and constituencies.
- Respect and preserve the historic building.
- Develop strategies that are environmentally, socially and economically sustainable.
- Determine recommendations for feasible short, medium and long-range sustainable solutions that improve collections care.

Findings of the study are presented as relative threats to the collection with recommendations that consider sustainable solutions with regard to efficiencies for energy consumption and functionalities. As with all buildings, priority is given to health and human safety, then collections preservation.

Notable achievements of the Museum are its professional and experienced staff, good interpretive exhibitions and exhibition spaces, good control of ultraviolet and visible light in the galleries spaces, and continued strides in inventorying the collection.

With regard to threats to the collections, of highest concern are code compliance issues, namely fire egress from the second floor that is currently used for offices and the majority of museum collections storage. There is no fire suppression system, and the load capacity of the second floor should be

investigated to determine whether it can continue to support the current and/or future collections housed in that location.

The next order of concern is that the collections are immensely overcrowded and there is no adequate space or human resources to appropriately inventory, sort, house and store the volume of collections.

The next order of concern is the HVAC systems have reached their life expectancies. This is a golden opportunity to upgrade the climate system design for the benefit of both the collection and the building as there is a real potential for improved energy efficiencies while at the same time improving the climate for collections. The climate systems design upgrades should take place in coordination with planned improvements to building functionalities and space use as there is potential for relocating some of the HVAC units to achieve improved system performance.

Additional threats to the collections and potential solutions are further detailed in this report and the appended Master Preservation Plan. Solutions to the highest priority threats alone will require a thoughtful and integrated design approach. A summary of high level recommendations are as follows:

Immediate Interventions

- Engage a structural engineer familiar with historic buildings to assess load capacities.
- Embark on an integrated design for more immediate upgrades of building space use and climate systems improvements:
    - Resolve code issues (fire egress and suppression systems).
    - Identify additional space for collections storage and processing.
- Expand resources and funding capacities.
    - Hire a full time collections manager.
    - Determine funding feasibilities for larger building campaign.

Mid-Range Solutions

- Implement architectural and environmental solutions in the existing building:
    - Employ Lemon Building or other facility for Museum staff offices and meeting space, and exhibitions preparation.
    - Consider utilizing Jail House for isolating incoming collections to avoid contaminating permanent collection with pests or mold.
    - Construct separate building (possibly temporary) for housing collections.
- Continue expanding funding and resource capacities.
    - Embark on a larger building expansion campaign, pending feasibility study.
- Refine long-term building expansion plans.

Long Range Solutions

- Embark on larger building expansion.

The Museum staff provides a high level of professionalism but is limited by resources and a building that was not purposely built as a Museum. The building occupies a site that has excellent potential for expansion to a cultural center, and the charm of the historic building lends itself to certain functionalities that can enhance a Museum visitor's experience. While planning for a longer-term

expansion to meet all its programming needs, there are more urgent needs that have direct impact on collections preservation and human health and safety that should be addressed as soon as possible.

As the Museum considers further growth, it will benefit from continuing to engage, in the planning and implementation phases, expertise from collections conservation, museum climate engineering, and historic preservation architects, in the planning and implementation phases who understand issues unique to the museum and historic building.

2. Project Team

Client

City of Ontario – Community and Public Services Agency – Museum of History and Art, Ontario

Mark Chase, Director, Community and Public Services Agency

Theresa Hanley, Director, Museum of History and Art, Ontario

General Contractor

Katharine Untch, Fellow AIC, Director, Conservation Division, ARG Conservation Services

Jennifer Correia, Associate Conservator, ARG Conservation Services

Sub Contractors

James McLane, AIA, LEED AP, Associate Principal, Architectural Resources Group

Michael C. Henry, PE, AIA, PP, Watson & Henry Associates

3. Methodology

This project follows a risk assessment approach to sustainable collections preservation. The process incorporates existing needs and observations into a prioritized assessment based on risk factors; and offers solutions that address priorities and cost efficiencies.

Background

The Museum has already achieved a level of self awareness through the work of its staff and professional consultants. Previous studies include Conservation Assessments of the building (1993) and collections (1994); a Long Range Interpretive Plan, and a Strategic Outlook Plan (2004) that explores overarching building, site and collections needs.

Background documents, existing needs and concerns were reviewed by the project team.

Site Visit

The team conducted a site visit in August 2011 and interviewed the staff. Interviews were followed by a facilities tour, where the team documented current conditions and shared immediate observations with the staff.

The site visit culminated with a Workshop where the museum staff and key stakeholders discussed the following topics:

1. Project Goals
2. Preliminary observations
3. Institutional objectives
4. Constraints
5. Possible strategies and feedback

Risk Assessment

Information from background materials, interviews, site visit and climate data were incorporated into the Risk Assessment to help define recommendations for immediate to longer term action items based on risks to collections.

The method used for this study is a simplified version of risk assessment methods used in other industries. An appended bibliography includes publications on preventive conservation and risk assessment as applied to cultural collections. For example, a model adapted to cultural material developed by Waller[1] uses additional parameters such as *fraction susceptible, loss in value* and *extent* to determine the magnitude of risk. For this study, however, the basic factors of *severity* and *frequency* were utilized since the objective was to determine relative priorities based on risks within available resources, and to develop a feasible Master Preservation Plan that can be utilized as a planning tool for the museum.

[1] Waller, Robert, 1995. "Risk Management Applied to Preventative Conservation." Pp. 21-28 in: Rose, C. L., Hawks, C. A. and Genoways, H. H. (eds.). *Storage of Natural History Collections: A Preventative Conservation Approach*. Society for the Preservation of Natural History Collections, Iowa City, x+448pp.

Risk Parameters

When analyzing risks, not all hazards or potential hazards pose as great a threat to collections. In determining risks to collections, one must consider the severity of the risk as well as the frequency. For example, a catastrophic event such as a fire or earthquake may not occur very frequently, but the impact on loss of collections could be severe. Conversely, handling of collections happens almost on a daily basis and while not be considered as severe an impact, the wear and tear, the amount of damage (and the potential for dropping an item) makes something generally considered less of a risk, be a much higher overall risk than expected.

For this reason, we have defined the following categories for the risk assessment analysis:

- *Observations* – items as observed from reviewing background materials, interviews, site visits and climate data;
- *Potential Threat to Collections* – a brief definition of the anticipated risk(s) involved related to observations;
- *Mitigation Measures* – recommendations or steps that can be taken to mitigate risks to collections;
- *Level of Severity* – a number 1 to 5 where 1 is low level of negative impact to the collection and 5 is a high level of damaging affects to the collection;
- *Frequency of Occurrence* – a number 1 to 5 where 1 is infrequent occurrence and 5 is frequent occurrences;
- *Risk Factor* – a numerical value from multiplying Level of Severity with Frequency of Occurrence. The higher the number, the greater the overall risk.

From these approximations, the appended sample risk assessment for collections was developed that is customized to the current conditions observed at the Ontario Museum facility. This is not an exhaustive list, nor does it follow precise mathematical constructs; however, it does provide a present time snapshot of the issues that should be of greatest concern at this juncture.

Physical Evidence

During this study, the conservator examined the collections as stored and on exhibit at the main building facility. Actual conditions were noted to determine whether potential risks were causing any damage. For example, dyes tend to fade with exposure to visible and ultraviolet light. Were collection items already faded or did some items still have bright colors? If fluctuations in temperature or relative humidity are of concern, were any of the collection items showing signs of deterioration or damage typically associated with climate fluctuations such as delaminating paint, warping or corrosion? Direct observations of collection conditions and evaluation of the frequency and severity of collection conditions also contributed to the outcomes of the risk assessment.

Climate Assessment

During the site visit, current readings were taken for climate (temperature and relative humidity) and light (visible and ultraviolet). Readings were taken at random locations inside the Museum building, Jail House and Lemon Building, and this climate data is appended to the report. The museum staff submitted previous climate data for review and analysis. The team suggested updating some of the climate monitoring system and submitting updated data recorded over the next several months for

further analysis near the end of the project timeline. The recorded data was analyzed and a summary of the findings are included in the findings of this report.

Master Preservation Plan

A Master Preservation Plan was developed from the Risk Assessment and is appended to the report in matrix form. The matrix summarizes risks by priorities, suggests possible resolutions, and outlines a sequencing schedule to coordinate activities that are likely to have action dependencies.

4. Findings

Summary of Collection Findings

Needs as defined by Museum

Highest priority needs were defined by the museum staff as follows:

Museum's Top Concerns

- How to use the basement;
- Building envelope for security and climate (doors and windows);
- Lemon building appropriate use;
- Second floor roof leaks for the past ten years.

Museum's Other Concerns

- Disaster preparedness;
- Lighting;
- Xeriscaping;
- Drainage.

Strengths

The Museum has several strengths that reduce risks to collections including:

- A professional, caring and experienced staff;
- Good interpretive and exhibition spaces;
- Progress with the collection inventory.

Observed Risks

The highest risks to collections as identified are presented in the appended prioritized list and include:

- Overcrowding of collections storage;
- Lack of space for basic collections management duties;
- Limited space and unsafe storage for exhibition preparations and materials;
- Fire hazards, combustible materials, lack of fire suppression system and limited egress;
- Moisture in basements and exterior drainage issues;
- Potential overloading on second floor.

In addition, museum staff provided a more detailed list of needs and concerns that is appended to this report. The same themes and issues appear in the risk assessment and outcomes in the Master Preservation Plan.

Summary of Environmental Findings

Climate Assessment

Climate drives the thermal and moisture environmental conditions inside a building and environmental management through non-mechanical and mechanical strategies offsets the risks to collections posed by the exterior environment.

The International Climate Zone classification for Ontario is Warm-Dry (3B). The climate data for Ontario CA may be summarized as follows[2]:

- Summer median extreme high temperature: 109 °F (dry bulb), 61 grains water/lb. dry air;
  Summer 1% occurrence, high temperature: 98 °F (dry bulb), 69 grains water/lb. dry air;
  Winter 99.0% occurrence: 38 °F (dry bulb), 27 grains water/lb. dry air;
  Winter median extreme low temperature: 30 °F (dry bulb), 18 grains water/lb. dry air;
- Summer median extreme high humidity ratio: 132 grains water/lb. dry air, 87 °F (dry bulb);
  Summer 1% occurrence, high humidity ratio: 103 grains water/lb. dry air, 80 °F (dry bulb);
- Median daily dry bulb temperature range: 25 °F;
- Mean precipitation:
  >4.0 inches per month: February;
  >3.0 and <4.0 inches per month: January;
  >2.0 and <3.0 inches per month: March, December;
  >1.0 and <2.0 inches per month: April, October, November;
  <1.0 inch per month: May, June, July, August, September;
- Freeze-thaw cycles, annual average: 2 cycles.

On the basis of degree days (65 °F Base), annual cooling loads are 0.89 times annual heating loads. With respect to infiltration, sensible and latent cooling loads are 33% of sensible and latent heating loads.

In this climate, mechanical systems must address:

- Sensible heating (to 68 °F): January, February, March, April, May, June, July, September, October, November, December;
- Sensible cooling (to 75 °F): April, May, June, July, August, September, October;
- Dehumidification (to 60%): June, July, August, September;
- Humidification (to 30%): January, February, March, November, December.

[2] Climate data sourced from National Climate Data Center, *Engineering Weather Data, Version 1.0, 1995*, except for precipitation data which was sourced from Weather Channel, http://www.weather.com/weather/wxclimatology/monthly/graph/USCA0806 , accessed 16 December 2012.

Warm-Dry climates pose risks to collections longevity due to:

- Desiccation of collections due to low relative humidity;
- Wide annual range of relative humidity between dry and moist seasons.

Building Envelope Performance Assessment

The interior environment of a building is a result of climatic interaction with the building envelope, with contributing effects from the site and the use/occupancy of the building. The performance of the exterior envelope sets limitations on the differences in temperature and atmospheric moisture that can be economically maintained between the exterior conditions and the interior environment. The building envelope is a primary factor in maintaining interior environmental conditions conducive to collections conservation.

In the Warm-Dry climate zone, the hygrothermal performance of a museum building envelope should be able to resist moisture vapor migration from inside to the outside as well as resist thermal energy transfer from outside to inside. In order to maintain interior conditions for collections longevity, the thermal and moisture vapor gains through the envelope must be reduced by active mechanical systems, and operation of these systems is directly related to energy consumption. Maintaining acceptable interior environmental conditions are an important issue for collections on loan, particularly if the loaned collections originate in a museum outside the Warm-Dry climate zone.

The Museum of History and Art, Ontario, is generally constructed of reinforced concrete walls, concrete slabs on grade for the first floor and reinforced concrete floor assembly for the second floor. The roof assembly is wood-framed with terra cotta roofing tiles; the roof framing supports the finished ceilings. Windows are single-glazed metal frame and sash and doors are wood. The MHAO building envelope, in a Warm-Dry climate zone, is equivalent to American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE) type IV and, if performing to capacity, should be able to support an ASHRAE Class B collections environment.[3] ASHRAE defines a Class B collections environment as having:

> *Moderate risk of mechanical damage to high-vulnerability artifacts; tiny risk to most paintings, most photographs, some artifacts, some books; no risk to many artifacts and most books. Chemically unstable objects unusable within decades, less if routinely at 86°F, but cold winter periods double life.*

At present, ASHRAE type IV envelope performance at the MHAO is limited by the poor infiltration performance of the windows and doors, which allow excessive infiltration of exterior air and particulates and gaseous pollutants.

Environmental Management Performance Assessment

The collections spaces in the Museum of History and Art, Ontario, are typically conditioned by exterior mounted combination heating cooling units serving individual zones. Two types of systems are used:

- North Wing (two zones, installed 1994): Exterior air-cooled combination air conditioner/heat pump with interior-mounted fan coil unit, evaporator coils and steam humidifier. Each zone is served by

[3] Envelope and collections environments classifications based on Chapter 23, Museums, Galleries, Libraries and Archives, of the *2011 ASHRAE Applications Handbook.*

interior sheet metal ductwork and conventional residential quality air filtration and is controlled by a thermostat and a humidistat;
- South Wing (three zones, first installed 1982) Exterior-mounted air handling units (AHU) with gas-fired warm air heat and direct expansion cooling with integral air-cooled condenser. The zone is served by exterior and interior sheet metal ductwork and conventional residential quality air filtration and the zone is controlled by a thermostat. Evaporative humidifiers, part of the original installation, appear to have been removed;
- Second floor (unknown installation date): similar to the South Wing.

The MHAO staff has an established environmental monitoring program; this program was enhanced with equipment and changes recommended during the site visit in August 2011. Review of data collected by staff from 06 December 2011 through 24 March 2013 indicated the following environmental management issues in the primary collections areas (Trend plots of the three datasets are included in Appendix G):

- **North Wing (Trend labeled as Center North Galleries):**[4]
  Relative Humidity, winter average: Class B target (not less than 40%RH) exceeded during 2012-3 winter (33 %RH);
  Relative Humidity, minimum: Class B limit (30%RH) routinely exceeded in 2012-3 winter and 2012 spring, with lowest value being 13%RH;
  Relative Humidity, seasonal range: Class B limit for maximum seasonal range (20%RH) exceeded during 2012-3 winter (13 to 51%RH, or 38%RH range) and routinely exceeded in 2012 spring (27 to 64%RH, or 37%RH range);
  Relative Humidity, summer average: Class B target (not more than 60%RH) is satisfied during 2012 summer (46%RH actual average);
  Relative Humidity, maximum: Class B limit (70%RH) not exceeded in 2012 summer (56%RH);
  Temperature control: Very good and consistent with Class B throughout the year;

- South Wing, Gem of the Foothills zone (Trend labeled as Gem of the Foothills):[5]
  Relative Humidity, winter average: Class B target (not less than 40%RH) is satisfied during 2012-3 winter (43 %RH);
  Relative Humidity, minimum: Class B limit for minimum (30%RH) is satisfied in 2012-3 winter and 2012 spring, with lowest RH being 31%;
  Relative Humidity, seasonal range: Class B limit for maximum seasonal range (20%RH) marginally exceeded in 2012-3 winter (31 to 53%RH, or 22%RH range);
  Relative Humidity, summer average: Class B target (not more than 60%RH) is satisfied during 2012 summer (45%RH actual average);
  Relative Humidity, maximum: Class B limit (70%RH) not exceeded in 2012 summer (53%RH);
  Temperature control: Very good and consistent with Class B;

- Second Floor (Trend labeled as Second Floor):[6]
  Relative Humidity, winter average: Class B target (not less than 40%RH) exceeded during 2012-3 winter (36%RH);
  Relative Humidity, minimum: Class B limit (30%RH) routinely exceeded in 2012-3 winter, with

[4] Data not available for 6 January 2012 to 6 March 2012 and 6 September 2012 to 24 October 2012

[5] Data not available for 6 January 2012 to 6 March 2012 and 6 September 2012 to 24 October 2012

[6] Data not available for 17 April 2012 to 24 October 2012

lowest value being 12%RH;
Relative Humidity, seasonal range: Class B limit for maximum seasonal range (20%RH) exceeded during 2012-3 winter (12 to 71%RH, or 59%RH range);
Relative Humidity, summer average: Data not available;
Relative Humidity, maximum: Class B limit (70%RH) exceeded in 2012-3 winter (71%RH);
Temperature control: Very good and consistent with Class B.

The above data and observation of the systems and the building envelope leads to the conclusion that the present mechanical system and the building envelope lack the capacity for the minimum relative humidity control (Class B) necessary for collections conservation in a major museum. It should be noted that the newer system in the North Wing performs worse than the system in the Gem of the Foothills zone in the South Wing.

Discussion of Findings

Currently the museum staff has a higher understanding of needs for collections care and preservation than what the current level of resources can support. In order to achieve a more sustainable approach to collections care, the museum must examine and improve its funding capacities for long term operational costs.

At present, the level of work required to safely maintain the collection outweighs available resources. The museum urgently needs a full time collections manager addition to its staff to manage the dire collection storage needs and relieve the curator of day-to-day collections responsibility so that the curatorial position can work on exhibition development and other necessary collections management tasks. The collections are in need of professional assessment in regard to interpretive potential and mission- appropriateness which is likely to take several years. Any culling of the collection that results will help to alleviate space needs, freeing up valuable collections space for incoming collections.

The Museum urgently needs alleviation of overcrowded collections storage space and architectural solutions to bring key spaces up to code compliance; namely egress from the second floor where art is currently stored, and an assessment of the load capacity of the same space. Long term use of the second floor for offices would require equal office space on the first floor to comply with ADA, or an elevator would need to be installed for access. Permanent collections storage on the second floor will have load capacity issues for seismic activity.

Three general scenarios were discussed for alleviating overcrowding and providing improved collections storage.

Option Strategy A: Use the Lemon building or other facility for collections storage. It would be more costly to upgrade the Lemon building to accommodate collections storage. Floor load capacities are yet unknown and could be more costly to upgrade. Lighting, foundation and ventilation would need to be upgraded. Water intrusion would need to be investigated.

Option Strategy B: A lower cost solution would be to expand collections storage temporarily, for example in another temporary building. This would provide time to further process and identify collections storage needs and volumes. It may be feasible to use the Jail building for incoming collections to quarantine prior to processing. Pending assessment by a structural engineer, it may be feasible to utilize the second floor of the Museum building for collections storage and relocate the office to the Lemon building. The Lemon building is currently set up for office use so this would be a lower cost transition. There is an area in the back of the building with high open ceilings that could serve as

exhibition preparations space. Retrofitting the Museum building and Lemon building for these purposes would be a more cost effective solution. Elevator access to the second floor would also be desirable for moving collections on a day-to –day operational basis.

Option Strategy C: A new building for collections storage could be constructed more immediately adjacent to the existing buildings with a future expansion to follow at a later phase.

5. Recommendations

Collections Management

The museum urgently needs additional resources for managing collections. The current level of staffing cannot keep up with the size and level of collections needs. The museum would benefit from an additional full time collections manager position immediately. This position will provide additional consistency with collections processing, can help supervise additional grant funded projects and volunteers, and free up the Curator position to address other duties such as the intellectual capacities of the collection, historical research, interpretation, culling and planning exhibitions.

Collections Storage Space Requirements

With regard to space requirements for collections storage, a few factors should be considered. There are different approaches for calculating space needs for collections storage. One is to just look at current storage space and add a factor such as 10% or 15% growth over the use expectancy of a building's occupancy before the next anticipated expansion campaign. This approach may not be the most effective for the Ontario Museum for several reasons.

1. The museum does not yet have a complete inventory of its holdings. Its limited staff cannot keep up with existing, recent and continued incoming collections. Several items are in boxes that have not yet been processed.
2. Only a portion of the collection has been re-housed with additional padding, protective sleeves or other housing materials. Many boxes are overcrowded. Appropriate housing will likely expand space needs.
3. Collections storage space needs are more accurately determined by calculating from the collection items outwards. For example, a work of art on paper is rarely stored just stacked in a pile. It typically has some type of housing such as a folder or matt to protect it. A three-dimensional object may have padding or support, a costume will have a padded hanger (wider than a regular hanger that takes up more space) and some type of protective cover. The folder, matt, hangar, cover, etc. are all types of housing. It is the housing dimensions that are considered when sizing for a box or drawer. Then the box or drawer dimensions determine sizes for shelving, cabinets and racks. For a collection in the current state at the Ontario Museum, a more in depth study would be needed to determine collections space needs as most of the collections are still housed in appropriately, crowded into boxes that are minimally accessible. For these reasons, the best scenario for estimating space needs would be to consider an expansion of about 3 x the current number of boxes. This is because for every box of material that has been processed, the Museum staff's experience is that when re-housed, one box of unprocessed material takes up about three boxes when padded or housed more appropriately. This total estimated number of boxes could be utilized for determining needed shelving space. This calculation does not include items that are not stored in boxes. A similar approach would be required for those items.
4. The Museum needs access to the collections and a complete inventory (with photo identification) to fully understand what it has. Only then can they effectively undertake the process of culling the collections and possibly de-accession items that may be repetitive, easily replaceable, or not meet the collecting mission criteria. It remains unknown how much of the collection could be culled and what impact that would have on space needs. Curatorial staff

would have to come up with an estimated percentage of collections to be culled. This percentage will need to be taken into consideration in addition to an estimated percentage for collections growth.

5. The percentage for collection growth will need to be determined by the curatorial staff in considering the recent and long-term history of collection growth, as well as any anticipated incoming collections. Curatorial staff typically examines potential new items prior to their coming into the collections so that the Museum does not become a dumping ground for donations that then cost precious time and resources to process with a larger percentage having to be disposed of.

A "collections space needs assessment" would be an appropriate next step in determining how much space would be required for short term temporary and long-term collections storage.

Building and Site Improvements

The historic building is impressive and formal, reflecting its historic context within the City of Ontario and its surrounding communities. The design and open courtyard strongly connects to the community. Its current use as a museum is much better than anticipated by the consulting architects as it provides an inviting space for visitors. It has a very high potential for adaptations that will increase its appeal and functionalities.

The building was not designed as museum to accommodate all museum functions; for example, there was never any space designed for dedicated collections storage.

The historic building can also be interpreted as a collection item. It is also at risk of further loss of historic integrity. A historic preservation architect should be involved in coordinating the multiple aspects of planning and design to provide continuity in oversight to any renovation or expansion project. An historic preservation architect can coordinate a design team that will likely include structural mechanical, electrical and plumbing engineers. An engineer experienced in current climate systems for museums will be able to determine systems and zoning efficiencies in coordination with HVAC specialists.

The collections and building preservation issues at the Ontario Museum will not be resolved with casual design advice. Design solutions need to be museum and historic building specific. Further studies and design work should be approached on a building and site wide basis. The type and location of an HVAC unit will impact the collections, gallery and storage space, exterior of the building, and possibly the functionality and preservation of the historic building's envelope or historic fabric.

Other project improvement opportunities may coordinate. For example:

- New egress hardware may be required when air filtration is remedied for doors;
- Study the pros and cons of using interior spaces for HVAC systems;
- Study future exhibit configuration when designing HVAC.

