Before Conservation



01 Cascade, York Hse

The large plants and water had been removed from the Cascade.

Within the report the numbering of the statues and column goes from left to right. All references to left and right within the report are from the statues position.



02 Nymph 1, Cascade, York Hse

The Cascade was covered in moss, algae and small plants.



03 Nymph 2, Cascade, York Hse

The missing and loose pieces were noted.



04 Nymph 3, Cascade, York Hse

The redundant lights and cabling were removed from the Cascade.



05 Nymph 4, Cascade, York Hse



06 Nymph 5, Cascade, York Hse



07 Nymphs 6 and 7, Cascade, York Hse



08 Sea-horses, Cascade, York Hse



09 Marble shell, Cascade, York Hse



10 Marble bowl, Cascade, York Hse

Conservation Treatments.

The marble statues, shells and bowls were examined and found to be in good structural condition. The Iron-stone rocks were also examined and found to have deteriorated greatly and in the areas were the water mainly flowed to be severely laminating. This and the wet environmental conditions of the Cascade when the fountain is working determined the choice of materials used for conservation.

The pieces of marble were adhered using threaded stainless steel dowel and epoxy resin. Epoxy resin was used because it has a much higher resistance to deterioration caused by water than polyester resin. The joints were filled with an epoxy resin and marble dust filler for the same properties. It was considered that epoxy resin is harder than polyester resin but the good structural condition of the marble enabled this to be acceptable. Epoxy resin, in contrast to polyester resin will develop a yellow tinge quickly. This was considered but it was thought that the water resistance that the epoxy resin provided would be more important over the long term. The joints filled with epoxy resin filler were also quite small.

The pointing and mortar repairs to the marble bowls and shells were done in a cement mortar rather than a hydraulic lime mortar. It was felt that such a hard mortar was necessary in these circumstances rather than the normal hydraulic lime mortar because of the aggressive environment, which meant that a hydraulic lime mortar would not survive frost damage.

The iron stone rocks were capped and pointed with a mortar mix containing hydraulic lime and cement. In normal circumstances a purely hydraulic lime mortar would have been used but it was decided that due to the aggressive environment the mortar would not have survived frost damage so a proportion of cement was added to the mix.

A protective micro-crystalline wax coat was applied to nymphs 1 to 6. The other statues were left as control samples. If the wax coating is beneficial in the protection of the statue from biological growths it would need to become part of the maintenance programme.



11 Nymph 5, Cascade, York Hse

Without damaging the stone as much moss and algae as possible was removed, using low pressure steam and water.

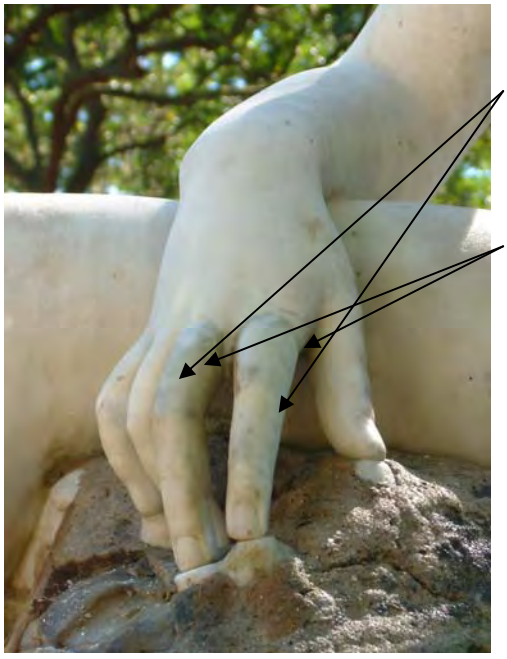
The marble statues, shells, bowls and the iron-stone rocks were all cleaned using this method.



12 Nymph 1, Cascade, York Hse

Loose previous repairs re-attached;
Nose
2 no. fingers, L.Hand
3 no. toes, R. foot

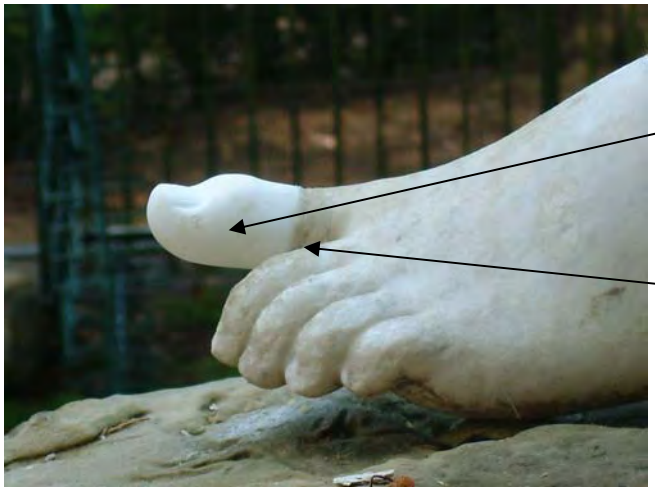
New marble pieces carved and attached;
1 no. toe, L. foot



13 Nymph 1, Cascade, York Hse – R.hand

The two previously repaired fingers were re-attached using 4mm threaded stainless steel dowel and epoxy resin.

