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

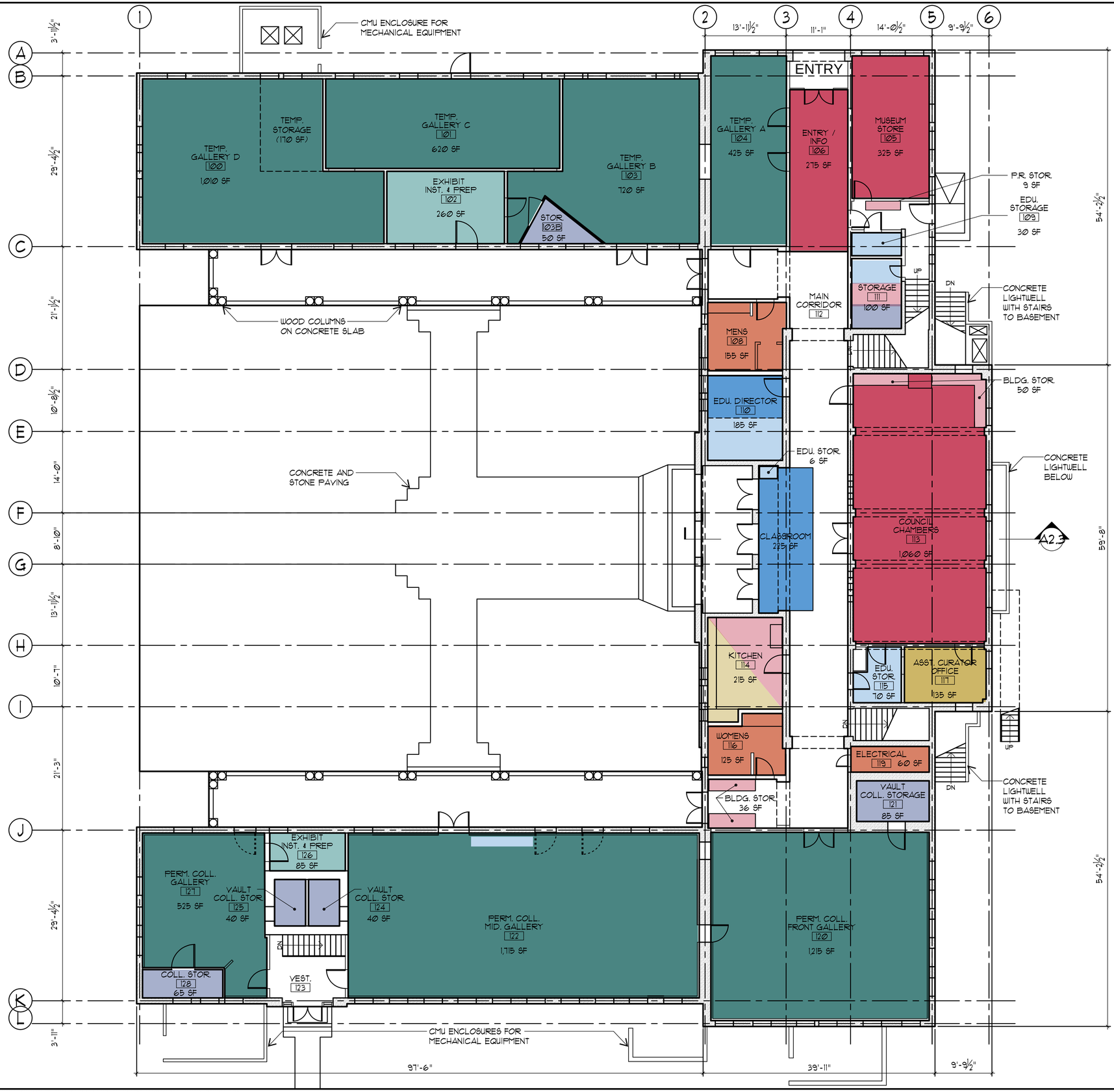
SHEET TITLE

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

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ARCHITECTURAL RESOURCES GROUP, Inc.
Architects, Planners & Conservators
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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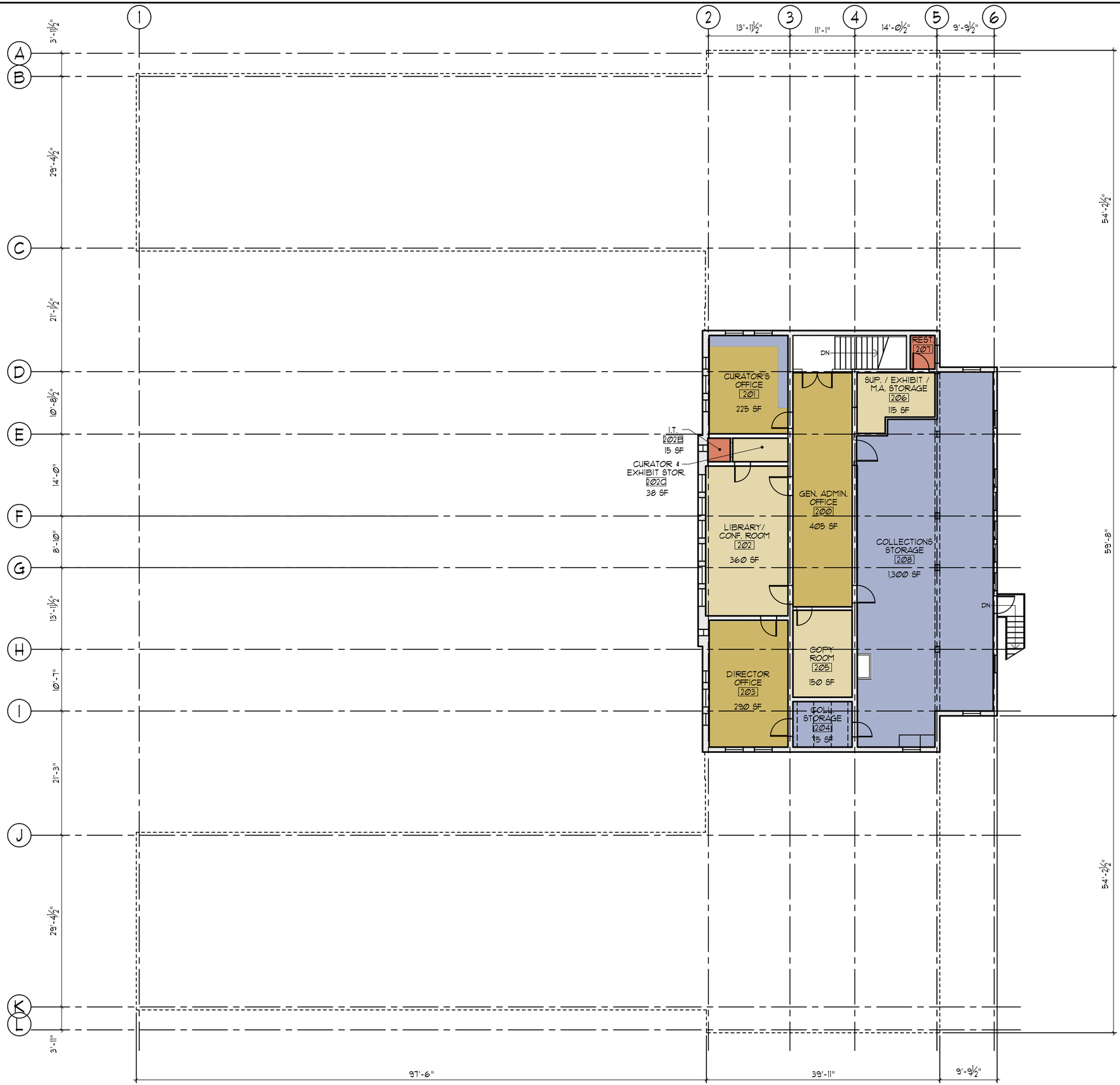

KEY

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

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1/8" = 1'-0"

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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

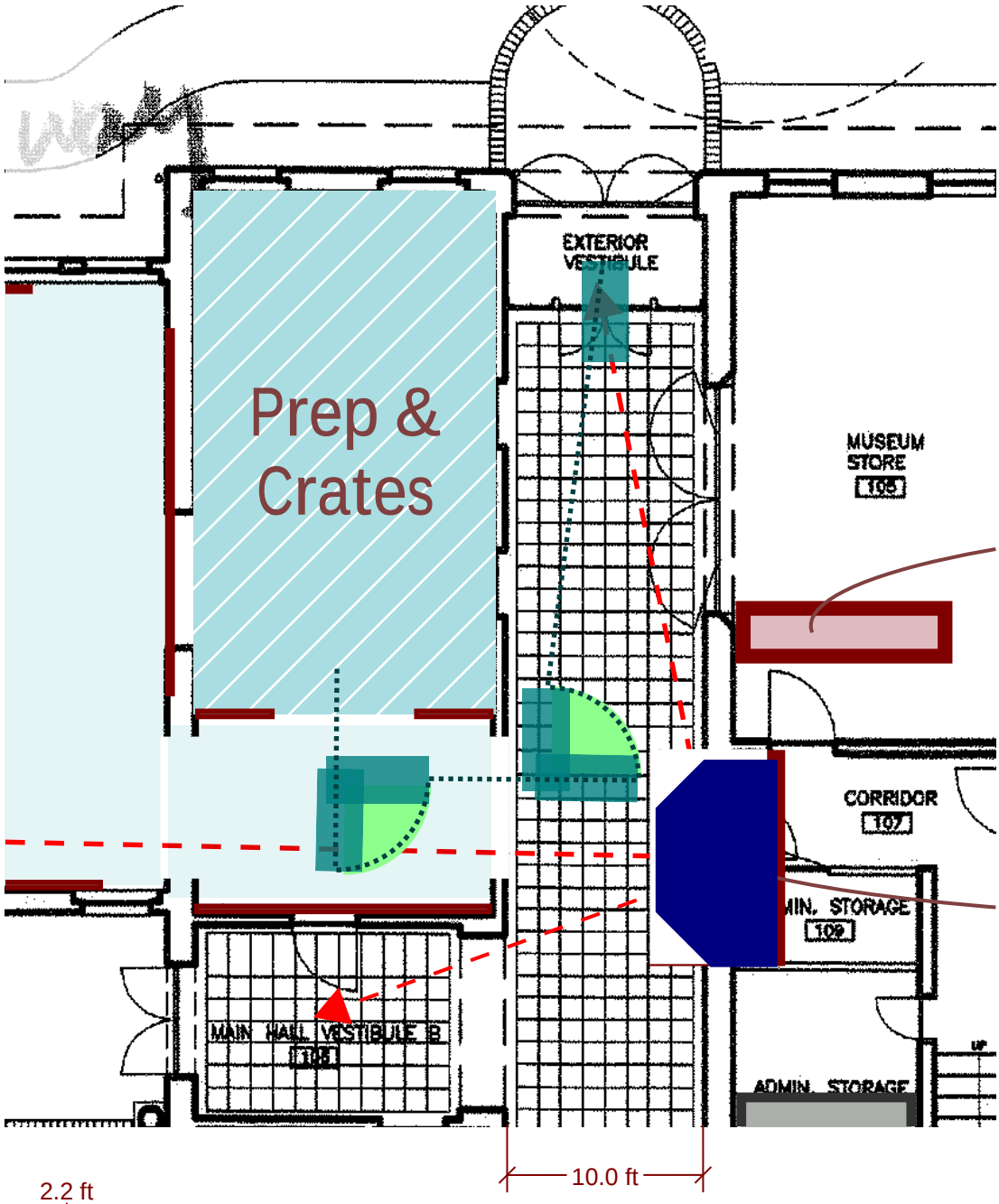
		Room Name	Existing NSF	Existing* FT/PT/V	ESSENTIAL Proposed NSF	Comments
1.0	**Public Serving**					
		Entry/Lobby/Info	275	2 PT	275	
		Museum Store	325	1 V	325	
		Council Chambers	1,060		1,060	Orientation Room; Classroom (9 at council table; 70 at audience)
	Support					
		Storage	-		100	
		Warming 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	

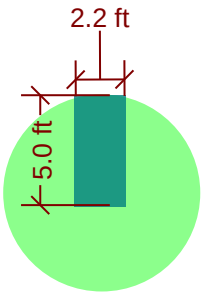
Ontario Museum of History and Art
Print Date: 3/14/2018

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.