Environmental Improvements

Based on review of the 2012 monitoring data, environmental management of the collections spaces at the Museum of History and Art, Ontario, does not achieve Class B; for comparison, loaned collections

typically require ASHRAE Class A conditions. With systems and envelope improvements, the MHAO should be able to sustain Class B conditions at a minimum during extreme annual low moisture events in winter and Class A conditions for the balance of the year. Unfortunately this is not the case at present.

Full analysis and diagnosis of the environmental management performance at the Museum of History and Art, Ontario are beyond the scope of this report, but the data collected during 2012 are sufficiently indicative of a performance problem with interior environmental management, particularly with respect to relative humidity control. The performance problem is likely to be attributable to the following:

1. The windows and doors, and possibly any penetrations through the walls and ceilings of the collections spaces, allow rapid equalization of interior and exterior moisture vapor;
2. The various mechanical systems are not capable of maintaining the necessary moisture levels during winter and spring. This may be due to excess outside air, insufficient humidification capacity or humidifier or controls failure;
3. A combination of the above.

General strategic guidance for replacement of the mechanical systems includes:

- Planning and execution of mechanical systems improvements must be integrated with planning and execution of other recommendations in this report, notably: building envelope improvements, source moisture control and use of spaces for collections;
- Electrical requirements will be directly affected by the size and type of mechanical systems;
- Realistically achievable performance criteria for the system should be developed in accordance with ASHRAE Chapter 23 (2011). Performance criteria must be balanced against reliability, maintainability and energy efficiency. Tight performance criteria are of no benefit if the system operation is unreliable or economically unsustainable;
- Systems and equipment serving museum zones must be available and operate 24 hours per day, seven days per week, 52 weeks per year without interruption and without regard to occupied/unoccupied states or utility supply schedules;
- HVAC zones in the building must be separated by keeping the interior doors between the zones closed. This was observed to be a notable problem during the site visit;
- Controls must be calibrated annually;
- Ductwork must be located in conditioned spaces.

6. Conclusion

A comprehensive set of collection and building-specific recommendations have been outlined in the section above, and the appended preservation plan matrix (matrix) attempts to phase and integrate these recommendations. MHAO would benefit from some immediate interventions, such as hiring a collections manager, culling the collection, and embarking on a short to mid-term planning and design study for short term building use and environmental solutions.

For long term goals, any future expansions will need to preserve the historic integrity of the building. Because of the historic nature of the building and the museum's collections, engaging a team of architects and conservators experienced in historic buildings and museums will be paramount in achieving appropriate design solutions. As a local landmark and eligible building to the National Historic Register, any expansion will be subject to a rigorous review process by the California State Office of Historic Preservation. With appropriate plans, the Museum can achieve a more feasible and sustainable solution that preserve collections and the building's history, while maximizing energy cost savings and opportunities for exhibits.

The appended matrix is a combined risk assessment and five-year plan, and lists issues that were identified by the team and staff, and articulates risks and possible resolutions for each issue. High priority activities were assigned to resolutions that address life safety concerns. To aid in implementation of possible resolutions, a five year plan is included that breaks recommended tasks into museum policy/administration, planning and/or design, and construction/implementation actions. Some of the possible resolutions require decision-making regarding strategies for achieving the museum's goals.

Short-Term Actions

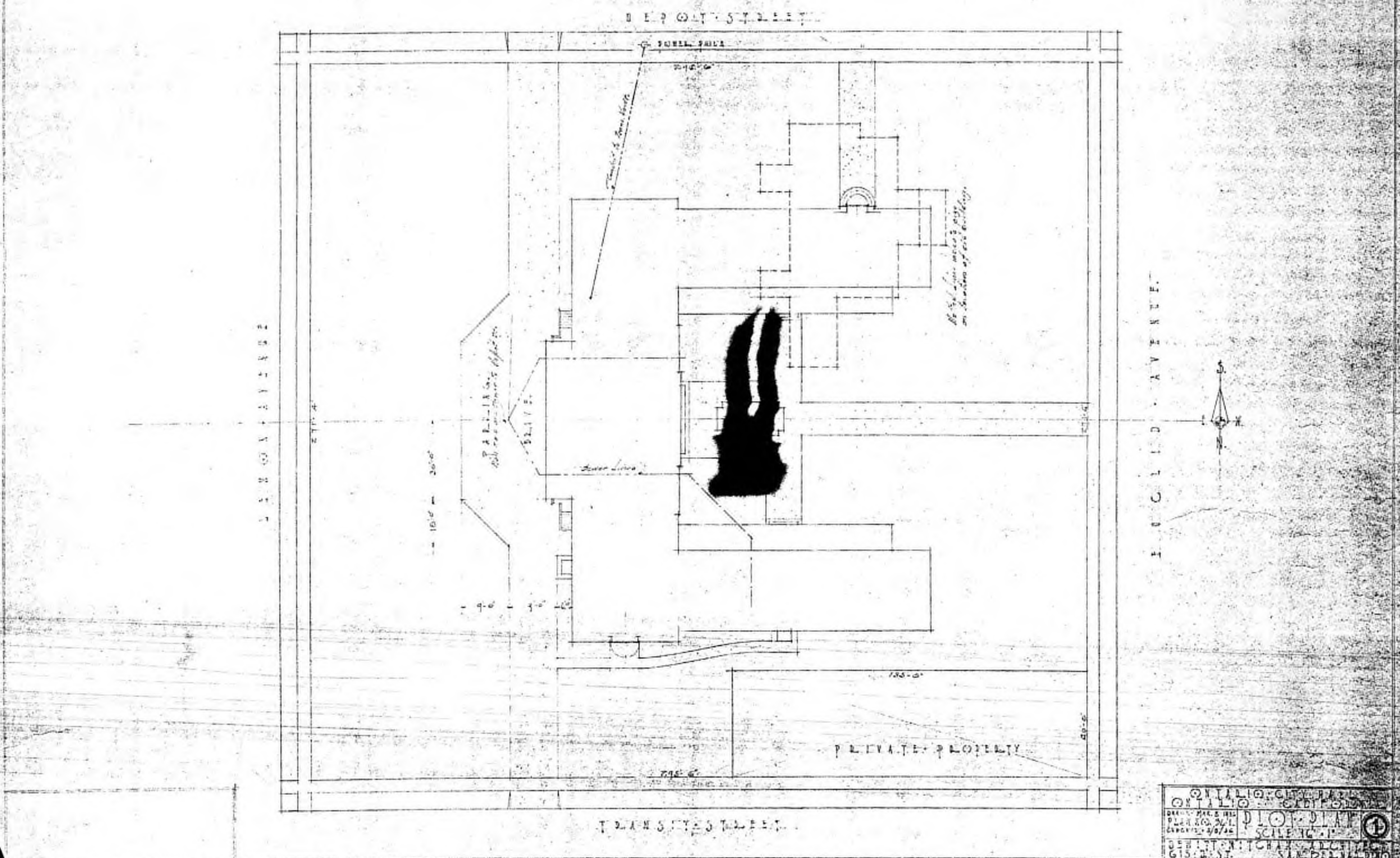
Overall short-term actions includes addressing high priority items that pose high risks for fire and life safety or tasks that can be implemented at a fairly low cost, such as weatherproofing. Implementing further studies of the building and its mechanical systems area also included in the near term, so that informed decisions can be made in regard to future design of the building and exhibit spaces. A cyclic maintenance plan is also recommended for the building as a preventative maintenance tool and strategy for keeping the building weather-tight. Fundraising activities need to be implemented to raise capital for longer term capital improvements.

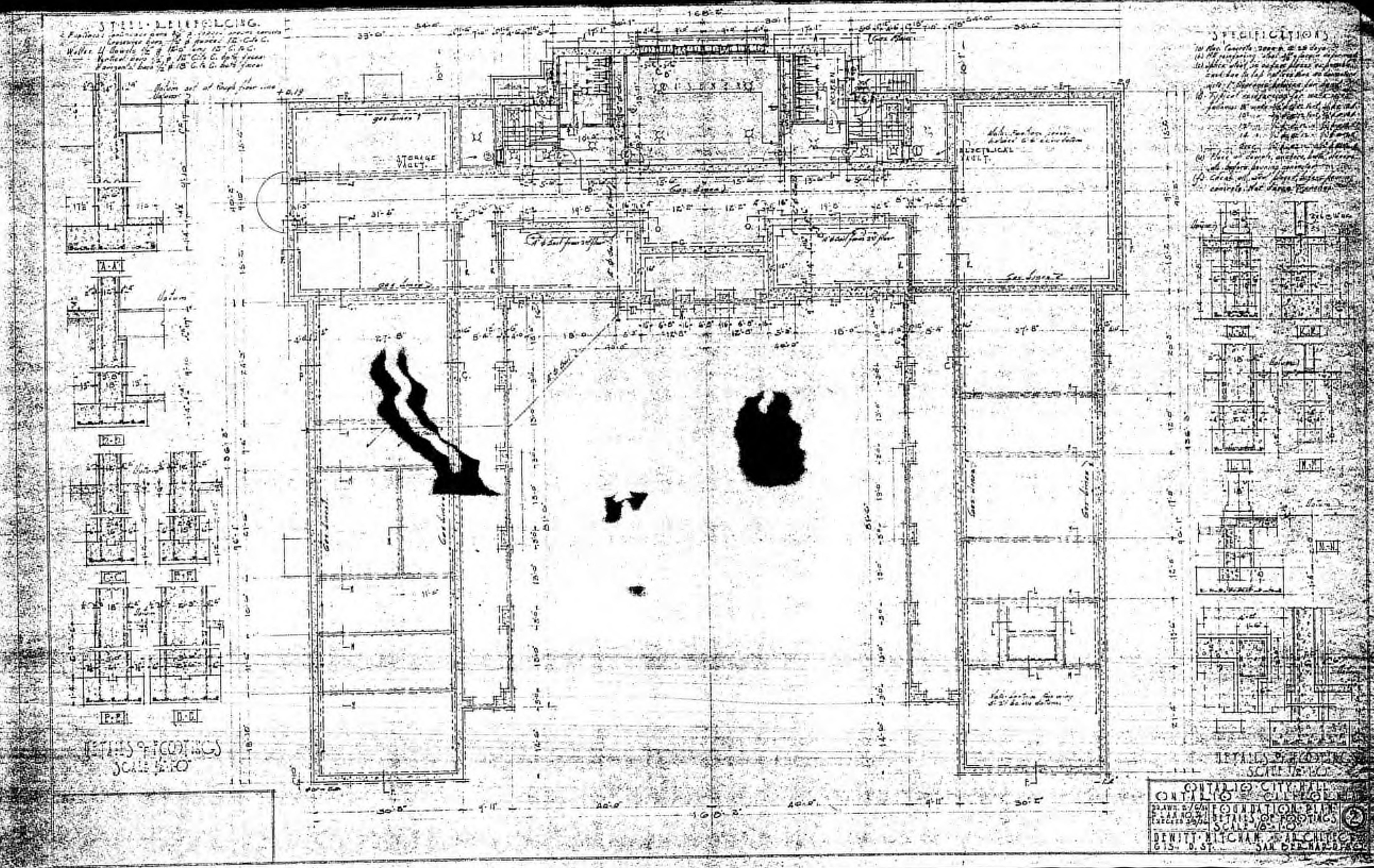
Long-Term Actions

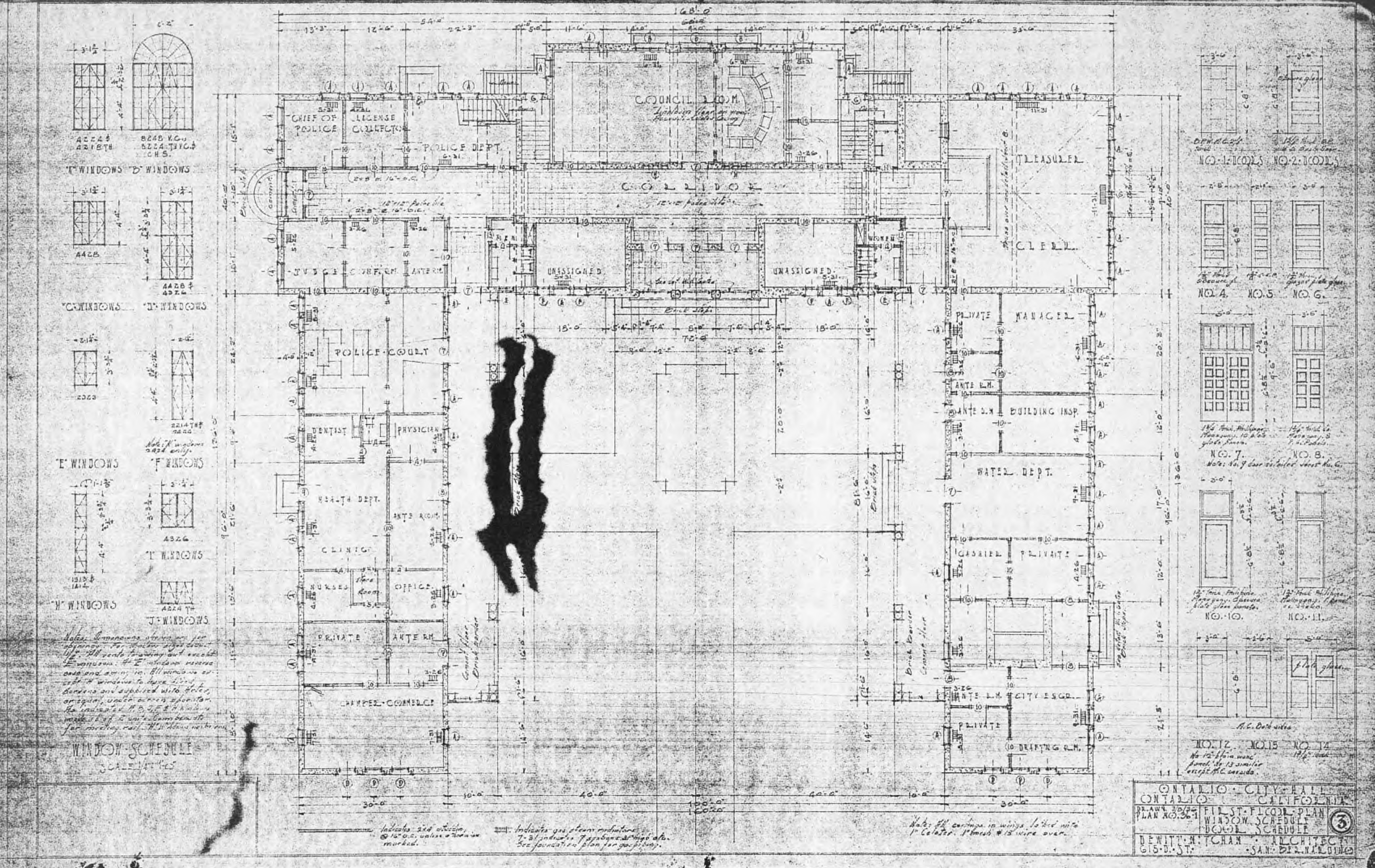
Overall long-term actions include improvements to the building that require additional studies and design work. Tasks also include later phases of additions and ongoing maintenance and fundraising tasks. Completion and evaluation of research documents in the short term are critical to the planning process required for major rehabilitation and new construction campaigns.

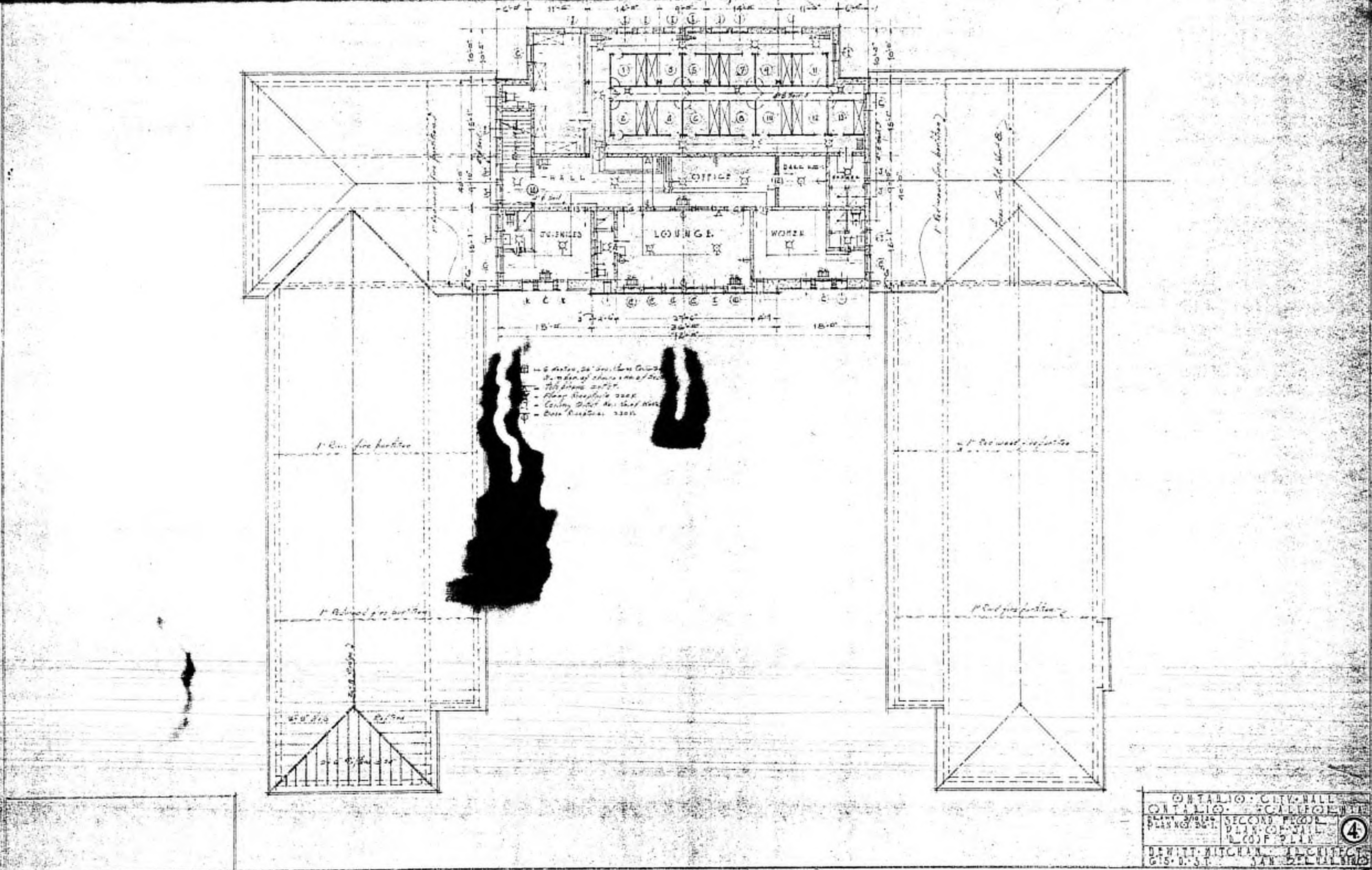
Appendix A – DRAWINGS

- 1937
- 1960
- 1982
- 1994
- 1997

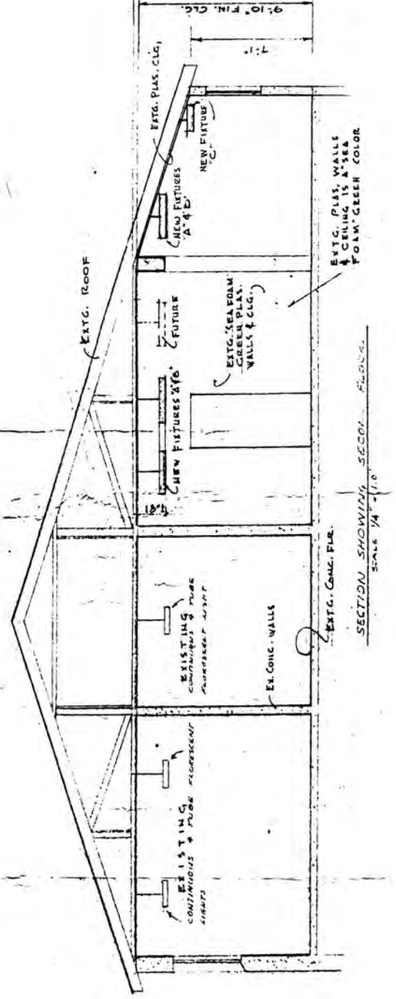

DEPOT STREET
EUCLID AVENUE
TRANSIT STREET
PRIVATE PROPERTY
DRIVE
PLOT PLAN
615 D ST.
1

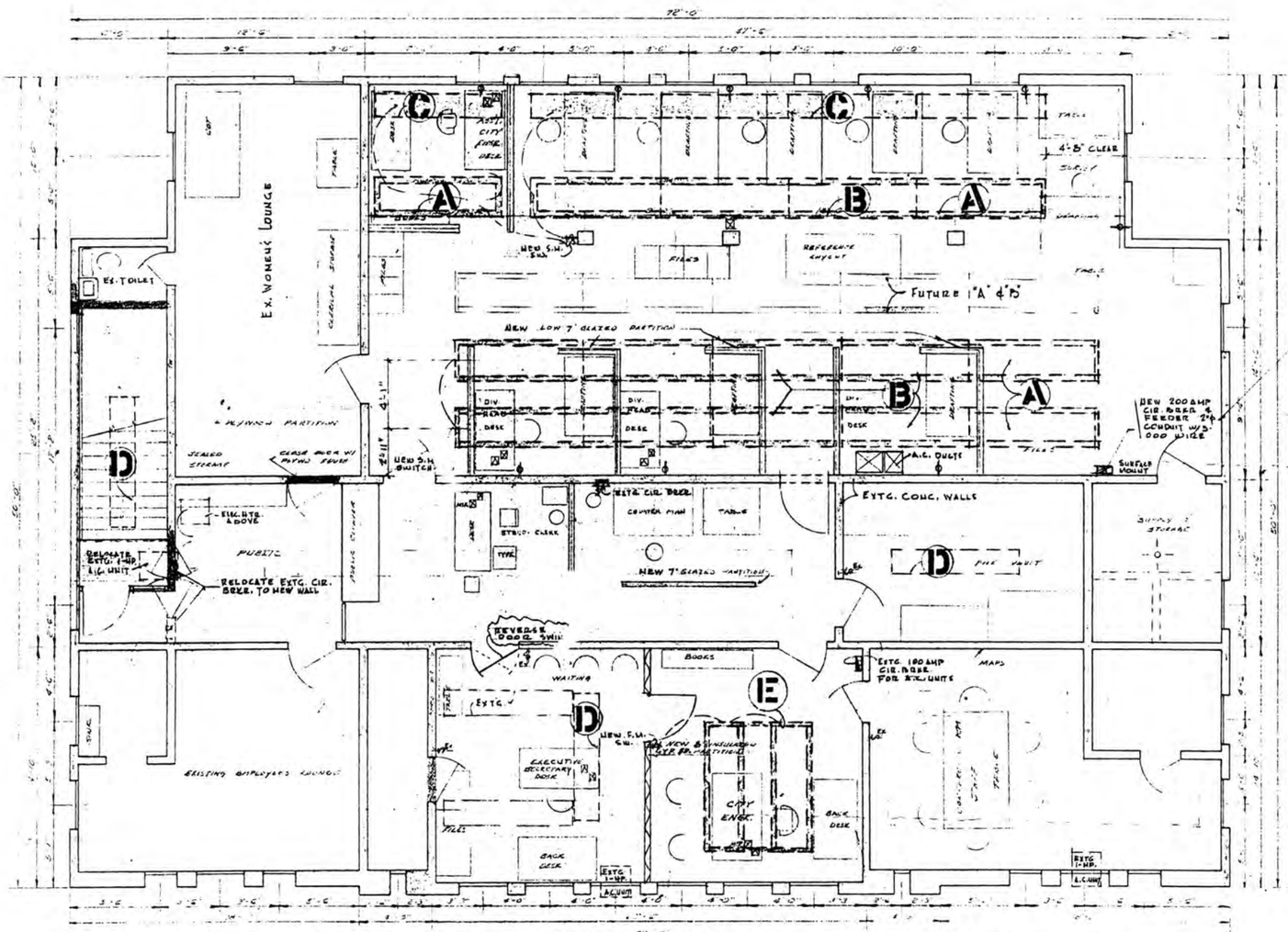

STEEL REINFORCING
STORAGE VAULT
ELECTRICAL VAULT
SPECIFICATIONS
DETAILS OF FOOTINGS
ONTARIO CITY HALL
ONTARIO CALIFORNIA
FOUNDATION PLAN
DETAILS OF FOOTINGS
DEWITT MITCHAM ARCHITECT
615 D. ST.
SAN BERNARDINO
2


CHIEF OF POLICE
LICENSE COLLECTOR
POLICE DEPT.
COUNCIL ROOM
CORRIDOR
TREASURER
CLERK
JUDGE
CONF. RM.
ANTE RM.
UNASSIGNED
UNASSIGNED
MEN
WOMEN
Brick Steps
POLICE COURT
DENTIST
PHYSICIAN
HEALTH DEPT.
ANTE ROOM
CLINIC
NURSES
Store Room
OFFICE
PRIVATE
ANTE RM.
CHAMBER COMMERCE
PRIVATE
MANAGER
ANTE RM.
ANTE RM.
BUILDING INSP.
WATER DEPT.
CASHIER
PRIVATE
ANTE RM.
CITY ENGR.
PRIVATE
DRAFTING RM.
"A" WINDOWS
"B" WINDOWS
"C" WINDOWS
"D" WINDOWS
"E" WINDOWS
"F" WINDOWS
"H" WINDOWS
"I" WINDOWS
"J" WINDOWS
WINDOW SCHEDULE
NO. 1 DOORS
NO. 2 DOORS
NO. 4.
NO. 5
NO. 6.
NO. 7.
NO. 8.
Note: No. 9 door detailed sheet No. 6.
NO. 10.
NO. 11.
NO. 12.
NO. 13
NO. 14
ONTARIO · CITY · HALL
ONTARIO
CALIFORNIA
PLAN NO. 36-1
FIRST · FLOOR · PLAN
WINDOW SCHEDULE
DOOR SCHEDULE
3
DEWITT · MITCHAM · ARCHITECT
615 · D · ST.
· SAN · BERNARDINO



HALL
OFFICE
DARK ROOM
LOUNGE
WOMEN
15'-0"
36'-0"
18'-0"
ONTARIO · CITY · HALL
ONTARIO · CALIFORNIA
PLAN NO. 36-1.
SECOND FLOOR
PLAN · OF · JAIL
& ROOF PLAN
4
DEWITT · MITCHAM · ARCHITECT
615 · D · ST. SAN BERNARDINO





REVISED
SECOND FLOOR PLAN
SCALE 1/4" = 1'-0"

N

ELECTRICAL FIXTURES

A { FOUR (4), SHOOT-HOLMAN (OR EQ. ALL-DRITE) PV. 288 "PERFECT VISION" W/ SOUND RATING "C" BALLASTS. STD. WARM WHITE 800 MILLIAMP. RAPID START LAMPS.

