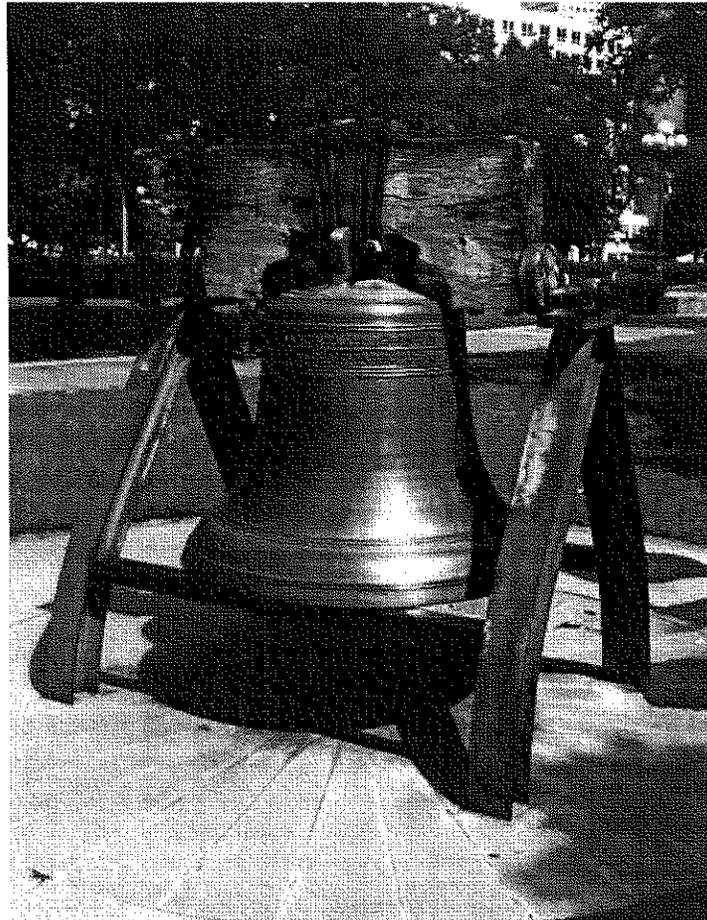


# TREATMENT PROPOSAL

## Denver's Liberty Bell replica



**JONATHAN TAGGART**

Taggart Objects Conservation

644 Five Islands Road, Georgetown, ME 04548-3309

Phone: 207- 371-2099, Cell: 207-522-9435

Email: [jtaggart@zwi.net](mailto:jtaggart@zwi.net)

## I. PROJECT DESCRIPTION

### A. CLIENT INFORMATION

OWNER: State of Colorado  
AUTHORIZED: Sue Johnson, Chairman Historical Preservation  
AGENT : Mount Rosa Daughters of American Revolution  
ADDRESS:  
PHONE: 303-921-1266 cell, 303-796-0453  
EMAIL: suejohnsonskj@comcast.net

### B. OBJECT INFORMATION

OBJECT: Liberty Bell replica  
ARTIST: Paccard Foundry in Annecy-le-Vieux, France.  
DATE: 1950  
LOCATION: Lower Capitol Lawn in Lincoln Park, Denver, Colorado  
MATERIALS: Cast bronze bell, steel bent I-beam frame and attaching bolts, and wooden yoke.

### C. CLIENT'S EXPECTATIONS

This treatment proposal is intended to address the conservation of the bronze bell, it's supporting wooden yoke, steel frame, attaching hardware and clapper. It does not include the replacement of the missing plaques and treatment to the supporting concrete.

It includes:

- Repair or replacement of failed structural elements following the recommendations of the engineering report.
- Consolidation or replacement any deteriorated wood related to the structural stability.
- Conservation of the surface of the bell and application of a maintainable protective coating to preserve the surface and appearance of the bell.
- Application of a wood preservative and water repellent to extend the life of the wood and maintain its existing appearance.
- Apply appropriate paint coatings to the iron structural and support elements.
- Installation of a copper cap on the yoke to protect the upper exposed surfaces from the elements.
- Removal of the two, later addition, restraining cross bars.
- Design and fabrication of a removable structure that prevents the bell and clapper from being unintentionally swung, while facilitating the ringing of the bell for ceremonial occasions.
- Refabrication and installation of the missing plaques is not considered as part of this draft proposal but could be considered in the final proposal.
- Treatment of the concrete is not considered as part of this draft proposal but could be considered in the final proposal.
- Develop a long term maintenance plan.