The joints were filled with an epoxy resin and marble dust filler.



14 Nymph 1, Cascade, York Hse – L. foot

The newly carved marble big toe was re-attached using 4mm threaded stainless steel dowel and epoxy resin.

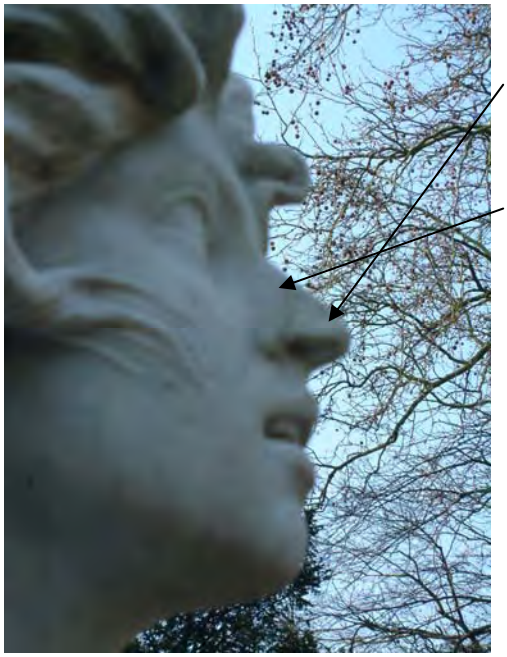
The joint was filled with an epoxy resin and marble dust filler.



15 Nymph 1, Cascade, York Hse – R. foot

The 3 previously repaired toes re-attached using 4mm threaded stainless steel dowel and epoxy resin.

The joints were filled with an epoxy resin and marble dust filler.



16 Nymph 1, Cascade, York Hse

The previously repaired nose was re-attached using 4mm threaded stainless steel dowel and epoxy resin.

The joint was filled with an epoxy resin and marble dust filler.



17 Nymph 1, Cascade, York Hse

A coat of micro-crystalline wax was brushed onto the finished statue.



18 Nymph 2, Cascade, York Hse

Loose previous repairs attached;
1 no. L. foot
1 no. toe, L. foot
1 no. toe tip, R foot

New marble pieces carved and attached;
1 no. L. hand and wrist
4 no. fingers, R. hand
1 no. thumb, R. hand
3 no. toes, L. foot
1 no. toe, R. foot
2 no. toe tips, R. foot

The loose foot was removed using hand chisels and the dowel holes re-drilled.

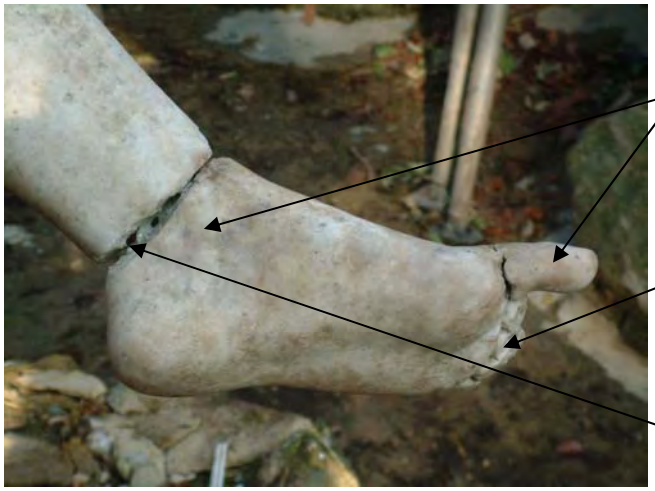


19 Nymph 2, Cascade, York Hse – R. foot

The previously repaired toe tip was re-attached using 4mm threaded stainless steel dowel and epoxy resin.

The newly carved marble toes were re-attached using 4mm threaded stainless steel dowel and epoxy resin.

The joints were filled with an epoxy resin and marble dust filler.



20 Nymph 2, Cascade, York Hse – L. foot

The previously repaired foot and big toe were re-attached using 12mm and 4mm threaded stainless steel dowel and epoxy resin respectively.

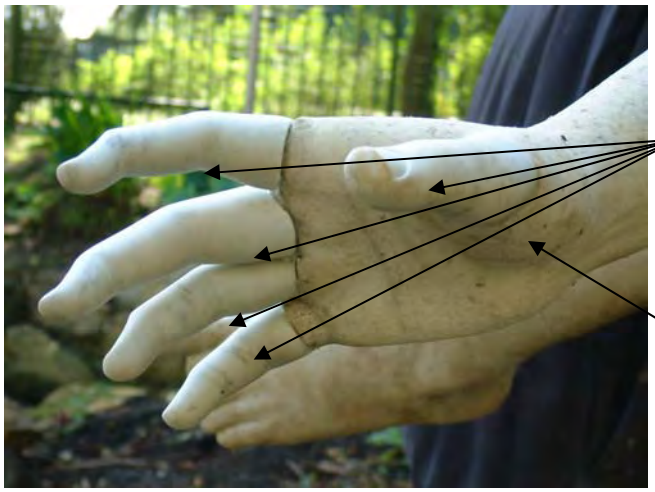
The newly carved marble toes were re-attached using 4mm threaded stainless steel dowel and epoxy resin.