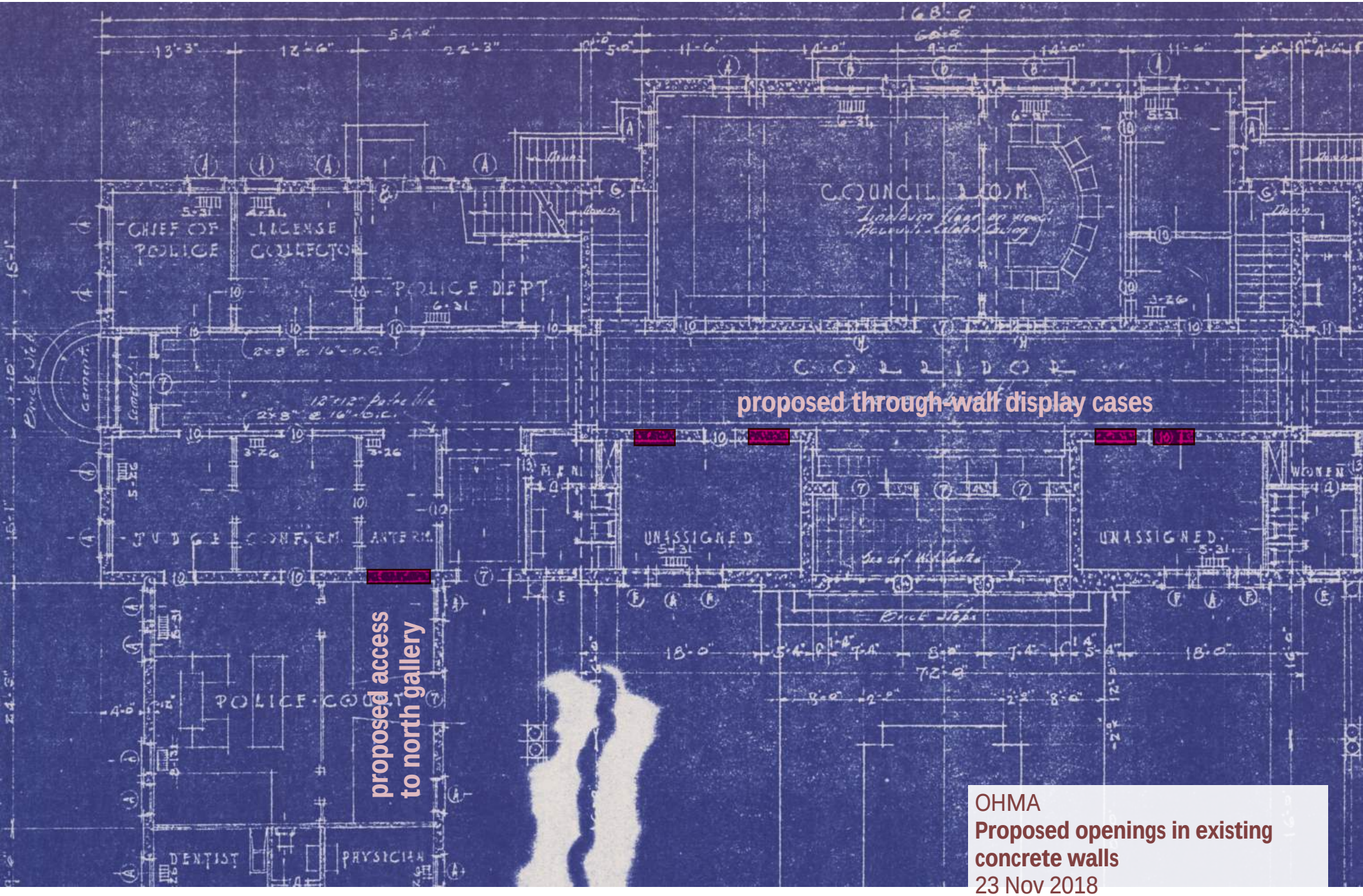




Typ pallet truck with
4'6" turning radius

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

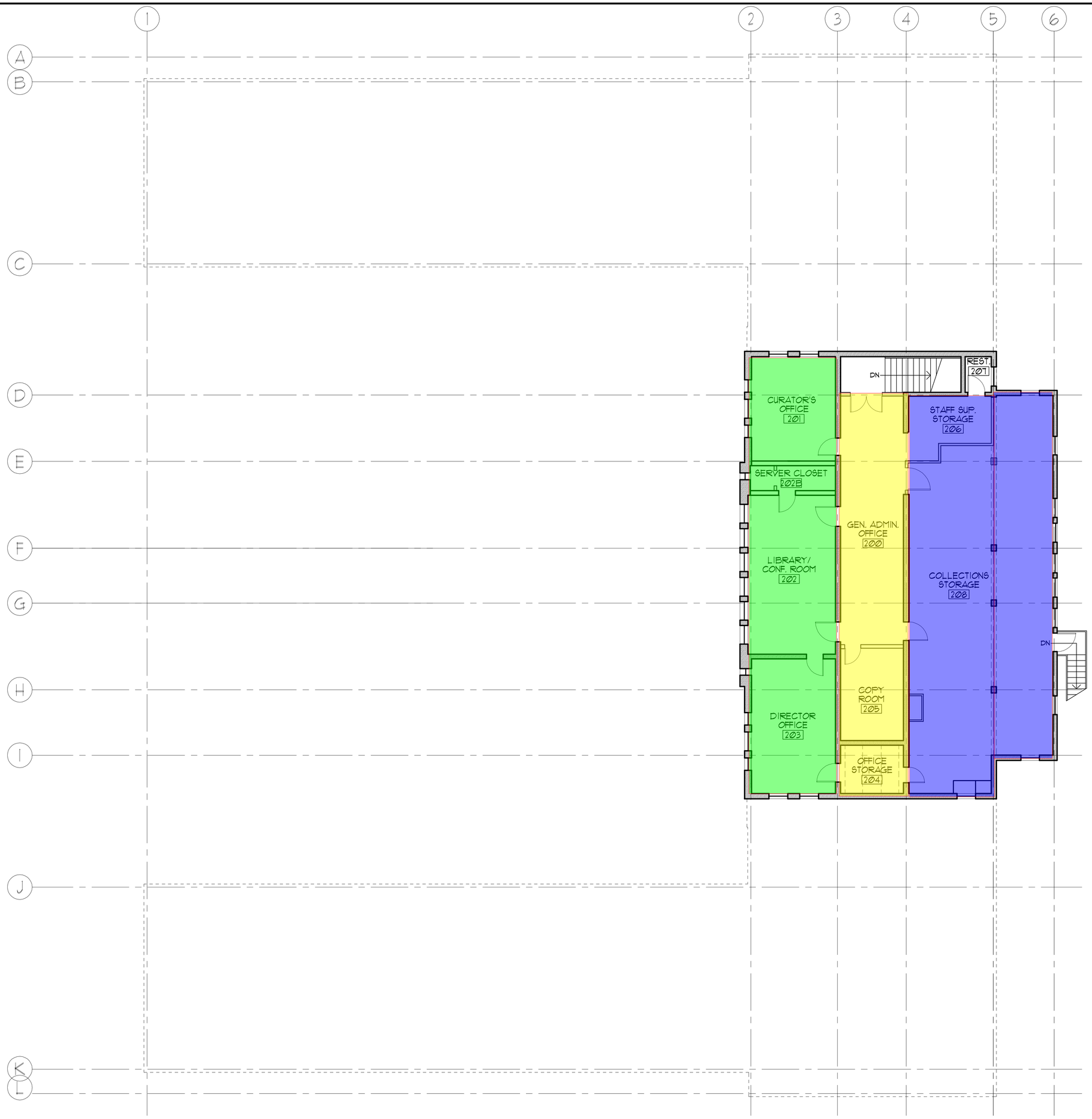
Samuel Mengelkoch, S.E.
Associate

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"

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APPENDIX B

PHOTOGRAPHS

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

Image 2. North elevation of south wing.

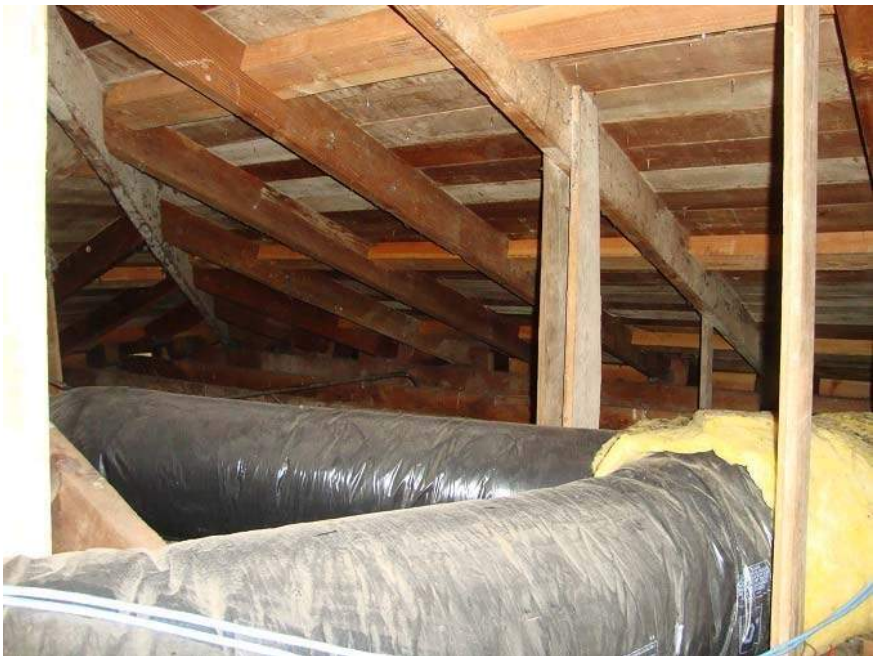


Image 3. Roof framing above second floor. Note straight sheathing.

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.