## II. CONDITION REPORT

### A. FABRICATION TECHNIQUES

This Liberty Bell replica is a traditional cast bronze piece, attached to a wooden yoke with iron hardware. This bell assembly is mounted on an iron "I" beam frame through supporting bearings. The supporting frame is mounted in concrete into which have been set bronze dedicatory plaques. Additional iron support for the bell, which appears to have been added later, has been attached by welding between the two supporting frames and under the bell. The clapper has been welded onto one of these additional support elements.

### B. STRUCTURAL CONDITION

The structure of the bell itself is in excellent condition. The iron fasteners that attach the bell to the yoke also seem secure, though some may have moved slightly due to compression of the wood. The wood of the yoke shows substantial aging, checking and deterioration appropriate to its age, but has substantial structural strength remaining according to the engineering report. The pivoting connections of the yoke to the bearings, through the axles, are problematic. The axles have shifted out of alignment, causing the bell to sag. Some of this sagging may be caused by deterioration of the wood, but it is primarily caused by inadequate support and stability at the bearings. The support frames appear to be structurally sound but showing signs of age. The welds of the frame to the additional support elements under the bell have begun to fail as evidenced by cracks in the welds. The attachment of the clapper to the bell appears sound. Some of the dedicatory plaques have been removed leaving the concrete scarred with old mounting holes. The concrete appears to be generally sound, exhibiting deterioration appropriate to its age including spider cracking and minor losses along some edges.

### C. SURFACE CONDITION

The surface of the bell is in very good condition exhibiting little of the deterioration typical of bronze in the outdoor environment, such as blue-green corrosion products. All of the iron elements exhibit deterioration and/or failure of their protective coatings resulting in areas of light surface corrosion. The wood of the yoke has greyed and eroded in places and may show some decay on the upper surface. The surface of the concrete has aged with some areas of surface loss.

## III. PROPOSED TREATMENT

### A. TREATMENT SUMMARY

The Denver Liberty Bell replica will be treated in situ. The bell will be washed and a reversible, maintainable hot wax protective coating applied. All of the mounting hardware attached to the yoke will be removed and individually treated to renew their protective coatings and insure their ongoing stability. The wood of the yoke will be evaluated to determine consolidation or replacement of bearing structural surfaces is needed. Once stabilized, it will be treated to discourage wood decaying organisms. A water repellent will then be applied to the wood. A copper cap will be installed to protect the upper exposed surfaces from the elements. The bearing system will be modified following the engineering report to adequately support the bell as well as preserve the overall appearance and parts where possible. The supporting axles may

be machined or refabricated. New or additional bearings will be added to provide additional support through the axles. The support frame will be cleaned and coated with the paint recommended in the engineering report or their equal. A system will be developed which allows the bell to be rung on occasion. This system will be designed with a locking mechanism to prevent unauthorized use. A Maintenance Plan will be provided, including recommendations for ongoing maintenance.

## B. RECOMMENDED TREATMENT

### 1. Concrete

It is the opinion of this conservator that the existing concrete may give many more years of service before needing to be replaced. Minor concrete repairs may be needed. Repair and/or replacement of the concrete are beyond the scope of this proposal. If the concrete is to be replaced, the deinstallation and reinstallation of the bell, along with its moving, storage, and security, are also beyond the scope of this proposal.

### 2. Bell

The bell will be cleaned with water and a mild nonionic surfactant to remove dirt, grime, pollution or other residues. Two coats of a reversible sculpture wax will be applied to the surface of the bronze sculptures. The first will be applied by a technique known as hot wax. The bronze elements of the bell will be warmed to the melting temperature of the wax system, using a propane torch. The wax will be brush-applied to all surfaces of the bronze bell and leveled using a propane torch. The wax which will be used is a formulation developed specifically to be used in sculpture conservation. After the bell has completely cooled, a second layer of cold paste wax (same mixture) will be applied to the surface. This layer will be bonded with the first layer and flame-polished with a little heat from the propane torch. The final appearance of the bell will be that of an aged but cared-for bronze. The surface will be semi-gloss in appearance. The overall appearance and legibility of the bell will be improved to more closely approximate the original intent, without completely eliminating the appearance of natural aging.