The joints were filled with an epoxy resin and marble dust filler.



21 Nymph 2, Cascade, York Hse

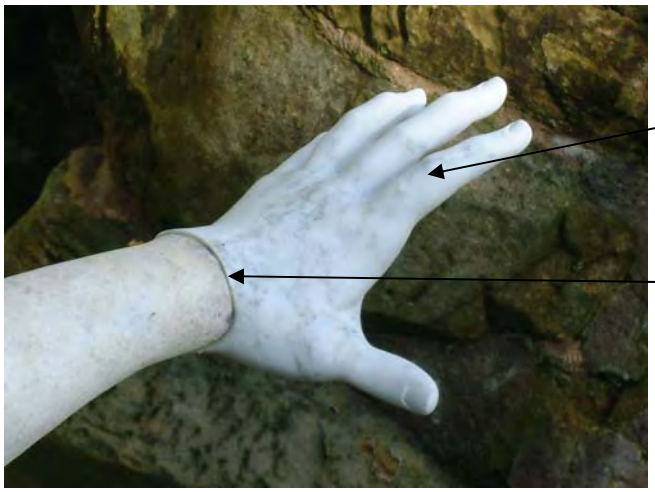
The new fingers and toes were modelled up on site in 'Plasticine'.



22 Nymph 2, Cascade, York Hse – R. hand

The newly carved marble fingers and thumb were re-attached using 4mm threaded stainless steel dowel and epoxy resin.

The joints were filled with an epoxy resin and marble dust filler.



23 Nymph 2, Cascade, York Hse – L. hand

The newly carved hand was re-attached using 12mm threaded stainless steel dowel and epoxy resin.

The joint was filled with an epoxy resin and marble dust filler.



24 Nymph 2, Cascade, York Hse

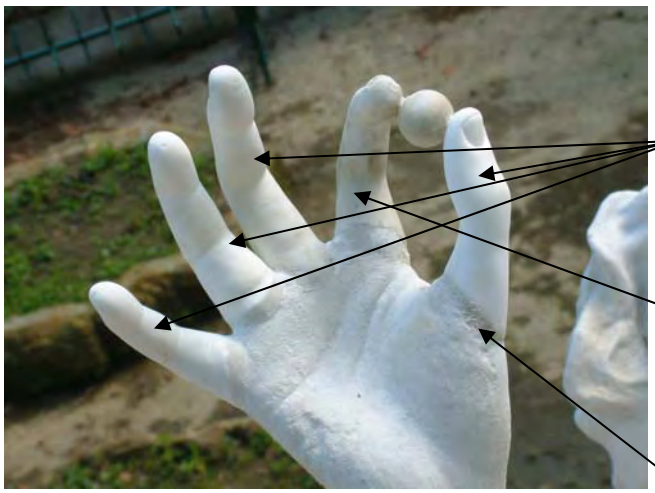
A coat of micro-crystalline wax was brushed onto the finished statue.



25 Nymph 3, Cascade, York Hse

Loose previous repairs attached;
1 no. finger, R. hand
1 no. pearl

New marble pieces carved and attached;
1 no. thumb, R. hand
3 no. fingers, R. hand



26 Nymph 3, Cascade, York Hse – R. hand

The newly carved marble fingers and thumb were re-attached using 4mm threaded stainless steel dowel and epoxy resin.

The previously repaired finger was re-attached using 4mm threaded stainless steel dowel and epoxy resin.

The joints were filled with an epoxy resin and marble dust filler.

The pearl was fixed in place with epoxy resin.



27 Nymph 3, Cascade, York Hse

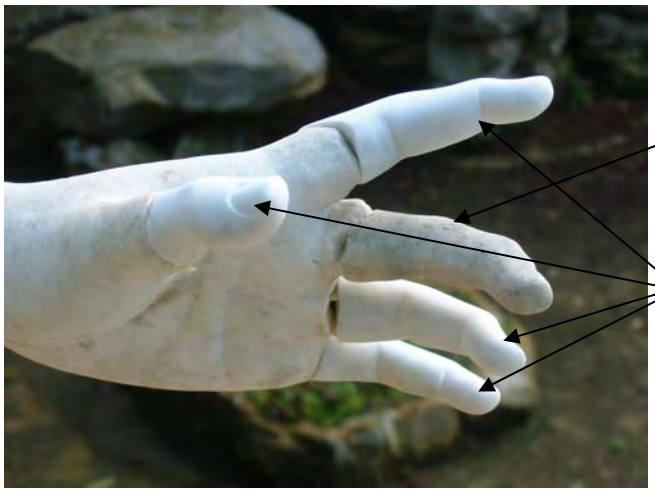
A coat of micro-crystalline wax was brushed onto the finished statue.