B { SIMILAR TO ABOVE, EXCEPT ELEVEN(11) PVC-288 FIXTURES & LAMPS - STD. WARM WHITE"

C { (FIVE'S) ALL-DRITE CAT.# 74296-800 "CORSAIR". 800 MILLIAMP. RAPID START, WARM WHITE LAMPS

D { REUSE & RELOCATE EXISTING 8'0" SLIMLINE FIXTURES (FROM CITY ENGRS. OFFICE)

E { TWO(2) UNIT SHOOT-HOLMAN (OR EQ) PVH-288 W/ SOUND RATING "C" BALLASTS. STD. WARM WHITE 800 MILLIAMP. RAPID START LAMPS

ALL BALLASTS TO HAVE SOUND RATING "C"

ALL FIXTURES & WIRING TO CONFORM TO NEMA & ONTARIO CITY BLDG. CODE ELECTRICAL STANDARDS, NAT. ELECT. CODE & NBFU RULES

AMP. = AMPERE
EX. & EXTG. = EXISTING.
SM = SURFACE MOUNTED
FM = FLUSH MOUNTED

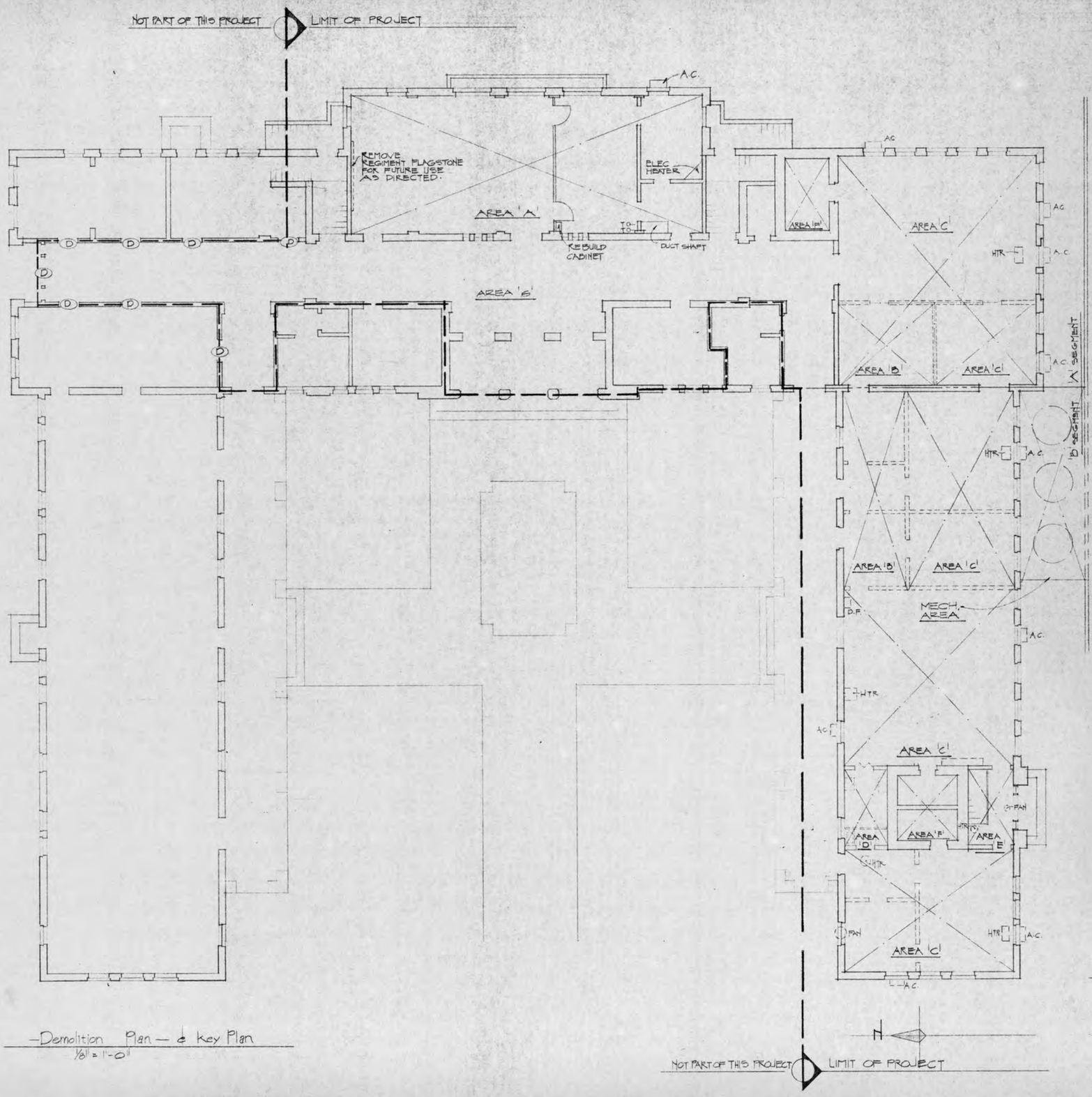
⊖ ELECT. DUPLEX-OUTLET 12"± ABOVE FLR.

CITY OF ONTARIO
CODE PLAN
BUILDING DEPT.
ELECTRICAL FIXTURE LAYOUT

Drawn by	Checked by PJP	Scale 1/4" = 1'
Approved		
REG. CIVIL ENGINEER No.		
Date NOV. 1959	Job No.	Drav. No. M-7

OCT 1960
FEB. 1960
REVISED JAN. 1960

Bob Jackson



—Demolition Plan— & Key Plan
1/8" = 1'-0"

Demolition Schedule

AREA — DEMO REQUIRED

A) 1. REMOVE EXISTG. LIGHT FIXTURES
2. REMOVE EXISTG. A/C TILE (GLUE UP TYPE)
3. REMOVE DAMAGED WOOD TRIM @ DOORS & WINDOWS
4. REMOVE EXISTG. DOORS & HRDWARE - RAIL & GATES.
5. REMOVE EXISTG CARPET, PAD ETC. W/ DAMAGED WOOD BASE.
6. SCRAPE & CLEAN EXISTG WALL FINISH PATCH AS REQ'D TO MATCH EXIST'G.
7. REMOVE LEAD & WOOD INSERTS FROM WALL OPENINGS.
8. REMOVE EXISTG A.C UNITS & ELEC. HEATER.

B) 1. REMOVE EXISTG WOOD STUD & PLASTER WALLS.
2. REMOVE REMAING WOOD BASE.
3. REMOVE EXISTG DROP CEILING, PLASTER W/ FRAMING.
4. REMOVE EXISTG DOORS, FRAMES, HRDWR. ETC.
5. REMOVE EXISTG GAS HTRS. & WINDOW MTD. AIR COND. UNITS: FLUES PIPING CONDUIT, PIPING, ETC INCLUDED.

C) 1. REMOVE ALL THE FOLLOWING:
a. FLOOR TILES, ACOUSTIC TILE, INTERIOR PARTITIONS, BASE, LIGHT FIXTURES, GAS HTRS, WINDOW A.C. UNITS, CONDUITS, GAS PIPE, DRINKING FOUNTAINS ETC., DAMAGED TRIMS, CHIPPED PLASTER, FLOOR MTD ELEC. OUTLETS, & PLUMBING PIPE.

D) 1. REMOVE ALL THE FOLLOWING:
a. SEE AREA 'C' ABOVE.
b. REMOVE ALL EXISTING CASEWORK, PANEL BOARDS, PLUMBING FIXTURES, EXPOSED PIPING & EXPOSED CONDUIT, ETC.

E) 1. REMOVE ALL THE FOLLOWING:
a. SEE AREA 'C' ABOVE
b. EXPOSED CONDUIT, FANS, HEATERS, ETC
c. EXPOSED ELECT. PANEL COVER (NEW DOORS ETC WILL BE REQ'D.).

F) 1. THROUGHLY CLEAN & PREP. SEE GENERAL NOTE #3. (A-1)

G) CORRIDOR AREAS
1. REMOVE ALL WROUGHT IRON MOUNTING BRACKETS
2. THROUGHLY CLEAN, SAND, SCRAPE, ETC. PATCH & PREPARE FOR PAINTING.
3. MATCH TEXTURE AT ALL PATCHES.
4. THROUGHLY CLEAN EXISTING FLOOR TILE & GROUT ETC. SEAL COAT AFTER FINISH OF PROJECT.

Demolition Notes

1. ALL WORK SHALL BE SCHEDULED IN SUCH A MANNER AS TO INSURE CONTINUOUS, UNINTERRUPTED OPERATIONS OF ALL FACILITIES.
2. ANY UTILITY SHUT DOWN SHALL BE SCHEDULED A MINIMUM OF 48 HOURS IN ADVANCE. ANY UTILITY SERVICE WHICH IS DAMAGED SHALL BE PUT BACK IN SERVICE AT NO ADDITIONAL COST TO THE OWNER.
3. IT SHALL BE THE RESPONSIBILITY OF THE GENERAL TO INSURE THAT NO EMERGENCY EXIT IS BLOCKED AT ANY TIME.
4. REMOVE EXISTING FLOORS, WALLS AND CEILINGS TO FULL EXTENT INDICATED, PROVIDE SHORING AS REQUIRED PATCH WITH LIKE MATERIALS TO MATCH EXISTING.
5. SAWCUT AND REMOVE EXISITING CONCRETE, WALLS, FLOOR, ETC. CORE DRILL FOR NEW PIPE CONDUIT, ETC.
6. CAP, PLUG, OR SEAL EXISTING UTILITY LINES CONCEAL WORK WITHIN FLOOR, WALL OR CEILING SPACE PATCH TO MATCH EXISTING FINISHES AS REQUIRED
7. FLOORS SCHEDULED TO RECEIVE A NEW FINISH SHALL HAVE EXISTING FLOOR FINISH REMOVED, BE PATCHED AND FILLED AS REQUIRED TO PROVIDE A SMOOTH, LEVEL FLOOR TO RECEIVE NEW FINISHES.
8. PROTECT EXISTING FINISHES AS REQUIRED. REPAIR ANY DAMAGE TO EXISTING FINISHES AS A PART OF THIS CONTRACT.
9. SEE MECHANICAL DRAWINGS FOR LOCATION OF ADDITIONAL OPENINGS TO BE SAWCUT IN EXISTING WALLS, ROOF, ETC.
10. PATCHING OF EXISTING WORK: ALL AREAS SUBJECT TO DEMOLITION SHALL HAVE FLOORS, WALLS, CEILINGS AND FINISHES PATCHED WITH LIKE MATERIALS AND FINISHED TO MATCH EXISTING, UNLESS OTHER WISE NOTED.
11. VERIFY EXACT LOCATIONS OF ALL MECHANICAL, PLUMBING AND ELECTRICAL EQUIPMENT AND FIXTURES PRIOR TO INSTALLATION OF SAID EQUIPMENT AND FIXTURES.
12. ALL EXISTING WALLS NOT SCHEDULED TO RECEIVE FURRING, BUT SCHEDULED TO RECEIVE NEW FINISH SHALL BE SANDED, GROUND OR PATCHED TO PROVIDE A SMOOTH SURFACE TO RECEIVE NEW FINISH.
13. ALL DOORS, FRAMES, HARDWARE, TRIMS ETC SHALL BE CAREFULLY REMOVED & PROPERLY STORED TO PREVENT DAMAGE. UNITS WILL BE REUSED IN FUTURE. STORE AS DIRECTED BY OWNER.
14. REMOVE PORTION OF BRICK PLANTER WALL, BUSHES, ETC. AS DIRECTED IN FIELD TO ACCOMODATE NEW MECH. EQUIPT. ENCLOSURE. TRIM TREES & ROOTS AS REQ'D. REPLACE ANY DAMAGED PLANTING IN KIND WHERE DAMAGE OCCURS OUTSIDE DESIGNATED AREAS.

Legend

- WALL CONSTRUCTION TO REMAIN.
- WOOD STUD WALLS TO BE REMOVED.
- DEMOLITION AREAS
- T-O — EXISTING THERMOSTAT

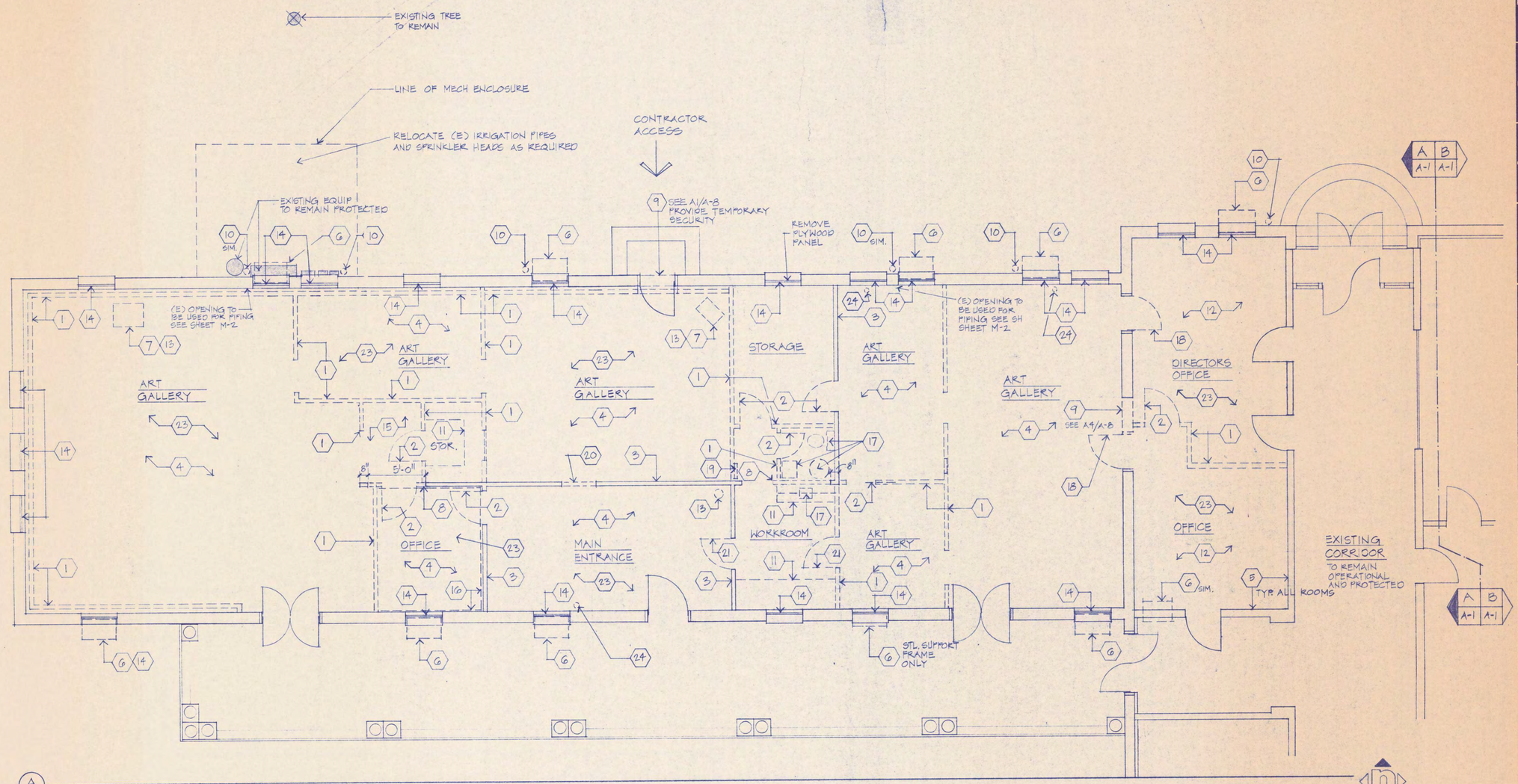
REVISIONS	BY

G. LLOYD DODDS ARCHITECT
147 SOUTH UKIAH WAY
UPLAND, CALIFORNIA 91786 (714) 982-2245

DEMOLITION PLAN NOTES

MUSEUM OF HISTORY & ART ONTARIO
HISTORY WING and CARLSON ROOM
225 SOUTH EUCLID ONTARIO CALIFORNIA

Date JULY 14, 1982
Scale 1/8"=1'-0"
Drawn J. A. E.
Job
Sheet A-2 Of Sheets



ASBESTOS ABATEMENT TO BE COMPLETED UNDER SEPARATE CONTRACT PRIOR TO CONSTRUCTION

ACM ABATEMENT & MAINTENANCE

NOTE:
THE EXISTING BUILDING MATERIALS CONTAIN ASBESTOS PER THE APRIL 19TH 1993 ASBESTOS SURVEY REPORT PERFORMED BY DIAGNOSTIC ENVIRONMENTAL INC. (818) 447-5216
REFER TO SURVEY FOR COMPLETE ASBESTOS LOCATIONS
PARTIAL LIST OF ASBESTOS MATERIALS WHICH WILL BE AFFECTED
- ROOFING MATERIALS – SUSPECTED, NOT TESTED
- WINDOW PUTTY
- FLOOR TILE AND FLOOR MASTIC
- MECH. VENT PIPE - SEE DEMOLITION NOTE #10 FOR LOCATIONS

DEMOLITION NOTES

1. REMOVE 2X WOOD STUD WALL GYPSUM BOARD AND/OR PLASTER TO CEILING ABOVE.
2. REMOVE DOOR AND DOOR FRAME.
3. REMOVE PLASTER AND LATH OVER WOOD STUDS, BOTH SIDES (WOOD STUDS TO REMAIN).
4. REMOVE GLUE-UP CEILING TILES AND ADHESIVE.
5. OWNER TO REMOVE AND SALVAGE WOOD BASE, TRIMS, AND CASINGS.
6. REMOVE WINDOW-MOUNTED AIR CONDITIONER UNIT AND STEEL SUPPORT FRAME. PROVIDE TEMPORARY SECURITY- 3/4" PLYWOOD AND 2X FRAMING MINIMUM.
7. REMOVE CEILING MOUNTED SPACE HEATER AND SUPPORT FRAME AND CAP-OFF GAS LINES. REMOVE VENT THROUGH ROOF. PATCH AND REPAIR ROOFING AND CLAY TILES TO MATCH EXISTING.
8. REMOVE PORTION OF 2K WOOD STUD WALL FOR NEW OPENING.
9. REMOVE PORTION OF CONCRETE WALL CORE DRILL AND SAWCUT CONCRETE : DO NOT OVER CUT CONCRETE OPENING. SALVAGE DOOR, WINDOW AND ALL WOOD FRAMES, TRIMS AND CASINGS
10. ~~REMOVE VENT PIPE AT THE BUILDING EXTERIOR~~. PATCH THE HOLE THROUGH THE WALL WITH CONCRETE. REFER TO ACM ABATEMENT REPORT. VENT PIPE REMOVED UNDER SEPARATE CONTRACT.
11. OWNER TO REMOVE AND SALVAGE CABINET. CONTRACTOR IS TO CAP-OFF PLUMBING LINES IN THE WALL, BELOW THE FLOOR OR ABOVE THE CEILING, PATCH AS REQUIRED.
12. REMOVE SUSPENDED T-BAR CEILING SYSTEM.
13. REMOVE VENT PIPE TO ABOVE THE CEILING AND THROUGH ROOF. PATCH AND REPAIR ROOFING AND CLAY TILES TO MATCH EXISTING.
14. REMOVE WINDOW BLINDS AND FIX WINDOWS CLOSED BY BOLTING EXISTING WINDOW HANDLES IN THE LOCKED POSITION.
15. REMOVE GYPSUM BOARD CEILING AND CEILING JOIST.
16. REMOVE WALL-MOUNTED GLUE-UP CEILING TILES.
17. REMOVE PLUMBING FIXTURE AND CAP-OFF PLUMBING LINES IN THE WALL, BELOW THE FLOOR OR ABOVE THE CEILING, PATCH AS REQUIRED.
18. REMOVE AND SALVAGE WOOD DOOR, TRANSOM WINDOW, WOOD FRAME, AND MOLDINGS. REUSE WHERE INDICATED.
19. RELOCATE THE ALARM PANEL WHERE INDICATED.
20. REMOVE AND SALVAGE TRANSOM WINDOW, WOOD FRAME AND MOLDINGS, AND DELIVER TO OWNER.
21. REMOVE AND SALVAGE WOOD DOOR, WOOD FRAME AND MOLDINGS, AND DELIVER TO OWNER.
22. REMOVE AND SALVAGE WOOD FRAME OR WOOD CASING. REUSE WHERE REQUIRED.
23. REMOVE CARPET.
24. REMOVE AND CAP-OFF GAS PIPE BELOW FINISH "LO..."