### 3. Yoke

The bell will be supported and the hardware that attaches the bell and yoke will be disassembled. The wood of the yoke will be evaluated to determine if there are areas of deterioration that need consolidation or replacement with wooden Dutchmen. It is anticipated that if this is necessary, it will only in areas that do not affect the overall exterior appearance of the yoke. The appearance of the aged wood is in keeping with overall appearance of this historic artifact and should be preserved. The yoke will be treated with a borate compound (Boro-care; reference at <http://nisuscorp.com/builders/products/bora-care>) to prevent biological and insect attack on the wood. Approval for the use of this product will be obtained before application. A maintenance coating of water repellent will then be applied. A copper cap will be installed to protect the upper exposed surfaces from the elements.

#### 4. Mounting Hardware and Support Frame Coating

The iron elements of bell assembly will be disassembled for treatment. These metal parts will be treated to remove corrosion products. They will then be treated using the products specified in the engineering report, or with the following. Final products will be approved before treatment begins. They could be primed with an appropriate epoxy primer (such as Ameron, Amerecoat 68HS or similar). Choice of products may depend on the degree of preparation achieved on the metal surface. They may be painted with silica based paint (such as Ameron, PX 700). (These maintenance coatings are intended for long-term durability, and are easily re-treatable. This is the same paint that is being used by the U. S. Navy and on bridges where a 30-year service life is expected. Retreatment is repainting with long-service life paint.) The threads of the bolts will be painted after everything is re-assembled.

#### 5. Bearing support

The bearings will be modified in compliance with the engineering report. While the axles are disassembled they will be machined or refabricated to rotate on a pair of bearings on each side. The new bearings will match the old ones, insuring that the axle remains horizontal under the load of the bell.

#### 6. Mount design

The cross bars that are a later addition the bell mount will be removed. In coordination with, and approved by the client, a mount will be designed for a mechanism to prevent the bell from swinging and to lock the clapper in place. They will be designed so that they can be removed to allow the bell to be rung on occasion. Because this bell does not have a mechanism to make the bell swing, it is recommended that the bell be rung using a rope tied to the clapper. The mechanism that keeps the bell from swinging may have to be removed to insure that the bell rings with a clear tone.

#### 7. Plaques

Replacement of the missing plaques is beyond the scope of this draft proposal but may be included as part of the final proposal. Before new plaques can be cast, camera-ready designs supplied by the client will be needed. The background color will be chosen to be compatible with the remaining plaque's appearance. They will be mounted using stainless steel studs in an appropriate permanent adhesive.

#### 8. Maintenance program

A maintenance program will be developed in conjunction with the final report. This program may include, but not be limited to, the following, depending on actual products and procedures used in treatment: procedures to maintain protective coatings on the bell, paint coatings, and wood preservatives and water repellants.

## V. COMPANY POLICIES

### A. STANDARDS

All work will conform to the code of ethics and standards of practice of The International Institute for Conservation of Historic & Artistic Works (I.I.C.) and The American Institute for Conservation of Historic and Artistic Works (A.I.C.).

### B. DOCUMENTATION

In keeping with both the international and national standards of practice, both written and photographic documentation will be undertaken. Before, during and after photographs will be taken. A treatment report and maintenance recommendations will be written, to be included with the attached condition report in a final report. This final documentation will be submitted to the client within a reasonable amount of time after the treatment is completed.

### C. QUALIFICATIONS OF WORKERS

#### 1. Conservator: Jonathan Taggart

Jonathan Taggart has a Master of Science degree in Art Conservation. He will be the primary person involved in the treatment. All standards, materials, techniques and workmanship will be directed by him. He will be present or available at all times when work is in progress. He has more than 25 years' experience as a conservator of artistic and historic monuments.