28 Nymph 4, Cascade, York Hse

Loose previous repairs attached;
1 no. finger, L. hand
3 no. fingers, R. hand
1 no. thumb, R. hand
2 no. antennae

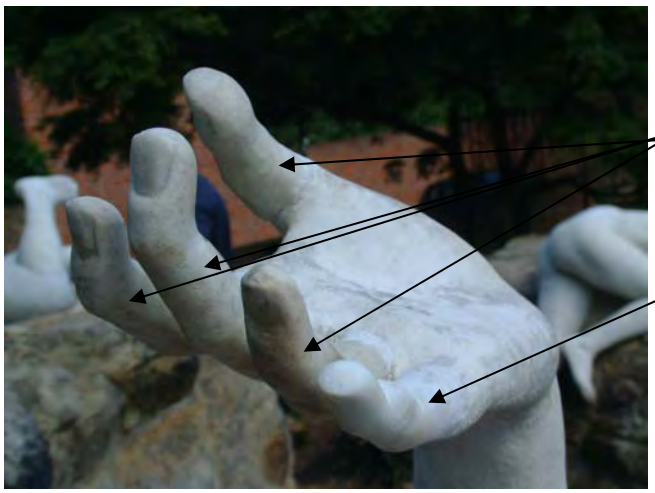
New marble pieces carved and attached;
3 no. fingers, L. hand
1 no. thumb, L. hand
1 no. finger, R. hand



28 Nymph 4, Cascade, York Hse – L. hand

The previously repaired finger was re-attached using 4mm threaded stainless steel dowel and epoxy resin.

The newly carved marble fingers and thumb were re-attached using 4mm threaded stainless steel dowel and epoxy resin.

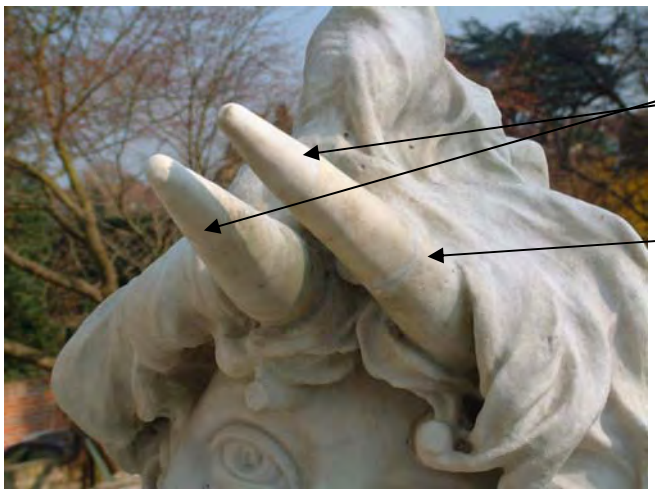


30 Nymph 4, Cascade, York Hse – R. hand

The previously repaired fingers and thumb were re-attached using 4mm threaded stainless steel dowel and epoxy resin.

The newly carved marble finger was re-attached using 4mm threaded stainless steel dowel and epoxy resin.

The joints were filled with an epoxy resin and marble dust filler.



31 Nymph 4, Cascade, York Hse

The previously repaired antennae were re-attached using 4mm threaded stainless steel dowel and epoxy resin.

The joints were filled with an epoxy resin and marble dust filler.



32 Nymph 4, Cascade, York Hse

The failed mortar and resin pointing was removed from the shell.
The joints and cracks were then re-pointed with mortar to tone with the marble;
1 part – white cement
2 parts – marble dust
1 part – Bath stone dust



33 Nymph 4, Cascade, York Hse

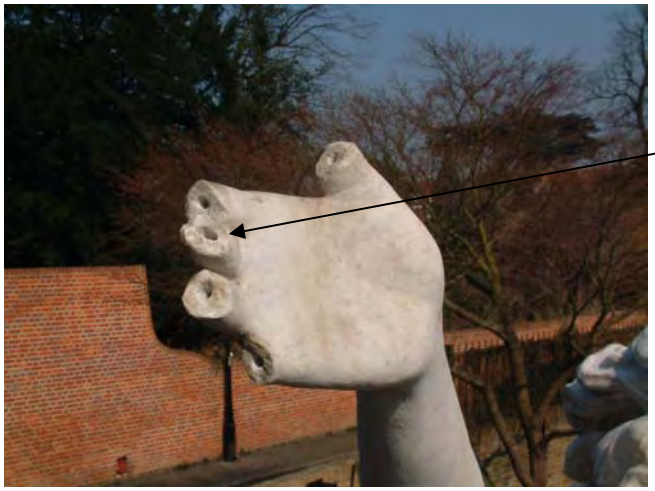
A coat of micro-crystalline wax was brushed onto the finished statue.



