The Corporation of the City of Sault Ste. Marie
Municipal Heritage Committee
Agenda

Wednesday, January 3, 2024

12:00 pm - 1:00 pm

Video Conference

Meetings may be viewed live on the City's Youtube channel
https://www.youtube.com/user/SaultSteMarieOntario

Pages

1. Land Acknowledgement

I acknowledge, with respect, that we are in Robinson-Huron Treaty territory, that the land on which we are gathered is the traditional territory of the Anishinaabe and known as Bawating. Bawating is the home of Garden River First Nation, Batchewana First Nation, the Historic Sault Ste. Marie Metis Council.

2. Adoption of Minutes 3 - 5

Mover _____

Seconder _____
Resolved that Minutes of Municipal Heritage Committee meeting of December 6, 2023 be approved.

3. Declaration of Pecuniary Interest

4. Adoption of Agenda

Mover _____

Seconder _____
Resolved that the Agenda for Municipal Heritage Committee meeting for January 3, 2024 as presented be approved.

5. Business Arising

5.1 Museum Bell 6 - 30

5.2 Heritage Week

6. Sub-committee / Task Force Updates

6.1 Heritage Trees

7. New Business

8. Correspondence

9. Next Meeting

10. Adjournment

Mover _____

Seconder _____

Resolved that this Committee now adjourn.

The Corporation of the City of Sault Ste. Marie

Municipal Heritage Committee

Minutes

Wednesday, December 6, 2023 at 12:00 pm
Video Conference
Meetings may be viewed live on the City's Youtube channel
https://www.youtube.com/user/SaultSteMarieOntario

Present:	A. White, S. Walker, N. Curry, K. Marshall, Councillor A. Caputo, S. Maragna
Absent:	J. Bumbacco, M. Bifano
Officials:	V. McLeod

1. Land Acknowledgement

2. Adoption of Minutes

Moved by: S. Maragna
Seconded by: S. Walker

Resolved that Minutes of Municipal Heritage Committee meeting of November 1, 2023 be approved.

Carried

3. Declaration of Pecuniary Interest

None noted

4. Adoption of Agenda

Moved by: A. White
Seconded by: S. Walker

Resolved that the Agenda for Municipal Heritage Committee meeting for December 6, 2023 as presented be approved.

Carried

5. Business Arising

5.2 Heritage Week 2024

Moved by: S. Walker
Seconded by: K. Marshall

Resolved that S. Maragna, A. White and N. Curry assist with the planning and preparation of heritage week along with City Staff be approved.

Carried

5.1 Heritage Property Tax Rebate

Moved by: S. Walker
Seconded by: A. White

Resolved that the Sault Ste. Marie Municipal Heritage Committee approve and recommend to City Council that the Designated Heritage Property Tax Rebates for the 2022 tax year be paid to the qualified owners of designated heritage properties enrolled in the program;

1. 36 Herrick Street

2. 242-246 Queen Street East - Hussey Block

and further that an inspection report and letter be sent to the property owners outlining the recommendations.