#### 2. Technicians

Other conservators or technicians may be employed as independent contractors to assist the conservator in set-up of equipment, handling of material, daytime site security and as needed in preparation, break-down and in the process of the treatment. The technicians will be skilled craftsmen with conservation experience.

### D. BUSINESS POLICIES

It is the policy of Taggart Objects Conservation to work cooperatively with the client to preserve our cultural patrimony. This proposal includes an estimate of the cost to complete the proposed work described above. The estimated costs of this proposal are based on estimated time charged at the rate of \$125 per hour and estimated costs of materials and expenses. Additional costs of changes approved by the client, made after the contract, will be charged at the rate of \$125 per hour and actual expenses.

### E. CONTRACT CONDITIONS

1. The Client will provide power and water to the site when it is available.
2. The Owner/Authorized Agent agrees that he/she is the owner or the authorized agent of the owner of the work(s) of art.
3. All conservation work will be performed consistent with the Code of Ethics and Guidelines for Practice set forth by the American Institute for Conservation of Historic & Artistic Works.
4. A service charge of 1.5% or \$50 per month, whichever is greater, will be made on charges not paid within 30 days after notice of completion of services performed in the signed agreement.

5. The Owner / Authorized Agent agrees that Taggart Objects Conservation may use photographs, drawings and written documents made in the performance of the proposed services for educational purposes.

#### F. COST CONSIDERATIONS

The hourly rates for the conservation team that this budget is based on are as follows:

Conservator, Jonathan Taggart:	\$125/ hr.
<u>Conservation Technicians, A. Launa and C. Hollis:</u>	<u>\$65 /hr. each</u>
Total team cost /hr. for budget estimating purposes:	\$260 / hr. for the team

#### VI. COST ESTIMATES

(C) Conservator (CT) 2 Conservation Technicians (T) Team

##### Conservators travel related expenses

Mobilization and demobilization	\$800
Insurance	\$100
Airfare	\$800
Hotels, 13 days, @ \$141 /room/day GSA rate	\$1,833
Per diem for 14 days, @ \$66/day	\$924
Work vehicle rental, 2 weeks	\$900
Mileage, round trip to airport; 90 mi. @ \$0.51/ mi.	\$46
<u>Travel time @ half rate, 20 hrs. @ \$62.50 / hr.</u>	<u>\$1,250</u>
TRAVEL SUB TOTAL	\$6,553

Proposal, report and documentation, 2 days (C)	\$2,000	
Bell cleaning and stabilization, 6hr (T)	\$1,560	
Application of two layers of protective coating, 6hr. (T)	\$1,560	
Shipping	\$500	
Site fencing and lifting equipment	\$1,000	
Scaffold, tenting	\$700	
Disassembly of bell from yoke and frame, 8 hr. (T)	\$2,080	
Frame air abrasive cleaning, 8 hr. (T)	\$2,080	
Air abrasive cleaning of all hardware 4 hrs. (CT)	\$520	
Cold galvanizing and painting all hardware, 4 hrs, (CT)	\$520	
Cole galvanizing and painting frame, 8 hrs. (CT)	\$1,040	
Design and Fabrication of new bearing system, 4 hrs. (T)	\$1,040	
Complete reassembly, 16 hrs. (T)	\$4,160	
Copper cap fabrication and installation, 4 hrs. (C)	\$500	
Mount design to prevent bell swing and secure clapper	\$1,000	
Mount fabrication and installation	\$2,000	
<u>Equipment: pressure washer, welder, air abrasive equip.</u>	<u>\$2,000</u>	
SUB TOTAL	\$24,260	\$24,260

Concrete work is not included.

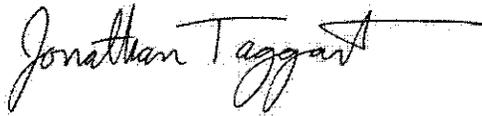
The cost of plaques could be \$500 to \$1000 each to produce, depending on size and complexity. The additional installation cost at the same time the rest of the work is accomplished is minimal.

### VIII. AUTHORIZATION

This section serves as an authorization for all of the proposed treatments for the various monuments listed in this document.