34 Nymph 5, Cascade, York Hse

Loose previous repairs attached;
4 no. fingers, R. hand
1 no. thumb, R. hand
1 no. toe, L. foot

New marble pieces carved and attached;
3 no. toes, L. foot



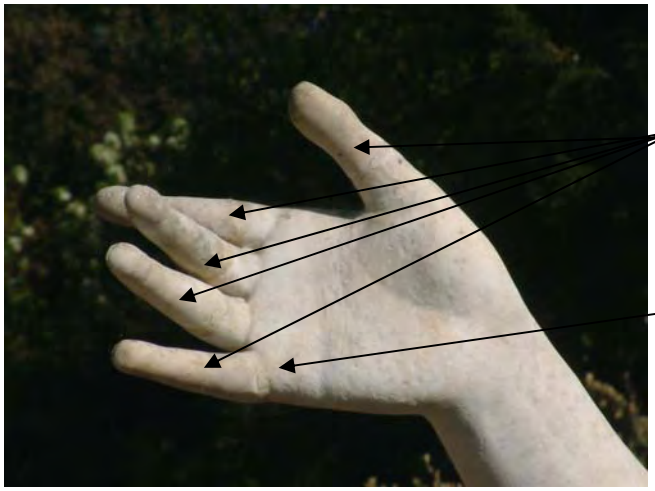
35 Nymph 5, Cascade, York Hse – R. hand

Having removed the previously repaired fingers the dowel holes were cleared of old resin and lengthened, if necessary using a drill.



36 Nymph 5, Cascade, York Hse – R. hand fingers

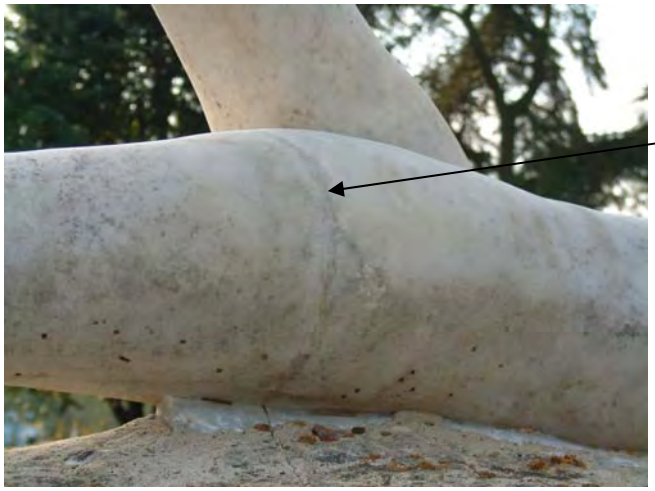
The previously repaired fingers with their new dowels, ready to be re-attached to the hand.



37 Nymph 5, Cascade, York Hse – R. hand

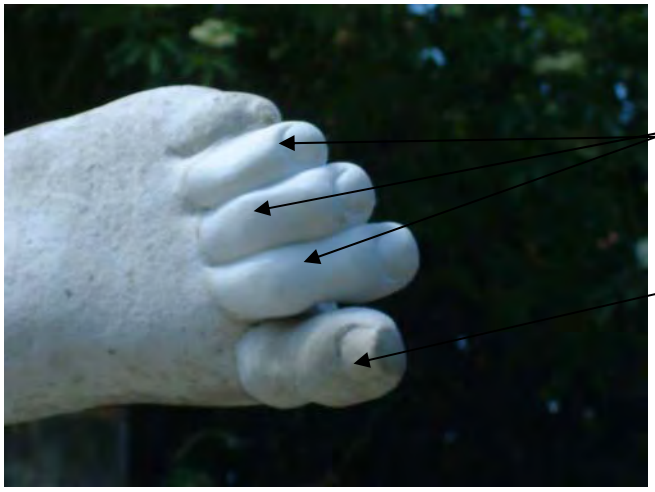
The previously repaired fingers and thumb were re-attached using 4mm threaded stainless steel dowel and epoxy resin.

The joints were filled with an epoxy resin and marble dust filler.



38 Nymph 5, Cascade, York Hse – R. leg

The large crack was filled with an epoxy resin and marble dust filler.



39 Nymph 5, Cascade, York Hse – L. foot

The previously repaired toe was re-attached using 4mm threaded stainless steel dowel and epoxy resin.

The newly carved marble toes were re-attached using 4mm threaded stainless steel dowel and epoxy resin.



40 Nymph 5, Cascade, York Hse

A coat of micro-crystalline wax was brushed onto the finished statue.



41 Nymph 6, Cascade, York Hse

Loose previous repairs attached;
1 no. toe, R. foot

A coat of micro-crystalline wax was brushed onto the finished statue.



42 Nymph 7, Cascade, York Hse

The finished statue was left un-waxed as a sample to compare over time with the 6 other waxed statues.



43 Nymphs 6 & 7, Cascade, York Hse

Open joints were filled with epoxy resin and marble dust filler.