Carried

6. Sub-committee / Task Force Updates

6.1 Heritage Trees

7. New Business

7.1 Cenotaph Conservation Plan

8. Correspondence

9. Next Meeting

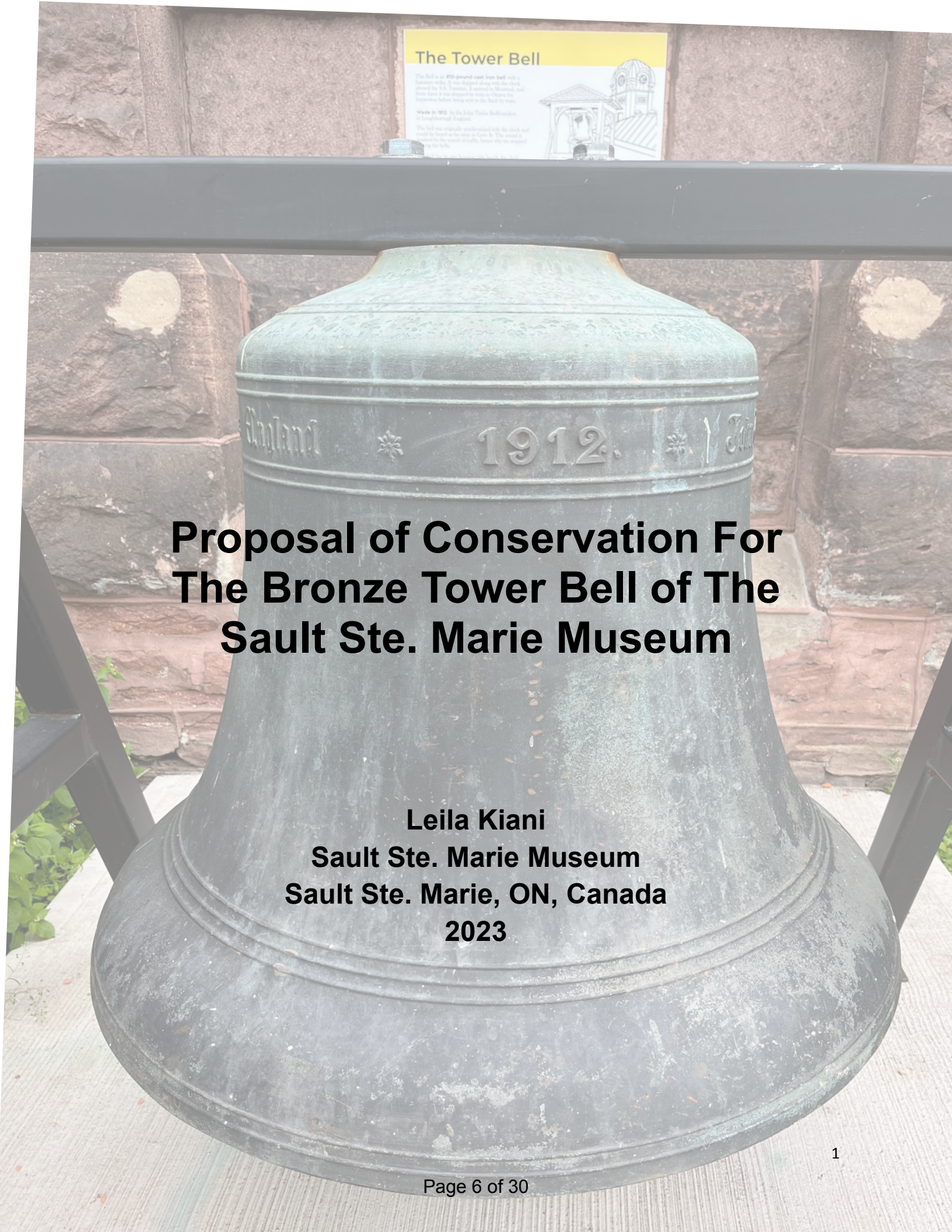
January 3, 2024

10. Adjournment

Moved by: S. Walker
Seconded by: A. White

Resolved that this Committee now adjourn.

Carried



Proposal of Conservation For The Bronze Tower Bell of The Sault Ste. Marie Museum

Leila Kiani
Sault Ste. Marie Museum
Sault Ste. Marie, ON, Canada
2023

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About the Writer

Leila Kiani, Collections Manager

Education:

- Bachelor's degree in Restoration of Historical Monuments, Isfahan University of Art, Isfahan, Iran, 2008-2012,
- Master's degree in Archaeology, Isfahan University of Art, Isfahan, Iran, 2012-2015

Work Experience:

- Collections Manager, SSM Museum, ON, Canada, Apr 2023-Current
- Curatorial and Collections Assistant, SSM Museum, ON, Canada, Jun 2019- Apr 2023
- Volunteer, Educator in Training, Aga Khan Museum, Toronto, ON, Canada, Dec 2018-Apr 2019
- Volunteer, Staff member, Ontario Association of Art Gallery, Toronto, ON, Canada, Nov 2018
- Educational Assistant, Isfahan University of Art, Isfahan, Iran, Feb 2015- Apr 2016

Research Experience

- ISI Article: Kiani, L., Ghadim, F.I. & Ahmadi, H. (2018). Study on the discovered ornaments from Jafar-Abad and Tu Ali-Sofla kurgans (second phase of excavations). *Archaeological and Anthropological Sciences, 10,* 973–987
- Master Thesis: Kiani, L, (2015). Introduction to Typology and Technological Characteristics of Bronze Objects in Kurgans of Jafar Abad and Tu-ali Sofla (Second Phase of Excavations)
- Bachelor Thesis: Kiani, L, (2012). Investigation on Metalworking and Restoration of a Bronze Artifact Belonging to the Late 2nd Millennium and Early 1st Millennium B.C.

