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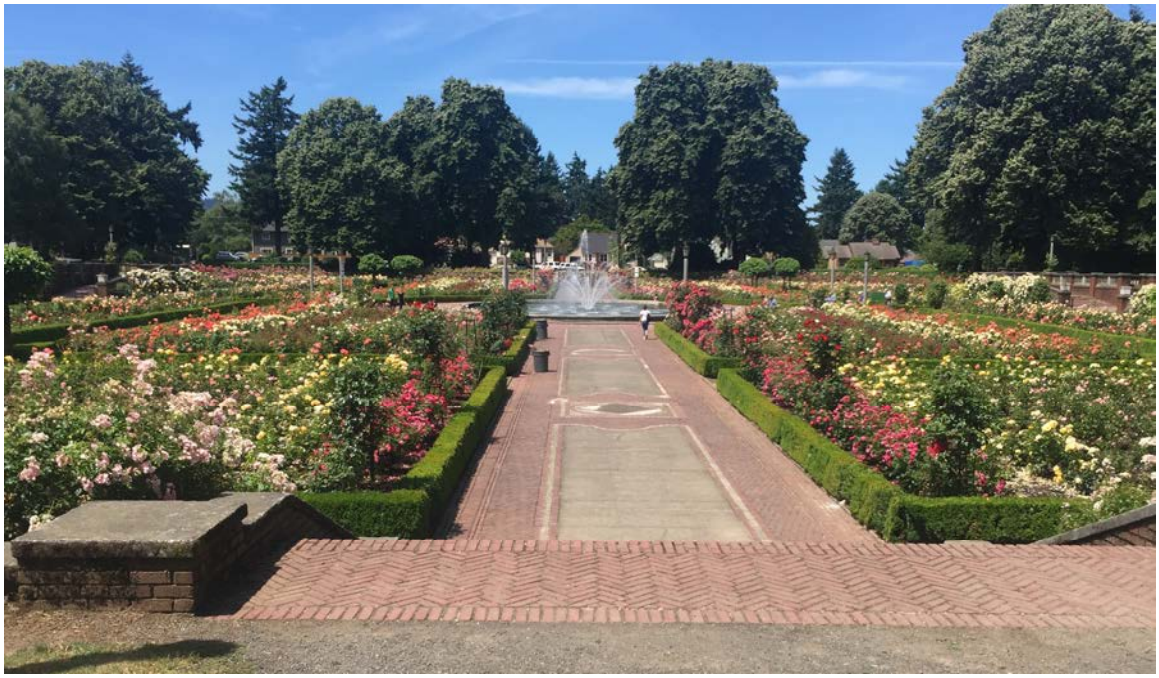
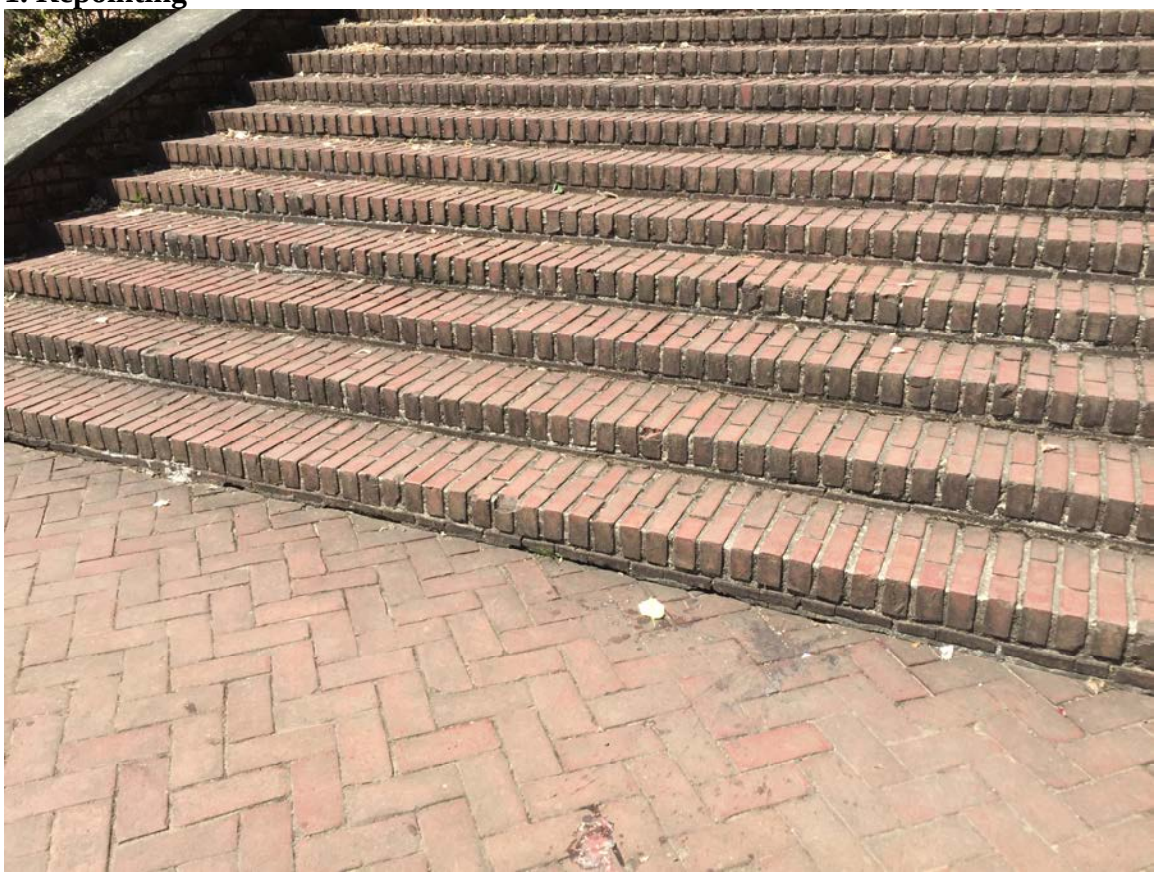
Assessment of Masonry in the Peninsula Park Rose Garden