44 Figure with Seahorses, Cascade, York Hse

Previously pinned repairs that were re-pointed;
2 no. L. leg, L. Seahorse
1 no. R. leg, L. Seahorse
2 no. R. leg, R. Seahorse

Previous repair that was re-attached;
1 no. hoof, R. leg, R. Seahorse



45 R. Seahorse, Cascade, York Hse – R. leg

The resin fill in the joint of the previous repair had failed and there was some movement across the joint.

The resin fill in the joint of the previous repair had failed.

The previous repair on the hoof was loose.



46 R. Seahorse, Cascade, York Hse – R. leg

Having removed the fill it could be seen that there was a copper dowel and two stainless steel pins in resin holding the joint.

A recessed 6mm threaded stainless steel pin was fixed, using epoxy resin, across the joint to stop the movement.

The excess resin was cut back on the old pins.

The joint was filled with;
1 part – white cement
3 parts – marble dust
⅛ part – slate dust



47 R. Seahorse, Cascade, York Hse – R. leg

Having removed the failed resin fill it could be seen that there was a threaded stainless steel dowel and a stainless steel pin holding the joint.

The excess resin was cut back on the old pin.

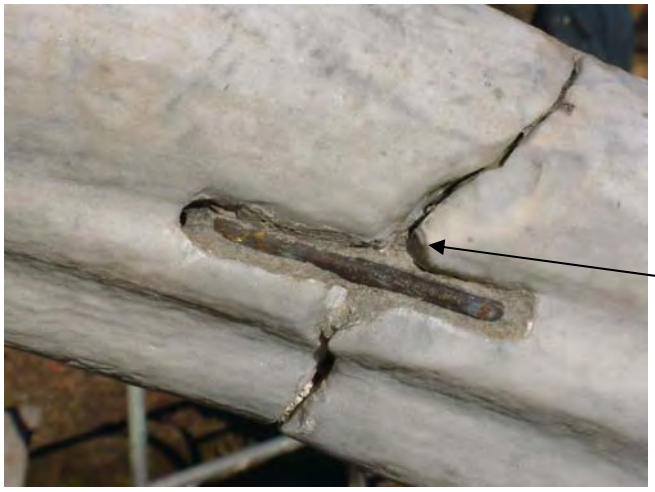
The joint was filled with mortar;
1 part – white cement
3 parts – marble dust
⅛ part – slate dust



48 R. Seahorse, Cascade, York Hse – R. leg

The previously repaired hoof was re-attached to the leg using two 6mm threaded stainless steel dowel and epoxy resin.

The joint was filled with epoxy and marble dust filler.



49 L. Seahorse, Cascade, York Hse – L. leg

The L. Seahorse's L. leg was previously repaired and pinned in two places and the R. leg in one, with copper pins and cement.

The failed joints were cleaned out and the excess cement cut back from around the pins.

The joints were then filled with epoxy resin and marble dust filler.

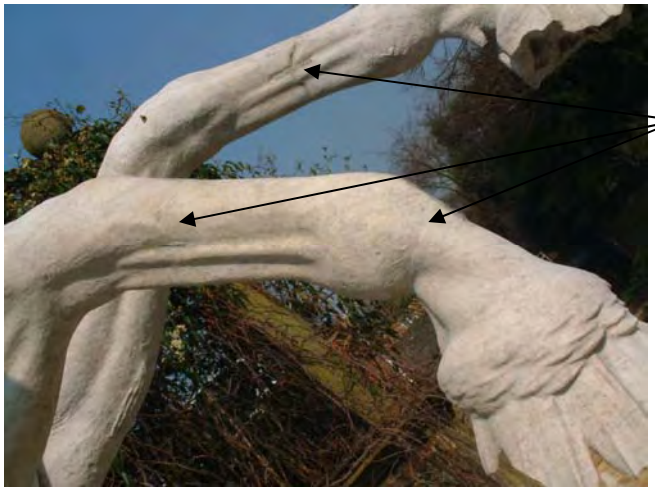


50 R. Seahorse, Cascade, York Hse

The joints filled with mortar;
1 part – white cement
3 parts – marble dust
⅛ part – slate dust

A cement mortar was used for these two fills as they were large and prominent. A resin fill would have been slower and more difficult to build up, as well as discolouring to a yellow tinge quickly.

The hoof re-attached and the joint filled with epoxy and marble dust filler.



51 L. Seahorse, Cascade, York Hse

The joints filled with epoxy and marble dust filler.



52 R. Seahorse, Cascade, York Hse

The failed pointing was removed from the joints of the figure and Seahorses and they were re-pointed using epoxy resin and marble dust filler.



53 Figure with Seahorses, Cascade, York Hse

Two areas of graffiti on the seahorses were removed using low pressure steam and water.

One area on the figures bottom could not be removed using low pressure steam and water. The area was cleaned further with Nitromors but the graffiti could only be reduced not completely removed.



54 Figure with Seahorses, Cascade, York Hse

The finished statue was left un-waxed as a sample to compare over time with the 6 other waxed statues.