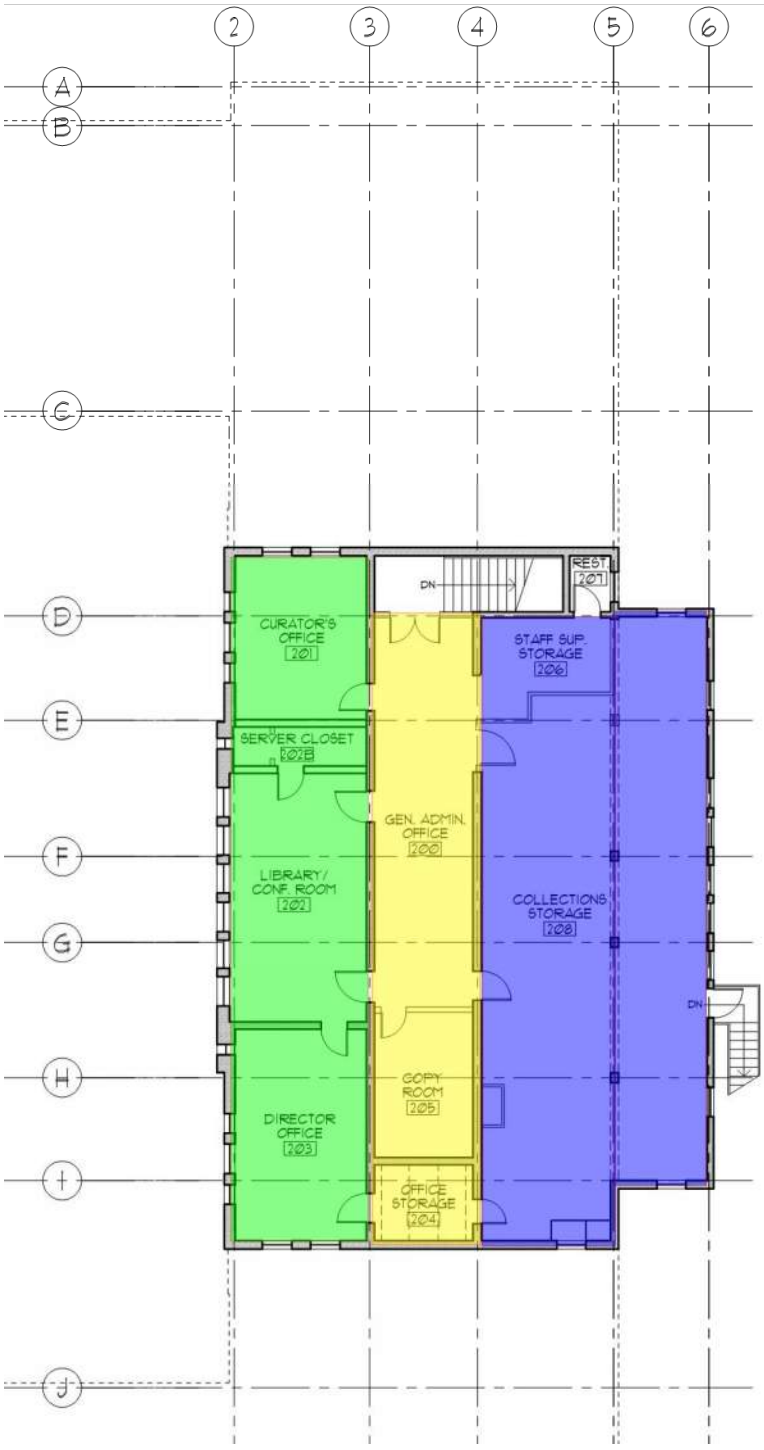
Sincerely,
STRUCTURAL FOCUS

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

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Suite 300
Long Beach CA 90806

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TABLE OF CONTENTS

Appendices

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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.

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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:

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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 - 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:

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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

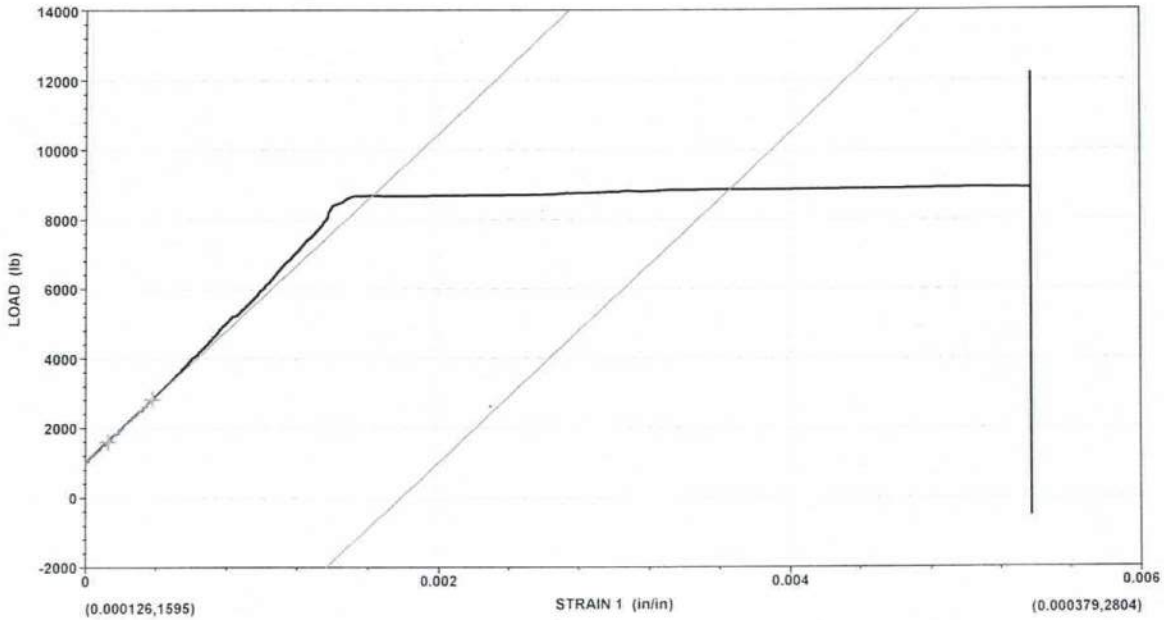
ID No.	Location	Member	Type	Diameter (in)	Cross Sectional Area (in^2)	Deformation Maximum Ave. Spacing (in)	Deformation Minimum Ave. Height (in)	Peak Load (lbs)	Tensile Strength (psi)	Yield Load @ 20% Offset (lbs)	Yield Strength (psi)	Gage Length (in)	Elongation (%)	Modulus of Elasticity	Rockwell Hardness
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:

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

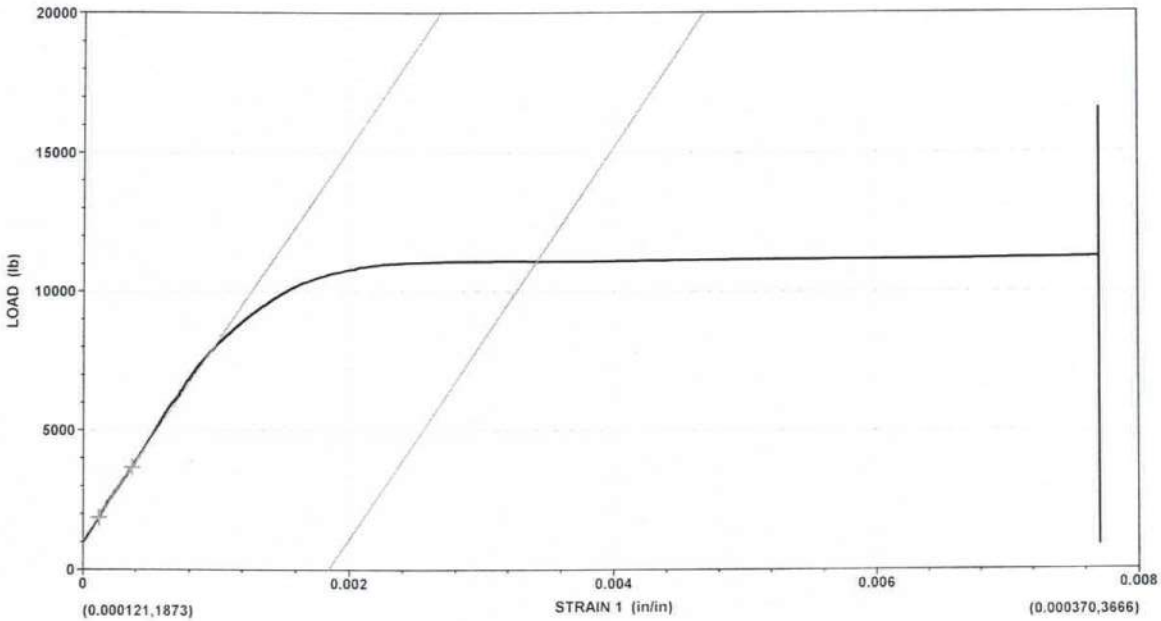
Time: 13:20:50
Elapsed: 00:01:52

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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Huntington Beach, CA
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element.com

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

FOR INFORMATION ONLY

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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

ONE (1) WALL CORE SAMPLE

EDU. DIRECTOR 110

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'-1⅜" 13'-11⅝" 10'-6¾" 2'-4½" 3'-11"

13'-1½" 11'-1" 14'-0½" 9'-9½"

1/8" = 1'-0"

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.

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

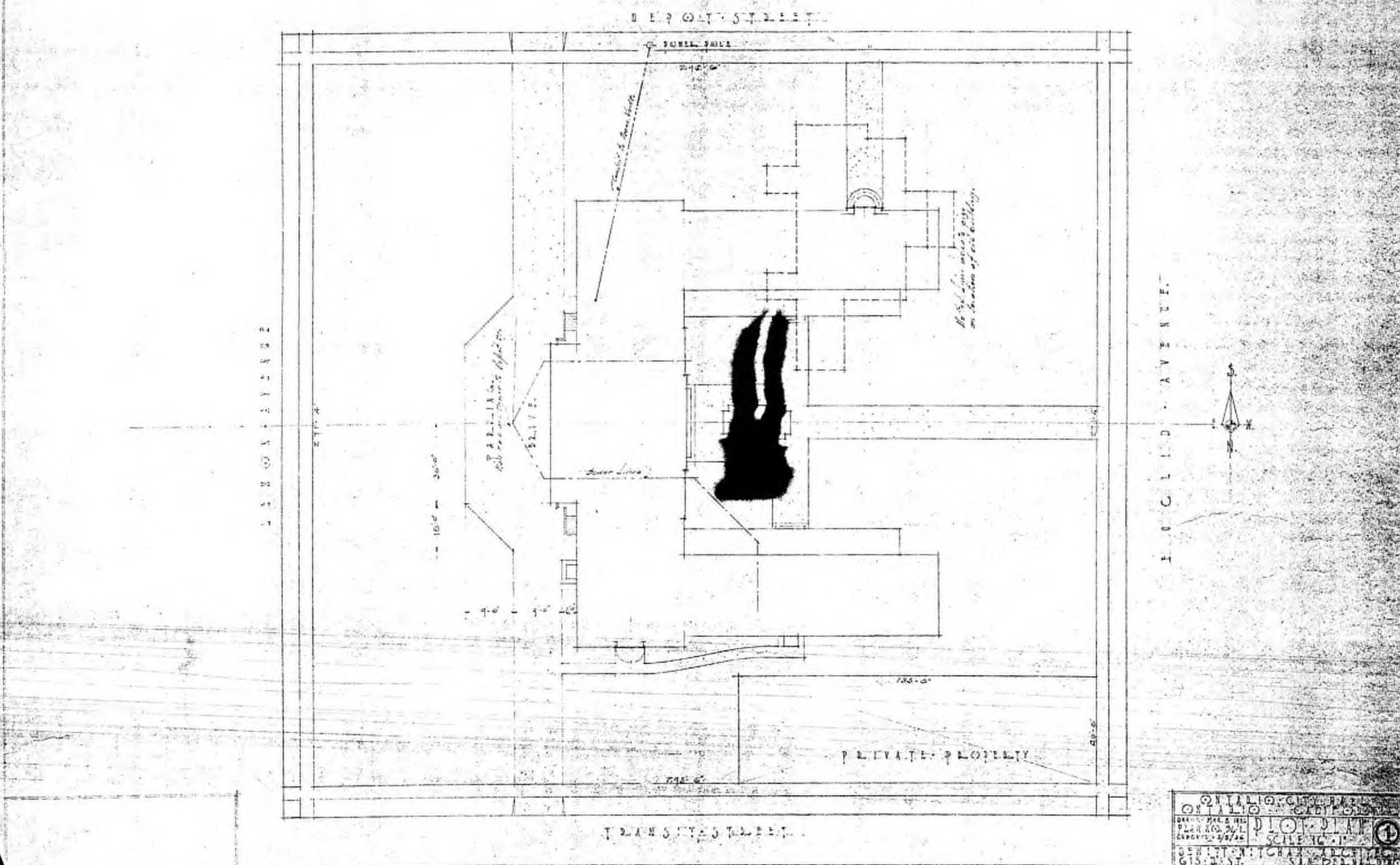
Overall short-term actions includes addressing high priority items that pose high risks for fire and life safety or tasks that can be implemented at a fairly low cost, such as weatherproofing. Implementing further studies of the building and its mechanical systems area also included in the near term, 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.

