conservation of sculpture & objects studio, inc.

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Object: General Tadeusz Kosciuszko, 1905.
Artist: Gastano Trentanove
Material: Bronze, Granite.
Owner: City of Milwaukee
Examined: 2008

## CONDITION

The sculpture has been exposed to an outdoor environment for 103 years. The entire surface is covered with corrosion, dirt and dust. The

bronze elements present typical green and black corrosion products, which disfigure the design of the monument. The surface is corroded unevenly. The disfiguring streaking is scattered over the entire surface of the sculpture. In addition to the aesthetical problems, there are serious structural problems caused by incorrect selection of materials for armature (it will be further discussed below).

Fig. 1. Proper left side view. The entire surface is corroded - disfiguring green, and black streaking. Please notice the two brackets attaching the base of the bronze to the stone. Please also notice the rusty stain at the front of the bronze base.

Fig. 2. Detail of the proper left side of the base - showing the bracket, and iron stain leaching out from the inside of the horses leg.

Fig. 3. Bracket attaching the sculpture to the pedestal. There are 4 mounting brackets holding the base of the sculpture to the pedestal.

Fig. 4. Detail of the proper right side - showing very unevenly corroded surface of the bronze. The streaking seriously disfigures the aesthetical design of the sculpture.

Fig. 5.  Detail of the upper section of the sculpture - showing streaking at the head of the horse, and the face and hat of Kosciuszko.

Fig 6.  Detail of the belly of the horse - showing severe streaking, and missing both spurs.

Fig. 7.  Detail of the proper left side of the sculpture.  Please notice the unevenly corroded surface, and white material leaching from the joints.  The

scabbard is missing. According to information provided by Mrs. Ramazzini the scabbard is in storage at the present time and can be reinstalled as it is.

Fig. 8. Front view. Please notice severe streaking, iron stains at the proper left knee of the horse, iron staining the base at the bottom of the proper left leg, and iron staining the base under proper right leg of the horse (raised up). It appears that the armature inside of the sculpture is severely corroded. It is very probable that the armature does not support the sculpture anymore. The amount of iron staining indicates that the problem is very serious. The sculpture should be further examined internally for redesigning structural support which might be necessary.

Fig. 9. Picture illustrating x-ray analysis of the sculpture.


Fig. 10. Detail of the proper left front leg of the horse. The image on the left illustrates external structural problems caused by deterioration of the internal ferrous armature and concrete fill. The white seen inside the leg was proved to be concrete (MVA analysis – see attached report). The material deposited under the crack is rusty in color and comes from decomposing ferrous reinforcement clearly visible in the x-ray image in the middle and drawing on the right. This long crack was created by freeze and thaw cycles, expansion of deteriorated concrete material and expansion of ferrous corrosion products. Iron corrosion products and core material leach out.


Fig. 11. This x-ray image clearly illustrates cracking of the bronze and presence of ferrous rods in the proper front left leg. (Incorrectly labeled as right leg by x-ray technician.)