HMC GROUP
500 East "E" Street
Ontario, California 91764
Telephone (714) 983-9623

MATERIALS KEYING

No.	Revisions/Submissions	Date

Consultant

Project Title
MUSEUM OF HISTORY AND ART, ONTARIO
NORTH WING RENOVATION
225 SOUTH EUCLID AVE ONTARIO, CA. 91761

Drawing Title
DEMOLITION PLAN

Seal

Designed	TH	Project No	2230002
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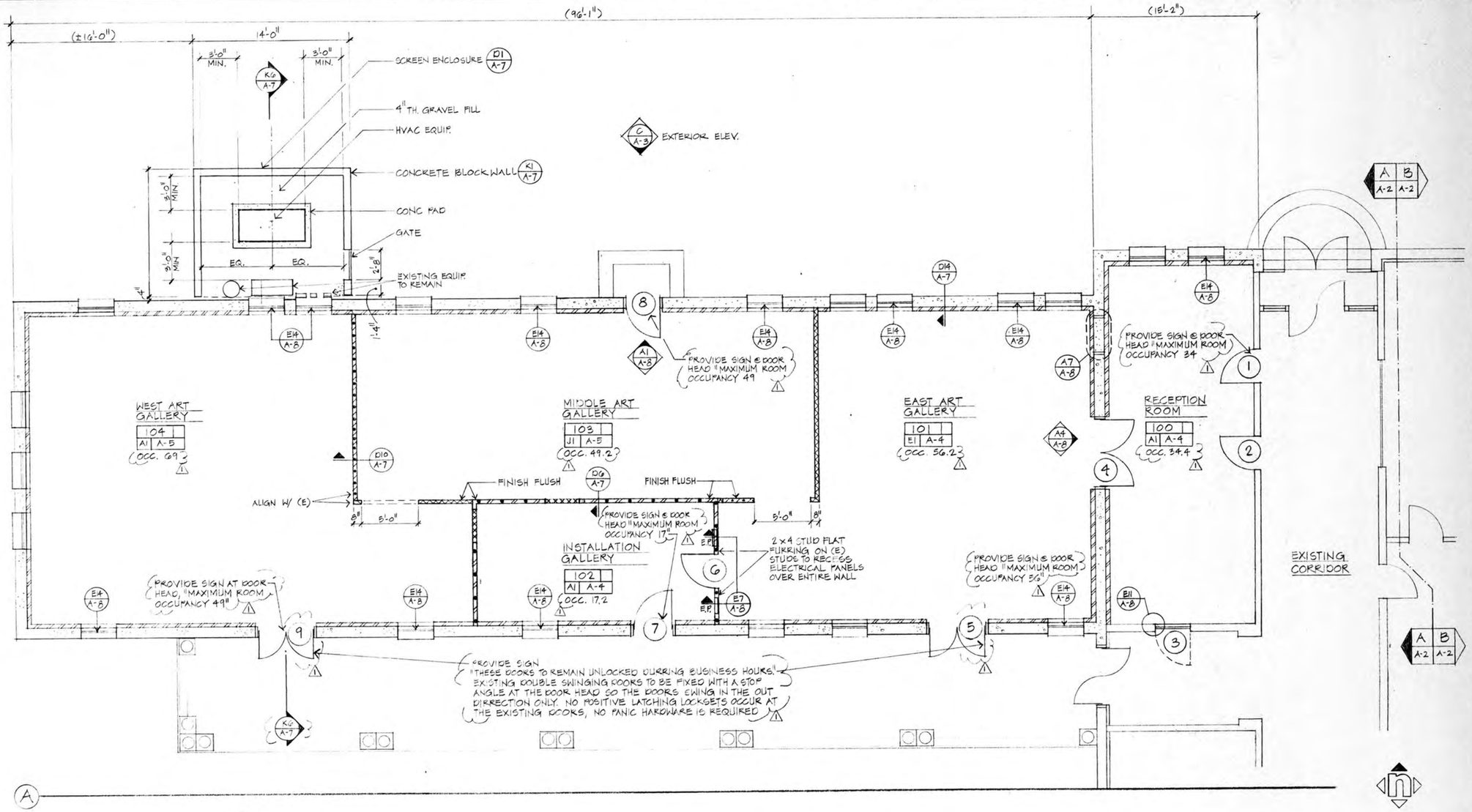
Checked		Drawing No	A-1
Reviewed			
Date	1/17/94		



OPENING SIZE	HEADER SIZE
UP TO 3'-4"	4x6
3'-4" TO 7'-0"	4x8

NOTE:
FOR NON-BEARING WALL

HEADER SCHED

WALL SYMBOLS

EXISTING CONCRETE WALL

EXISTING WOOD STUD WALL

EXISTING 2x WOOD STUD WALL WITH 1 LAYER OF 5/8" GYP. BD. OVER 1/2" PLYWOOD BOTH SIDES

EXISTING 2x WOOD STUD WALL WITH 2 LAYERS OF 5/8" GYP. BD. OVER 1/2" PLYWOOD BOTH SIDES FOR A 2 HOUR FIRE RATED WALL

EXISTING 2x WOOD STUD FURRING WITH 1 LAYER OF 5/8" GYP. BD. OVER EXISTING PLYWOOD, ONE SIDE

2x WOOD STUD FURRING WALL WITH 1 LAYER OF 5/8" GYP. BD. OVER 1/2" PLYWOOD, ONE SIDE

2x WOOD STUD INFILL AT EXISTING WALL WITH WALL CONSTRUCTION, FINISH AND FIRE RATING TO MATCH ADJACIENT WALLS

2x4 WOOD STUD WALL WITH 1 LAYER OF 5/8" GYP. BD. OVER 1/2" PLYWOOD BOTH SIDES

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MATERIALS KEYING

No	Revisions/Submissions	Date
1		

Consultant

Project Title
MUSEUM OF HISTORY AND ART, ONTARIO
NORTH WING RENOVATION
225 SOUTH EUCLID AVE. ONTARIO, CA. 91761

Drawing Title
FLOOR PLAN

Seal

Designed	TH	Project No.	2230002
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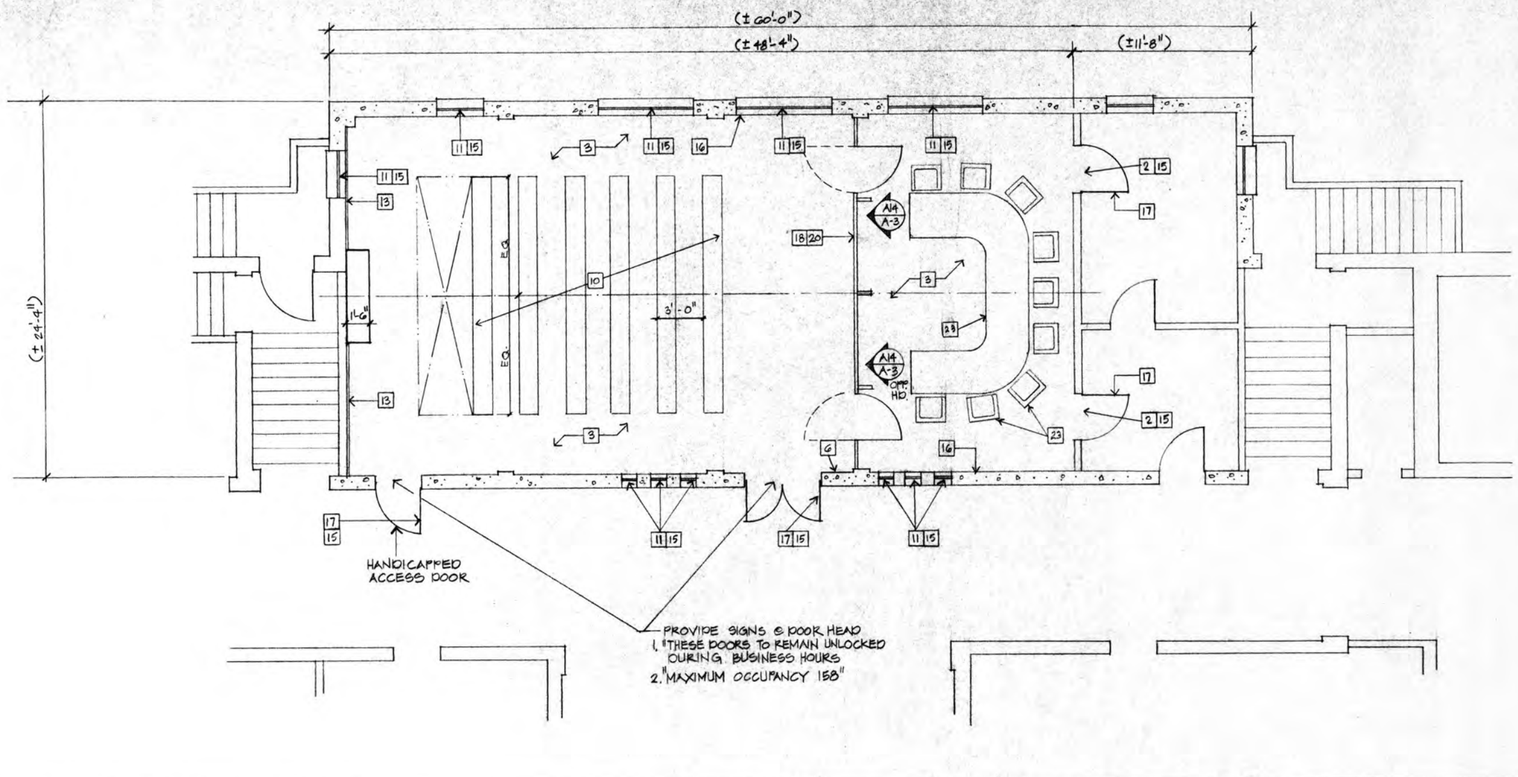
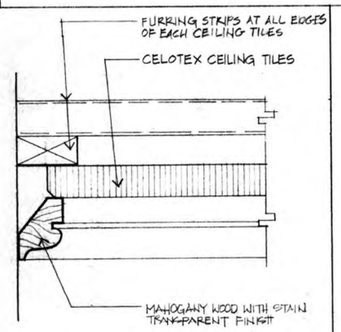
Checked		Drawing No.	A-2
Reviewed		of	
Date	1/17/94		



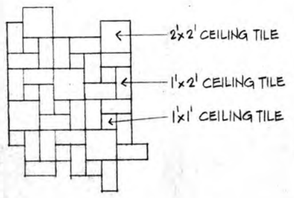
J1 FLOOR PLAN

1/4"=1'-0"



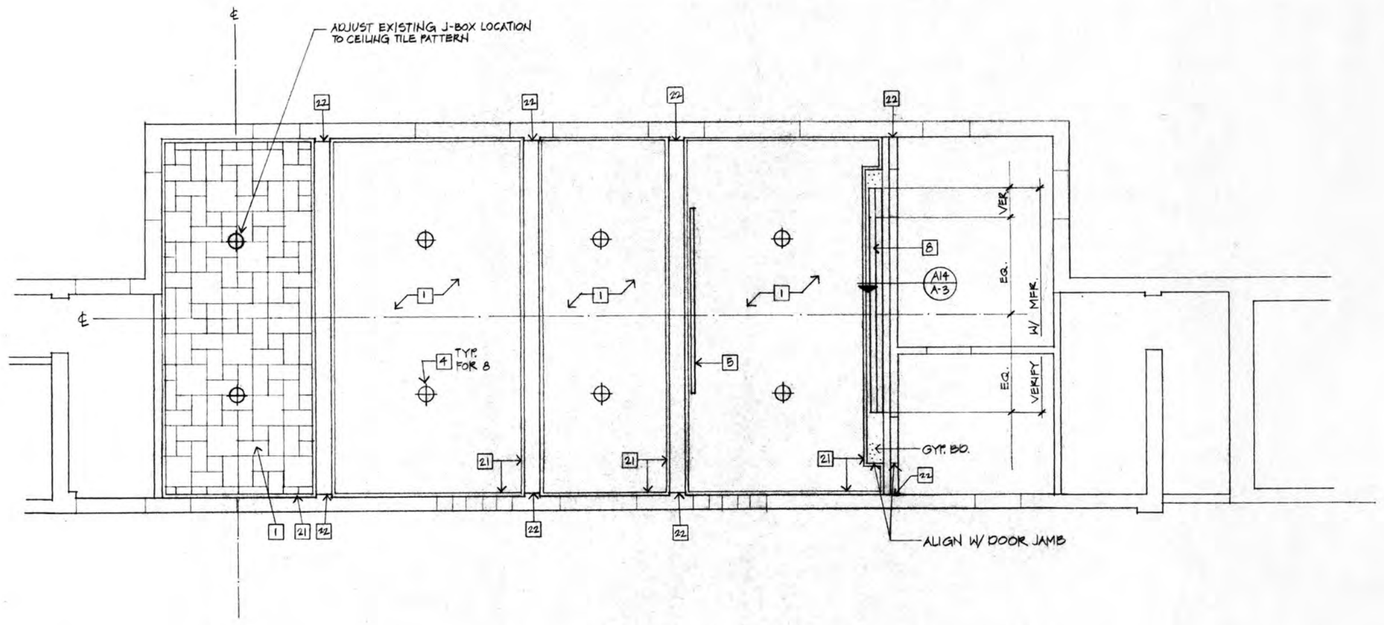
E1 WOOD CORNICE

HALF SIZE



A1 CEILING TILE PATTERN

1/4"=1'-0"



A4 REFLECTED CEILING PLAN

1/4"=1'-0"

HMC GROUP
3270 Inland Empire Blvd.
Ontario, California 91764
Telephone (909) 989-9979

MATERIALS KEYING

NOTES:

1. CELOTEX CEILING TILES; PROVIDE SIZES AND PATTERN PER A1/A-2 DETAIL.
2. INSTALL CLEAR TEMPERED GLAZING IN THE EXISTING WINDOW TRANSOM.
3. BASE BID: SEE NOTE BELOW FOR BID ALT 2. FILL AND PATCH ALL HOLES, SEAMS, AND INDENTATIONS IN THE EXISTING SHEET LINOLEUM
4. OWNER FURNISHED, CONTRACTOR INSTALLED PENDANT LIGHT FIXTURE AT THE EXISTING CEILING JUNCTION BOX LOCATION. (ADJUST J-BOX LOCATION PER CEILING TILE PATTERN)
5. OWNER FURNISHED, CONTRACTOR INSTALLED TRACK LIGHTING. PROVIDE 2 X WOOD BLOCKING AS REQUIRED.
6. REPLACE EXISTING SWITCHES WITH SLIDING DIMMER SWITCHES, TYPICAL FOR FOUR (4).
7. RELOCATE THE EXISTING CLOCK; PROVIDE ELECTRICAL POWER.
8. ELECTRICAL POWER PROJECTION SCREEN. (6 PC.)
9. PROVIDE 2 X WOOD BACKING FOR RELOCATED WALL-MOUNTED FLAGS AND HOLDER. (VERIFY LOCATION W/ MUSEUM DIR.)
10. RELOCATE EXISTING FIXED SEATING, AS SHOWN ON THE FLOOR PLAN.
11. SAND, PRIME, AND PAINT THE EXISTING STEEL WINDOW FRAME.
12. NOT USED
13. CLEAN AND PAINT EXISTING FLOOR-MOUNTED HVAC GRILLE.
14. PATCH AND REPAIR ALL HOLES IN THE EXISTING WALLS; TEXTURE TO MATCH THE EXISTING WALLS. PAINT ALL WALLS, BEAMS, AND SOFFITS.
15. LOUVERED WINDOW BLINDS - INSIDE MOUNT.
16. REFINISH EXISTING MAHOGANY WOOD TRIM, BASE, MOLDING, AND CASINGS; PROVIDE A STAIN TRANSPARENT FINISH.
17. REFINISH THE EXISTING MAHOGANY WOOD DOOR, BOTH SIDES; PROVIDE A STAIN TRANSPARENT FINISH.
18. REFINISH THE EXISTING MAHOGANY WOOD BARRICADE; PROVIDE A STAIN TRANSPARENT FINISH.
19. (NOT USED)
20. FOLD DOWN MAHOGANY WOOD BARRICADE. A1/A-3 BID ALT. #3 (ADDITIVE)
21. WOOD CEILING CORNICE E1/A-2
22. REMOVE PAINT FROM PLASTER CAPITALS. RESTORE "TERRA COTTA" TILE & GROUT TO ORIGINAL COND. TYP.
23. REFINISH EXISTING MAHOGANY WOOD TABLE & CHAIRS. BID ALT #4

NOTE:

1. SHEET LINOLEUM BASE BID IS PER NOTE #3 ABOVE
2. SHEET LINOLEUM ALT. BID # 1 (ADDITIVE) PROVIDE CARPET TILES OVER THE EXISTING (PROVIDE BID ALLOWANCE OF $ 31.22 SQ.YD.)
3. SHEET LINOLEUM ALT. BID # 2 (ADDITIVE) REMOVE EXISTING SHEET LINOLEUM AND REPLACE WITH NEW SHEET LINOLEUM. (SEE SHEET A-1 FOR ADDITIONAL WORK.)
4. INSTALL MISSING WOOD TRIM. FINISH TO MATCH (E) ADJACENT WOOD TRIM.

No	Revisions/Submissions	Date

Consultant

Project Title: MUSEUM OF HISTORY AND ART, ONTARIO
COUNCIL CHAMBER REFURBISHMENT
225 SOUTH EUCLID AVE. ONTARIO, CA. 91761

Drawing Title: **FLOOR PLAN AND REFLECTED CEILING PLAN**

Seal

Designed	T.H.	Project No	2230001
Drawn	T.H.	Scale	
Checked		Drawing No	A-2
Reviewed			
Date	3/17/97		

of

Appendix B – Museum Staff Identified List of Needs

Preventative Conservation Measures

- RH / Temperature / Light / Pollutants
- Storage Systems
- Safeguarding Collections – theft _____ - natural _____

Mitigate the greatest risk to collections

Disasters

- Fire
- Flooding – natural and plumbing – sewers
- Train wreck and train vibrations
- Earthquake
- Airplane crash
- Winds – High winds – Tree damage to building

Building Envelope

- General characteristics. Mediterranean Revival Style – deliberately designed to take advantage of airflow. Lots of doors and windows.
- Temperature RH – Light issues
- Dust and pollutants
- Security/theft
- Lack of energy efficiency
- Thick concrete walls
- Pests

Building

- Revival – Historic structure
- Local significance
- National Register eligible
- Local Landmark
- WPA Building
- Vaults
- Kitchen
- No elevator
- Security systems
- High ceilings
- Energy challenge
- Attic spaces
- Fire vulnerability
- Basement uses
- Fire suppression system/lack of
- Auditorium – w/original furnishings – light and environmental issues

MUSEUM STAFF IDENTIFIED LIST OF NEEDS

Building Systems

- Security and fire alarms
- Lack of suppression
- No moisture _indicators
- Multiple HVAC units
- _____ collection and non-collection
- Lack of HVAC in central hallway
- Lack of humidity control throughout
- Pest _____ /control
- Gallery and house lighting
- Maintenance lighting
- Collection room lighting
- Potential indoor plumbing (shut off valves)

Capacity of Institution

- Small but mighty
- Professional Museum staff
- History of planning and implementation to improve operations
- City infrastructure
- Building and facility expertise
- Historic Preservation expertise and certified local government
- History of successful grant administration

Nature of Collections

- Local regional history
- Great variety of materials
- archival
- Photographic
- Material culture
- Library textiles
- Metal
- Digital
- Synthetic material
- Liquid paintings
- ceramics
- Glass
- Non-living organic materials

MUSEUM STAFF IDENTIFIED LIST OF NEEDS

Local Climate

- CAP report
- Temperature swing extremes in 24 hour period
- Wind
- Air pollution
- Santa Ana's
- Humidity effects
- Fire/smoke
- Flooding
- El Nino/La Nina drought/flood cycles

Climate Change

Effectiveness of Current Situations

- SW – carpeting /NW no
- CAP
- BP Report/evaluation

Collections

- Offices shared on same floor
- Appropriate storage equipment and furniture
- Disaster – first aid procedures

Appendix C – Climate Data

Room No	Rm Name	Date	Time (approximate)	RH	Temp	Visible Light (foot-candles)	UV (mW/L)	Comments
120	Perm Coll Front Gallery	8/16/2011	10:00 AM			12	92	
19	"South Basement"	8/16/2011	10:00 AM	60				
122	Perm Coll Middle Gallery	8/16/2011	10:00 AM	40	74	3.5	0	
122	with work lights on	8/16/2011	10:00 AM				48	
126	Vault (adjacent to Carlson Gallery)	8/16/2011	10:00 AM	43	76.4	22.8	118	no sleeve on fixture, lights are off most of the time
123	Vault (adjacent to middle gallery)	8/17/2011	9:00 AM	40	72	26	120	light switch is easily accessible to visitors and can be switched on without anyone knowing
112	Main Corridor	8/16/2011	10:15 AM	36.8	76	0.9	0	
018	Basement (Electrical Rm)	8/16/2011	10:15 AM	40	76.7			
015	Basement ("Womens Rm")	8/16/2011	10:15 AM	45	77			
010	Basement (Frabrication Rm)	8/16/2011	10:15 AM	47	77			
001	Basement (vault)	8/16/2011	10:15 AM	43	79	1.9	0	empty with door ajar
004	Basement (corridor)	8/16/2011	10:15 AM	38	79	3.4	50	This basement suite has had sewage flooding up to 18".
005	Basement (middle room)	8/16/2011	10:30 AM	37	78.3	4.2	0	
103	Gallery B	8/16/2011	10:30 AM	42.7	79	39.4	0	
101	Gallery C	8/16/2011	10:30 AM	48.2	76.7	6.1	0	with gallery lighting (hallogens)
101	Gallery C	8/16/2011	10:30 AM			203	0	with installed work lighting

Room No	Rm Name	Date	Time (approximate)	RH	Temp	Visible Light (foot-candles)	UV (mW/L)	Comments
101	Gallery C	8/16/2011	10:30 AM			29.3	9	vis reading taken near window with blinds
100	Gallery D	8/16/2011	10:45 AM	50.7	75	26.4	0	with fluorescents on
	Outside	8/16/2011	11:00 AM	53.4	80	8065	7	
200	2nd floor Gen Admin Office	8/16/2011	11:05 AM	51	77	60.7	7	
202	Library/Conference Room	8/16/2011	11:10 AM	50	76	65	7	
208	Collections Storage	8/16/2011	11:10 AM	55	74.6	12	0	fluorescent tubes with UV filters
	Lemon Building Lobby	8/16/2011	11:20 AM	30.3	90	3.5	300+	UV source is likely window
	LB first office	8/16/2011	11:20 AM	37	81	31	11	
	LB open ceiling area	8/16/2011	11:20 AM	43.6	80	127	283	clearstory windows
	Jail	8/16/2011	11:30 AM	45.2	85	1.1	0	
	Jail "store room"	8/16/2011	11:30 AM	46.7	85	44	104	