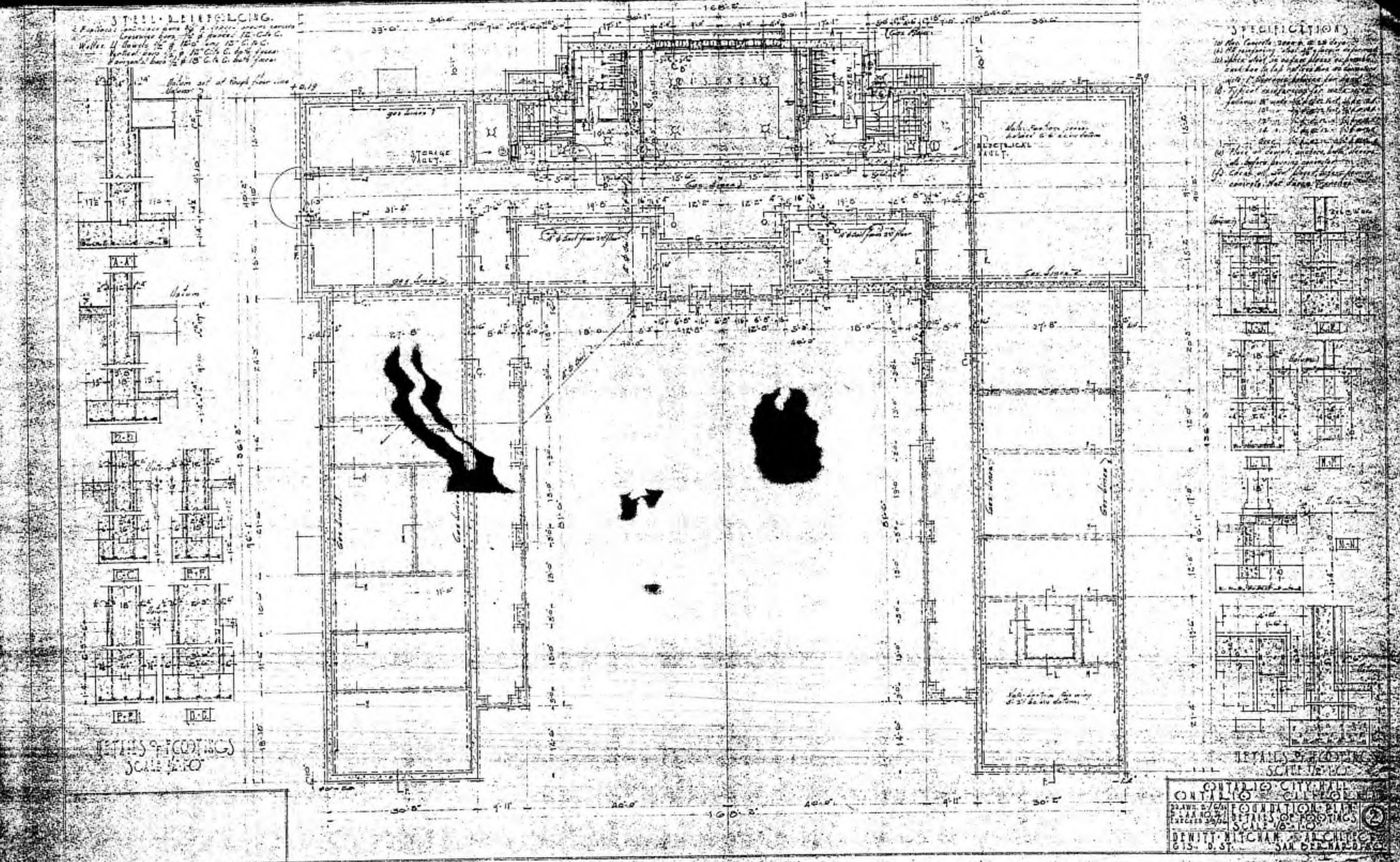
Long-Term Actions

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.

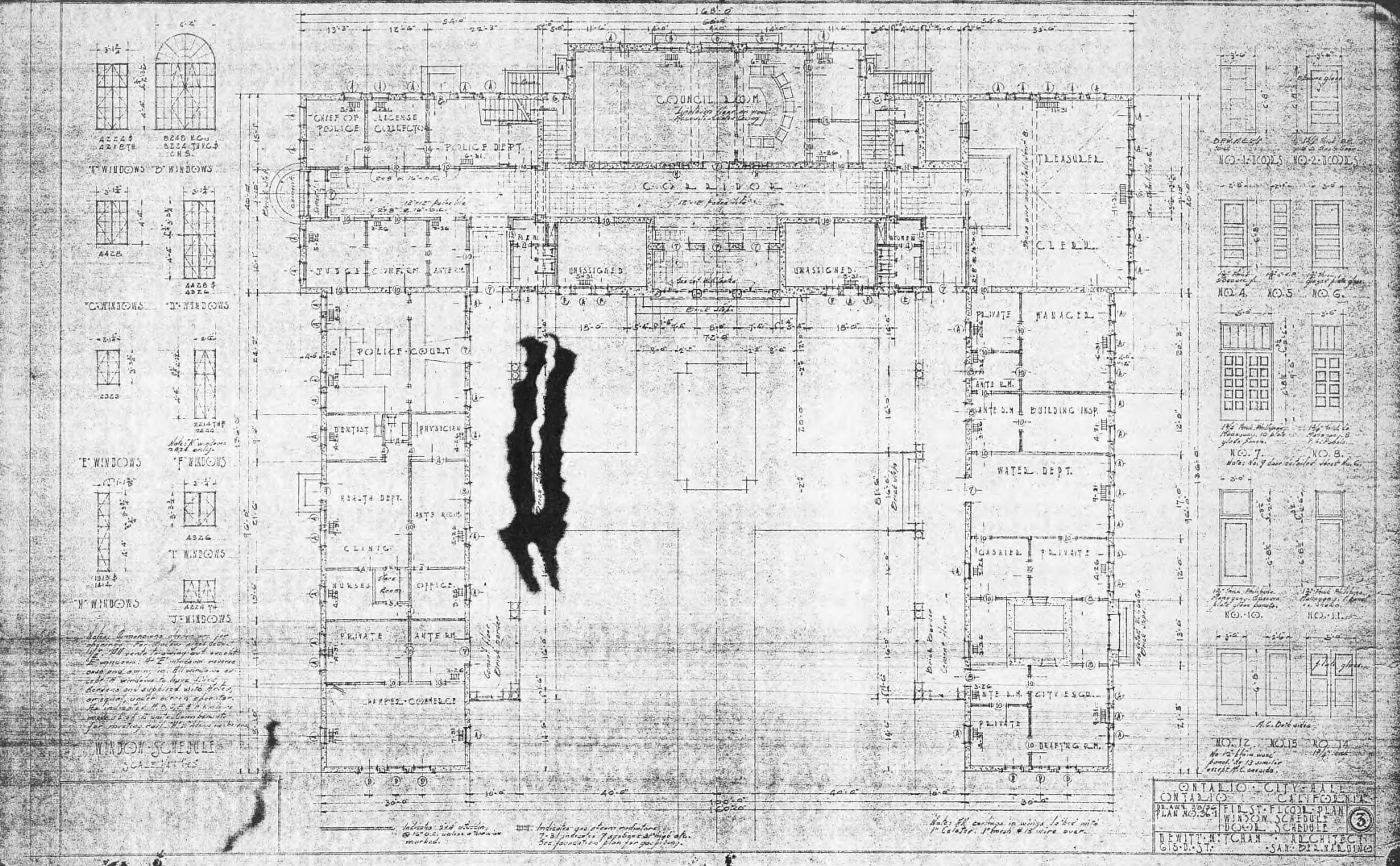
Appendix A – DRAWINGS

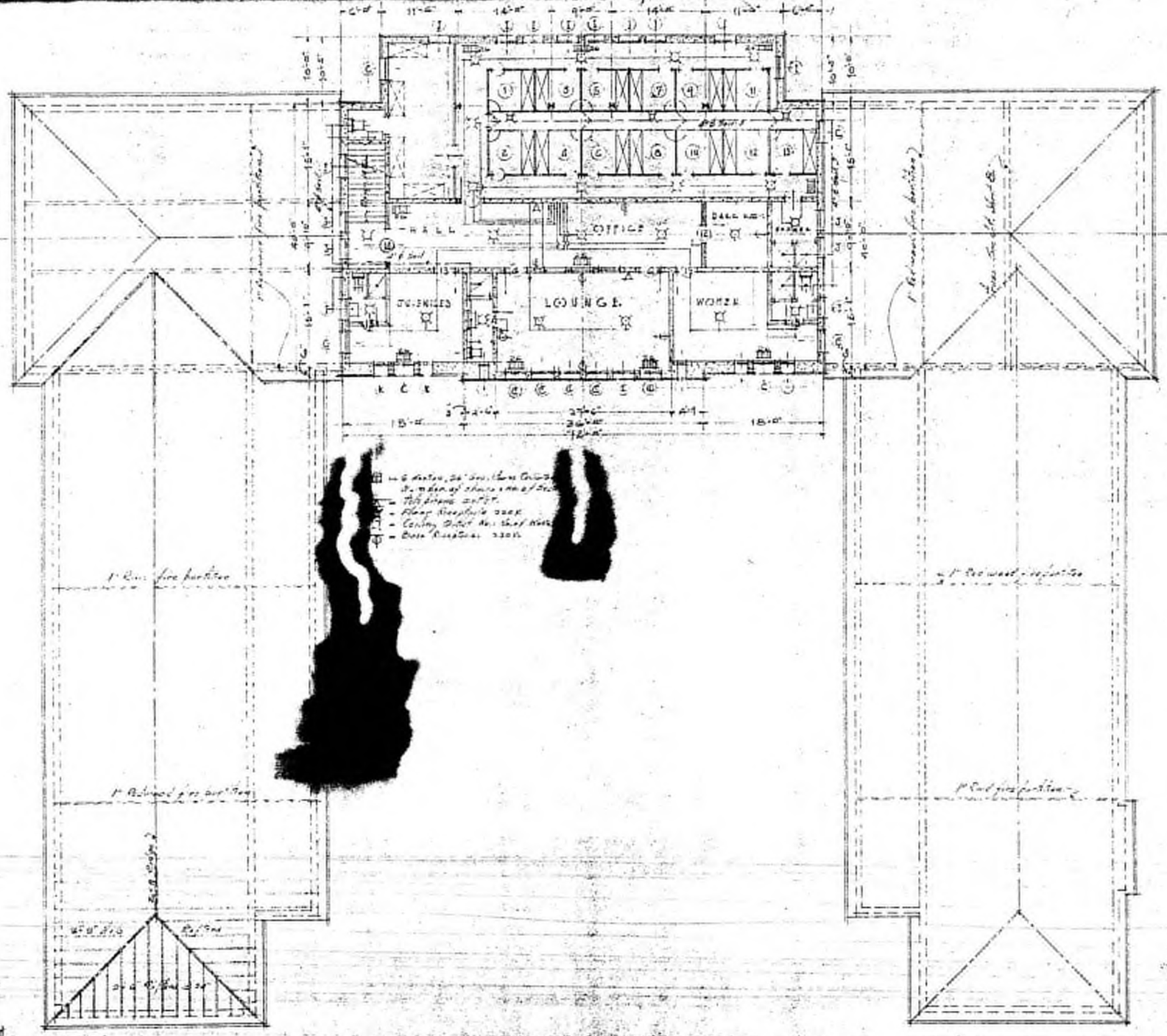
- 1937
- 1960
- 1982
- 1994
- 1997


DEPOT·STREET
TRANSIT·STREET
EUCLID·AVENUE
PARKING
DRIVE
PRIVATE·PROPERTY
ONTARIO·CITY·HALL
ONTARIO · CALIFORNIA
PLOT·PLAN
SCALE 1/16"=1'
SAN DIEGO