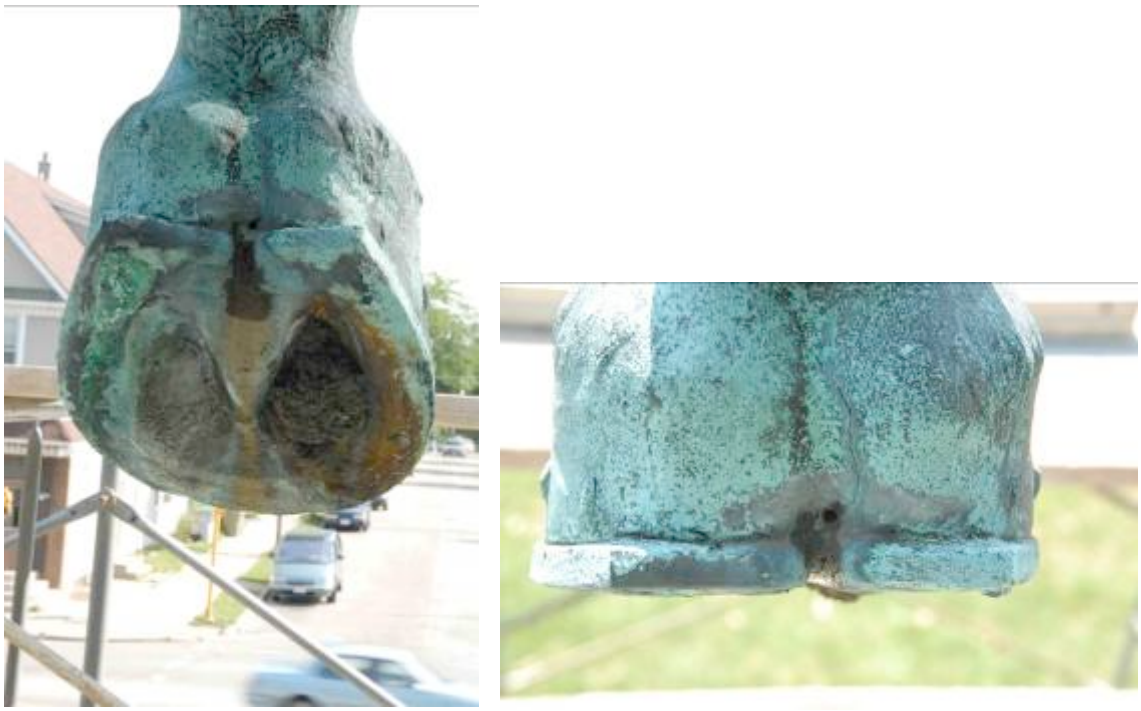

Fig. 12. Images illustrating external condition of proper right hoof. There is a thick layer of deposited material that leached out from the inside of the sculpture.

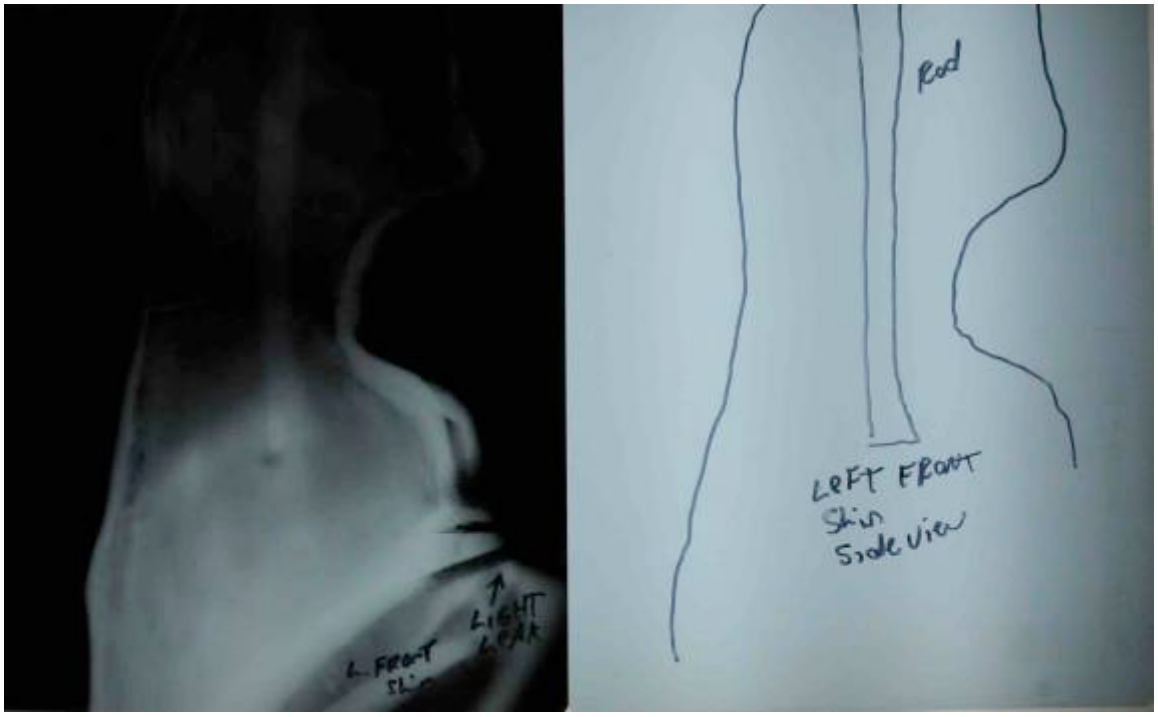


Fig. 13. X-ray image illustrating presence of internal armature. X-ray analysis and analysis of samples performed by MVA strongly suggest that the armature is made of ferrous material. (Incorrectly labeled as left leg by x-ray technician.)