Introduction

Terminology

Bronze:

Bronze is an alloy that mainly contains copper as the base element with additions of primarily tin alongside other constituents such as aluminium, manganese, arsenic, etc. Tin increases the castability of copper by decreasing its melting point and the required temperature to complete casting. Bronze objects show higher mechanical properties and have better resistance against corrosion in comparison with pure copper.

Corrosion:

Corrosion is a chemical change in the metal's structure that affects the stability and appearance of objects and can happen either quickly or over an extended period of time. Corrosion in bronze can either be a safe corrosion (inactive) which is called *Patina* or a problematic corrosion (active corrosion) which is harmful to the object and needs to be removed.

Patina:

Over time and under the influence of conditions such as humid environments that promote corrosion, bronze undergoes chemical changes in structure and the alloy starts to oxidise and form different corrosion products. Patina is a safe product of corrosion and acts as a stable oxide layer and a barrier to hinder further oxidation. In bronze, the patina (oxide layer) is usually dark green and blue. The difference in colour depends on the weight percentage of alloying elements and the corrosive environment (soil, graves containing organic materials such as bones, underwater acidic or basic activity, outdoor

environment under sunlight and rain, indoor in normal temperature, storage in hot conditions, etc.)

Protecting the patina is important in the protection process of historical objects for two main reasons. First, the patina is the evidence of ageing and needs to be protected because it shows the history of the object such as the structure and the condition of the preservative environment. As mentioned before, the patina is a part of the object despite the occurred chemical changes. Second, the patina acts as a natural protection for the inner layers of the objects and prevents them from further corrosion because it limits the exposure of the inner layers of the object to water, air pollution, and other external environmental factors. As Deck (2020) mentioned, a reliable condition with Relative Humidity (RH) below 55% is the best place to keep bronze and maintain its stability by limiting the corrosion and protecting the patina layer as a safe corrosion layer. If the RH rises, even the patina can change to aggressive and harmful types of corrosion and can cause damage to the object.

Bronze Disease:

The problem is an active corrosion that can advance from the outer layers of the object and penetrate the inner parts until it reaches the core of the metal. If not controlled promptly, this type of corrosion decreases the stability, function, and durability of bronze objects. The most harmful type of active corrosion is called Bronze Disease. The light green and powdery corrosion is a sign of Bronze Disease in historical bronze artefacts and has a chlorine chemical structure. Atacamite is the most dangerous Bronze Disease in historical bronze objects. According to numerous scientific papers, the main mechanism for this type of corrosion is high RH (55% and above). The high pH

(acidic condition) and pollution in air and water further accelerate the process of corrosion.

(https://www.getty.edu/publications/artistryinbronze/conservation-and-analysis/35-casaletto/ Deck, 2020).

Chemical Compound	Mineralogical Name	Chemical Formula	Color
Oxides	Cuprite	Cu_2O	Red/Orange
	Tenorite	CuO	Black Gray
Carbonates	Malachite	$CuCO_3\ Cu(OH)_2$	Green
	Azurite	$2\ CuCO_3Cu(OH)_2$	Blue
	Chalconatronite	$Na_2(CuCO_3)_2\ 3\ H_2O$	Green/Blue
Chloride	Nantokite	CuCl	Green/White
*Basic Chlorides	*Atacamite	$Cu_2(OH)_3Cl$	Green
	*Paratacamite	$Cu_2(OH)_3Cl$	Pale Green
	*Botallakite	$Cu_2(OH)_3Cl$	Pale Green/Blue
Sulphides	Chalcocite	Cu_2S	Black
	Covellite	CuS	Black
Sulphate	Brochantite	$CuSO_4\ 2\ Cu(OH)_2$	Green