Appendix D – Sample Risk Assessment

	Observations	Threat to Collections	Severity	Frequency	Risk Index	Recommendations
	Collections storage is so full that there is no more room to shoehorn any more in.	The lack of space seriously limits the museum's mission to make the collection intellectually and physically accessible.	4	5	20	*Identify appropriate storage space for collections. Consider separate, even temporary building, or determine whether 2nd floor is feasible with appropriate renovations.*
	Collections storage is on second floor in collections storage room, in the library/conference room/staff overflow workspace room, curator's office, jail, and off-site (for larger items).	This multi-use storage space poses several threats to the collections including overcrowding, maneuvering, security, fire, climate and potential structural concerns for floor load capacities.	4	5	20	*Implement strategies to alleviate crowding including culling and inventory, and plan on consolidating storage locations. Short term and longer term solutions needed.*
	There is an immediate need for improved collections storage. The collection is currently at risk from overcrowding.	Overcrowding creates high risk for damage and loss, and presents security concerns.	4	5	20	*Consult with structural engineer on load capacities of second floor and for seismic mass for lateral loads and request recommendations for immediate redistribution of collections storage, placement of shelving units and bracing for seismic events.*
	Collections storage has never been addressed through an architectural plan. The Museum building was not designed with collections storage, exhibits and activities in mind. The present collections storage is an ad hoc solution to a growing problem.	Storing collections inappropriate conditions creates risk for damage and accelerated rates of material decay.	4	5	20	*Conduct short term planning to alleviate immediate collections storage challenges through phased architectural and space use solutions.*
	Collections accession rate exacerbates this problem on a daily basis.	Exacerbates current conditions with multi-use storage space.	4	5	20	*Consider other structures or extending parking lot area for collections or other uses.*
	Landscape irrigation may be contributing to excess water around building exterior walls and dampness in basements.	Excess water compromises the building envelop and may contribute to water and moisture entering the building.	4	5	20	*Use xeriscaping and low-water plants in landscaping design. Redirect irrigation away from the building to leave a "no water" zone.*
	The Museum currently has three full time City positions: Director (20+ yrs at museum), Art Curator (4+ yrs at museum), Education Curator: Miriam (8 yrs at museum). There are also three part time museum attendants that mostly work the front desk during open hours. There is one	Lack of adequate staffing directly impacts care of the collections. Even with the current dedicated staff, grant and volunteer support, the museum is behind in processing collections and had troubles keeping up with new acquisitions. This has contributed to collection overcrowding,	4	4	16	*<u>Immediately</u> add 1 FT Collections Manager. Justification: Museum has not been able to keep up with collections processing and has a backlog of collections management functions that will require significant attention to help alleviate storage overcrowding and to keep up with the pace*
	Office space for staffing is limited and competes with space for collections storage and processing.	Overlapping office and collections storage space limits functionality of collections care activities, collections security, and the ability to adequately zone the spaces for more efficient collection specific climates.	4	4	16	*Identify additional space for increased staffing and for temporary staffing, such as for grant-funded projects.*
	HVAC units have been rebuilt and are about 15 years old, near the end of their life expectancies and probably not as energy efficient as newer units.	Imminent failure will result in replacement in kind which is not satisfactory for either collections or energy conservation.	4	4	16	*Develop a design for upgrading HVAC in exhibition galleries and implement climate zones prior to system failure or replacement in kind.*
	Basement and stairways have combustible storage items	Combustible items contribute to risk of fire	4	4	16	*Remove combustible items, clear areas for egress.*
	Gutter drains go to perimeter of building.		4	4	16	*Consider redirecting gutters and downspouts.*
	Downspouts exit at ground level adjacent to building. Previously the downspouts tied into a subterranean drain system.	Water may be seeping into the building, compromising the envelope and potentially allowing water and moisture into the	4	4	16	*Inspect and repair subterranean drainage system and tying downspouts back in.*
	There is no designated collections processing space. Collections are currently processed on a table and adjacent computer workstation at the end of the second floor storage area.	Bringing uninspected items into an existing collections storage or exhibition space poses a threat of contamination by insects, pests or mold.	3	5	15	*Designate a quarantine area in a separate building for unprocessed collections to deter contamination to the rest of the collections and historic building with mold, insect or vermin.*
	Collections shelving is not braced from seismic activity.		5	3	15	*Provide bracing to prevent shelving units from toppling.*
	CODE COMPLIANCE: Fire resistance barriers are compromised Introduction of HVAC, plumbing, electrical and other systems have removed material barriers.	Lack of fire barriers compromise fire rated assemblies, allowing smoke and fire to enter adjacent areas.	5	3	15	*Identify where fire resistant assemblies have been compromised. Design repairs or improvements to be code compliant. Implement Repairs.*

Appendix E – Bibliography

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Appendix F – Preservation Plan Matrix

Issues	Risks	Possible Resolutions	Year 1	Year 2	Year 3	Year 4	Year 5
1. Overuse of 2nd floor	Structure of second floor was originally designed for typical office floor loads, and its present load capacity is unknown.	Engage structural engineer to evaluate second floor load capacities. Reduce loads to recommended limits. In the future, it may be beneficial to add structural improvements to increase second floor loads. If collections remain on second floor, elevator access will be required to eliminate risks on staff and collection of hand-carrying items up and down stairs.	Budget and find funding for design work. Start decision making process for long and short term use of the second floor.	Engage Sturctural Engineer (SE). Redistribute or remove loads as recommended by SE. Assessment of load limits will impact space planning and budget decisions. See "high density decongestion" possible resolution below.	Initiate design phase of structural improvements if they are deemed necessary for the future use of the second floor. Design plans will need to be coordinated within an overall design and capital upgrade campaign to the building.	Continue design depending on progress. Can move to construction if decide on phased approach to the building upgrades.	
	High density and congestion of collections storage posses physical risk to collections and health risk to staff.	Decongest collections by either redistributing collections across entire second floor (requires relocation of offices) or by redistributing some collections to north gallery spaces (loose exhibit space) or to off site storage.	Start culling process to decongest in the short term.	Make decision to move offices to Lemon Building or find alternate off site storage options. Wait for SE to determine load capacity limits.	If office space is moved to the Lemon Building or elsewhere, collections can be redistributed on the 2nd floor and/or move out portion of collections as needed to comply with structural determinations (load limits). Wait for completion of design studies/planning decisions.	Can start to move or distribute collections as determined by design. If structural upgrades are undertaken to this area, collections will need to moved.	
	Collections storage shelving is not braced for seismic event and could block egress.	Move shelving to allow for code compliant paths of egress.	Move shelving immediately that is blocking paths of egress. Coordinate with future decongestion activities and load reduction.	Engage SE to advise on shelving locations and bracing. New shelving locations and heights are dependent on how collections storage is decongested. Make decision if it is appropriate to upgrade shelving now or if it should wait for any building upgrades or repairs.	Apply for grants and find funding for new shelving system.	Purchase and install new collections shelving to be compatible with future compactor units if collections storage is the determined use of the second floor. Anchor shelving as recommended.	
	Some stored collections may include volatile or high fire risk materials	Fire risk assessment to determine appropriate fire detection and suppression systems. Determine short and long term solutions for fire protection. See NFPA 909 and 914 for guidance in addition to other applicable codes. High risk materials may need to be stored in a separate space or cabinetry.	Consult with the fire department or hire another qualified entity to complete a fire risk assessment of the building.				
	Combustible storage and wall construction in the stairway affects fire and egress	Eliminate storage and combustible materials from these areas. Evaluate wall construction and other ways to hedge fire risks.	Eliminate storage and combustible materials from all egress routes. Assign staff person to identify combustible materials and consult as needed to move them to a secure location.				
2. Inadequate space for collections storage	Collections storage has never been addressed through architectural plan. The present collections storage is an ad hoc solution to a growing problem. 2nd floor storage congestion is a result. The urgent needs address the existing collections only to date.	The identified solutions to this problem are a new collections storage building or leasing off site storage space. The existing building cannot accommodate the existing collections storage needs. In the near term planning documents, such as an HSR can help with decision-making for future modifications and organization of space.	Conduct HSR study as first step in space planning for the historic building. See issue number 13.	Initiate a design/planning process for interior space and site based on collections volume estimate, available sites and facilities, budget, and all known information. Can plan on having a phased design that can be implemented in stages.	Construction documents and bidding. Phase upgrades as needed. Furnishing designs and bidding	Construct new storage facility. Procure furnishings.	Move into new collections storage building
	New unprocessed items are stored with collection items, and could introduce insects, pests or mold to the existing collection	Create separate spaces for new collection items and existing collection items. New collections need to be quarantined.	Explore feasibility of moving new collections to the jail. See issue number 3 below.				
	Collections are stored in boxes that are stacked too high. This poses a threat to staff that need to move boxes, and is a crushing hazard for stored objects.	Install new shelving systems that accommodate storage one box high and two boxes deep. The new system should be seismically sound.	Complete decisions regarding space use before installing new shelving systems.	Incorporate new shelving into any plans design plans.			
3. No dedicated space for collections intake and processing	Collections accession rate exacerbates storage problem on a daily basis.	Create dedicated new space separate from existing collections storage for intake and processing of new collections. Include quarantine area. The existing jail with minor modifications/upgrades is a good interim candidate for this function. In the long term, space should be provided in a new collections storage and processing facility.	Approve use of the jail to accept new acquisitions and create an area for processing. Make long term decisions/planning for a new facility vs. outside facility for new collections.	Contract to design upgrades/maintenance for jail to accept collections. Move to construct jail improvements - design build is an option if want construction to start faster if funding is available.	Contract modifications/upgrade to jail. Move in new acquisitions to be processed in renovated jail once construction is complete. Initiate long term goals as planned.		
4. Lack of space for exhibit preparations	Combustible and hazardous materials, dust, noise from exhibit preparations pose risk to exhibit collections if not physically separated. Currently, exhibit preparations materials are stored in and adjacent to exhibit areas and exhibit construction takes place in exhibition galleries.	Create dedicated new space separate for exhibit preparations. The existing skylight area in the Lemon Building with minor upgrades is a good interim candidate for this function. In the long term, space should be provided in a new space. Initiate space planning/master design to determine upgrades and modifications needed for the existing buildings.	Conduct HSR study as first step in space planning for the historic building. See issue number 13.	Initiate a design/planning process for interior space and site based on collections volume estimate, available sites and facilities, budget, and all known information. Can plan on having a phased design that can be implemented in stages.			

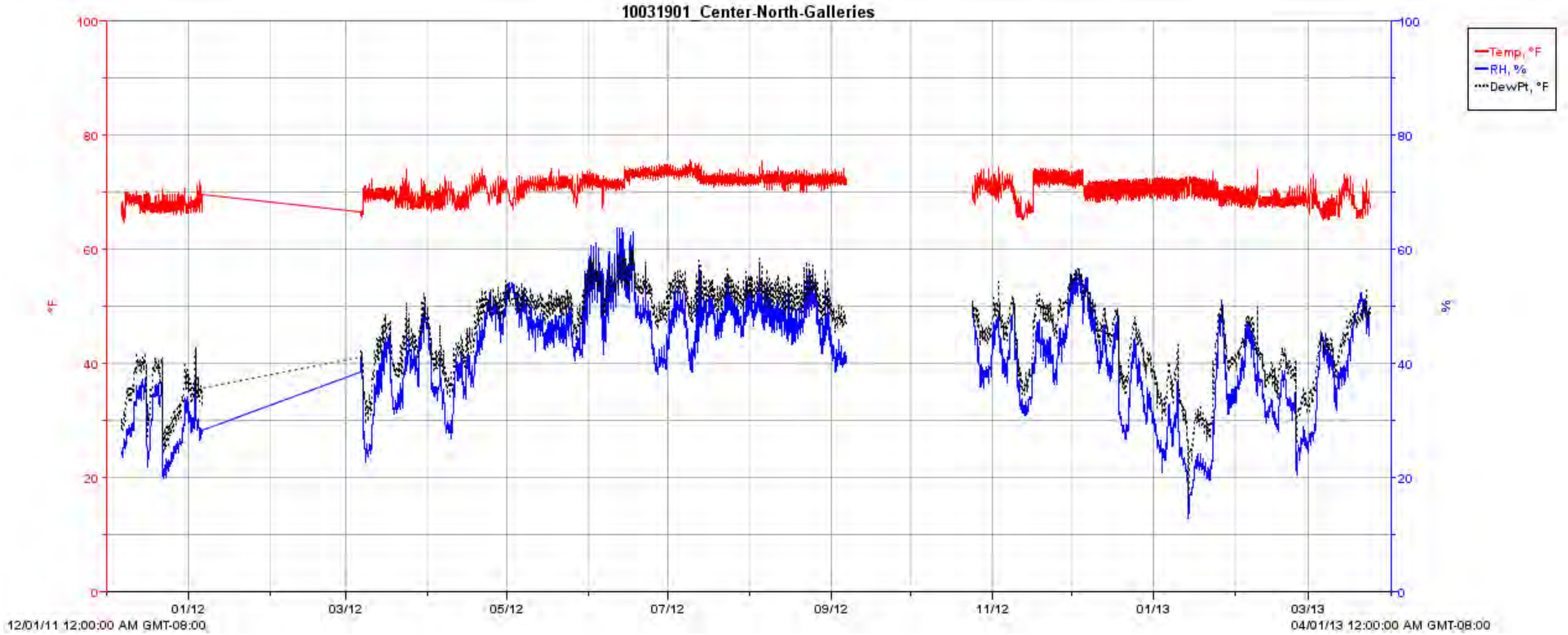
Issues	Risks	Possible Resolutions		Year 1	Year 2	Year 3	Year 4	Year 5
5. End of life HVAC systems in South Wing	Openings and gaps in the building envelope at walls, ceilings and between doors and frames and between window sash and frames can increase energy costs, and allow fluctuations in humidity and temperature that can damage collections as well as allow the entry of particulates	Develop a design for upgrading existing windows and doors in exhibition galleries to control exfiltration/infiltration of air, moisture vapor & particulates. This will require restoration of the historic metal sash windows and refitting of existing doors in the frames as well as weather-stripping the operable doors. Survey the walls and ceilings (between the conditioned space and the roof/attic space) and identify all penetrations. Developed a plan for sealing the penetrations.		Budget and find funding weatherproofing and ongoing maintenance of keeping building weather tight. Create building maintenance plan as part of HSR contract. See issue number 13.	For S Wing only: Implement door improvements. Apply exterior air leakage reduction repair to windows, perhaps sealant. Fold these repairs into cyclic maintenance plan - see below.	Implement exterior cyclic building maintenance plan-start with exterior door and window sealant.	Implement exterior cyclic building maintenance plan. When current exhibitions at end of life, make insulation repairs.	
	Three HVAC units serving the exhibition galleries of the South Wing are at or past end of service life. Replacement units should be designed to meet collections conservation and energy conservation. Unless a replacement strategy is planned and designed now, imminent failure will result in replacement in kind, which is not satisfactory for either collections or energy conservation.	Develop a design for upgrading HVAC units and systems in exhibition galleries and implement on a zone by zone basis before existing equipment fails. Monitor T&RH in spaces with existing systems and have the data analyzed to identify performance deficiencies that must be addressed by new design. Phased implementation on zone by zone basis allows for proofing on new designs as well as sequential implementation without closing all galleries. New HVAC has to be installed concurrent or after building envelope repairs (see above).		Contractor to install maintenance-related weather proofing measures that do not require design.	Implement environmental monitoring program. Pending funding, begin systems design for South Wing system upgrade. Plan for deinstalling (or partial) South Wing exhibiting space for systems installation. Design of HVAC can occur concurrent or before building envelope repairs.	Bid and install new HVAC system in South Wing. A new HVAC system can only be installed if the building envelope repairs are complete or are in progress. Deinstall galleries to coordinate.	Commission system for 1 year after installation.	
6. Building envelope, air infiltration and dust through windows and doors	Lack of weatherproofing in exterior windows and doors allows water and moisture to enter the building and adversely affects climate control.	Install weatherproofing measures to exterior doors and windows.		Contractor to install maintenace-related weather proofing measures that do not require design.	Contractor to all install weatherproofing.	Contractor to all install weatherproofing as needed and perform maintenance of existing.	Contractor to all install weatherproofing as needed and perform maintenance of existing.	Contractor to all install weatherproofing as needed and perform maintenance of existing.
	Water ingress poses threats to museum collections and exhibits.	Further assess the condition of the sawtooth roof and water ingress		Condition assessment of the building will be conducted as part of the recommended HSR in issue number 13. An exterior cyclic building maintenance plan can be added to the HSR scope, or written after the HSR is complete.	Contract exterior roof repairs, and minor envelope maintenance reaprs as needed per the building maintenance plan.	Contract repairs as needed per the building maintenance plan.	Contract repairs as needed per the building maintenance plan.	Contract repairs as needed per the building maintenance plan.
7. Poor use of space within the building has resulted in overcrowding, storage of inappropriate items in egress spaces	Combustible items are stored in the stairway are a fire risk. Furthermore, items stored in the hallways block egress routes in the event of an emergency.	Move items immediately.		Assign staff to identify and move combustible items to a secure location. Consult with the fire department or a consultant as needed.				
	There is a kitchen space located in the main building for daily use and for special events. This use puts the collection at risk of fire and pest damage/infestation. Also it may be a better use to store overcrowded collections in this space.	Any new design plans should be tasked with incorporating a space for staff and special event food preparation.		In the short term, curtail use of the kitchen in the building as much as possible. Have catered events set out tents outside as much as possible.	Incorporate new kitchen space into new master design plan for the building.			
	No master plan has been done for the historic building. Some of the spaces have flooring and finishes that are not ideal, such as old carpeting and plywood walls. Also second floor is overcrowded (see issue numbers one and nine) and meetings are often conducted in rooms with historic furnishings.	Many recommendations ask the building to consider relocating certain activities and uses to other buildings. It is best to make these decisions after a comprehensive plan has been completed. This plan design should taken into account historic materials.		As part of the planning process contract a historic preservation firm to complete a Historic Structures Report. Start report as soon as possible to inform all other recommended design processes. See issue number 13.	Initiate a design/planning process for interior space and site based on collections volume estimate, available sites and facilities, budget, and all known information. Can plan on having a phased design that can be implemented in stages.			
8. Fire resistance barriers compromised	Introduction of HVAC, plumbing, electrical and other systems, materials have been lost that compromise fire rated assemblies. Compromises to fire resistant assemblies can allow smoke and fire to enter into adjacent areas.	Identify where fire resistant assemblies have been compromised. Design repairs or improvements to be code compliant. Implement Repairs.		Fold this resolution task in to the recommended fire risk assessment in issue number 1.				
9. Lack of fire and seismic protection	Combustible materials in storage (boxes, collection materials), as well as wood framing on building are susceptible to significant loss by fire.	Design and install fire detection and suppression systems appropriate to collections and historic buildings. These designs should take historic materials into account in the designs, and construction activities should be phased and coordinated to minimize impacts to the building and collections.		Budget and find funding for design work.	Initiate a design/planning process for interior space and site based on collections volume estimate, available sites and facilities, budget, and all known information. Can plan on having a phased design that can be implemented in stages.	Construction documents and bidding. Phase upgrades as needed. Furnishing designs and bidding		
	The museum is located in an area that has a known risk of fire and earthquakes. The building does not have a fire suppression system, which puts staff and collections at risk.	Install a fire suppression system. Designs can be incorporated into a mechanical upgrade campaign. These designs should take historic materials into account in the designs, and construction activities should be phased and coordinated to minimize impacts to the building and collections.		Budget and find funding for design work.	Initiate a design/planning process for interior space and site based on collections volume estimate, available sites and facilities, budget, and all known information. Can plan on having a phased design that can be implemented in stages.	Construction documents and bidding. Phase upgrades as needed. Furnishing designs and bidding		

Issues	Risks	Possible Resolutions		Year 1	Year 2	Year 3	Year 4	Year 5
10. There is not a full time staff person dedicated to collections care, resulting in overcrowding and slow processing of new acquisitions	Collection is overcrowded, and not all items have not been inventoried yet. These items are at a higher risk for damage, loss or theft since they are not documented.	Add a full time collections manager to the current staffing. This is cost effective way to tackle the current overcrowding problem, and is a task that can be implemented in the near term.		Hire a full time collections manager.				
11. Indeterminate environmental conditions	Interior conditions are monitored, but are not fully understood. Some areas of the building may be more suited for collection storage. Future modifications or organization of space can take additional interior climate studies.	Future modifications or organization of space can take advantage of additional interior climate studies.		Contract a consultant to monitor the interior climate of the building. Decide on specific zones/areas that should be monitored.				
	Climate and lighting in exhibition needs to comply with requirements for borrowing traveling exhibitions/collections.	Install climate zones to enhance borrowing capacities for exhibitions. Incorporate a new design for climate zones in the new HVAC recommendations in issue number 14.		Budget and identify funding.	Hire firm to redesign mechanical systems, can be part of an overall renovation/rehab campaign or an initial phase of multi-year upgrade campaign. Incorporate completed planning and design studies initiated in year 1.			
12. Limited resources result in slow progress of capital projects and inadequate operating budget	Additional funds will be required for additional storage, whether the museum decides to use additional outbuildings + leased storage space or construct a new facility. Project progress will be slowed by limited resources and continues the existing at risk conditions for collections.	Identify funding in the near and far term.		Strategic planning for near term funding resources.	Funding campaign for a new storage building and other large capital projects. Use master design for the historic museum building as strategies for grants and other funding resources.	Funding campaign for a new storage building and other large capital projects.	Funding campaign for a new storage building and other large capital projects.	Funding campaign for a new storage building and other large capital projects.
	Operating budget is not commiserate with collections preservation needs and overall poses a threat to collections.	Explore possible reallocation of budget funds and identify strategies to raise additional operation funds (grants, city funding, maximize funds from public programs/exhibits, etc.).		Identify funds for a permanent full time collection manager.	Increase museum funds/income to support recommended capital projects.	Increase museum funds/income.	Increase museum funds/income.	Increase museum funds/income.
	Many individual board members are docents, and fundraising capacities have a direct relation to collections preservation.	Set a minimum donation amount to be raised or donated for each board member.		Initiate Board member donation policy.				
13. Preservation Plan and historic designation	Several studies have been conducted; however, the historic significance has not been evaluated with the current use. Compatible adaptive reuse possibilities are not understood.	Conduct a Historic Structure Report (HSR). The report will identify areas that are sensitive to change, as well as areas that can more easily be modified. This type of study can also evaluate several other recommended implementation items, such as incorporation of a new HVAC system, seismic upgrades and incorporation of an ADA compliant entrance.		Contract preservation professionals to compile an HSR for the buildings on the site. This report will include an exterior assessment, and recommend locations for upgrades and/or replacements of mechanical, fire and electrical systems. An exterior cyclic building maintenance plan should be included with this contract. See issue number 6.	Circulate the final HSR to any new contracted design/engineering firms.			
	The building has been identified as eligible for the National Register. Eligible buildings are subject to all of the "rules" and none of the "rewards."	Hire a preservation architect or consulting firm to complete the national register nomination process. Once added to the National Register of Historic places, the building will be eligible for certain types of grants and National Register status can offer tourism or marketing dollars.		Hire firm to complete National Register nomination; may be able to write into same contact as the recommended HSR.	Complete nomination process and submit to the Department of the Interior and California Office of Historic Preservation.			
14. Coordinate emergency response plan with the city	Risk of natural and man-made disasters have been identified, and city departments should be aware of significant collections and other safety concerns.	Meet with the city and participate in meetings devoted to emergency response planning. Find contacts within the city for continued coordination.		Integrate the museum's emergency plan within the city's master plan.	Annual emergency preparedness and training.	Annual emergency preparedness and training.	Annual emergency preparedness and training.	Annual emergency preparedness and training.
15. HVAC in all other Wings of Museum Building	Some units are near the end of the their life cycle and failure is immanent. Unplanned replacement will result in an emergency fix to existing equipment or replacement in kind. This is undesirable from the standpoint of collections care and energy conservation.	Develop a design for upgrading HVAC in exhibition galleries and implement climate zones prior to system failure or replacement in kind. Fluctuations in relative humidity or humidity that is too high can result in accelerated deterioration of collections.		Planning/ Board resolutions to raise funds for upgrades to mechanical systems.	Hire firm to redesign mechanical systems, can be part of an overall renovation/rehab campaign or an initial phase of multi-year upgrade campaign. Incorporate completed planning and design studies initiated in year 1.	Initiate construction of new mechanical installation.		
16. Lemon Building use	The future use of the Lemon Building should be determined. It can offer office space, but may need upgrades to accommodate this use.	Decide how the Lemon Building can best solve issues. If the offices are moved to the Lemon Building, make minor upgrades/repairs and space plan as needed.		Board resolution needed to decide if the office space in the main building should be moved to the Lemon Building. Remedy immediate issues on the second floor. As soon as move decision is made, coordinate with current Lemon Building users.	Contract to design upgrades/maintenance to move offices to the Lemon Building. Design build is an option if want construction to start faster if funding is available.	Contract designed repairs and hire moving coordinator.		

Issues	Risks	Possible Resolutions		Year 1	Year 2	Year 3	Year 4	Year 5
17. ADA compliance - Accessibility to basement and second floor is limited	City is vulnerable to legal action by someone who is denied access to portions of the building.	If 2nd floor and basements continue to be used, install an elevator. Make sure future planning/design work incorporates ADA compliance into the designs.		Incorporate ADA compliance standards into future master plans for the historic building.	Complete design and planning studies needed to make decisions about building use, particularly on the second floor. Use of second floor and inaccessible areas will need to consider ADA compliance.	Make ADA upgrades as needed per design-construction should be coordinated, and may not start in year two.		
18. Redesign South Wing exhibits	The South Wing has been used for storage and traveling crates, and these items may contain mold and pests that can contaminate collections.	Relocate storage per the recommended master plan for the building specifies.		Raise funds for future master plan for historic building and systems upgrades.	Coordinate exhibition redesign with environmental monitoring program and new HVAC installation. Study day lighting opportunities. See issue number 5.			
19. Museum not included in outlay for City's general Capital Improvement Fund	The museum has limited resources. The museum is linked to the city's economic health and should be factored into future capital improvements to the city.	Include museum in city capital outlay		Update city policy and plan to include museum in capital outlay.				