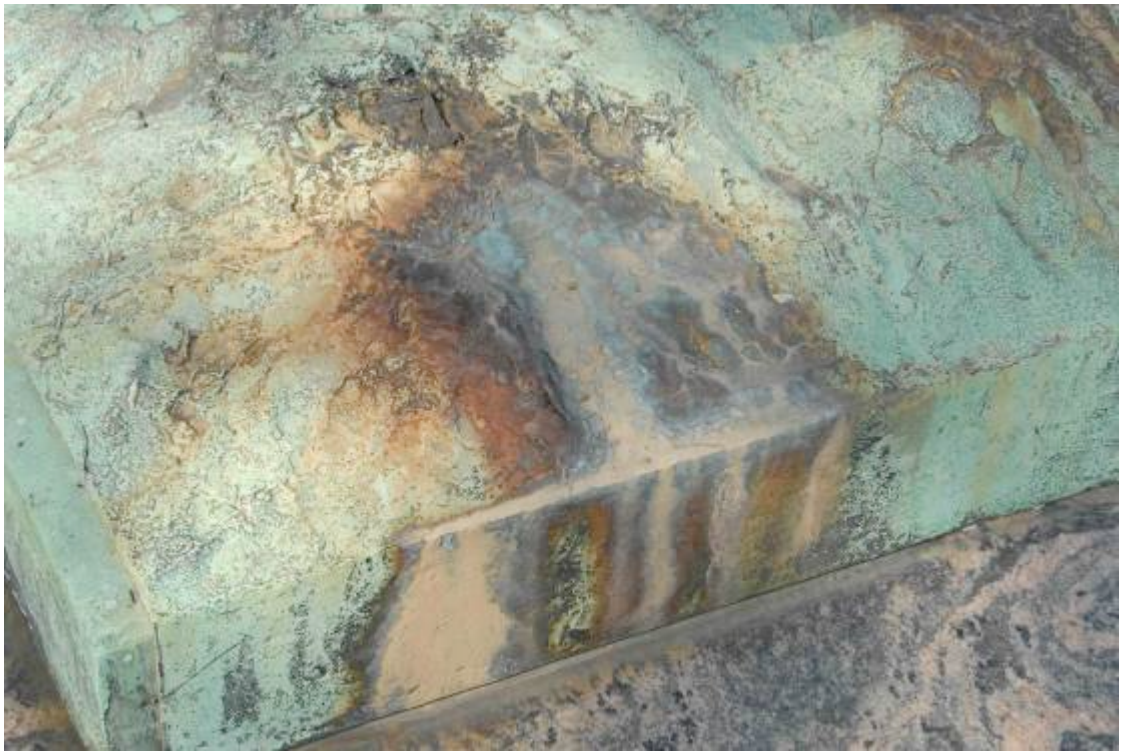

Fig. 14. Front of the bronze base. Please notice iron staining of the surface running from the proper right front leg of the horse.

**Summary of condition evaluation of bronze:**

Visual inspection of the sculpture supported by x-ray analysis and analysis of samples taken from the sculpture which proved that all of the legs of the horse are filled with concrete. The concrete fill was found in all legs up to hips and shoulders of the horse. The horse is supported (stands) on three legs. The front leg has very long vertical crack at the knee and a very deep horizontal crack just above the hoof. This leg is filled with severely deteriorated concrete that holds moisture. X-ray analysis proved presence of corroded ferrous armature in this leg. This scenario presents serious structural problem because the crack will continue to grow as a result of freeze and thaw process and expansion of deteriorating concrete and armature will continue to the point that the sculpture will collapse. As a result in my opinion, there is only one choice for treatment. The sculpture has to be stabilized by dismantling and addressing all of the structural problems. The surface appearance and corrosion are secondary as a conservation problems. Because three legs support this sculpture the deterioration of the front left leg presents a very serious structural risk. In my opinion, this is a very serious problem that should be addressed as soon as possible.

## CONDITION OF THE BASE

Fig. 15. Detail of the proper left side of the back of the base. Please see leaching white material from the joint, and graffiti on the horizontal surface. The white material has green tint, which indicates that there is a failed joint between stones at the upper section where the bronze rests. Green indicates presence of copper corrosion in the deposit.

Fig. 16. Detail of the proper right side of the back of the base. Please see leaching white material from the joint, and graffiti on the horizontal surface.

The stone is slightly soiled. Small chips were found at the edges. The over all condition of the base is good, however the joints should be cleaned and tuck pointed.

Fig. 17. These two images show both sides of the pedestal. Both sides have an inscription that is difficult to read from a distance.