Figure 1:List of the most common copper corrosion products, (https://www.getty.edu/publications/artistryinbronze/conservation-and-analysis/35-casaletto/)

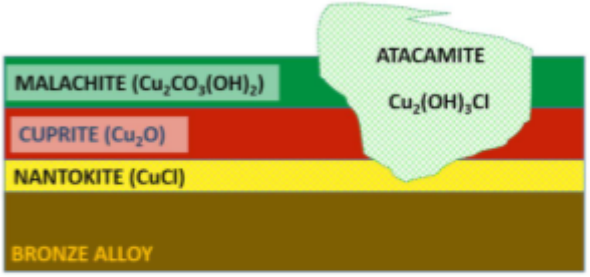


Figure 2:Corrosion of archaeological bronzes: schematic illustration of "bronze disease", (https://www.getty.edu/publications/artistryinbronze/conservation-and-analysis/35-casaletto/)

History of the Bell

According to the Sault Museum archive, the bell was cast in 1912 in England and shipped together with the clock to the Dominion Building which was a post office and government offices during that time. The inscription on the top of the bell mentions the name of the builder and the date of casting. It states “John Taylor – Founders – Loughborough – England – 1912”. The bell of the clock is an 810-pound bronze bell with a hammer strike. As for the other measurements, the outer length is 28.00 inches, the inner length is 25.00 inches, and the diameter is 34.00 inches.

The most significant feature of the bell is that it was originally synchronised with the clock and could be heard from as far away as Gore Street. The original location of the bell was on the museum’s roof by the clock tower. It was kept underneath a gable roof which protected it from rain and sunlight. It was stored in the same spot until 2017, after which during roof maintenance, it was moved to storage and was kept there for almost five years. In 2023, it was moved outside the building and it has been there as a symbol of the building and represents the history of Sault Ste. Marie. According to the communication between the writer and the manufacturer, the company is still active in building bells, and they have a museum of the history of the company as well. The result of the communication confirmed that the bell was built by John Taylor in England

in 1912. Below is the script of an email by the archivist of Loughborough Bellfoundry Trust with acknowledgment to the Loughborough Bellfoundry Trust:

> "The bell will be listed in our records under the name of the clockmaker rather than the destination. The job book shows some 12 bells supplied to Smith of Derby for clocks for Canada, the places listed individually on page 228. Your bell was order no.126 (or K) in the list, diameter 34" (86cm) weight 7 cwt 0 qr 6 lbs (358kg), note 909hz (B flat minus 44 cents of a semitone). The metals book shows that the bells were dispatched to Smiths on 11 October 1912. The daybook shows that your bell (and a second one) was invoiced to Smiths on 28 December 1912 – and records the shipping details and destination"