KEY
Security/Fire Improvements (high priority)
Museum Policy/Administrative Action
Planning and/or Design Action
Construction or Implementation Action

Appendix G – Environmental Monitoring Trend Plots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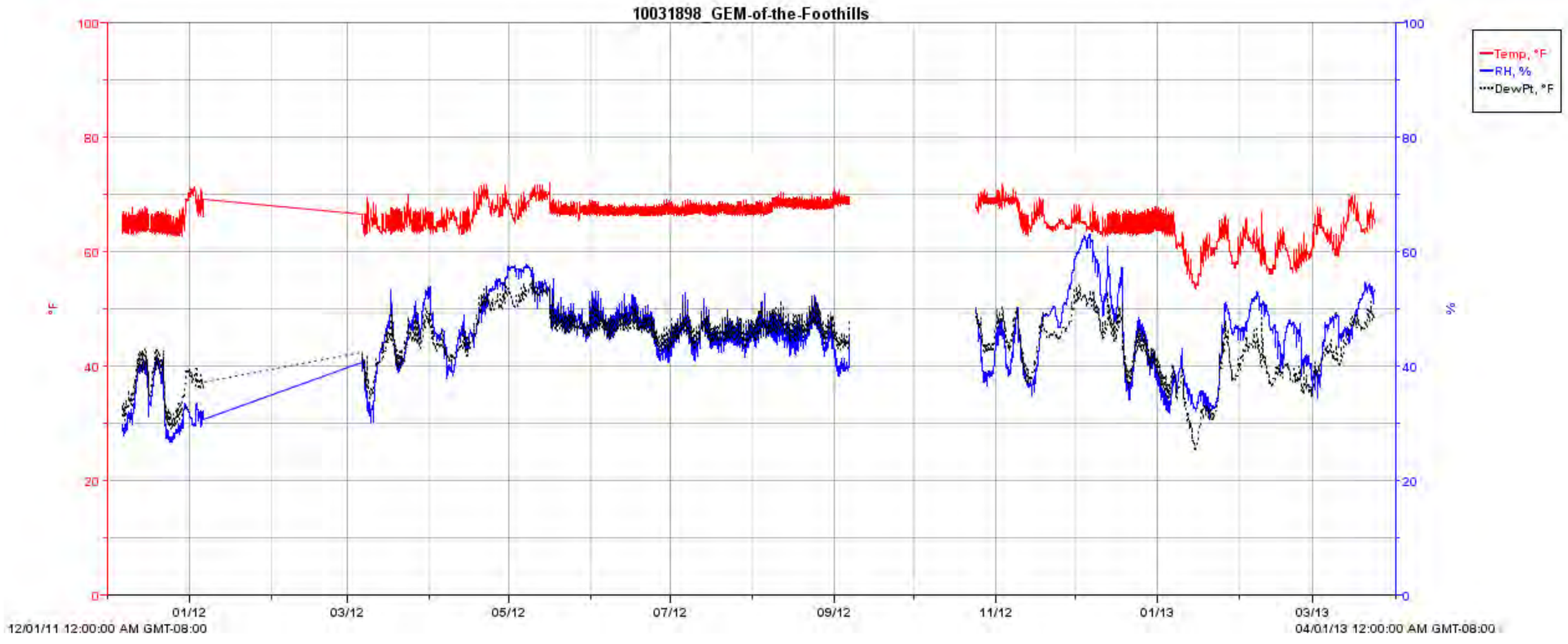
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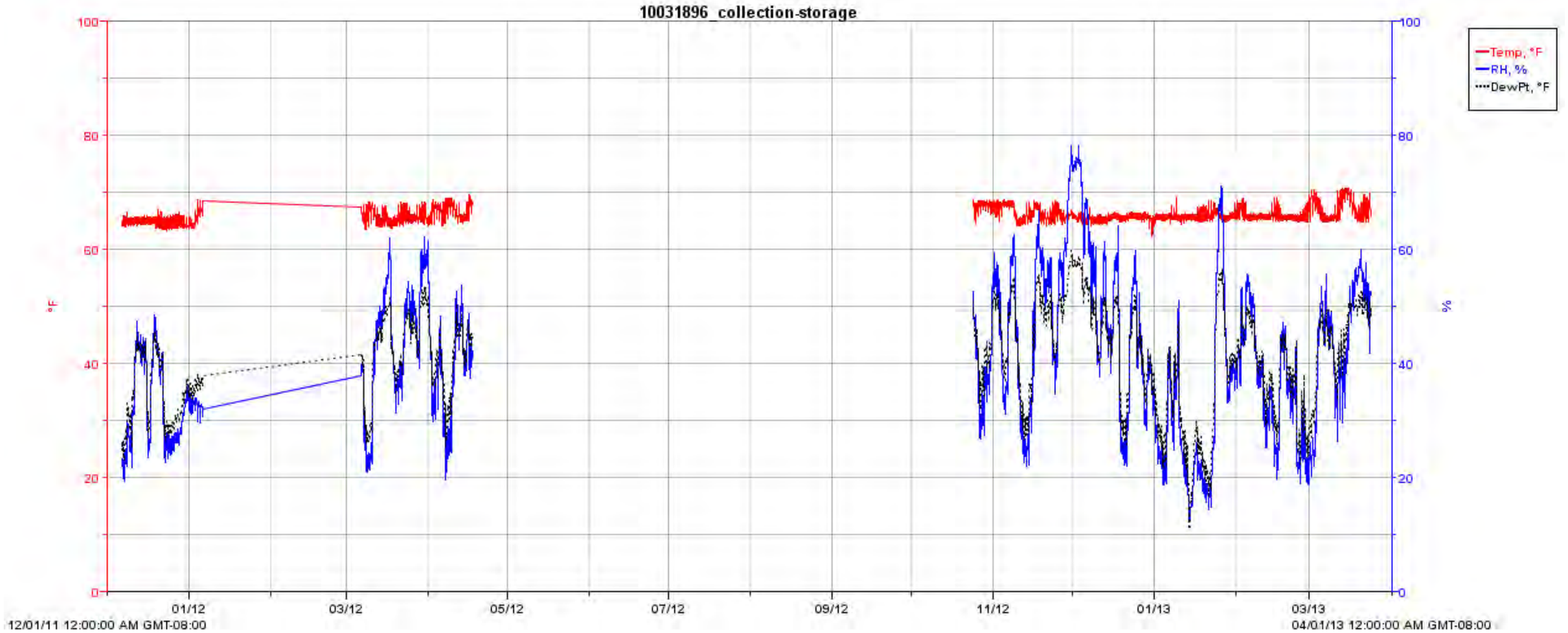
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Ontario Museum
MEP Condition Assessment Report

Located at:

225 S. Euclid Avenue,
Ontario, Ca 91762

Prepared for:

Prepared by:

HARITON ENGINEERING

751 N. Fair Oaks Avenue, Suite 201
Pasadena, CA 91103

On:

February 20, 2018

Introduction

Hariton Engineering conducted a visual survey on February 16th, 2018 of the existing mechanical, plumbing and electrical systems at the Ontario Museum. The museum is 2-story structure and basement. The scope of this report was to visually identify the existing MEP infrastructure and determine its suitability for planned upgrades to the museum. A schematic-level existing information of the systems is enclosed in the report.

Electrical Systems

The entire building is supplied by a 600A, 120/240v, 3ph, 4w service located in an electrical room of the building in the basement. The main distribution board has (4) 200A 2P, (4) 100A 2P, (1) 50A 2P, (3) 40A 2P and (3) 20A 2P breakers. The service is feeding total 8 sub panels, AC#4 & AC#5 and FAC#1 & FAC#2. Per our observation (1) 40A 2P and (1) 50A 2P breakers were considered as spare.

Panels “A” and “B” are 200A, 1Ph, 3W located in the basement electrical room. They are in good condition; however, the connected loads were not confirmed therefore it is recommended to rearrange the distribution of the breaker to use the panels more efficiently.

The panel “C” and “D” located at 1st floor south and north sides of corridor are feeding kitchen area and common area lighting and powers. Panels` condition are good but the load distribution shall be verified during remodeling to distribute the loads equally among breakers avoiding any over load or tripping.

Panel “E” is located in the closet beside Perm. Coll. Gallery (121) room at first floor. Panel overall condition is acceptable. The load distribution shall be verified to use the panel efficiently.

Panel “F” is located in the Inst. & Prep. Storage. Panel itself is in good condition; however, load distribution shall be verified. On the other hand, per NEC code electrical panel could not be in storage, so in the remodeling process it shall be relocated.

Panel “G” is located in the Storage (109). Serving purpose of the panel is not identified. It is not in good condition; therefore, it is recommended to replace with the new one and relocate to a point to have proper clearance.

Panel “H” is located on 2nd floor in the Library Conference Room (202). Connected loads are not clear. It is recommended to either verify the necessity of the panel or use panel “C” or “D” instead of it.

Lighting in the 1st floor corridors are pendant incandescent fixtures which are in old condition and not adequately lit. Lighting fixture for the rest areas including 2nd floor and closets are all (2x4) fluorescent fixtures which are in old condition and having low efficiency. All building lighting is controlled via manually on/off switches and observed no time clock for shut-off control.

There are a few combos exit sign/emergency fixtures installed in the galleries and corridors which are not sufficient to provide adequate lumen for the egress path.

In the electrical closet at 1st floor observed a fire alarm control panel which requires to be identified covering zones. Fire alarm controls devices were observed in most areas however the condition and testing should be done during remodeling. Supplemental fire alarm devices such as strobes, heat detectors should be verified and installed during remodeling.

Kitchen equipment and receptacles were observed. It appeared there are not enough adequate circuits dedicated for kitchen equipment. It is required to rearrange the equipment and provide dedicated circuit as needed. Also, in the kitchen observed a 50A receptacle which the serving purpose was not clear. It should be removed during remodeling.

General receptacles in the corridor and common areas are not adequate. Receptacles were found to be at non-ADA compliant heights as they were mounted in the 1st floor. Also, the receptacles do not meet current code spacing requirements as only few outlets were observed in the common areas.

Electrical System Recommendations:

The electrical service is in good shape as it has been upgraded in the last 30 years and the components are not deteriorated or corroded.

The distribution breakers shall be identified clearly to know which breaker is feeding each panel. On the other hand, serving area of each panel shall be verified and connected load of each breaker shall be checked to make sure they are not

over loaded. There are small panels in building which could be merged with the good condition panels such as “A” and “B” to have better distribution of the loads. Panel “G” is recommended to be replaced with the new one and relocated to have proper clearance.

Egress path shall be verified and emergency fixtures shall be provided to have minimum 1 foot-candle along the path. Also, exit signs shall be provided for areas having more than two entrances. These modifications apply to whole building.

Fire alarm system and devices for the building shall be tested and confirmed operational condition. Essentially, Fire Alarm Control Panel is recommended and as necessary additional fire alarm devices such as heat detectors and strobes for the basement and 2nd floor as well.

Feasibility study and installation of security system cameras for the building shall be verified.

Lighting in the common areas is deficient and simply functional. It is recommended that either replaced with the same type (fluorescent 2’x4’ wraparounds), or a modern look be achieved by installing new LED decorative-type surface mounted fixtures be installed per floor. As part of title 24 compliance, lighting controls are recommended by providing dimmers, occupancy sensor and astronomical time clock.

Outlets in the common areas will have to be modernized as part of the improvements.

It is recommended that all old wiring be removed and modernized as part of the proposed improvements to the building.

Figure 1 - 1st Floor Corridor Lighting

Figure 2 - Panel "G"

Figure 3 - Sample Missing Exit Sign/Emergency Fixture

Figure 4 - Missing Fire Alarm Control Panel

HVAC (Heating, Ventilation, and Air Conditioning):

The museum features multiple HVAC systems but not all building areas are being served. The basement level is currently not ventilated. The existing basement ductwork (for 3-ton split system and two forced air furnaces) serve the council chambers on the ground floor. Some of the split system ducting are quite antiquated and probably contain asbestos which will most likely require hazmat abatement.

The north galleries and museum store are being served by two split system heat pumps, (1) 3 ton and (1) 5 ton outdoor units. These units are located in the CMU enclosure on the northwest portion of the building. There are supply/return air diffusers at multiple locations throughout the rooms. The existing ductwork is located above the finished ceiling and was not observed.

The main corridor, restrooms, and adjacent open stairs on the ground floor do not have any direct heating or cooling.

The director's office and kitchen do not have any direct heating. It is being served by one small window-mounted air conditioning unit in each room.

The south galleries are being served by three gas/electric package units, (1) 3 ton, (1) 4 ton and (1) 5 ton outdoor units. These units are located in three separate CMU mechanical enclosures along south wall of building. The existing ductwork is above an open T-bar ceiling grid painted black. To further evaluate the condition of the existing ductwork and supply/return diffusers beyond the ceiling grid will require further investigation.

The second-floor offices and collection storage rooms are being served by two split system heat pump units (1) 8.5 ton unit and (1) 4 ton unit. These are located on the partial 2nd floor roof at the southeast portion of the building (8.5 ton unit) and at the ground floor on the east side of the building (4 ton unit). There are supply/return air diffusers at multiple locations throughout the rooms. The existing ductwork is located above the finished ceiling and was not observed.

Archival storage areas were also overserved both in the basement (via old vault) and on the second floor of the building. No climate and/or humidity control appears to be in either area.

HVAC Unit Summary

	Area Served	Unit Type	Unit Size	Model	Yr. Mfg	Est. Life	Repl Yr
1	North Gallery - East	Heat Pump Split	3 ton	25HCD360A-500	2014	15	2029
2	North Gallery - West	Heat Pump Split	5 ton	38YCA060-530	1995	15	2010
3	South Gallery - East	Gas/Elect Package	4 ton	48VLNA4809050	2013	15	2028
4	South Gallery - Central	Gas/Elect Package	5 ton	48VLNA6009050	2013	15	2028
5	South Gallery - West	Gas/Elect Package	3 ton	48SDN036060-511	2007	15	2022
6	Council Chambers	Split Syst. Ceiling	3 ton	38HDC036-521	2000	15	2015
7	Council Chambers	Forced-Air Furnace			NA	NA	NA
8	Council Chambers	Forced Air Furnace			NA	NA	NA
9	Council Chambers	Split Syst. Ceiling	5 ton	38HDC060-521	2001	15	2016
10	2nd floor Collections	Heat Pump Split	8.5 ton	50TFQ009-521	2002	15	2017
11	2nd floor Offices	Heat Pump Split	4 ton	38VCC048-541	2001	15	2016

HVAC System Short Term Recommendations:

The functionality of the exiting systems on the surface appears to be working properly, it is recommended that that the museum hire a third party to perform testing, adjusting and balancing report, preferably NEBB (National Environmental Balancing Bureau) of the entire building. In addition, provide findings for engineer to review and make recommendations if any to museum.

HVAC System Long Term Recommendations:

Identify all areas to be used building present and future and how each intends to function, condition spaces and humidity control accordingly. Because of the

variety of materials to be maintained, and the costs versus environmental risks deemed acceptable by each facility administrator, there are very few documented design parameters that are accepted by all institutions. Therefore, it is necessary for the project design team to include input from the facility's administrators, collection managers, curators, and conservators to determine the acceptable temperature and humidity parameters for each repository.

In general, archival storage recommendation is a stable temperature no higher than 70°F and a stable relative humidity between a minimum of 30% and a maximum of 50% (i.e., approximately 33-55 gr/#, or 37-71°Fdp).

Plumbing:

The existing water serves all three floors of the building. The basement has two plumbing chases which appear to have severed restrooms in the past but have since been demolished and are being used as storage rooms. The ground public restrooms and kitchen on 1st floor are currently in use and finally the 2nd floor appears to have had a bathroom and/or janitor closet but fixtures have been removed.

The existing building sewer system was not observed but it is recommended that third party provide video scoping of all lines.

The existing gas service and meter are located at north/east of the property. The gas service appears to serve the forced air units in the basement, gas/electric HVAC outdoor units and water heaters currently.

Plumbing System Recommendations:

Demolish abandoned cold-water piping and sewer connections in both basement and 2nd floor back to source.

Fire Sprinklers:

Building is currently not sprinklered.

Architectural
Resources Group

Ontario Museum of History & Art
Programming Code Review

March 2018

1. Applicable Codes

2016 California Building Code (CBC)
2016 California Electrical Code (CEC)
2016 California Mechanical Code (CMC)
2016 California Plumbing Code (CPC)
2016 California Energy Code (CEC)
2016 California Historical Building Code (CHBC)
2016 California Fire Code (CFC)
2016 California Existing Building Code (CEBC)

The Secretary of the Interior Standards and Illustrated Guidelines for Rehabilitating Historic Buildings, revised 1999

2. Use and Occupancy Classification (CBC, Chapter 3)

Group	Description
Group A-3	**Assembly (Museum)**
Group B	**Business (Offices & Ancillary)**
Group S-1	**Storage: Moderate-Hazard (books, archive-quality cardboard, clothing, furniture, etc.)**

3. Mixed Use and Occupancy (CBC, Section 508)

☐ Non-separated uses ☒ Separated Uses

Required Separation of Occupancies *if uses are separated* (CBC, Table 508.4)

Occupancy Types	Separation		Comments
	Sprinklered	Non-Sprinklered	
A-3 to B	None	None	B is ancillary to A-3
A-3 to S-1	1	2	Collections above/below Council Chambers
B to S-1	None	None	B is ancillary to S-1

4. Special Detailed Requirements Based on Use and Occupancy (CBC, Chapter 4)

5. Construction Type (CBC Section 602)
Concrete exterior walls, concrete and wood interior walls and floors.

☐I-A ☐I-B ☐II-A ☐II-B ☐III-A ☒III-B ☐IV-HT ☐V-A ☐V-B

6. Fire-Resistance Rating for Building Elements (CBC Table 601)

Building Element	**Fire Rating Requirements**
Structural Frame	0
Bearing Walls	
Exterior	2
Interior	0
Nonbearing walls & partitions	
Exterior – See Table 602	0
Interior	0
Floor construction	0
Roof construction	0

7. Maximum Area of Exterior Wall Openings (Table 705.8, applicable requirement highlighted below)

Classification of opening	**Fire Separation Distance** (location)							
	0 to less than 3[b,c,k]	**3 to less than 5[d,e]**	**5 to less than 10[e,f,j]**	**10 to less than 15[e,f,g]**	**15 to less than 20[f,g]**	**20 to less than 25[f,g]**	**25 to less than 30[f,g]**	**30 or greater**
Unprotected, Not Sprinklered	NP[k]	NP	10%[h]	15%[h]	25%	45%	70%	No limit
Unprotected, Sprinklered[i]	NP[k]	15%	25%	45%	75%	No limit	No limit	No limit
Protected	NP[k]	15%	25%	45%	75%	No limit	No limit	No limit

8. Opening Fire Protection Ratings (CBC, Tables 716.5 and 716.6)

Type of Assembly	**Wall Rating**	**Fire Door or Shutter Rating**	**Sidelight or Transom Rating**	**Fire Window Rating**

Fire Barrier	2	1-1/2	2 hr rating	Not Permitted
Fire Partitions:				
Corridor walls	1	1/3	45 min protection	3/4
Other walls	1	3/4	45 min protection	3/4

9. Occupant Load & Exiting Requirements (CBC, Chapter 10, Tables 1004.1.2 and 1006.2.1)

A-3	30 net	B	100 gross	S-1	500 net

Room No	Room Name	Occupancy	Net Area	Gross Area (net* 10%)	Area/Occ.	Occ. Load	Stair Width (0.3"/occ.)	Door Width (0.2"/occ.)	No. Exits Required
BASEMENT 1									
009	Storage	B	30	33	100	1	0.3	0.2	1
010	Exhibit Shop	B	270	297	100	3	0.9	0.6	1
011	Storage	B	60	66	100	1	0.3	0.2	1
015	Storage	B	150	165	100	2	0.6	0.4	1
001	Collections	S-1	85		500	1	0.3	0.2	1
005	Storage (Collections)	S-1	105		500	1	0.3	0.2	1
008	Storage (Collections)	S-1	140		500	1	0.3	0.2	1
						10			
BASEMENT 2									
	Storage (empty)	B	320	352	100	4	1.2	0.8	1
	Storage (empty)	B	85	94	100	1	0.3	0.2	1
						0			

FIRST FLOOR

100	Temp. Gallery D	A-3	1,010		30	34	10.2	6.8	1
101	Temp. Gallery C	A-3	620		30	21	6.3	4.2	1
103	Temp. Gallery B	A-3	775		30	26	7.8	5.2	1
104	Temp. Gallery A	A-3	425		30	15	4.5	3	1
113	Council Chambers	A-3	1,060		30	80	10.8	7.2	1
120	Perm. Front Gallery	A-3	1,215		30	41	12.3	8.2	1
122	Perm. Mid. Gallery	A-3	1,715		30	58	17.4	11.6	2
127	Perm. Rear Gallery	A-3	600		30	20	6	4	1
102	Exhibit Prep	B	260	286	100	3	0.9	0.6	1
105	Museum Store	B	325	358	100	4	1.2	0.8	1
110	Education Director	B	185	204	100	3	0.9	0.6	1
111	Storage	B	100	110	100	2	0.6	0.4	1
112	Entry/Lobby/Info	B	275	303	100	4	1.2	0.8	1
112	Education Classroom	B	200	220	100	3	0.9	0.6	1
115	Admin. Office	B	135	149	100	2	0.6	0.4	1
117	Storage	B	70	77	100	1	0.3	0.2	1
109	Storage	S-1	30		500	1	0.3	0.2	1
121	Vault	S-1	85		500	1	0.3	0.2	1
124	Vault	S-1	40		500	1	0.3	0.2	1
125	Vault	S-1	40		500	1	0.3	0.2	1

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SECOND FLOOR

200	Gen. Admin. Office	B	405	446	100	5	1.5	1	1
201	Curator's Office	B	225	248	101	3	0.9	0.6	1
202	Library/Conference	B	360	396	102	4	1.2	0.8	1
203	Director's Office	B	290	319	103	4	1.2	0.8	1
205	Copy Room	B	150	165	104	2	0.6	0.4	1
206	Storage	B	115	127	105	2	0.6	0.4	1
204	Collections	S-1	30		500	1	0.3	0.2	1
208	Collections	S-1	1,300		500	3	0.9	0.6	1

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1. Per CBC 1011.11, handrails are required on each side of stairways. Per CHBC 8-102.1.6, qualified historical buildings shall not be subject to work beyond that required to complete the work undertaken, so this requirement would apply only to new stairways.
2. Per CBC 1019.3, exit access stairways are required to be enclosed with a shaft enclosure. Per CHBC 8-102.1.6, qualified historical buildings shall not be subject to work beyond that required to complete the work undertaken, so this requirement would apply only to new stairways.

10. Exit Access Travel Distance (CBC, Table 1017.2, applicable requirement highlighted below)

	Distance	
Occupancy	**w/o sprinklers**	**w/ sprinklers**
A-3	200	250
B	200	300
S-1	200	250

11. Corridor fire-resistive rating (CBC Table 1017.1)

12. Interior Finishes Requirement by Occupancy (CBC Chapter 8, Table 803.11)

	Exit stairways and exit passageways[a,b]		Exit access corridors and other exitways		Rooms and enclosed spaces[c]	
Group	**NS**	**S**	**NS**	**S**	**NS**	**S**
A-3	A	B	A	B	C	C
B	A	B	B	C	C	C
S-1	B	C	B	C	C	C

Per CHBC 8-102.1.6, qualified historical buildings shall not be subject to work beyond that required to complete the work undertaken, so these requirements would apply only to new interior finishes.