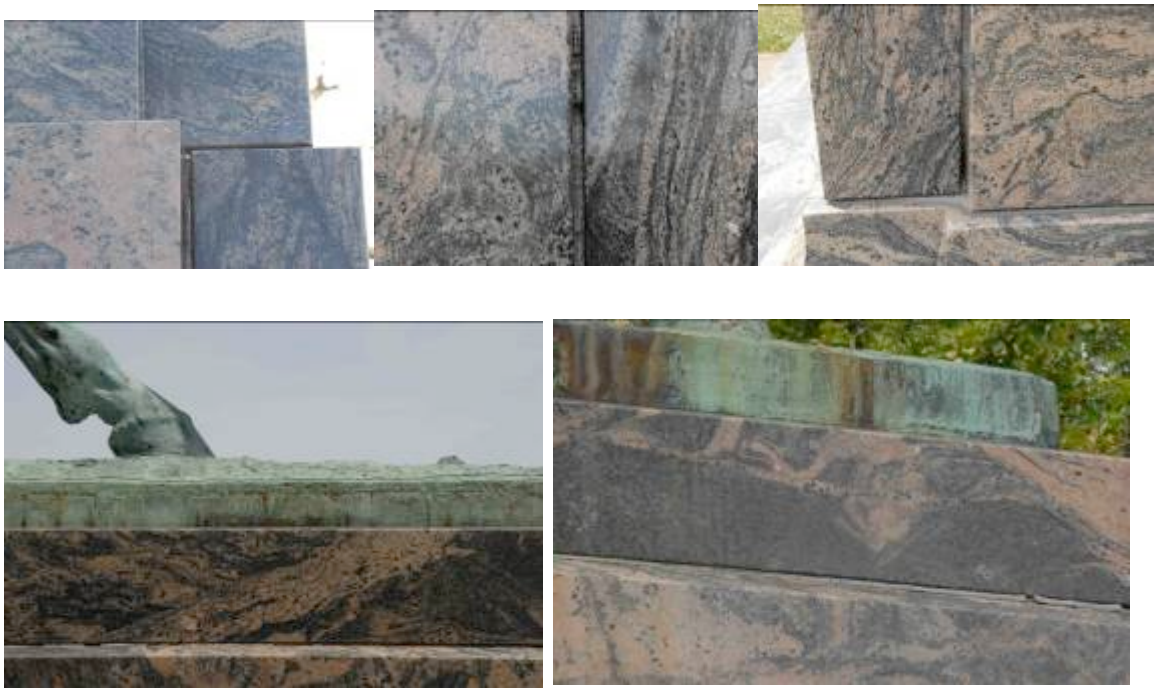

Fig. 18. The above images illustrate deterioration of pointing material. All of the joints of the stone are deteriorated and should be cleaned of old pointing and re-pointed.

## PROPOSED TREATMENT

*Bronze:*

1. Dismantle the sculpture from the pedestal and transport it to CSOS studio.
2. Support the front of the sculpture using a custom designed hoisting system.
3. Create openings in the sides and top of the sculpture where needed in order to remove all of the concrete from the interior of the horse.
4. Remove concrete and ferrous armature from interior of the sculpture.
5. Design and install new stainless steel armature.
6. Weld all of the cracks in the surface of the sculpture.
7. Weld back all of the cut sections of the sculpture.
8. Chase all of the welds.
9. Remove loose corrosion products using lasers.
10. Weld in place the scabbard.
11. Drill weep holes, and flush-out the interior of the sculpture to remove any remaining core material, and corrosion.
12. Wash with warm water (approx. 170 deg. F) and 5% solution of Orvus Non-Ionic Detergent using tampico scrub brushes.
13. Patinate the bronze according to the owners color specifications.
14. Apply a corrosion inhibitor BTA.
15. Coat the sculpture with Incralac.
16. Reinstall the bronze in the pedestal (after treatment of the pedestal is completed).

*Pedestal:*

1. Test, and after owners approval of the test results clean the stone.
2. Wash with warm water and a 5% solution of Orvus Non-Ionic detergent using low pressure washing (under 1500 psi).
3. Remove salt deposits.
4. Remove the old pointing.
5. Tuck point the stone.
6. Gild or paint the inscriptions in the pedestal (optional - research needed to determine if the inscription was ever gilded or painted).

At the present time conservators of outdoor bronzes use two kinds of coating: a combination of microcrystalline waxes, or an Incralac - an acrylic resin in organic solvents with BTA - a corrosion inhibitor added. Both of the coatings require maintenance. A wax coating has to be maintained at least once a year. An Incralac coating should be washed and waxed every other year, and removed, and reapplied after 7 to 10 years. Waxes are easier to maintain, but Incralac gives better protection for a bronze, and in my opinion is a lot better for our climate.

## COST ESTIMATE

When we get to the point of approval of the treatment we will provide you with an exact cost of this part of the project.

Resumes of all conservators, and a copy of the insurance policy, are available on request prior to starting the project.

We carry $2,000,000.00 business insurance, but if additional coverage is needed it will be provided before beginning work.

Please review attached report from corrosion and metal samples analysis prepared by MVA.