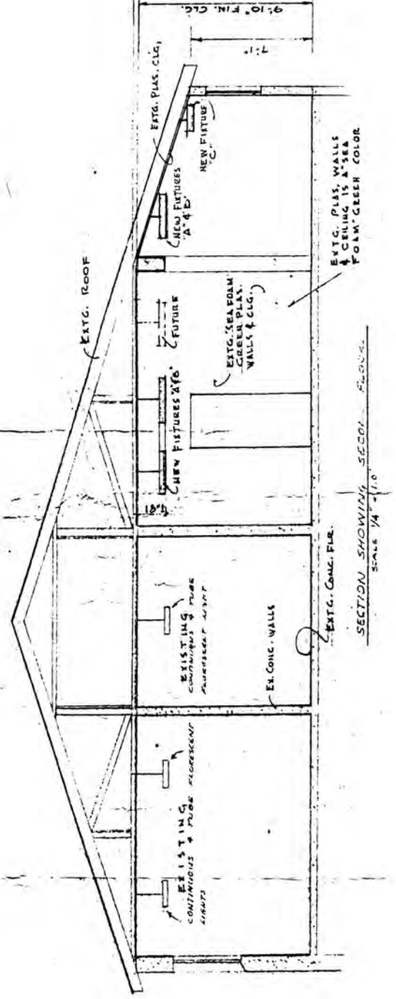


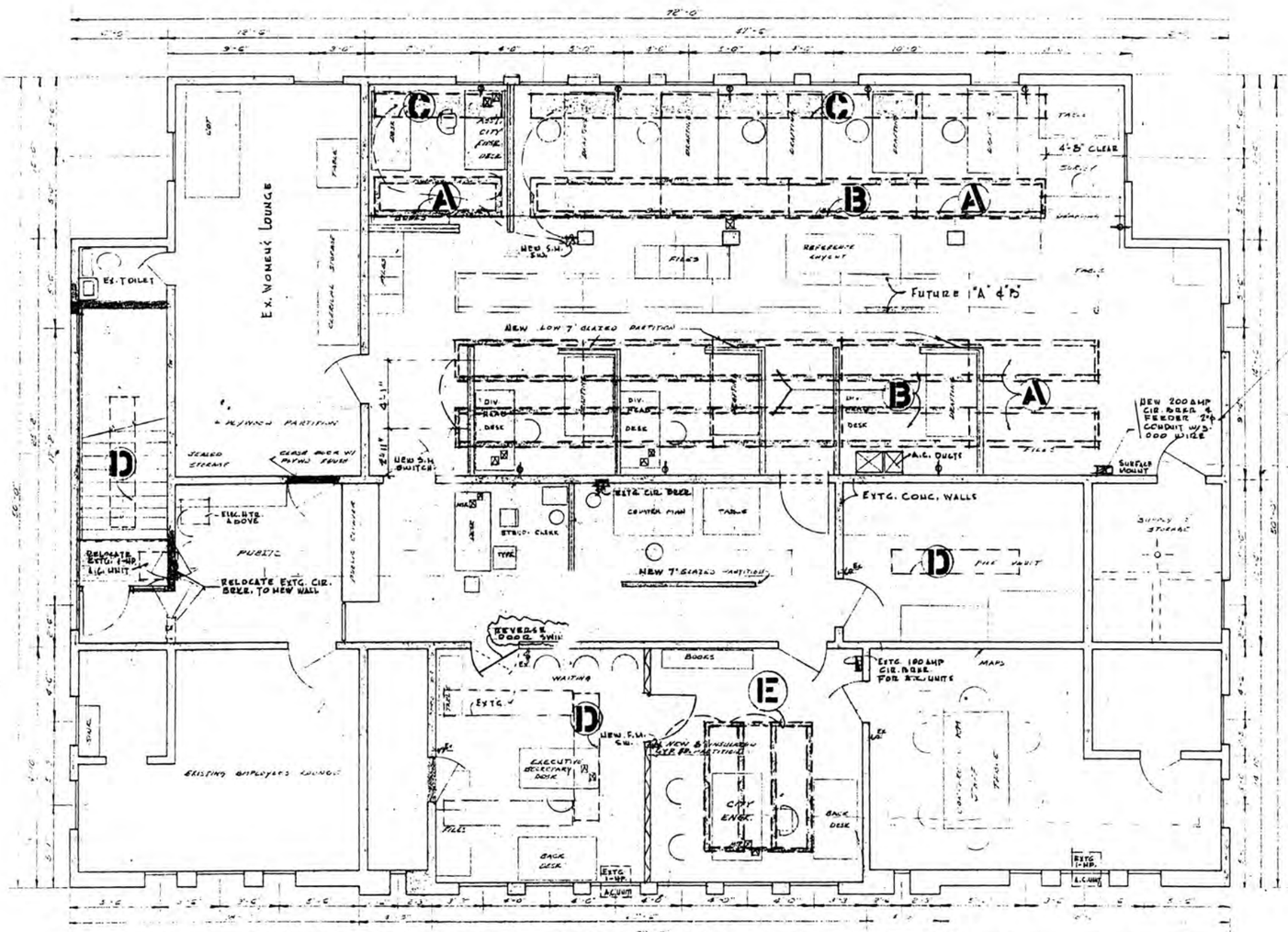
STEEL REINFORCING.
SPECIFICATIONS
STORAGE VAULT.
ELECTRICAL VAULT.
KITCHEN
DETAILS OF FOOTINGS
SCALE 1/2"-1'-0"
ONTARIO CITY HALL
ONTARIO CALIFORNIA
FOUNDATION PLAN
DETAILS OF FOOTINGS
SCALE 1/8"-1'-0"
DEWITT MITCHAM ARCHITECT
615 D. ST.
SAN BERNARDINO
2


"A" WINDOWS
"B" WINDOWS
"C" WINDOWS
"D" WINDOWS
"E" WINDOWS
"F" WINDOWS
"H" WINDOWS
"I" WINDOWS
"J" WINDOWS
WINDOW SCHEDULE
CHIEF OF POLICE
LICENSE COLLECTOR
POLICE DEPT
COUNCIL ROOM
CORRIDOR
JUDGE
CONF. RM.
ANTE RM.
UNASSIGNED
UNASSIGNED
MEN
WOMEN
TREASURER
CLERK
POLICE COURT
DENTIST
PHYSICIAN
HEALTH DEPT.
ANTE ROOM
CLINIC
NURSES
OFFICE
PRIVATE
ANTE RM.
CHAMBER OF COMMERCE
PRIVATE
MANAGER
ANTE RM.
BUILDING INSP.
WATER DEPT.
CASHIER
PRIVATE
ANTE RM.
CITY ENGR.
PRIVATE
DRAFTING RM.
Brick Steps
168'-0"
72'-6"
100'-0"
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
DRAWN 3/8/36
PLAN NO. 36-1
FIRST FLOOR PLAN
WINDOW SCHEDULE
DOOR SCHEDULE
3
DEWITT MITCHAM · ARCHITECT
615 D ST. · SAN BERNARDINO



ONTARIO · CITY · HALL
ONTARIO · CALIFORNIA
SCALE: 1/8" = 1'-0"
DATE: 3/10/48
PLAN NO. 36-1
SECOND FLOOR PLAN OF JAIL & ROOF PLAN
4
DEWITT · MITCHAM · ARCHITECTS
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

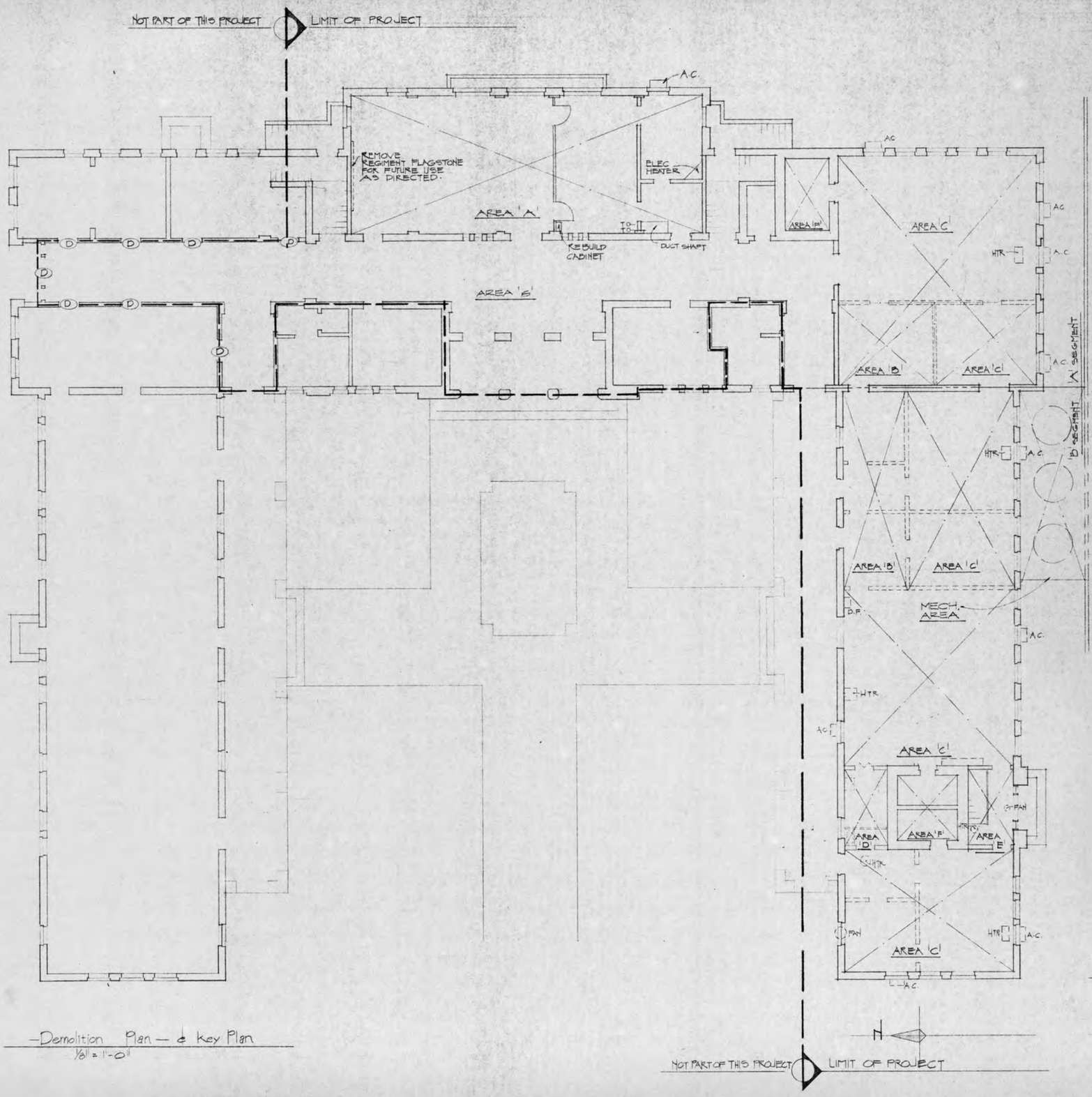
⊖ ELECT. DUPLEX-OUTLET 12"± ABOVE FLR.