13. Plumbing Fixture Requirements (CPC Table 422.1, Table A)
Note: Gender neutral restrooms may be applicable if University of California project

Occupancy	**Occupant Load Factor**	**Area**	**Occupant Load**	**Male**	**Female**
Assembly (A-3 Interior)	30	7,420	248	124	124
Business (B)	200	3,805	20	10	10
Storage (S-1)	5,000	1,890	1	1	1

Occupancy	Water Closets		Urinals	Lavatories		Bathtubs/ Showers	Drinking Fountains
	Male	Female	Male	Male	Female		
Assembly (A-3)	*2*	*4*	*2*	*1*	*2*	*NA*	*NA*
Business (B)	*1*	*2*	*1*	*1*	*1*	*NA*	*NA*
Storage (S-1)	*1*	*1*	*NA*	*1*	*1*	*NA*	*NA*
TOTAL	***4***	***7***	***3***	***3***	***4***	*NA*	*NA*

Appendix C

Cost Projection

C.1 Cost Plan Report

C.2 “Built On Water” Concept Budget

Wednesday, February 13, 2019

KPJ Consulting

Master Plan & Building Assessment

Ontario Museum of Art and History

Ontario, California

for

Architectural Resources Group, Inc.

ph 213 800 1568, e jchan@kpjconsultingusa.com

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AT A GLANCE

This Cost Plan Report

The following Cost Plan Report has been prepared to help establish, review and manage a realistic project scope, budget and cost. This report should be reviewed, revised and updated as each project nears the completion of design prior to bidding and construction. This is a measured cost plan based on programming information and industry experience, making assumptions on approximate quantities rather than a specific dollar-per-square-foot basis. Therefore, this cost plan is intended to be a guide and starting point for the development of these projects requiring subsequent review and cost analysis based on the state of documentation, program, and design process at the time of active development. It is the responsibility of the client to insure this revision process occurs at time of project.

This report is based historical cost data derived from a number of sources including but not limited bids data and past cost estimates of similar building types. However, specific responses to documents, designs, and programs will vary, based on each contractor's assessment of the current market, material prices and workload. It is conceivable that local and smaller general contractors may offer more competitive bidding than other general contractors with higher off-site costs and employed supervisors. The goal of this Cost Plan Report is to help you establish a "fair price" price for each project in consideration. Actual bid prices may vary. The basis for this cost analysis is derived from experience, qualifications, and best practice judgements from KPJ Consulting, a professional cost consultant familiar with the construction industry. However, KPJ Consulting cannot and does not guarantee that proposals, bids, or actual construction costs will not vary from this or subsequent cost estimates for these projects.

In addition, this cost analysis does not include allowances for potential cost saving techniques of the construction process. Techniques such as the implementation of a negotiated bid contract, construction management contract, or a non-traditional form of procurement may assist in reducing or increasing project costs, based on accelerating the project schedule or limiting competitive risk for the selected contractor. However, these results are on a case by case basis specific to the general contractor and any City protocol that may exist regarding design and construction on your facility.

Scope of Cost Plan

The scope of work is based on Architectural Repairs and Maintenance Scope, Recommendations and Quantities of repairs prepared by ARG dated 12.12.18.

Specific Inclusions - PC Allowances, Provisional & other allowances

Hazmat, lead and mold abatement.

Assumptions made in the Cost Plan

This cost plan was prepared under the following assumptions:

1. Competitive Design-Bid-Build procurement will be utilized with 4 or more general contractors.
2. Phasing will be required.
3. Work can take place during normal and off business hours.

AT A GLANCE

4 Prevailing Wage labor rate structure.
5 All repair/ replacement is a "guess-timate" at this point, and will change during construction after more of the deterioration is revealed.

Phasing Plan and Schedule

1 Overall work includes items of high or immediate need, or necessary repairs.
2 Area work includes items of refresh, new porgrams, moderate repair need and maintenance items.

Exclusions

Costs for the following items are excluded from this report. These items should be considered, checked and confirmed during design, and prior to bidding and construction. Allowances for their costs may need to be added to the project cost. Please refer also to the 'Detailed Trade Costs' section of this Cost Plan report for other specific exclusions.

1 Professional design and consulting fees.
2 General building permit including plans and permits for fire alarm system unless noted.
3 Testing fees unless noted.
4 Owner's field inspection costs.
5 Construction / project manager's fees.
6 Plan check fees and building permit fees unless noted.
7 Furnishings, fixtures and equipment (FF&E) / Group II.
8 Owner-furnished items.
9 Building signage beyond code-required signage.
10 Artwork and interior plants.
11 Construction contingency unless noted.
12 Move-in costs, relocation costs or maintenance costs after move-in.
13 Financing, land and due diligence costs.
14 Complete seismic
15 ADA compliance.
16 Title 24 energy compliance.
17 Remove and relocate on site furniture.
18 Grading and new/modifying existing utility
19 Site clearing at existing site.
20 Underpinning.
21 Pest control survey.
22 Correct floor settlement.
23 New or repair or reinstall interior finishes.
24 Mortar Analysis.
25 Environmental testing and report.
26 All Owner operations costs.
27 Escalation.
28 Exterior optic fiber network.

AT A GLANCE

Material & Escalation Index

An estimate of future escalation is included in this Cost Plan in order to capture increasing margins which will likely be higher than normal labor and material cost growth. Why escalation may differ regionally, with lagging regions taking longer to experience higher escalation, a recommended escalation of 5% annually has been implemented for this report.

Contingency

As the needs and priorities of your department change over time, this may impact the scope and character of the projects identified in this master plan. These changes during design, documentation, and construction many result in additional costs to the project in question. To help maintain the estimated project budget and account for these unexpected or undefined costs, a 15% Design Contingency is included in this report.

This report is prepared by...

Total Construction Cost Summary

Item	Scope	Area SF	Cost / SF	Total Present Value
1	Overall work	18,800	$74	$1,389,071
2	Area work	18,800	$80	$1,503,062
3	Overall or Area by area	18,800	$196	$3,676,739
	TOTAL ESTIMATED CONSTRUCTION COST	**18,800 SF**	**$349**	**$6,568,873**

Main Building Schedule of Areas & Control Quantities

Schedule of Areas	SF	SF
Enclosed GSF Areas		
Basement	2,000	
Ground Floor	13,300	
Second Floor	3,500	
Subtotal, Enclosed GSF Areas		**18,800**
Total Gross Floor Area		**18,800**

Control Quantities	Qty	Ratio to Gross Area

Master planning Phase 2 -Overall Work

Item	Elemental Format	Quantity	Unit	Unit Cost	Total
1	Asbestos, lead and mold abatement, allowance				
	Mold remediation include removal and disposal of materials with mold, basement	2,000	SF	$1.18	$2,360
	Hazmat abatement	18,800	SF	$7.80	$146,640
	Lead paint encapsulation	18,800	SF	$1.55	$29,140
	Environmental engineering and testing	1	LS	$7,000.00	$7,000
	Subtotal: Direct costs	***$9.85/SF***			**$185,140**
	Markups				
	General Conditions	20.00	%	$185,140	$37,028
	General Requirements	10.00	%	$185,140	$18,514
	Bonds	2.00	%	$185,140	$3,703
	Insurance	1.50	%	$185,140	$2,777
	Contractor's Overhead & Profit	5.00	%	$247,162	$12,358
	Design contingency	15.00	%	$259,520	$38,928
	Cost escalation -excluded		%	$298,448	
	Total	***$15.87/SF***			***$298,448***
2	New sprinkler system				
	Patch and repair existing ceiling	18,800	SF	$3.00	$56,400
	New wet sprinkler system throughout the buildings.	18,800	SF	$8.00	$150,400
	Fire water utility				
	AWWA type C900 "6" water pipe	200	LF	$100.00	$20,000
	Thrust block, allow	3	EA	$1,500.00	$4,500
	Fire water meter, allow	1	EA	$5,000.00	$5,000
	Subtotal: Direct costs	***$12.57/SF***			***$236,300***
	Markups				
	General Conditions	20.00	%	$236,300	$47,260
	General Requirements	10.00	%	$236,300	$23,630
	Bonds	2.00	%	$236,300	$4,726
	Insurance	1.50	%	$236,300	$3,545
	Contractor's Overhead & Profit	5.00	%	$315,461	$15,773
	Design contingency	15.00	%	$331,234	$49,685
	Cost escalation -excluded		%	$380,919	
	Total	***$20.26/SF***			***$380,919***

Master planning Phase 2 -Overall Work

Item	Elemental Format	Quantity	Unit	Unit Cost	Total
3	Fire Alarm System				
	New smoke and heat detectors, alarm and strobe, control panel, partial new wiring	18,800	SF	$10.00	$188,000
	Subtotal: Direct costs	***$10.00/SF***			**$188,000**
	Markups				
	General Conditions	20.00	%	$188,000	$37,600
	General Requirements	10.00	%	$188,000	$18,800
	Bonds	2.00	%	$188,000	$3,760
	Insurance	1.50	%	$188,000	$2,820
	Contractor's Overhead & Profit	5.00	%	$250,980	$12,549
	Design contingency	15.00	%	$263,529	$39,529
	Cost escalation -excluded		%	$303,058	
	Total	***$16.12/SF***			***$303,058***
4	Security/IT video systems				
	Outdoor cameras including conduit and wiring	8	EA	$3,000.00	$24,000
	Indoor cameras including conduit and wiring	15	EA	$4,500.00	$67,500
	DDN storage and monitor system including computer, software and hardrives	1	LS	$10,000.00	$10,000
	Subtotal: Direct costs	***$5.40/SF***			**$101,500**
	Markups				
	General Conditions	20.00	%	$101,500	$20,300
	General Requirements	10.00	%	$101,500	$10,150
	Bonds	2.00	%	$101,500	$2,030
	Insurance	1.50	%	$101,500	$1,523
	Contractor's Overhead & Profit	5.00	%	$135,503	$6,775
	Design contingency	15.00	%	$142,278	$21,342
	Cost escalation -excluded		%	$163,619	
	Total	***$8.70/SF***			***$163,619***

Master planning Phase 2 -Overall Work

Item	Elemental Format	Quantity	Unit	Unit Cost	Total
5	Telecommunication				
	Data outlet	46	EA	$1,700.00	$78,200
	Data/voice outlet	30	EA	$1,700.00	$51,000
	Exterior telecommunication cable by City				
	Subtotal: Direct costs	***$6.87/SF***			**$129,200**
	Markups				
	General Conditions	20.00	%	$129,200	$25,840
	General Requirements	10.00	%	$129,200	$12,920
	Bonds	2.00	%	$129,200	$2,584
	Insurance	1.50	%	$129,200	$1,938
	Contractor's Overhead & Profit	5.00	%	$172,482	$8,624
	Design contingency	15.00	%	$181,106	$27,166
	Cost escalation -excluded		%	$208,272	
	Total	***$11.08/SF***			***$208,272***
6	Seismic upgrades				
	Out of plane anchorage at the top of second floor interior concrete walls				
	Install steel anchors attach to diaphragm for seismic restraints	34	EA	$280.00	$9,520
	2x blocking and new 5/8" dia anchor 6" epoxy embedment w/ beveled washer @ 48" oc				
	Provide additional anchors near grid line D and I @ 32"oc	43	EA	$280.00	$12,040
	Subtotal: Direct costs	***$1.15/SF***			**$21,560**
	Markups				
	General Conditions	20.00	%	$21,560	$4,312
	General Requirements	10.00	%	$21,560	$2,156
	Bonds	2.00	%	$21,560	$431
	Insurance	1.50	%	$21,560	$323
	Contractor's Overhead & Profit	5.00	%	$28,783	$1,439
	Design contingency	15.00	%	$30,222	$4,533
	Cost escalation -excluded		%	$34,755	
	Total	***$1.85/SF***			***$34,755***

Master planning Phase 2 -Area Work

Item	Elemental Format	Quantity	Unit	Unit Cost	Total
1	Elevator				
	Demolition	500	SF	$50.00	$25,000
	Elevator shaft wall including foundation	1,260	SF	$75.00	$94,500
	Elevator shaft penthouse	560	SF	$55.00	$30,800
	Hydraulic elevator, 3 stop, rear and front opening	3	Stop	$65,000.00	$195,000
	Subtotal: Direct costs	***$18.37/SF***			**$345,300**
	Markups				
	General Conditions	20.00	%	$345,300	$69,060
	General Requirements	10.00	%	$345,300	$34,530
	Bonds	2.00	%	$345,300	$6,906
	Insurance	1.50	%	$345,300	$5,180
	Contractor's Overhead & Profit	5.00	%	$460,976	$23,049
	Design contingency	15.00	%	$484,024	$72,604
	Cost escalation -excluded		%	$556,628	
	Total	***$29.61/SF***			***$556,628***
2	Local accessibility adjustments				
	Cut and place doors thresholds, patch and repair flooring	35	LF	$46.00	$1,610
	Exit door hardware, double door	10	EA	$450.00	$4,500
	Subtotal: Direct costs	***$0.33/SF***			**$6,110**
	Markups				
	General Conditions	20.00	%	$6,110	$1,222
	General Requirements	10.00	%	$6,110	$611
	Bonds	2.00	%	$6,110	$122
	Insurance	1.50	%	$6,110	$92
	Contractor's Overhead & Profit	5.00	%	$8,157	$408
	Design contingency	15.00	%	$8,565	$1,285
	Cost escalation -excluded		%	$9,849	
	Total	***$0.52/SF***			***$9,849***
3	Front desk/accessible washroom				
	Demo concrete wall and create opening 8' x 8'	1	LS	$3,000.00	$3,000
	New concrete lintel beams	6	LF	$400.00	$2,400
	Demo floor / wall finishes	92	SF	$20.00	$1,840
	New ceramic floor tiles 12" x 12" Daltile or similar	20	SF	$25.00	$500
	New ceramic wall tiles 12" x 12" Daltile or similar	72	SF	$25.00	$1,800

Master planning Phase 2 -Area Work

Item	Elemental Format	Quantity	Unit	Unit Cost	Total
	Paint existing wall, prime & 2 coats	72	SF	$2.40	$173
	New drywall ceiling, painted	20	SF	$30.00	$600
	Toilet compartment and accessories	1	LS	$1,500.00	$1,500
	Custom plam welcome desk with quartz countertops	5	LF	$1,000.00	$5,000
	Misc. metal and rough carpentry	24	SF	$10.00	$240
	General plumbing equipment				
	Electric water heater	1	EA	$350.00	$350
	Wall-mount vitreous china flush valve toilet	1	EA	$1,050.00	$1,050
	Wall-mount vitreous china lavatory, stop valves, escutcheons, connectors and faucets	1	EA	$850.00	$850
	Floor drains	1	EA	$300.00	$300
	Rough-in	4	EA	$800.00	$3,200
	Sanitary waste, vent and service piping	100	LF	$40.00	$4,000
	Gas distribution	100	LF	$45.00	$4,500
	Firestopping	1	LS	$1,500.00	$1,500
	Testing and sterilization	1	LS	$1,500.00	$1,500
	Trade demolition	1	LS	$2,000.00	$2,000
	Subtotal: Direct costs	***$825.06/SF***			**$36,303**
	Markups				
	General Conditions	20.00	%	$36,303	$7,261
	General Requirements	10.00	%	$36,303	$3,630
	Bonds	2.00	%	$36,303	$726
	Insurance	1.50	%	$36,303	$545
	Contractor's Overhead & Profit	5.00	%	$48,464	$2,423
	Design contingency	15.00	%	$50,887	$7,633
	Cost escalation -excluded		%	$58,521	
	Total	***$1,330.01/SF***			***$58,521***
4	Museum store upgrade				
	Major concrete wall demolition	1	LS	$3,000.00	$3,000
	Demo floor / wall finishes	734	SF	$3.00	$2,202
	New concrete lintel beams	6	LF	$400.00	$2,400
	Interior hollow metal door, frames and hardware, 6'-0" x 6'-8"	1	EA	$5,000.00	$5,000
	New custom PLAM reception desk, 9'L x 3'H	9	LF	$1,000.00	$9,000
	New custom book shelves, 9'L x 8'H	9	LF	$2,000.00	$18,000
	Quartz countertops	9	LF	$300.00	$2,700
	Patch and repair floor/wall/ceiling finishes	104	SF	$4.00	$416
	Subtotal: Direct costs	***$410.75/SF***			**$42,718**

Master planning Phase 2 -Area Work

Item	Elemental Format	Quantity	Unit	Unit Cost	Total
	Markups				
	General Conditions	20.00	%	$42,718	$8,544
	General Requirements	10.00	%	$42,718	$4,272
	Bonds	2.00	%	$42,718	$854
	Insurance	1.50	%	$42,718	$641
	Contractor's Overhead & Profit	5.00	%	$57,029	$2,851
	Design contingency	15.00	%	$59,880	$8,982
	Cost escalation -excluded		%	$68,862	
	Total	***$662.13/SF***			***$68,862***
5	Kitchen upgrade				
	Demo floor / wall finishes / cabinetry	220	SF	$5.00	$1,100
	Quartz countertops	37	LF	$300.00	$11,100
	New custom PLAM pantry base cabinets	37	LF	$450.00	$16,650
	New custom pantry upper cabinets	37	LF	$350.00	$12,950
	New vinyl tiles	220	SF	$8.00	$1,760
	New drywall on existing partition, painted	945	SF	$25.00	$23,625
	Patch and paint existing ceiling, 2 coats	220	SF	$3.00	$660
	Misc. metal and rough carpentry	220	SF	$1.50	$330
	General plumbing equipment				
	Electric water heater	1	EA	$350.00	$350
	Kitchen sink and faucet, with garbage disposal	1	EA	$2,000.00	$2,000
	Isolation valves for sink	1	EA	$250.00	$250
	Local rough-in at fixture	1	EA	$800.00	$800
	Refrigerator and rough-in	1	EA	$150.00	$150
	New dishwasher connections	1	EA	$450.00	$450
	Sanitary waste, vent and domestic service piping	100	LF	$40.00	$4,000
	Gas distribution	100	LF	$45.00	$4,500
	Firestopping	1	LS	$1,500.00	$1,500
	Testing and sterilization	1	LS	$1,500.00	$1,500
	Trade demolition	1	LS	$2,000.00	$2,000
	Subtotal: Direct costs	***$389.43/SF***			**$85,675**

Master planning Phase 2 -Area Work

Item	Elemental Format	Quantity	Unit	Unit Cost	Total
	Markups				
	General Conditions	20.00	%	$85,675	$17,135
	General Requirements	10.00	%	$85,675	$8,568
	Bonds	2.00	%	$85,675	$1,714
	Insurance	1.50	%	$85,675	$1,285
	Contractor's Overhead & Profit	5.00	%	$114,376	$5,719
	Design contingency	15.00	%	$120,095	$18,014
	Cost escalation -excluded		%	$138,109	
	Total	***$627.77/SF***			***$138,109***
6	Office upgrade				
	Demo floor / wall finishes	1	LS	$33,000.00	$33,000
	New concrete lintel beams	6	LF	$400.00	$2,400
	Quartz countertops	7	LF	$300.00	$2,100
	New custom PLAM pantry base cabinets	7	LF	$450.00	$3,150
	New custom pantry upper cabinets	7	LF	$350.00	$2,450
	Interior hollow metal door, frames and hardware, 3'-0" x 7'-0"	2	EA	$3,500.00	$7,000
	New carpet tiles	1,750	SF	$8.00	$14,000
	New vinyl tiles	1,750	SF	$8.00	$14,000
	New 2 x 6 partition, drywall both sides, painted	600	SF	$25.00	$15,000
	Patch and paint existing ceiling, 2 coats	3,500	SF	$3.00	$10,500
	Misc. metal and rough carpentry	3,500	SF	$1.50	$5,250
	General plumbing equipment				
	Electric water heater	1	EA	$350.00	$350
	Kitchen sink and faucet, with garbage disposal	1	EA	$2,000.00	$2,000
	Isolation valves for sink	1	EA	$250.00	$250
	Local rough-in at fixture	2	EA	$800.00	$1,600
	Refrigerator and rough-in	1	EA	$150.00	$150
	New dishwasher connections	1	EA	$450.00	$450
	Sanitary waste, vent and domestic service piping	100	LF	$40.00	$4,000
	Gas distribution	100	LF	$45.00	$4,500
	Firestopping	1	LS	$1,500.00	$1,500
	Testing and sterilization	1	LS	$1,500.00	$1,500
	Trade demolition	1	LS	$2,000.00	$2,000
	Subtotal: Direct costs	***$36.33/SF***			**$127,150**
	Markups				
	General Conditions	20.00	%	$127,150	$25,430
	General Requirements	10.00	%	$127,150	$12,715
	Bonds	2.00	%	$127,150	$2,543
	Insurance	1.50	%	$127,150	$1,907

Master planning Phase 2 -Area Work

Item	Elemental Format	Quantity	Unit	Unit Cost	Total
	Contractor's Overhead & Profit	5.00	%	$169,745	$8,487
	Design contingency	15.00	%	$178,233	$26,735
	Cost escalation -excluded		%	$204,967	
	Total	***$58.56/SF***			***$204,967***
7	Washroom upgrades				
	Demo floor / wall finishes	1085	SF	$5.00	$5,425
	New ceramic floor tiles 12" x 12" Daltile or similar	285	SF	$25.00	$7,125
	New ceramic wall tiles 12" x 12" Daltile or similar	400	SF	$25.00	$10,000
	Paint existing wall, prime & 2 coats	400	SF	$2.40	$960
	New drywall ceiling, painted	285	SF	$25.00	$7,125
	Toilet compartment and accessories	1	LS	$4,000.00	$4,000
	Misc. metal and rough carpentry	285	SF	$1.50	$428
	General plumbing equipment				
	Electric water heater	2	EA	$350.00	$700
	Wall-mount vitreous china flush valve toilet	6	EA	$1,050.00	$6,300
	Wall-mount vitreous china lavatory, stop valves, escutcheons, connectors and faucets	6	EA	$850.00	$5,100
	Floor drains	2	EA	$300.00	$600
	Rough-in	16	EA	$800.00	$12,800
	Sanitary waste, vent and service piping and trenching (Assumed water lines was existing)	200	LF	$40.00	$8,000
	Gas distribution	200	LF	$45.00	$9,000
	Firestopping	1	LS	$4,000.00	$4,000
	Testing and sterilization	1	LS	$4,000.00	$4,000
	Trade demolition	1	LS	$5,000.00	$5,000
	Subtotal: Direct costs	***$317.76/SF***			**$90,563**
	Markups				
	General Conditions	20.00	%	$90,563	$18,113
	General Requirements	10.00	%	$90,563	$9,056
	Bonds	2.00	%	$90,563	$1,811
	Insurance	1.50	%	$119,543	$1,793
	Contractor's Overhead & Profit	5.00	%	$121,336	$6,067
	Design contingency	15.00	%	$127,402	$19,110
	Cost escalation -excluded		%	$146,513	
	Total	***$514.08/SF***			***$146,513***

Master planning Phase 2 -Area Work

Item	Elemental Format	Quantity	Unit	Unit Cost	Total
8	Loggia restoration				
	Wood rafters repairs: Remove loose/decayed wood material with hand tools. Treat wood surfaces with a wood preservative/fungicide. Repair loss areas with a wood-compatible epoxy patching compound (Abatron WoodEpox or similar). Tool and finish surfaces of patch to match surrounding wood, and paint entire rafter tail to match existing.	100	EA	$500.00	$50,000
	Wood beams at porches (north and south courtyard elevations)				
	Assume painted iron strap type repair, installed at intervals along the beams length, and epoxy injection of deep splits/checking with wood-compatible epoxy. Estimate 30 straps total (15 per elevation)	30	EA	$300.00	$9,000
	Subtotal: Direct costs	***$3.14/SF***			**$59,000**
	Markups				
	General Conditions	20.00	%	$50,000	$10,000
	General Requirements	10.00	%	$50,000	$5,000
	Bonds	2.00	%	$50,000	$1,000
	Insurance	1.50	%	$50,000	$750
	Contractor's Overhead & Profit	5.00	%	$75,750	$3,788
	Design contingency	15.00	%	$79,538	$11,931
	Cost escalation -excluded		%	$91,468	
	Total	***$4.87/SF***			***$91,468***
9	Corridor wall cases/ground floor office				
	Major concrete wall demolition	1	LS	$10,000.00	$10,000
	Double angled lintel beams	1	LS	$8,000.00	$8,000
	Demo floor / wall finishes	100	SF	$10.00	$1,000
	Display cases, 1/4" tempered glass with lighting	8	LF	$5,000.00	$40,000
	Misc. metal and rough carpentry	100	SF	$3.00	$300
	Patch and repair floor/wall/ceiling finishes	100	SF	$20.00	$2,000
	Subtotal: Direct costs	***$613.00/SF***			**$61,300**
	Markups				
	General Conditions	20.00	%	$61,300	$12,260
	General Requirements	10.00	%	$61,300	$6,130
	Bonds	2.00	%	$61,300	$1,226
	Insurance	1.50	%	$61,300	$920