55 Marble shells, Cascade, York Hse

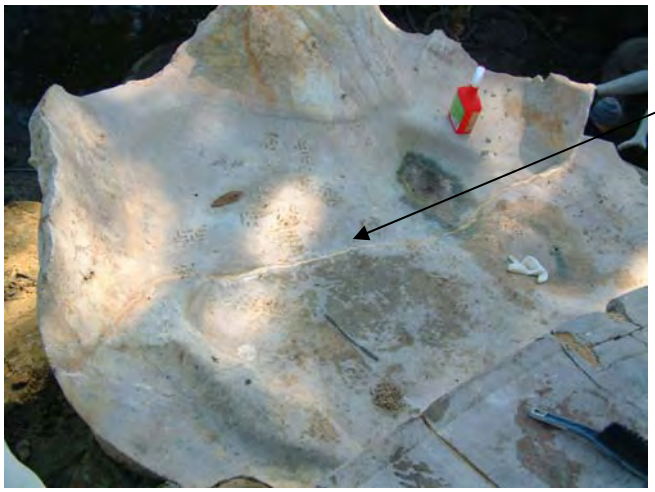


56 R. marble shell, Cascade, York Hse

A previously repaired section of the shell was loose.

It was re-attached using two 6mm threaded stainless steel dowels and epoxy resin.

The joint was pointed using mortar;
1 part – white cement
2 parts - marble dust
1 part – Bath stone dust



57 R. marble shell, Cascade, York Hse

The failed joint of a previous repair across the shell was cleaned out and filled using a mortar;
1 part – white cement
2 parts - marble dust
1 part – Bath stone dust



58 Lower marble bowl, Cascade, York Hse

The failed cement pointing was cut out using hand chisels.

The joints were re-pointed using mortar;
1 part – white cement
2½ parts – pink silver sand
½ part – slate dust



59 Lower marble bowl, Cascade, York Hse

The failed cement repairs were removed using hand chisels. Old repairs that were still stable were not removed.

The cracks and repairs were filled using a backing mortar and then a top coat mortar to tone with the marble.

The backing mortar used was;
1 part – cement
3 parts – fine sharp sand

The top coat mortar used was;
1 part – white cement
2½ parts – pink silver sand
½ part – slate dust



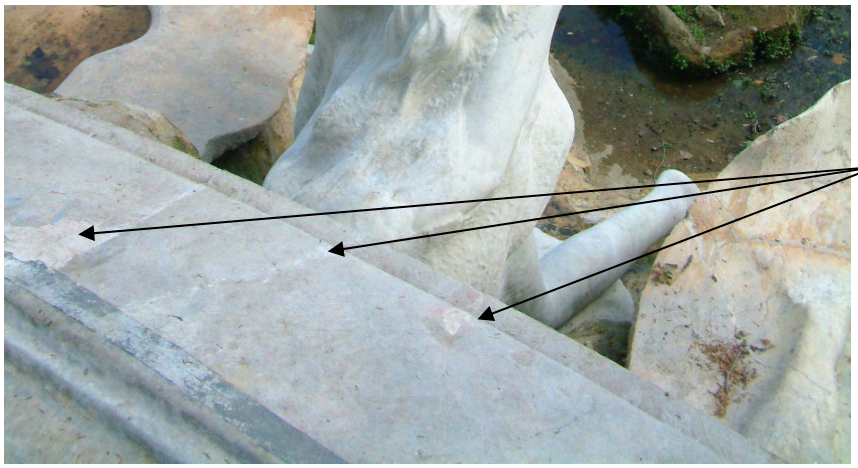
60 Upper marble bowl, Cascade, York Hse

Broken sections were re-adhered using epoxy resin and 4mm threaded stainless steel dowels.

Sections of the bowl edge that were missing were build up using 4mm stainless steel armature fixed with epoxy resin, backing mortar and a top coat of mortar to tone with the marble.

The backing mortar used was;
1 part – cement
3 parts – fine sharp sand

The top coat mortar used was;
1 part – white cement
2½ parts – pink silver sand
½ part – slate dust



61 Lower marble bowl, Cascade, York Hse

The mortar repairs and pointing around the bowls.



62 Upper marble bowl, Cascade, York Hse – R. side

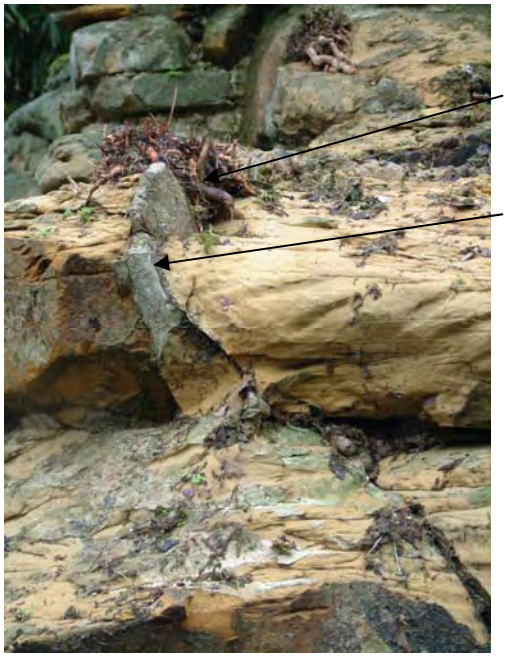
The flow of water over the upper bowl was not evenly distributed across the bowl. The bowl lip was levelled to provide an even distribution of water flow.