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

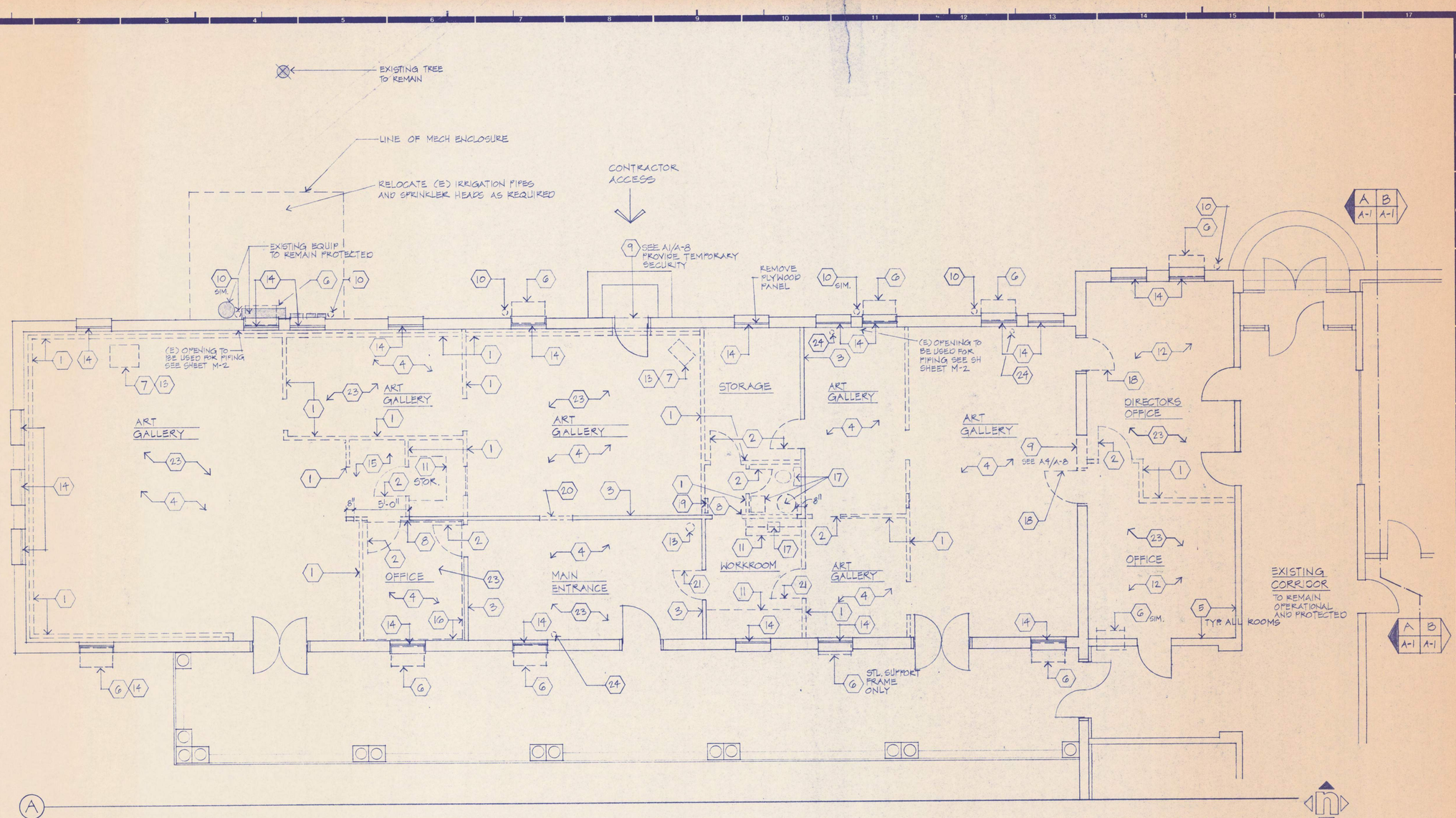
REVISIONS	BY

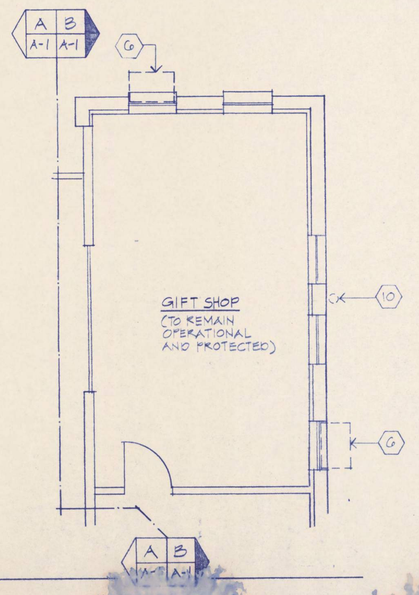
G. LLOYD DODDS ARCHITECT
147 SOUTH UKIAH WAY
UPLAND, CALIFORNIA 91786 (714) 982-2245

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

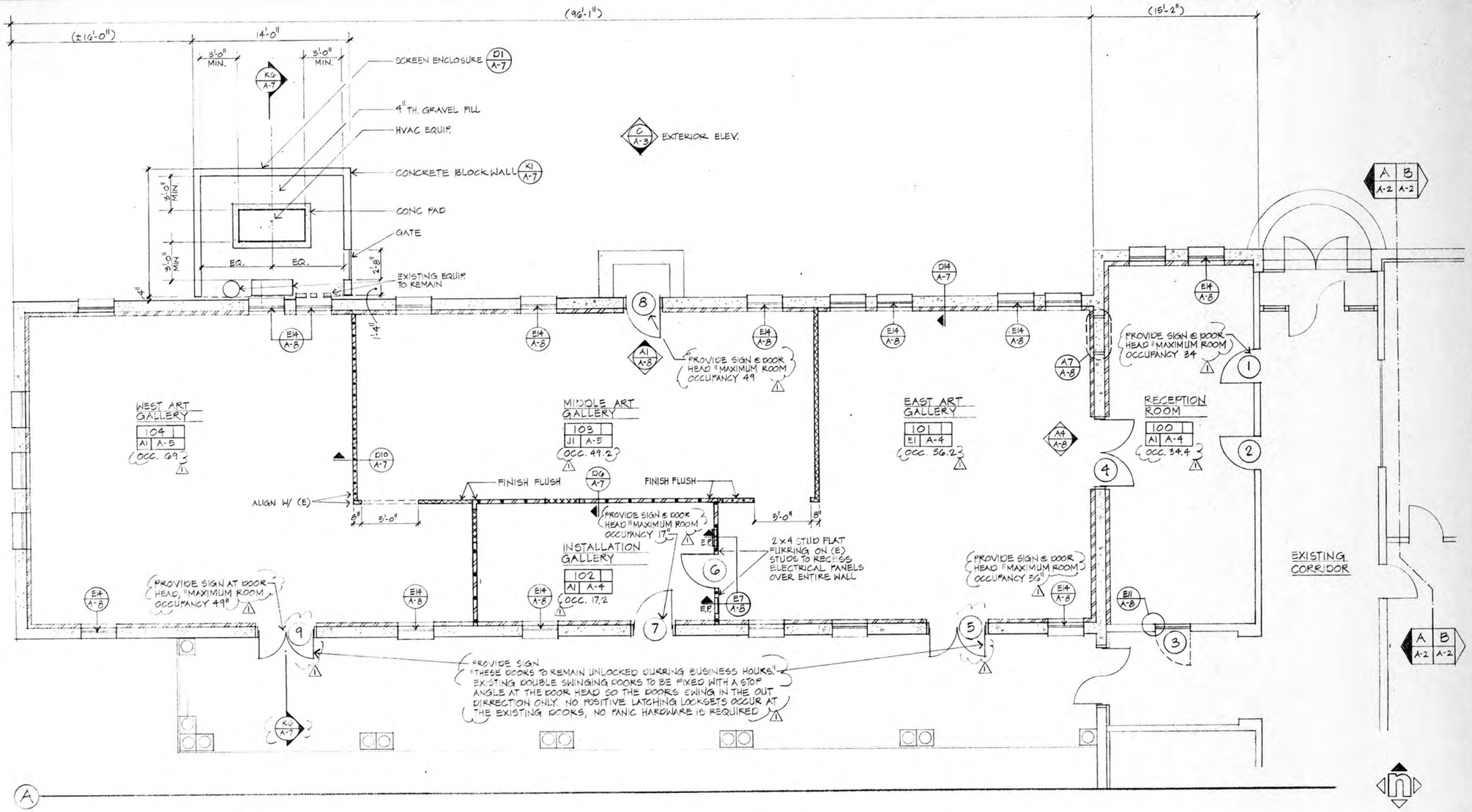
Consultant

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
Drawn TH	Scale 1/4" = 1'-0"
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