It is understood that a treatment may be halted or modified should new problems or concerns arise from the parties involved in this contract. After consultation with the Owner or Authorized Agent, a new estimate may be given if the problems are more complex and the treatment more time-consuming than originally estimated.

In accordance with these listed contract conditions, the above proposals are accepted and the Conservator is authorized to carry out the proposed treatments.



Submitted by \_\_\_\_\_ Date June 28, 2013  
Jonathan Taggart

Approved by \_\_\_\_\_ Date \_\_\_\_\_

This cost estimate is valid until the end of the year 2014.



# **Premier** Specialty Contractors

2311 S. Platte River Drive, Denver, CO 80223 • (303) 934-2467 • [www.premierspecialty.net](http://www.premierspecialty.net)

*Preserve, Restore, Protect*

July 12, 2013

suejohnsonskj@comcast.net

Mount Rosa Chapter  
Daughters of the American Revolution

Attention: Ms. Sue Johnson

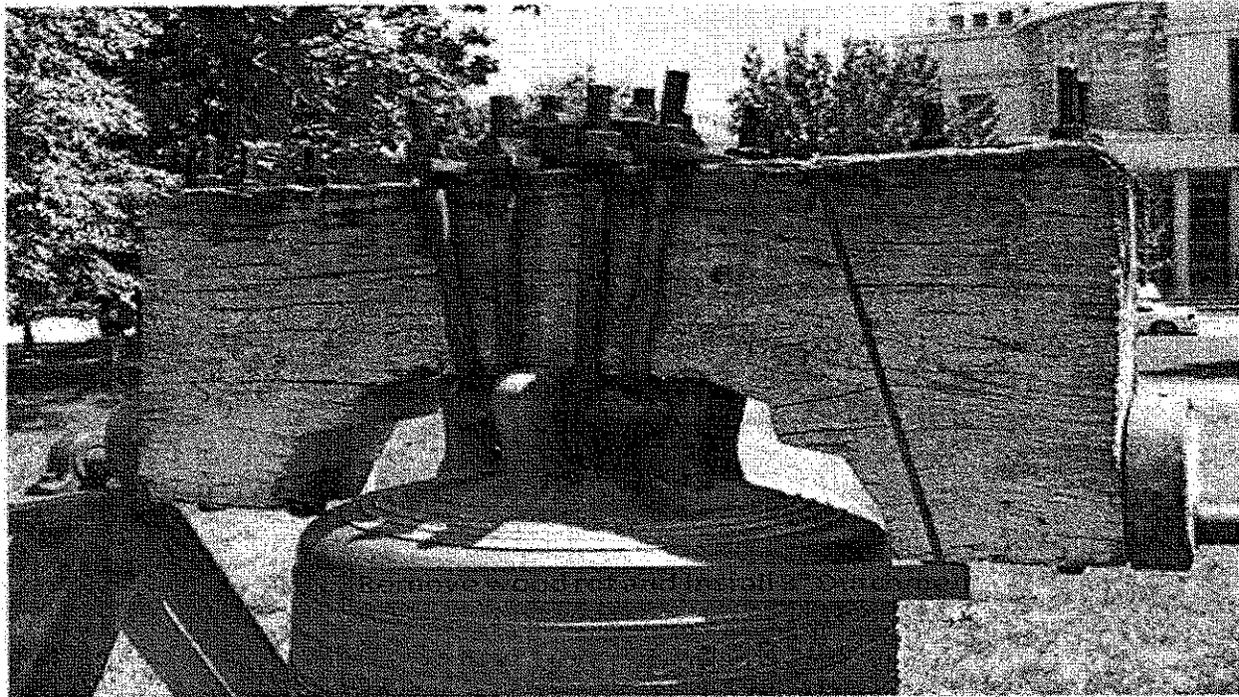
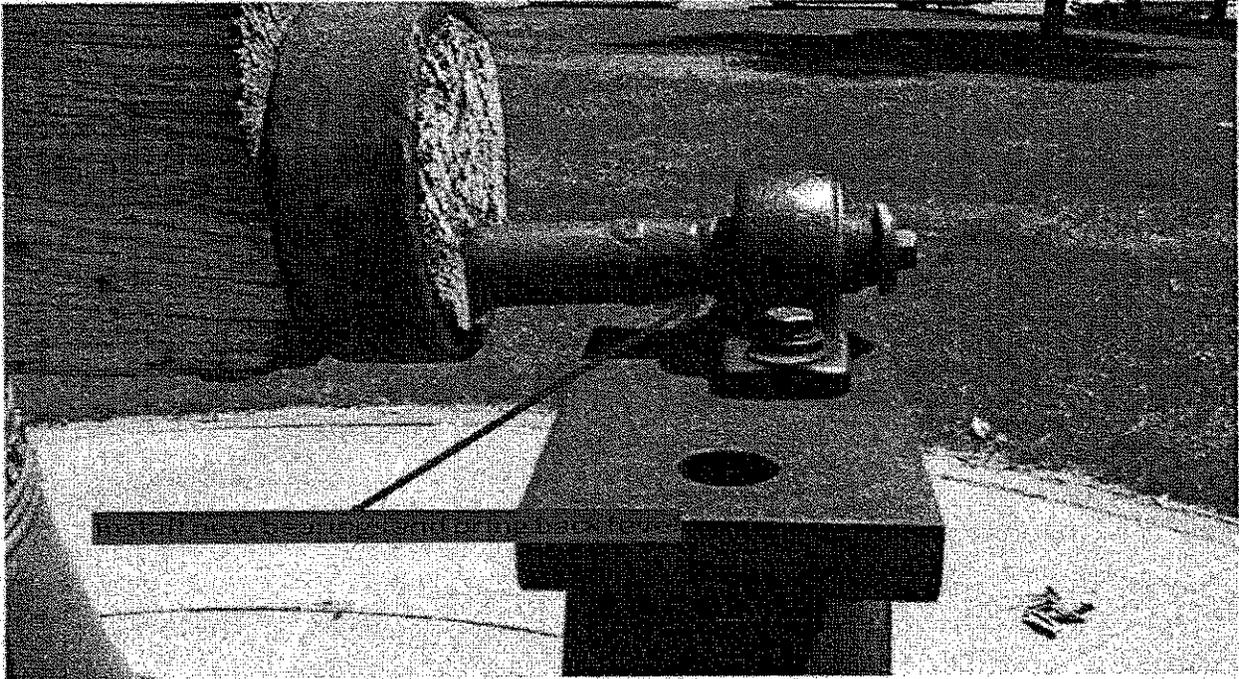
Re: Colorado Liberty Bell  
Budget Estimate