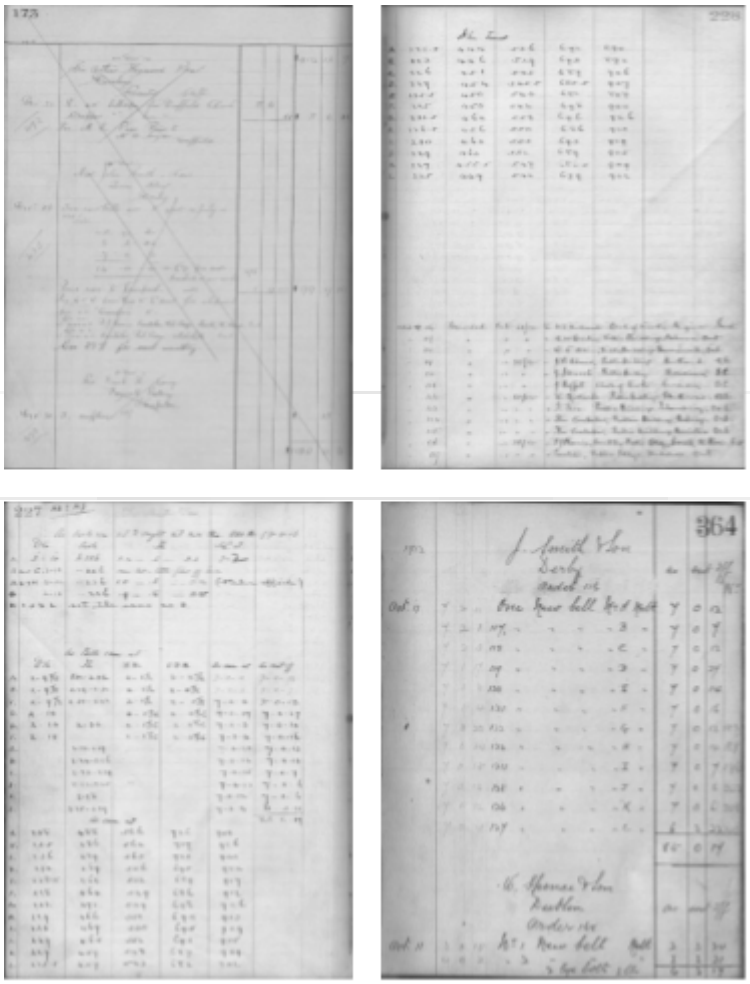


Figure 3: Document of Loughborough Bellfoundry Trust that shows the data and manufacturing location of the bell

Current Situation

The historic bell housed in front of the Sault Ste. Marie Museum was removed from the museum roof during repairs in 2016. It was at this time that the City and in turn

the Municipal Heritage Committee took possession of the bell. Therefore, the bell is currently the property of the Sault Ste. Marie Municipal Heritage Committee. In 2020 discussions were had between the Sault Ste. Marie Museum and the Municipal Heritage Committee over the decision to display the bell in front of the Sault Museum. The committee wished to display the bell in the garden in front of the Sault Museum for all to see. On August 19, 2020, it was stated that the legal department of City Hall had confirmed that the bell would be residing on City property so if there was any issue the City's liability insurance "would respond". Therefore any damages or issues to the bell are to be covered under the liability insurance. And as the bell is the property of the Municipal Heritage Committee it is their responsibility to take care of the bell.

On or around July 1st, 2023 the bell was vandalised. News sites such as SooToday documented the damage and interviewed William Hollingshead the director and chief curator of the Sault Ste. Marie Museum. He stated "The main concern is it's around 110 years old — it is a historic artifact. It's made of bronze, so it's pretty withstanding, but we don't want to just start polishing it and then have one spot where there's obvious repair done, and the rest looks bad. We also don't want to get the chemical composition wrong and then further deteriorate the bronze with it. Currently, we're trying to go through certain conservation standards set out by the government and various museum organizations to see what kind of solvents might work in that regard." The day after this article was released a supervisor from the Parks Department ordered two summer students to clean and powerwash the bell to remove the graffiti. This was conducted early in the morning with no warning to Sault Museum staff. Once staff realised what was happening they asked the students to stop as they were damaging a

historic artefact. It was understood at this time that the students were told to use a solvent to loosen the spray paint before they power washed the entire artefact.

Hollingshead contacted the city and inquired more about the situation and to understand how this situation had occurred though no response has been given. After the bell was power washed damage to the patina was evident. Also, a green ring on the concrete pad appeared below the bell. This shows more damage that was done to the bell. If the bell had not been further damaged by the unknown solvent and the powerwasher the amount of conservation work would not be as extensive.

On December 18, 2023, Sault Ste. Marie Museum staff discovered that the historic bell had once again been vandalised. This outlines the necessity of having the bell protected by the carriage house so vandals will not be able to access the artefact as easily.

Figure 5: Photos - Left: Bell pre vandalism (taken by Sault Museum May 2023). Right: After first vandalism event (photo from SooToday July 4, 2023)

Figure 4: Before conservation process - Above left: Front view of bell after power washing. Above right: Back view of bell, *note the difference in the patina where it was not damaged by the power washing.* Below left: Condition of bell after power washing and second vandalism event (photos by author, summer 2023) Below right: Current condition of bell with third vandalism event (photo by Nicole Curry, December 18, 2023).