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

MATERIALS KEYING

No	Revisions/Submissions	Date
1		

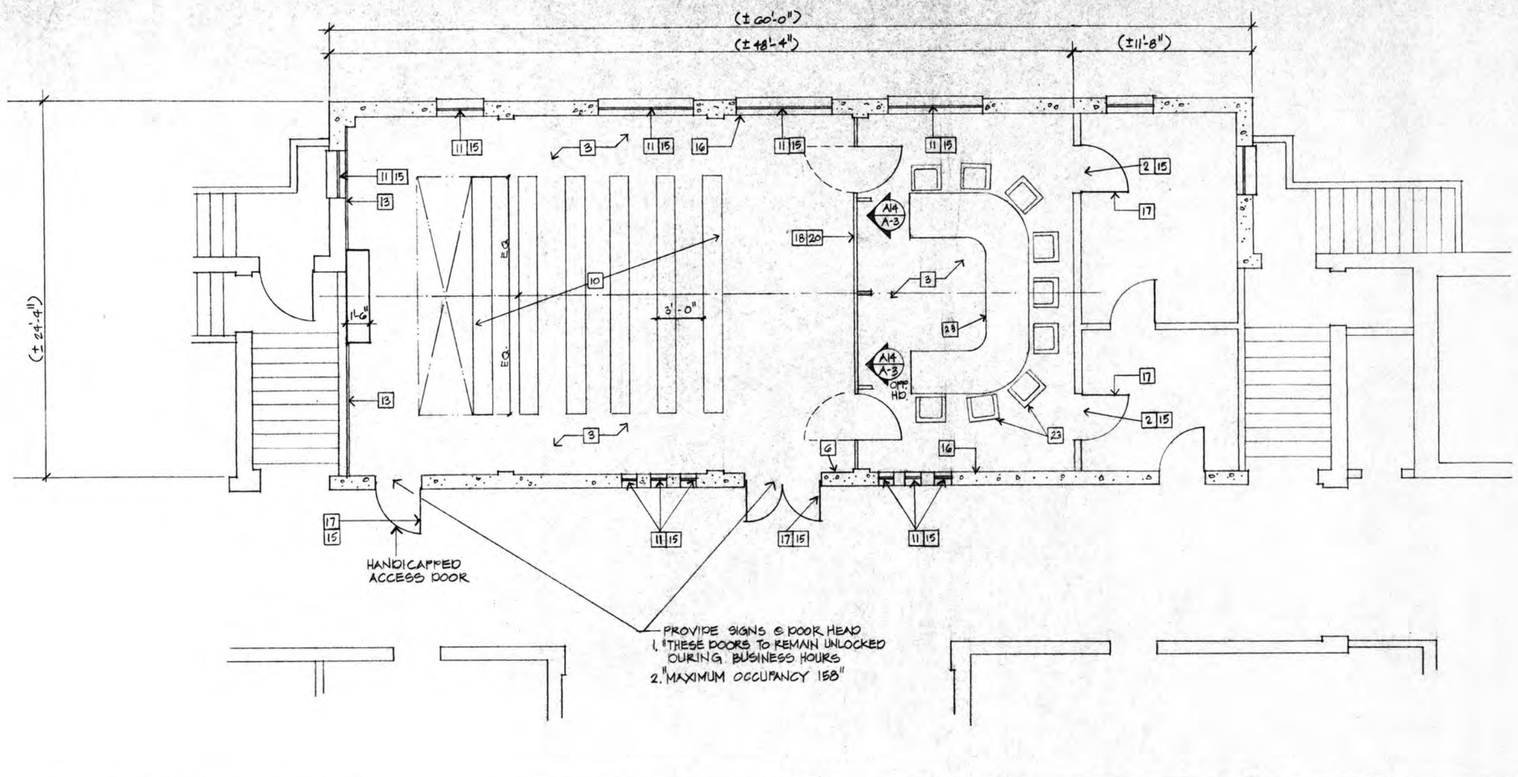
Consultant

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

Drawing Title
FLOOR PLAN

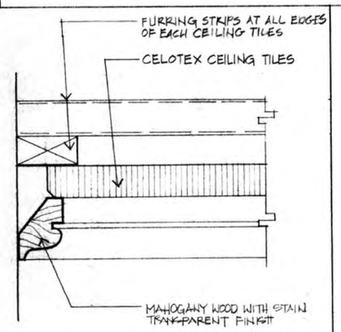
Seal

Designed	TH	Project No.	2230002
Drawn	TH	Scale	1/4"=1'-0"
Checked		Drawing No.	A-2
Reviewed		of	
Date	1/17/94		



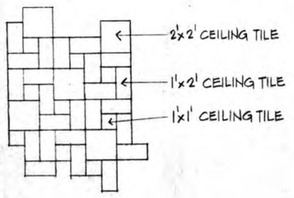
J1 FLOOR PLAN

1/4"=1'-0"



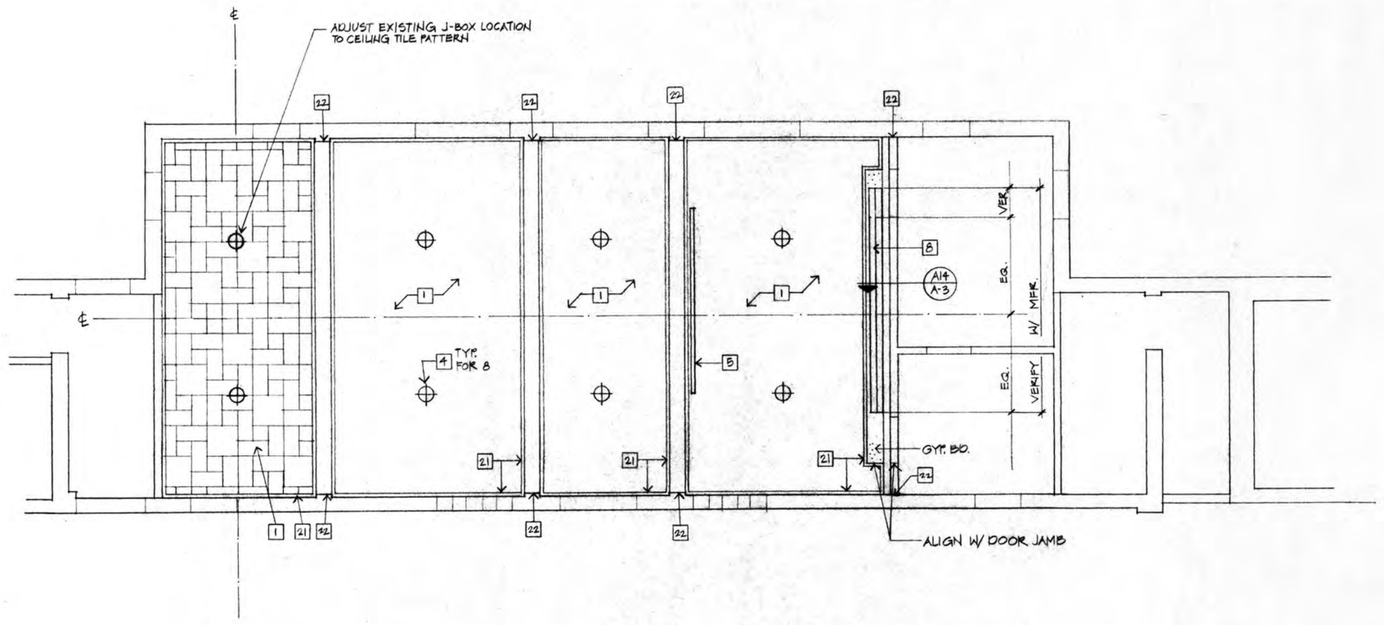
E1 WOOD CORNICE

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

Bibliography

American Society of Heating, Refrigerating and Air Conditioning Engineers. *ASHRAE Handbook 2011: Heating, Ventilating, and Air-Conditioning Applications.* ASHRAE: Atlanta, GA, 2011.

Chu + Gooding Architects. *Strategic Outlook: Museum of History and Art, Ontario*. A study prepared for the MHAO. Ontario, CA, 2004.

Grimmer, Anne E. and Jo Ellen Hensley, Liz Petrella, and Audrey T. Tepper. *The Secretary of the Interior's Standards for Rehabilitation and Illustrated Guidelines on Sustainability for Rehabilitating Historic Buildings.* U. S. Department of the Interior, National Park Service: Washington, D. C., 2011.

John Twilley Conservation. *Museum of History and Art, Ontario: Conservation Assessment*. Prepared for MHAO. Ontario, CA, 1994.

Museum of History and Art, Ontario. *Draft Architectural Conservation Assessment.* Prepared for MHAO. Ontario, CA, 1993.

Michalski, Stefan. "Light, Ultraviolet and Infrared." Canadian Conservation Institute – CCI in Action, Conservation Resource Centre webpage. http://www.cci-icc.gc.ca/crc/articles/mcpm/chap08-eng.aspx (accessed July 28, 2011).

National Climate Data Center. *Engineering Weather Data, Version 1.0.* National Climatic Data Center: Asheville, NC, 1995.

Waller, Robert. "Conservation Risk Assessment: A Strategy for Managing Resources for Preventative Conservation." Pp 21-28. In: Roy, A. and P. Smith. *Preventative Conservation: Practice, Theory and* Research. IIC: London, 1994.

Waller, Robert. "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, 1996, x+448pp.

Waller, Robert. "Preventive conservation planning for large and diverse collections. Preservation of Collections: Assessment, Evaluation, and Mitigation Strategies." *Workshop June 10-11, 1996 Preprints*. American Institute for Conservation: Washington, D.C., 1996, p. 1-9.

Waller, Robert. 2002. "A risk model for collection preservation." *13th Triennial Meeting in Rio de Janeiro Preprints*, International Council of Museums, Committee for Conservation, 2002, pp. 102 107.

Waller, Robert. "Comprehensive risk assessment: Applying the cultural property risk analysis model to the Canadian Museum of Nature." In*:* Linkov, Igor, Elizabeth Ferguson, and Victor S. Magar. *Real Time and Deliberative Decision – Application to Emerging Stressors,* based on papers of the NATO Advanced Research Workshop on Risk, Uncertainty and Decision Analysis for Environmental Security and Non-Chemical Stressors in Estoril, Portugal, April 2007. Springer: The Netherlands, 2008, pp. 179-190.

Waller, Robert and Stefan Michalski. "Effective Preservation: From Reaction to Prevention," Getty Conservation Institute Newsletters, Vol. 19.1, spring 2004. http://www.getty.edu/conservation/publications/newsletters/19 1/feature.html (accessed July 28, 2011).

Waller, Robert and S. Michalski, 2005. "A Paradigm Shift for Preventive Conservation, and a Software Tool to Facilitate the Transition." *14th Triennial Meeting in Hague Preprints*, International Council of Museums, Committee for Conservation, 2005, pp. 733-738.

Western Region Field Service Office, Balboa Art Conservation Center. *Conservation Consultation Report for the Museum of History and Art, Ontario*. Ontario, CA, 2005.

Weather Channel. "Precipitation data." http://www.weather.com/weather/wxclimatology/monthly/graph/USCA0806 (accessed 16 December 2012).

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.			