Master planning Phase 2 -Area Work

Item	Elemental Format	Quantity	Unit	Unit Cost	Total
	Contractor's Overhead & Profit	5.00	%	$81,836	$4,092
	Design contingency	15.00	%	$85,927	$12,889
	Cost escalation -excluded		%	$98,816	
	Total	***$988.16/SF***			***$98,816***
10	Basement waterproofing				
	Repair basement walls/window at mechanical area to address water intrusion: Remove plywood infill panels and poor sealant at original window opening. Prep window masonry opening, and install new flexible flashing (window opening approx. 3 ft. x 3 ft). Provide new painted sheet metal infill panel at exterior, with new flashing at ductwork penetration. Seal around ductwork penetration. Provide new gypsum board infill at interior, seal around opening and paint. Repair existing painted concrete wall below opening (approx. 30 sf); remove loose paint coatings and debris, clean and prep concrete surface and repaint.	40	SF	$150.00	$6,000
	Demo the existing basement partitions and dead plumbing	40	LF	$85.00	$3,400
	New 2 x 6 partition, drywall both sides, painted	600	SF	$25.00	$15,000
	New drywall ceiling, painted	2,000	SF	$20.00	$40,000
	Subtotal: Direct costs	***$32.20/SF***			**$64,400**
	Markups				
	General Conditions	20.00	%	$64,400	$12,880
	General Requirements	10.00	%	$64,400	$6,440
	Bonds	2.00	%	$64,400	$1,288
	Insurance	1.50	%	$64,400	$966
	Contractor's Overhead & Profit	5.00	%	$85,974	$4,299
	Design contingency	15.00	%	$90,273	$13,541
	Cost escalation -excluded		%	$103,814	
	Total	***$51.91/SF***			***$103,814***

Master planning Phase 2 -Area Work

Item	Elemental Format	Quantity	Unit	Unit Cost	Total
11	Plumbing service to Carlson Gallery				
	New concrete lintel beams	6	LF	$400.00	$2,400
	Demo floor / wall finishes	344	SF	$8.00	$2,752
	New ceramic floor tiles 12" x 12" Daltile or similar	64	SF	$25.00	$1,600
	New ceramic wall tiles 12" x 12" Daltile or similar	140	SF	$25.00	$3,500
	Paint existing wall, prime & 2 coats	140	SF	$2.40	$336
	New drywall ceiling, painted	64	SF	$30.00	$1,920
	Toilet compartment and accessories	1	LS	$3,000.00	$3,000
	Misc. metal and rough carpentry	64	SF	$5.00	$320
	General plumbing -assumed N.I.C				
	Subtotal: Direct costs	***$247.31/SF***			**$15,828**
	Markups				
	General Conditions	20.00	%	$15,828	$3,166
	General Requirements	10.00	%	$15,828	$1,583
	Bonds	2.00	%	$15,828	$317
	Insurance	1.50	%	$15,828	$237
	Contractor's Overhead & Profit	5.00	%	$21,130	$1,057
	Design contingency	15.00	%	$22,187	$3,328
	Cost escalation -excluded		%	$25,515	
	Total	***$398.67/SF***			***$25,515***
12	Future loading dock -nic				

Master planning Phase 2 -Overall or Area by Area

Item	Elemental Format	Quantity	Unit	Unit Cost	Total
1	HVAC				
	New HVAC new VRF split system, new refrigerant piping, ductwork, insulation, registers, controls ventilation and misc. electrical connections				
	Ground floor, north	6,000	SF	$55.00	$330,000
	Ground floor, east	2,700	SF	$55.00	$148,500
	Ground floor, west	4,600	SF	$55.00	$253,000
	Ground floor, center (Council Chamber)	3,300	SF	$100.00	$330,000
	Second floor	3,500	SF	$45.00	$157,500
	Basement	2,000	SF	$35.00	$70,000
	Subtotal: Direct costs	***$68.56/SF***			**$1,289,000**
	Markups				
	General Conditions	20.00	%	$1,289,000	$257,800
	General Requirements	10.00	%	$1,289,000	$128,900
	Bonds	2.00	%	$1,289,000	$25,780
	Insurance	1.50	%	$1,289,000	$19,335
	Contractor's Overhead & Profit	5.00	%	$1,720,815	$86,041
	Design contingency	15.00	%	$1,806,856	$271,028
	Cost escalation -excluded		%	$2,077,884	
	Total	***$110.53/SF***			***$2,077,884***
2	Window restoration and weatherstripping				
	Basic maintenance of steel windows	69	EA	$800.00	$55,200
	Upgrades of steel windows	36	EA	$1,500.00	$54,000
	Extensive repairs of steel windows	20	EA	$3,000.00	$60,000
	Subtotal: Direct costs	***$9.00/SF***			**$169,200**
	Markups				
	General Conditions	20.00	%	$169,200	$33,840
	General Requirements	10.00	%	$169,200	$16,920
	Bonds	2.00	%	$169,200	$3,384
	Insurance	1.50	%	$169,200	$2,538
	Contractor's Overhead & Profit	5.00	%	$225,882	$11,294
	Design contingency	15.00	%	$237,176	$35,576
	Cost escalation -excluded		%	$272,753	
	Total	***$14.51/SF***			***$272,753***

Master planning Phase 2 -Overall or Area by Area

Item	Elemental Format	Quantity	Unit	Unit Cost	Total
2	Door restoration and weatherstripping				
	Repair existing wood doors, sidelights and transoms				
	Exterior single door	2	EA	$1,600.00	$3,200
	Exterior double door	2	EA	$3,200.00	$6,400
	Metal decorative gates	7	EA	$3,000.00	$21,000
	Subtotal: Direct costs	***$1.63/SF***			**$30,600**
	Markups				
	General Conditions	20.00	%	$30,600	$6,120
	General Requirements	10.00	%	$30,600	$3,060
	Bonds	2.00	%	$30,600	$612
	Insurance	1.50	%	$30,600	$459
	Contractor's Overhead & Profit	5.00	%	$40,851	$2,043
	Design contingency	15.00	%	$42,894	$6,434
	Cost escalation -excluded		%	$49,328	
	Total	***$2.62/SF***			***$49,328***
3	Exterior walls				
	Repair cracks at localized areas. Inject cracks min. 1/16-inch or wider with an epoxy-based grout. Finish flush with surface, and touch-up paint coating.	25	LF	$70.00	$1,750
	Patch concrete spalls at localized areas. Remove loose material and debris to sound concrete substrate. Patch loss area with a proprietary concrete patching compound (polymer-modified mortar), and finish to match surrounding surface. Touch-up paint coating to match existing.	5	SF	$100.00	$500
	Touch-up paint coating at base of walls and other localized areas: Clean and prepare surfaces to remove loose/peeling paint coatings, and repaint to match existing	500	SF	$3.00	$1,500
	Replace 10 missing terracotta tiles	10	EA	$100.00	$1,000
	Subtotal: Direct costs	***$0.25/SF***			**$4,750**
	Markups				
	General Conditions	20.00	%	$4,750	$950
	General Requirements	10.00	%	$4,750	$475
	Bonds	2.00	%	$4,750	$95
	Insurance	1.50	%	$4,750	$71
	Contractor's Overhead & Profit	5.00	%	$6,341	$317
	Design contingency	15.00	%	$6,658	$999

Master planning Phase 2 -Overall or Area by Area

Item	Elemental Format	Quantity	Unit	Unit Cost	Total
	Cost escalation -excluded		%	$7,657	
	Total	***$0.41/SF***			***$7,657***
4	Roofing				
	Repair existing downspouts: Reattach components where loose; re-solder open joints; prep and paint as needed.	120	LF	$22.00	$2,640
	Remove and salvage existing clay tile to expose underlayments and flashings. Correct waterproofing and flashing as required. Then reinstall salvaged clay tile.	20	SF	$500.00	$10,000
	Subtotal: Direct costs	***$0.67/SF***			**$12,640**
	Markups				
	General Conditions	20.00	%	$12,640	$2,528
	General Requirements	10.00	%	$12,640	$1,264
	Bonds	2.00	%	$12,640	$253
	Insurance	1.50	%	$12,640	$190
	Contractor's Overhead & Profit	5.00	%	$16,874	$844
	Design contingency	15.00	%	$17,718	$2,658
	Cost escalation -excluded		%	$20,376	
	Total	***$1.08/SF***			***$20,376***
5	New Gallery lighting/finishes upgrades				
	Major concrete wall demolition	1	LS	$12,000.00	$12,000
	Double angled lintel beams	1	LF	$6,000.00	$6,000
	Demo floor / wall finishes	5,364	SF	$5.00	$26,820
	Interior hollow metal door, frames and hardware, 6'-0" x 6'-8"	1	EA	$7,000.00	$7,000
	New 2 x 6 partition, plywood sheathing, drywall one sides, painted	272	SF	$25.00	$6,800
	New 2 x 6 partition, plywood sheathing drywall both sides, painted	3,660	SF	$28.00	$102,480
	New custom PLAM pantry base cabinets	15	LF	$450.00	$6,750
	New custom pantry upper cabinets	15	LF	$350.00	$5,250
	Polished concrete	2,764	SF	$4.00	$11,056
	New vinyl tiles for pantry	336	SF	$8.00	$2,688
	New drywall ceiling, painted	3,100	SF	$20.00	$62,000
	Misc. metal and rough carpentry	3,100	SF	$1.00	$3,100
	General plumbing -assumed N.I.C				
	Electrical				
	Recessed linear 4' downlight	10	EA	$850.00	$8,500
	Track lighting, one head per 10'	250	LF	$80.00	$20,000

Master planning Phase 2 -Overall or Area by Area

Item	Elemental Format	Quantity	Unit	Unit Cost	Total
	Track lighting	25	EA	$450.00	$11,250
	Occupancy sensors, photocell, switches, etc.	10	EA	$450.00	$4,500
	Seismic supports	1	EA	$4,000.00	$4,000
	Commissioning assistance only	1	EA	$920.00	$920
	Coredrill and fireseal penetrations	45	EA	$52.00	$2,340
	Subtotal: Direct costs	***$97.89/SF***			**$303,454**
	Markups				
	General Conditions	20.00	%	$303,454	$60,691
	General Requirements	10.00	%	$303,454	$30,345
	Bonds	2.00	%	$303,454	$6,069
	Insurance	1.50	%	$303,454	$4,552
	Contractor's Overhead & Profit	5.00	%	$405,111	$20,256
	Design contingency	15.00	%	$425,367	$63,805
	Cost escalation -excluded		%	$489,172	
	Total	***$157.80/SF***			***$489.172***
6	New Exhibit lighting/finishes upgrades				
	Misc. demolition	1	LS	$3,000.00	$3,000
	Demo floor / wall finishes	2,320	SF	$5.00	$11,600
	Interior hollow metal door, frames and hardware, 3'-0" x 7'-0"	1	EA	$3,500.00	$3,500
	Carpet tiles	1,200	SF	$8.00	$9,600
	ACT ceiling to remain, painted	1,200	SF	$3.00	$3,600
	New drywall on existing partition, painted	($25 /SF)			
	½" plywood backing laminated to existing wall surface	2,100	SF	$3.50	$7,350
	5/8" GWB facing	2,100	SF	$6.50	$13,650
	3'x6' removable panels at windows (x11) -$5/sf- assume GWB on 1" ply with some wood framing	18	SF	$28.00	$504
	Allowance for remediating existing substrate where uneven	1,700	SF	$14.00	$23,800
	Painting	2,100	SF	$3.50	$7,350
	Misc. metal and rough carpentry	1,200	SF	$1.00	$1,200
	Electrical				
	Recessed linear 4' downlight	6	EA	$850.00	$5,100
	Track lighting, one head per 10'	90	LF	$80.00	$7,200
	Track lighting	9	EA	$450.00	$4,050
	Occupancy sensors, photocell, switches, etc.	6	EA	$450.00	$2,700
	Seismic supports	1	LS	$2,000.00	$2,000
	Commissioning assistance only	1	LS	$920.00	$920
	Coredrill and fireseal penetrations	21	EA	$52.00	$1,092
	Subtotal: Direct costs	***$90.18/SF***			**$108,216**

Master planning Phase 2 -Overall or Area by Area

Item	Elemental Format	Quantity	Unit	Unit Cost	Total
	Markups				
	General Conditions	20.00	%	$108,216	$21,643
	General Requirements	10.00	%	$108,216	$10,822
	Bonds	2.00	%	$108,216	$2,164
	Insurance	1.50	%	$108,216	$1,623
	Contractor's Overhead & Profit	5.00	%	$144,468	$7,223
	Design contingency	15.00	%	$151,692	$22,754
	Cost escalation -excluded		%	$174,446	
	Total	***$145.37/SF***			***$174,446***
7	Middle Gallery lighting/finishes upgrades				
	Misc. demolition	1	LS	$5,000.00	$5,000
	Demo floor / wall finishes	3,000	SF	$5.00	$15,000
	Interior hollow metal door, frames and hardware, 3'-0" x 7'-0"	2	EA	$3,500.00	$7,000
	Carpet tiles	1,600	SF	$8.00	$12,800
	ACT ceiling to remain, painted	1,600	SF	$3.00	$4,800
	New drywall on existing partition, painted	2,625	SF	$25.00	$65,625
	Misc. metal and rough carpentry	1,600	SF	$1.00	$1,600
	Electrical				
	Recessed linear 4' downlight	10	EA	$850.00	$8,500
	Track lighting, one head per 10'	250	LF	$80.00	$20,000
	Occupancy sensors, photocell, switches, etc.	10	EA	$450.00	$4,500
	Seismic supports	25	EA	$450.00	$11,250
	Commissioning assistance only	1	LS	$4,000.00	$4,000
	Coredrill and fireseal penetrations	1	LS	$920.00	$920
		45	EA	$52.00	$2,340
	Subtotal: Direct costs	***$102.08/SF***			**$163,335**
	Markups				
	General Conditions	20.00	%	$163,335	$32,667
	General Requirements	10.00	%	$163,335	$16,334
	Bonds	2.00	%	$163,335	$3,267
	Insurance	1.50	%	$163,335	$2,450
	Contractor's Overhead & Profit	5.00	%	$218,052	$10,903
	Design contingency	15.00	%	$228,955	$34,343
	Cost escalation -excluded		%	$263,298	
	Total	***$164.56/SF***			***$263,298***

Master planning Phase 2 -Overall or Area by Area

Item	Elemental Format	Quantity	Unit	Unit Cost	Total
8	Classroom lighting/finishes upgrades				
	Misc. demolition	1	LS	$6,000.00	$6,000
	Demo floor / wall finishes	1,368	SF	$5.00	$6,840
	Interior hollow metal door, frames and hardware, 3'-0" x 7'-0"	1	EA	$3,500.00	$3,500
	Patch and paint existing walls	1,440	SF	$2.40	$3,456
	Carpet tiles	600	SF	$8.00	$4,800
	Patch and paint existing ceiling	600	SF	$3.00	$1,800
	Misc. metal and rough carpentry	600	SF	$1.00	$600
	Electrical				
	Recessed linear 4' downlight	8	EA	$850.00	$6,800
	Track lighting, one head per 10'	40	LF	$80.00	$3,200
	Track lighting, one head per 10'	4	EA	$450.00	$1,800
	Occupancy sensors, photocell, switches, etc.	8	EA	$450.00	$3,600
	Seismic supports	1	LS	$4,000.00	$4,000
	Commissioning assistance only	1	LS	$920.00	$920
	Coredrill and fireseal penetrations	20	EA	$52.00	$1,040
	Subtotal: Direct costs	***$80.59/SF***			**$48,356**
	Markups				
	General Conditions	20.00	%	$48,356	$9,671
	General Requirements	10.00	%	$48,356	$4,836
	Bonds	2.00	%	$48,356	$967
	Insurance	1.50	%	$48,356	$725
	Contractor's Overhead & Profit	5.00	%	$64,555	$3,228
	Design contingency	15.00	%	$67,783	$10,167
	Cost escalation -excluded		%	$77,950	
	Total	***$129.92/SF***			***$77,950***
9	Steel exit stair				
	Clean and prep metal surfaces to remove loose/peeling paint and light to moderate corrosion	1	FLT	$25,000.00	$25,000
	Treat areas where corrosion was removed with a rust reformer and rust-inhibitive primer				
	Cut out section of damaged handrail post, and replace with new. Grind all field welds smooth				
	Repaint metal surfaces of stair and railing				
	Subtotal: Direct costs	***$1.33/SF***			**$25,000**

Master planning Phase 2 -Overall or Area by Area

Item	Elemental Format	Quantity	Unit	Unit Cost	Total
	Markups				
	General Conditions	20.00	%	$25,000	$5,000
	General Requirements	10.00	%	$25,000	$2,500
	Bonds	2.00	%	$25,000	$500
	Insurance	1.50	%	$25,000	$375
	Contractor's Overhead & Profit	5.00	%	$33,375	$1,669
	Design contingency	15.00	%	$35,044	$5,257
	Cost escalation -excluded		%	$40,300	
	Total	***$2.14/SF***			***$40,300***
10	Site/Pavements				
	Repair concrete paving at courtyard porches and entrances				
	Epoxy-inject cracks at localized areas, cracks min. 1/16-inch or wider. Finish flush with surface				
	Patch spalls and losses at localized areas. Remove loose material and fill with polymer-modified mortar). Finish to	100	SF	$200.00	$20,000
	Replace damaged concrete flatwork adjacent entrance bay at central west courtyard elevation	100	SF	$200.00	$20,000
	Reset brick pavers at rose garden: Remove damaged areas of brick pavers and stack/salvage units for reuse.	500	SF	$150.00	$75,000
	Repair slate pavers at courtyard, localized areas				
	To correct tripping hazards and heavier damage or loss areas. Inject cracks in mortar setting bed with comparable color-matched mortar. Inject cracks in slate with epoxy-modified, color matched repair mortar (integrally pigmented, red to purple shades). Infill areas of slate loss with setting bed type mortar	20	SF	$500.00	$10,000
	Subtotal: Direct costs	***$173.61/SF***			**$125,000**
	Markups				
	General Conditions	20.00	%	$125,000	$25,000
	General Requirements	10.00	%	$125,000	$12,500
	Bonds	2.00	%	$125,000	$2,500
	Insurance	1.50	%	$125,000	$1,875
	Contractor's Overhead & Profit	5.00	%	$166,875	$8,344
	Design contingency	15.00	%	$175,219	$26,283
	Cost escalation -excluded		%	$201,502	
	Total	***$279.86/SF***			***$201,502***

Master planning Phase 2 -Overall or Area by Area

Item	Elemental Format	Quantity	Unit	Unit Cost	Total
11	Exterior historical fixtures				
	Clean and refinish existing original bronze sconces and pendant fixtures	11	EA	$117.00	$1,287
	Subtotal: Direct costs	***$0.07/SF***			**$1,287**
	Markups				
	General Conditions	20.00	%	$1,287	$257
	General Requirements	10.00	%	$1,287	$129
	Bonds	2.00	%	$1,287	$26
	Insurance	1.50	%	$1,287	$19
	Contractor's Overhead & Profit	5.00	%	$1,718	$86
	Design contingency	15.00	%	$1,804	$271
	Cost escalation -excluded		%	$2,075	
	Total	***$0.11/SF***			***$2,075***

Architectural
Resources Group

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Memorandum

Project OMHA
Project No. 14046
Subject Built on Water gallery concept scope and budget
Date 1 February 2019

Below is a concept architectural scope and budget for the "Built on Water" gallery upgrades based on KPJ's 3 January 2019 cost estimate for the OMHA masterplan.

Scope Item	*Est. Direct Cost*
Demolition	$14,600
Interior doors	$3,500
Floor finish	$9,600
Clean and paint ceiling grid system	$3,600
New painted partitions and window cover panels	$52,500
Misc metal and rough carpentry	$1,200
Electrical & lighting	$24,000
HVAC (this gallery only)	$66,000
Window refurbishment: $800 x 9	$7,200
Window extensive repair: $3000 x 2	$6,000
Subtotal: Estimated Direct Costs	**$188,200**
Contractor Mark-up @ 63%	$118,600
Subtotal: Construction Cost Estimate	**$306,800**
Soft Costs A/E Design Fees @ 20%	$61,400
Owner Costs @ 15% Project Management, Temp Facilities, Construction Contingency, etc.	$46,000
Total Estimated Project Budget	**$414,200**

Exclusions:

- Exhibit and modular wall systems design, fabrication, and installation
- Wifi and security systems
- Hazardous materials abatement
- Electrical mapping

Appendix D

Historic Preservation

D.1 Preservation Approvals Matrix

Preservation Approvals Matrix

As detailed in Section 4.9, work on OMHA's building is subject to Ontario's Historic Preservation Ordinance (HPO), as administered by the Advance Planning division of the City's Planning Department.

Approval of work typically takes the form of a Certificate of Appropriateness. A Waiver to the Certificate of Appropriateness may be issued by the Planning Director if the proposed work is considered minor and does not adversely affect character-defining features.

The following matrix of anticipated approvals per work type is based on input from Ontario's Planning Department. It is advisory, not definitive: requirements for work other than regular cleaning and maintenance should be confirmed with the Planning Department on a case-by-case basis.

Roofing and Drainage	
Regular inspection and cleaning	No review required
Repair existing downspouts	No review required
Remediate second floor mechanical pad	Administrative approval required
Exterior Walls and Features	
Remediate localized concrete cracks and spalls	Administrative approval required
Touch-up painting	No review required
Replicate and replace historic tiles	Administrative approval required
Remediate and waterproof basement walls	No review required
Repair or replace basement windows	Administrative approval required
Basic steel window upkeep	No review required
Steel window frame repairs and reconstruction	Administrative approval required
Glazing upgrades (laminated, UV film, etc.)	Administrative approval required
Windows and Doors	
Maintain wood doors	No review required
Refinish and repair wood doors	No review required
Upgrade door hardware for egress/accessibility	Administrative approval required
Conserve and repaint metal gates	No review required
Repair or replace basement windows	Administrative approval required
Basic steel window upkeep	No review required
Steel window frame repairs and reconstruction	Administrative approval required
Glazing upgrades (laminated, UV film, etc.)	Administrative approval required

Wood Framing and Trim	
Repair/rebuild rafter tails	Administrative approval required
Remediate wood structural beams at veranda	Administrative approval required
Steel Exit Stairs	
General maintenance	No review required
Repairs	No review required
Exterior Lighting	
Conservation of historical fixtures	Administrative approval required
Relamp/rewire fixtures	Administrative approval required
Landscape Features	
Clean concrete and brick surfaces	No review required
Repoint brick paving	Administrative approval required
Remediate cracks and losses in pavement	Administrative approval required
Repairs to slate paving in courtyard	Administrative approval required
Interiors	
General maintenance and cleaning	No review required
Painting	No review required if same color
Replacement of non-historic interior finishes *(for instance, carpet, bathroom tile, acoustical ceilings)*	No review required
Work requiring selective opening and patching *(for instance, installation of sprinkler system or electrical wiring)*	No review required
Alterations in areas without contributing historic fabric *(gallery wings, office, basement)*	No review required
Alterations in areas with contributing historic fabric *(front desk, main hall)*	Administrative approval or Certificate of Appropriateness required
Work with any impact on Council Chambers	Administrative approval or Certificate of Appropriateness required
Conservation of historical fixtures and fittings	Administrative approval required