The Necessity of Conservation and Preservation

The environment in which a brass or bronze piece is used or stored plays a significant role in its health and longevity. Moisture can be particularly destructive. Keeping humidity levels below 55% and avoiding rapid fluctuations in temperature is essential. Temperature changes cause metals to contract and expand, weakening the surface and encouraging protective coatings to fail. Air pollution, such as car exhaust fumes, cigarette smoke, dust, and debris are also detrimental. These can accumulate on the surface, attracting moisture and promoting corrosion. Mishandling of brass or bronze objects can cause denting, breakage, bending or cracking. Lifting should be avoided from the extended areas, such as the edge or handle. In addition, skin contact is not safe for bronze objects as oils and moisture from human skin will be absorbed into the metal surface and cause corrosion. It is necessary to use clean cotton gloves when handling.

The Sault Ste. Marie Museum's bronze bell is important because of its history and is a magnificent symbol of the Dominion Building and former post office. In addition, this historic object represents the trade communication between Canada and bell clock builders in England. Furthermore, external factors such as the environment and vandalism have demonstrated the necessity to protect the bell from more damage.

As this object has been placed outside the building with no roof or shelter. It faces different temperatures and varying weather conditions from highs of 30° C in summer to lows of -30° C in winter under direct sunlight, rain, and snow. The overall condition of the bell is fair, and therefore there is a need to protect it. More details and pictures about the current condition of the bell is provided in the "Before Conservation and

Preservation" section. Although the patina is still in good shape, vandalism, which includes the power washing, damaged its homogeneity and protective function. As a result, it is vital to start the conservation and preservation process as soon as possible.

Conservation Planning

The three main causes of damage to metal objects are corrosion, mishandling and poor environment. The conservation plan includes steps to clean and protect the object during its lifetime. This section presents the process and materials that need to be prepared. For more clarification, the process and the materials are divided into three parts which include before conservation and preservation, during conservation and preservation, and after conservation and preservation.

Before Conservation and Preservation

This is the first step in the process of conservation and includes research and data gathering about the history of the object, past and current conditions of the bell, the physical appearance and features such as different layers of corrosion, vandalism and any changes in stability and structure of the object. Documenting via taking photos and research plays a key role in this step before further process. The photos below display the current condition and environmental factors as well as the appearance of the bell. Based on the research, different corrosion types and damage on the bell are shown in the chart below.

Type of corrosion/damage	Location	Photo
Bronze disease	On the top of the bell	
Damage related to the iron frame corrosion	On the top of the Bell	
Traces of rain and snow and washing of corrosion material from top of the bell	On the surface of the bell	

Scratch on the surface because of vandalism	On the surface of the bell	
Corrosion of bronze. This dark layer is part of the patina.	All the surface of the bell but more concentrated on the middle and bottom of the object.	
Scratch on the surface, writing by marker, and chalk due to vandalism. In this picture, the green ring below the bell on the ground is also recognizable. This is the part of the patina that was washed by water.	On the surface of the bell	

Trace of birds' excreta on the bell	On the top of the bell	
Damage to the patina with water pressure conducted to clean the graffiti (vandalism)	On the front side of the bell	 After water pressure  Before water pressure

Dust and insect	On the surface of the bell both inside and outside	 
Picture of inside of the bell: corrosion of bronze on the edge	inside	
Scratch and contamination inside the bell	inside	

Conservation and Preservation

This step is the main part of the conservation process and applies to necessary materials using conservation procedures. In general, it involves removing dust and corrosion (cleaning), stabilising damaged and broken parts with adhesive (conservation), rebuilding the missing parts for stability and aesthetics purposes (restoration), and designing an appropriate condition with relative humidity (RH) below 55% to prevent Bronze Disease (preservation).

Table 2: Summary of the conservation plan

	Solutions	Method	Material and Equipment
Step 1: Cleaning	Mechanical cleaning	Hand-based cleaning	- brush - vacuum cleaner
	Water-based cleaning	Mix of water and organic solvent	- deionized water - isopropyl rubbing alcohol - cotton swabs
		Water and Vulpex (*Alternative plan for organic solvent)	- deionized water - Vulpex (conservation soap) - soft brush
Step 2: Coating	Chemical covering	Incralac (mix of B-72 and BTA)	- Incralac - Acetone - Spray container
Step 3: Preservation	Protection	Building a protective roof	Look at table 4: the expected budget of cupola

Cleaning:

In the cleaning phase the focus is on cleaning the bell from dust and air pollution, and traces of markers and pens resulting from vandalism. In addition, corrosion with the sources of chlorine (light green powder) should be removed. Physical cleaning to remove dust and traces of vandalism from the surface is the first treatment in this phase. For this purpose, dusting with a brush can clean the inside and outside of the

bell from dust, insects, and spider webs. This is the action with the lowest risk in this step. There may even be the need to use a vacuum cleaner to clean the inside of the bell from dust. For this purpose, in regards to not scratching the bell, a piece of clean cotton cloth will be attached to the vacuum cleaner to avoid direct touch with the object. Then a mix of deionized water and isopropyl rubbing alcohol 70-99% with cotton swabs could be used to clean the stuck dust and greasy residues to complete the cleaning process. As an alternative for solvent organic material such as alcohol, to remove dirt, the cleaning could be conducted with Vulpex as an approved conservation soap in a 3% solution in deionized water to remove the dirt and grime with a lint-free cloth or natural soft bristle brush (Deck, 2020).

Conservation:

Based on the research of Molina et al (2023) at the Canadian Conservation Institute, after 12-15 years of artificial light exposure with filtered fluorescent lamps, which is equivalent to approximately 45 years in a museum, most “acrylics” show in general good ageing behaviour in terms of pH stability, minimal discoloration to yellow, and mechanical properties. Paraloid B72, Paraloid B-44 and Incralac are common types of acrylics in metal conservation. For outdoor applications “Incralac” is the best option with a life duration of around 3-5 years. The main ingredients of Incralac are Paraloid B-44 (ethyl methacrylate/methyl methacrylate copolymer), levelling agent, epoxidized soybean oil, an ultraviolet stabiliser, toluene, ethanol, and the corrosion inhibitor benzotriazole (BTA) (Molina et al, 2023). Wolfe & Grayburn (2017) concluded that Incralac is an ideal air-drying clear coating lacquer based on acrylic resin and it is removable using laser and carbon dioxide blasting techniques. Incralac is a solvent-based, clear, very high gloss, air-dry coating for copper and copper-based alloys

such as bronze. According to the International Copper Research Association (INCRA), Incralac was found to provide the best protection for copper and brass of all air-dry coatings tested. It is stated that spraying the chemical material on the historical bronze yields better results in providing a whole coverage with a homogenous thickness on the object (International Copper Research Association. 1966a, b). This coating lacquer provides protection against bronze disease and any type of corrosion including chloride-based degradation.

After Conservation and Preservation

As this bronze object will stay outdoors, it is impossible to control the temperature and the weather conditions. However, we can design and build a protective roof to prevent any damage from rain, snow, and direct sunlight on the bronze. For this purpose, it is suggested to build a wooden gable roof with four columns similar to the original gable roof when the bell was kept on the roof of the museum's building.

Figure 6: Photos - Left: The sketch of the original location of the bell on the roof of the Sault Museum (Museum Bell plaque). Middle and right: Bell carriage at time of museum roof repair in 2016 documenting the condition of the carriage and the bell.

Please note that a written conservation treatment report will be provided after the process of conservation is completed. The report will include the treatment process that has been done, condition assessment/report, photos of before and after the treatment to

track the process, and recommendations for handling, storage, and/or display in outdoor and indoor settings.

Alternative plan

At the request of the Municipal Heritage Committee, the alternative approach regarding moving the bell inside the building is added to this proposal. All aspects of this decision such as the method of moving, cost of moving, and the capacity of the building to tolerate the weight of the bell long-term, need to be determined accurately.