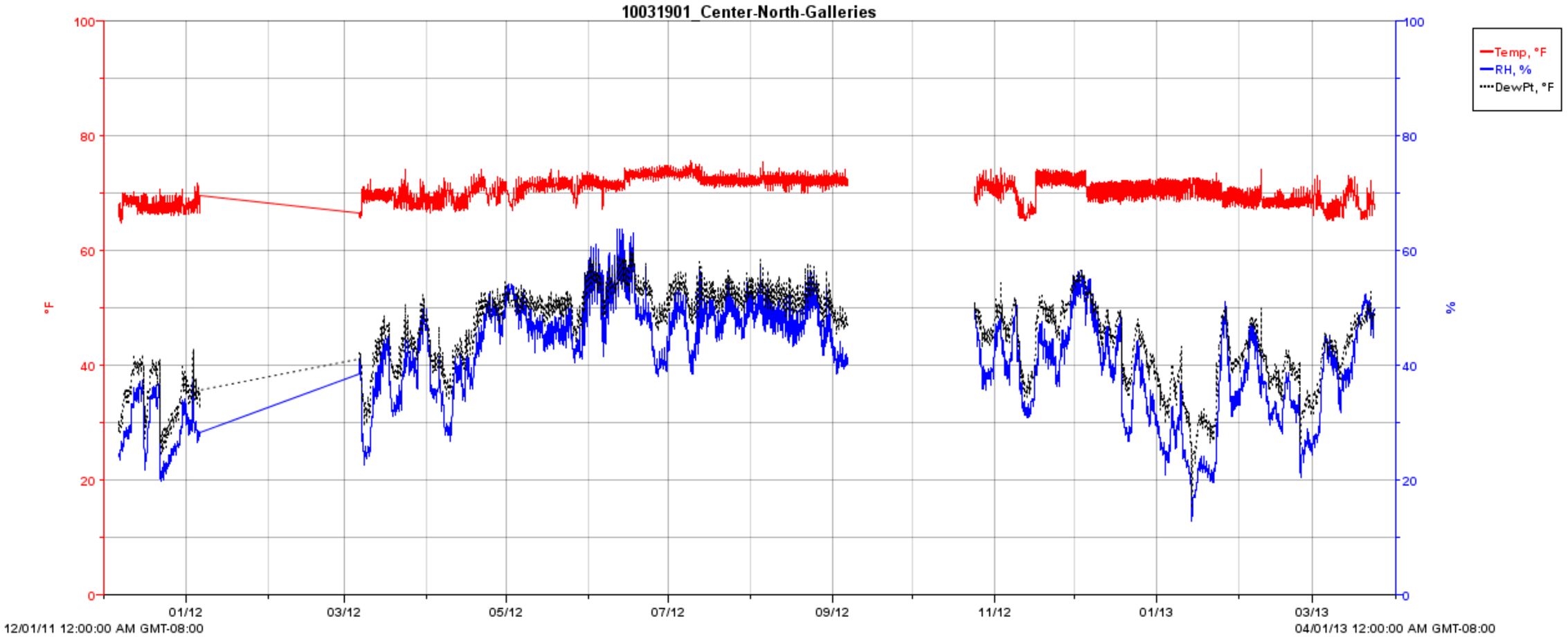
Issues	Risks	Possible Resolutions		Year 1	Year 2	Year 3	Year 4	Year 5
5. End of life HVAC systems in South Wing	Openings and gaps in the building envelope at walls, ceilings and between doors and frames and between window sash and frames can increase energy costs, and allow fluctuations in humidity and 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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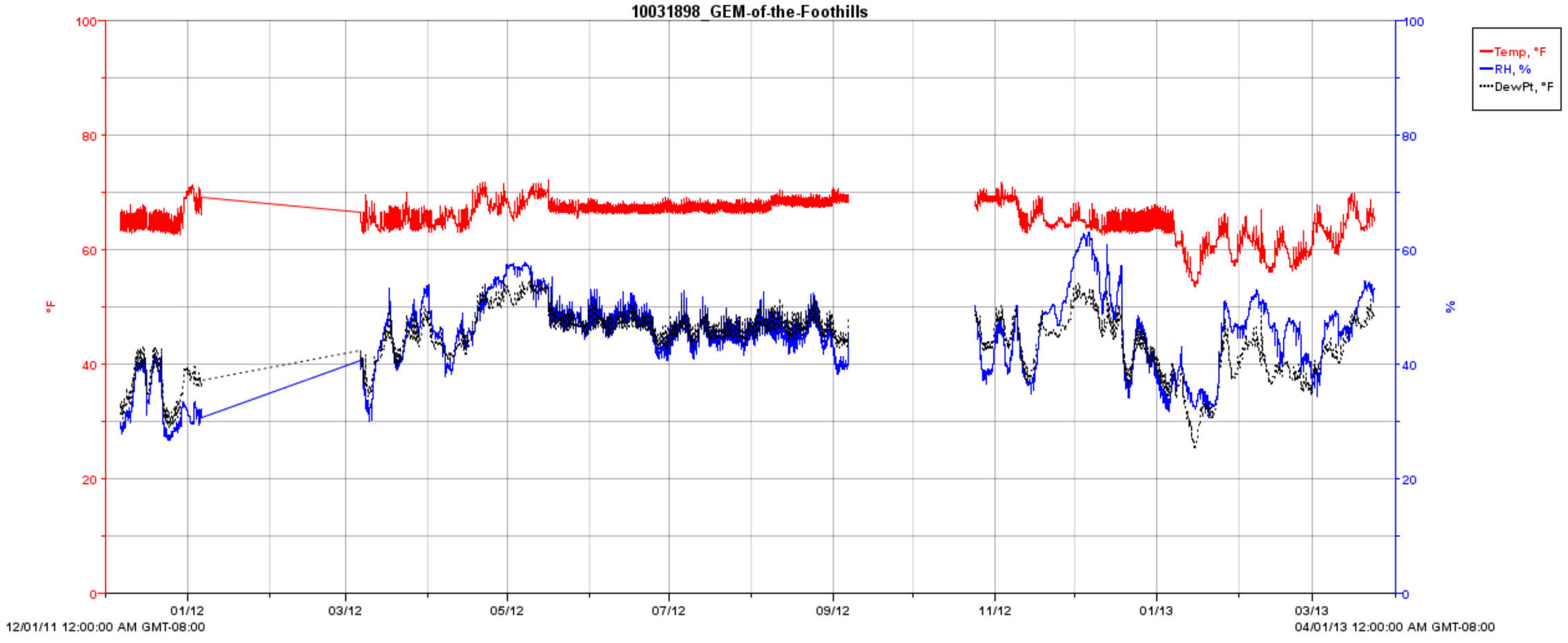
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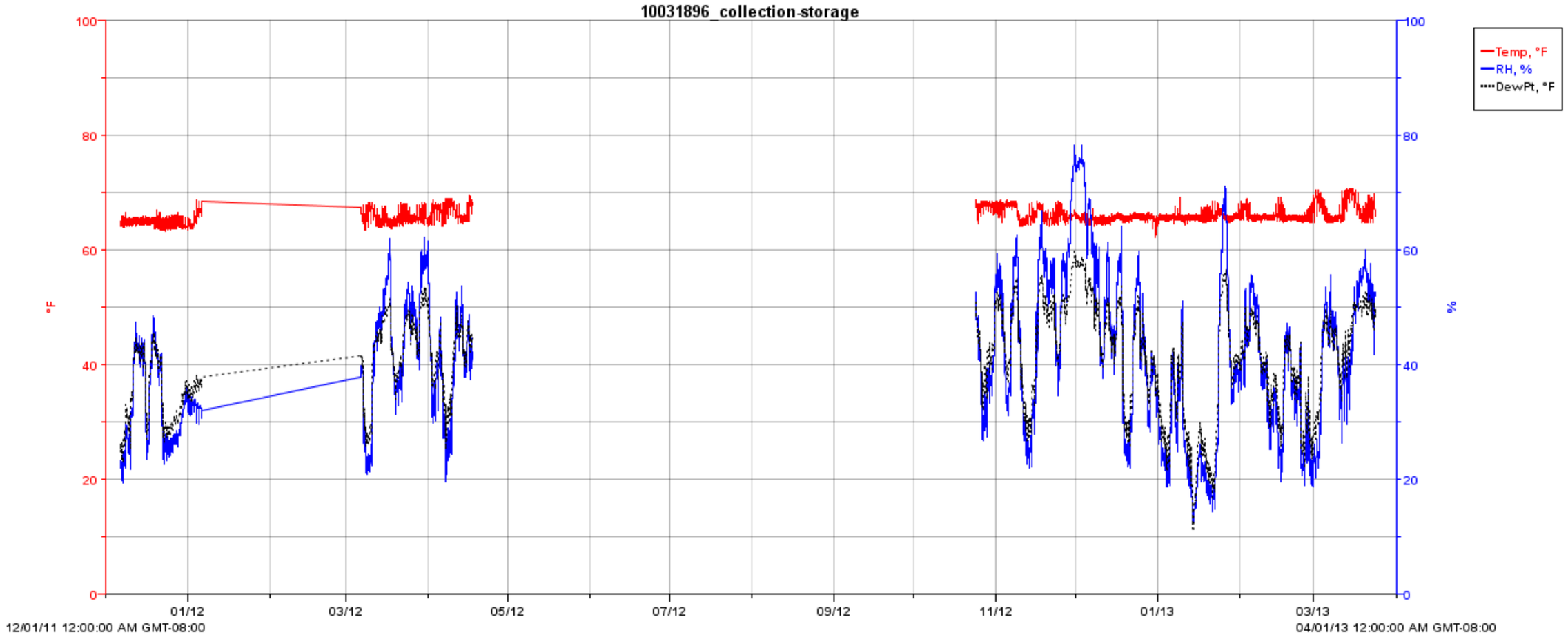
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Ontario Museum
MEP Condition Assessment Report

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.

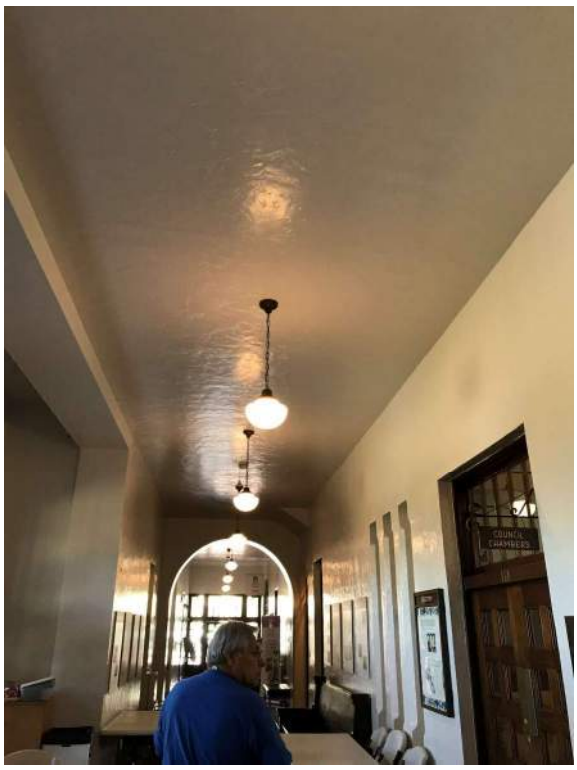

Figure 1 - 1st Floor Corridor Lighting

Figure 2 - Panel "G"

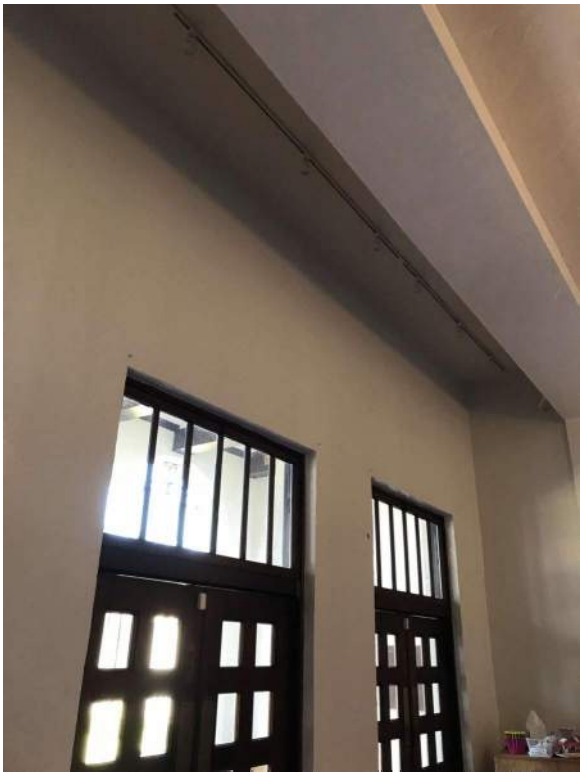

Figure 3 - Sample Missing Exit Sign/Emergency Fixture

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

TABLE OF CONTENTS

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.

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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.

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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

360 E. 2nd Street, Suite 225
Los Angeles, California 90012

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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