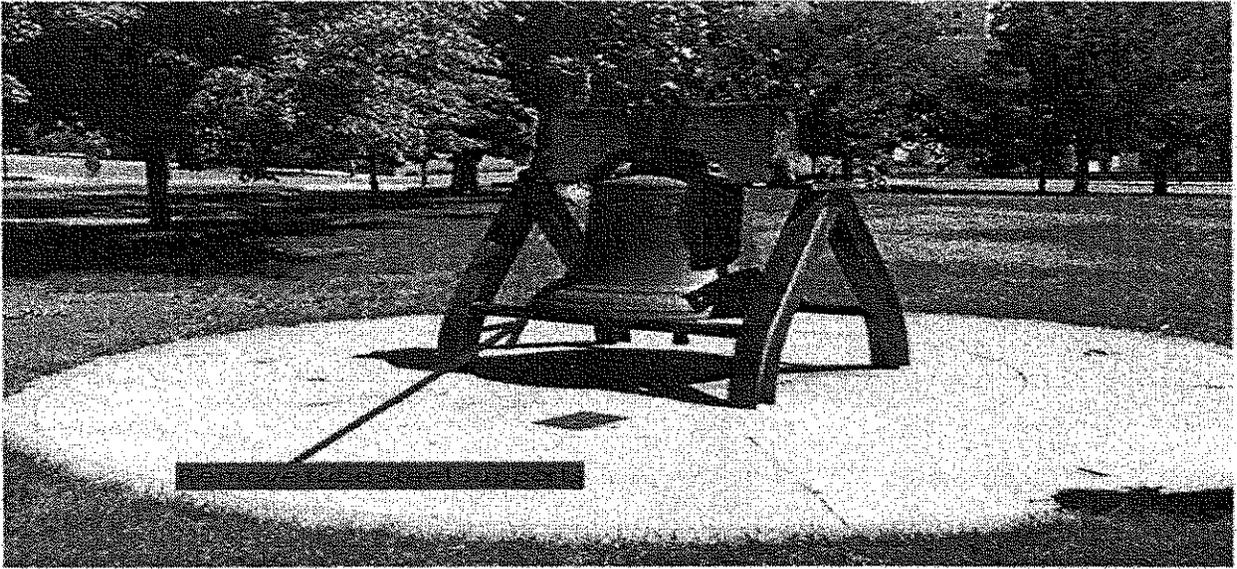
Dear Ms. Johnson,

Thank you for calling on Premier Specialty Contractors regarding the Colorado Liberty Bell Project. In accordance with your request, we are forwarding Premier Specialty Contractors budgetary costs to perform the following items of repair:

- Provide necessary construction permits
- Provide temporary power and water as needed
- Provide temporary sanitation
- Provide temporary security fencing around the bell during construction
- Provide shoring support of the Liberty Bell during bearing and wood yoke repairs
- Provide equipment to hoist bell
- Removal of existing and installation of new both right and left side axles and bearings
- Remove existing tube steel supports
- Fabrication and installation of new removable clapper lock
- Areas as identified in the drawing for treatment of corroded steel will be cleaned and primed with Zinc Rich primer as per specifications.
- Remove wood rot as identified in the drawings and provide installation of new oak Dutchman
- Install new copper metal cap with hemmed drip edge

We are providing this budget estimate based on review of Anthony & Associates, Atkinson-Noland & Associates Report dated May 14, 2013, and from our review of existing physical site conditions. Should work reveal hidden problems or defects, changes may be required in the scope of work. Premier is not an engineering firm and does not perform these services.





Sincerely,

This work can be expected to be completed for the sum of: \$24,225.00

PREMIER SPECIALTY CONTRACTORS

A handwritten signature in black ink, appearing to read "L.V. Holland", written over the printed name.

Lawrence Holland

Project Manager

LH

**From:** "Ron Anthony" <woodguy@anthony-associates.com>  
**To:** "Sue Johnson" <suejohnsonskj@comcast.net>  
**Cc:** "Ron Anthony" <woodguy@anthony-associates.com>, "Carlo Citto" <ccitto@ana-usa.com>, "Dave Woodham" <dwoodham@ana-usa.com>  
**Sent:** Monday, June 17, 2013 12:51:44 PM  
**Subject:** Flashing question for the Liberty Bell Replica

Hi Sue,

You asked about whether to cover the top of the wooden yoke. Typically, a flashing material, such as copper, would be used if there was a desire to protect the exposed wood from the elements. If flashing is used, copper is not recommended. When copper and steel or iron are in contact, there is a risk of galvanic corrosion, which accelerates the corrosion rate of the steel. Galvanized or stainless steel would be preferable. Because of the existing configuration at the top of the yoke, proper flashing installation would be very challenging. Every hole required to accommodate the rods needs to be sealed to prevent water infiltration. The sealant will likely need to be replaced every five to seven years. If water gets under the flashing (through holes or absorption through the end grain of the wood), the yoke is more susceptible to deterioration. If there is a desire to have some protective metal covering, in addition to the comments above, the flashing should extend approximately an inch below the top of the yoke and be attached with small nails. A drip edge is also recommended to channel water away from the wood. Any metal covering over the yoke is susceptible to vandalism due to its location in a very public place with easy access that could diminish the effectiveness of the flashing. One other note is that many flashing materials potentially react with precipitation and leach metal ions onto the wood surface, resulting in streaks on the faces of the yoke. Our recommendation is to leave the wood uncovered as it was originally intended.

Please let me know if you have questions.

Best regards,

Ron Anthony  
Wood Scientist  
Anthony & Associates, Inc.  
P.O. Box 271400  
Fort Collins, CO 80527 U.S.A.  
Ph: 970-377-2453  
Fax: 970-377-2469  
[woodguy@anthony-associates.com](mailto:woodguy@anthony-associates.com)