The Expected Budget

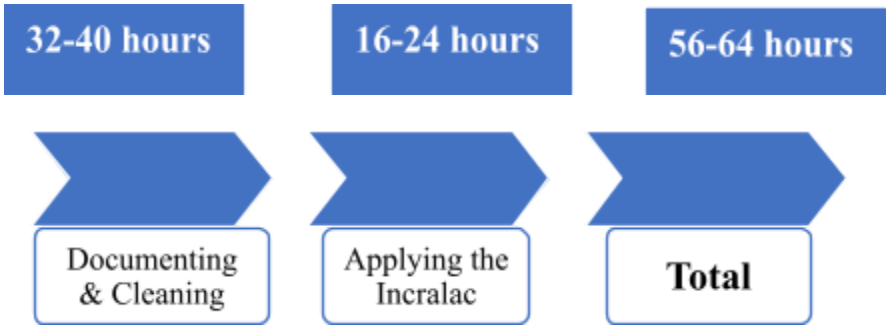
Material/tool	Purpose	Expenses
Conservation Dusting Brushes	Mechanical cleaning	Museum supply
OLFA® Art Knife	Mechanical Cleaning, to remove thick corrosions and germ	CA$10.75 Purchase Link
Isopropyl rubbing alcohol	Mix with water for cleaning	CA$7.79 Purchase link
Vulpex Soap (*alternative for alcohol)	Gentle chemical cleaning *if required	CA$160.00 Purchase Link
Deionized Water	Mix with Vulpex Soap	CA $19.95 x 2 Purchase Link
Cleaning Swab Kit	Cleaning wet and dry	CA$24.80 Purchase Link
Incralac-Solvent Base 1 gallon	Coating	CA $197.00 Purchase Link
Filter Mask	Personal protective equipment (PPE)	CA $30.99 Purchase Link
Safety glass	PPE	CA $19.79 Purchase Link
Spray container	Spraying Incralac	CA $119.99 Purchase Link
Acetone	To make the Incralac more liquid if it is necessary to cover the surface of the bell	CA $12.99 Purchase link
Total Cost of materials/tools		**$464 (*excluding $160.00)**
Conservator's wage	**$50.00/hr**	**$2,800-3,200**

**Material costs are tentative and may be affected by change in the amount depending on the process and the result of each step.*

Table 4: Cupola for Museum Bell (prepared by David Curry)

Materials	#/unit	$/Item	# Needed	Total Cost
Peak 4 x 4 Heavy duty steel bolt down post support	1	$23.57	4pcs	$94.28
3/8 x 3 inch steel hex head sleeve anchor	15	$24.34	1pc	$24.34
3/8 x 3 inch	1pc	$2.27	1pc	$2.27
Paulin 1/4 x 1-1/2 inch black hex lag bolt	5 pc	$2.68	7pcs	$18.76
Paulin 1.6”x3”x1/8” black corner brace	1	$7.85	4pcs	$31.40
1-1/4 inch roofing nails	1 box	$5.20	1	$5.20
4”x4”x8 foot pressure treated post	1	$16.78	4pcs	$67.12
2”x4”x8 foot pressure treated	1	$7.47	8pcs	$52.29
1”x6”x 6 foot pressure treated	1	$6.00	8pcs	$48.00
GAF Timberline UHDZ Weathered Wood	1 pk	$59.49	1	$59.49
Algae resistant shingles (*to be determined)				
Behr Solid stain white	1 gal	$31.97	1	$31.97
Assorted fasteners, brushes, misc				$75.00
Grand Total *not including tax				**$510.00**

Timetable of the Process



**The duration of the process may be affected by weather conditions, as the process will be conducted in an outside environment.*

References

Deck, C., (2020). The Care and Preservation of Historical Brass and Bronze, *Benson Ford Research Center*, 1-9 https://www.getty.edu/publications/artistryinbronze/conservation-and-analysis/35-casaletto/

Loughborough Bellfoundry Trust, Archive documents

Molina, M., T., Cano, E., Ramírez-Barat, B. (2023). Protective coatings for metallic heritage conservation: A review, *Journal of Cultural Heritage 62*, 99–113

Wolfe, J. & Grayburn, R. (2017). A review of the development and testing of Incralac lacquer, *Journal of the American Institute for Conservation*, DOI: 10.1080/01971360.2017.1362863

Sandell, E.R, (2018). New Materials for the Coating of Outdoor Bronze, Submitted in partial fulfillment of the requirement for the degree Master of Science in Historic Preservation, *Columbia University*

International Copper Research Association. 1966a.Development of an aerosol INCRALAC. INCRA Project 96. New York: David Litter Laboratories

International Copper Research Association. 1966b.Development of clear coatings for protection of copper base alloys: Project report 1960–1965. INCRA Project 16(d). Waterbury, CT: Chase Brass & Copper