The resin and mortar lip on the right side of the upper bowl was cut back and the build up to a new level in cement mortar. The bowl lining was then re-sealed to the marble with polyester resin and fibre-glass.



63 Cascade, York Hse

All the rocks under the upper bowl and the main front section of the rocks under the lower bowl were re-pointed.



64 Rocks, Cascade, York Hse – under shells

Plant roots were dug out as far as possible and any new leaf growth was treated with a systemic biocide.

In a number of areas the iron stone rocks had severely deteriorated leaving the cement pointing proud. This pointing was cut back using hand chisels to the present level of the stone.

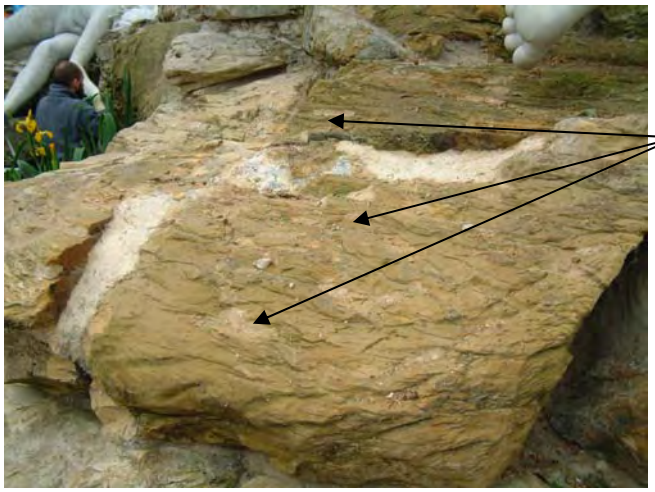
The loose pointing was cut out using hand chisels.
Any large cavities were then back-filled with ballast and coarse sharp sand in a 3:1 mix with cement.
The rocks were then re-pointed. The pointing was recessed and a mortar mix chosen to tone with the stone.



65 Rocks, Cascade, York Hse – under shells

The stone directly under the shells were suffering from serious de-lamination, possibly as a result of being in the direct path of the water flow from the shells.

In these two areas the stones were capped with mortar.



66 Rocks, Cascade, York Hse – under shells

The stones directly under the shells were capped with mortar to match the stone.
The mortar used was;
½ part – hydraulic lime
½ part – grey cement
2 parts – building sand
2 parts – Bath stone dust



67 Rocks, Cascade, York Hse – under shells

The rocks were re-pointed. The pointing was recessed and a mortar mix chosen to tone with the stone.
The mortar for the recessed pointing was;
½ part – hydraulic lime
½ part – grey cement
4 parts – fine sharp sand



68 Front pool edge, Cascade, York Hse

The joints were cleaned out and re-pointed.

The mortar for the pointing was;
½ part – hydraulic lime
½ part – grey cement
4 parts – fine sharp sand



69 Front pool edge, Cascade, York Hse

The metal work within the pool was stripped using the pressured steam and water.

The metal was then painted with one coat of Hammerite paint in Deep Green.



70 Column 4, Cascade, York Hse

The iron sleeve within the cast socle has corroded and broken the socle into four sections and away from the ball.

The flaking iron corrosion was removed and the remainder treated with rust converter. The sections of the socle were then re-adhered with polyester resin. The original dowel was removed and the socle and ball fitted to the capital with a 12mm threaded stainless steel dowel and a cement bedding mortar.

The joints and repairs were filled with a matching cement mortar;
½ part – white cement
½ part – grey cement
3 parts – fine sharp sand



71 Column 1, Cascade, York Hse – top half

The old mortar was removed from the joints and holes drilled for the 20mm threaded stainless steel dowels between the column sections and for the capital.



72 Column 1, Cascade, York Hse – bottom half

The old mortar was removed from the joints and a hole drilled for the 20mm threaded stainless steel dowel between the column sections.



73 Column 1, Cascade, York Hse

The sections were lifted into place separately using a block and tackle.

The sections of the column were fitted together with 20mm stainless steel dowel and polyester resin.
The joints were filled with mortar to match the stone;
½ part – hydraulic lime
½ part – grey cement
2 parts – building sand
2 parts – Bath stone dust

A new cast ball was fixed to the original socle using 12mm threaded stainless steel dowel and polyester resin and the joint repaired with mortar;
½ part – white cement
½ part – grey cement
3 parts – fine sharp sand

74 Cascade, York Hse – after conservation.