Overview

The masonry in the Peninsula Park Rose Garden is currently in need of repair. Necessary repairs can be organized into the following categories:

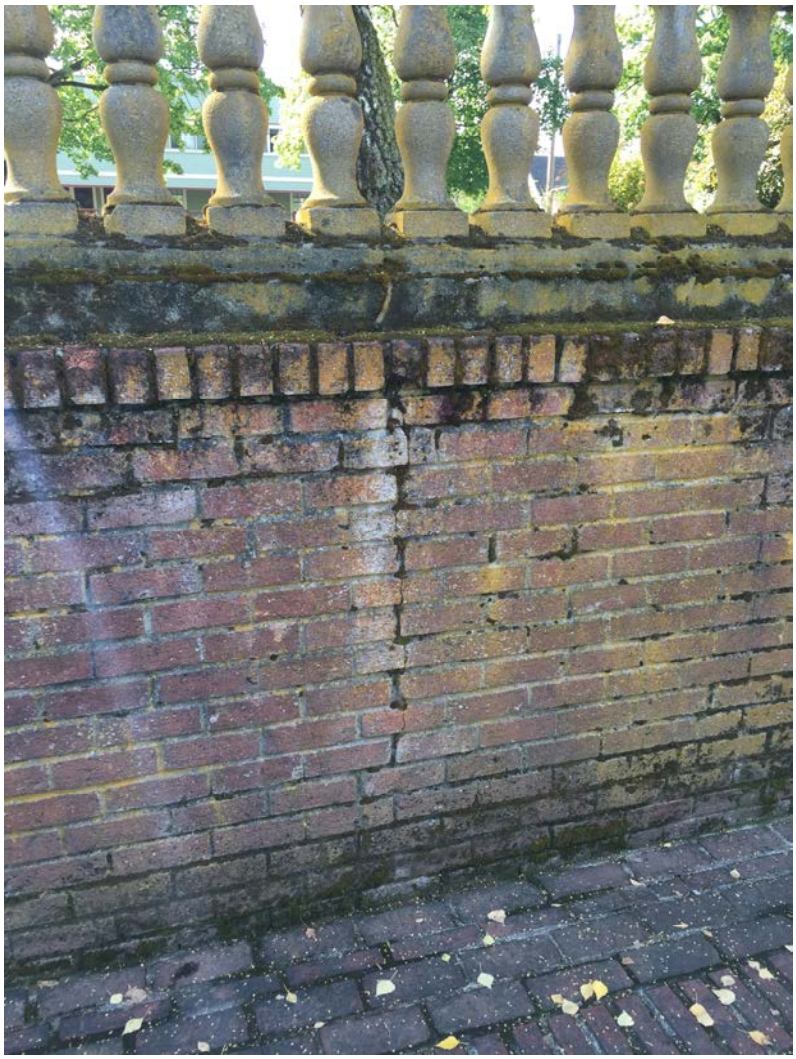
1. Repointing



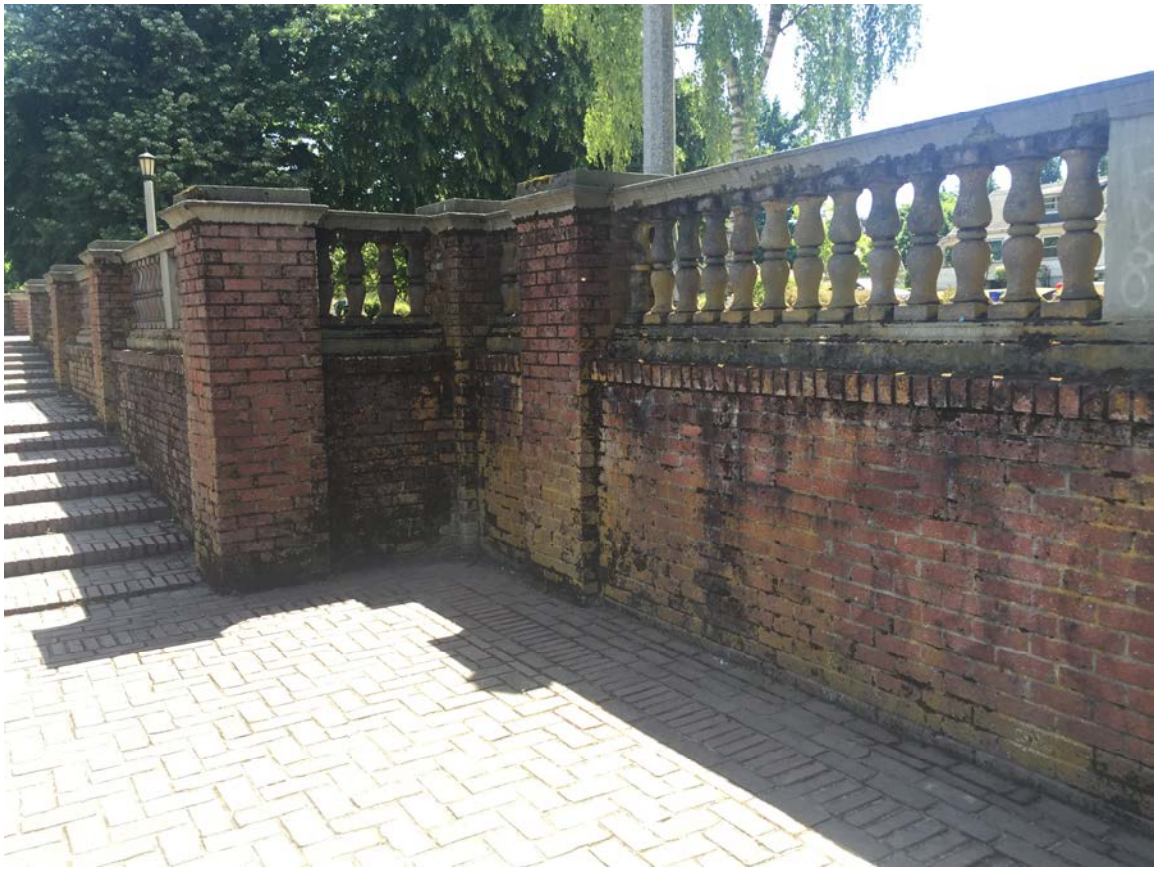
Steps in the PPRG in need of repointing

Mortar used between bricks, whether walls or flatwork, has deteriorated. This is normal wear, brought on by the movement of water into and out of the mortar, the accumulation of organic matter such as moss in mortar voids, and the effect of freeze-thaw cycles on mortar. The result is a slow deterioration of mortar as the mineral matrix of the mortar breaks down.

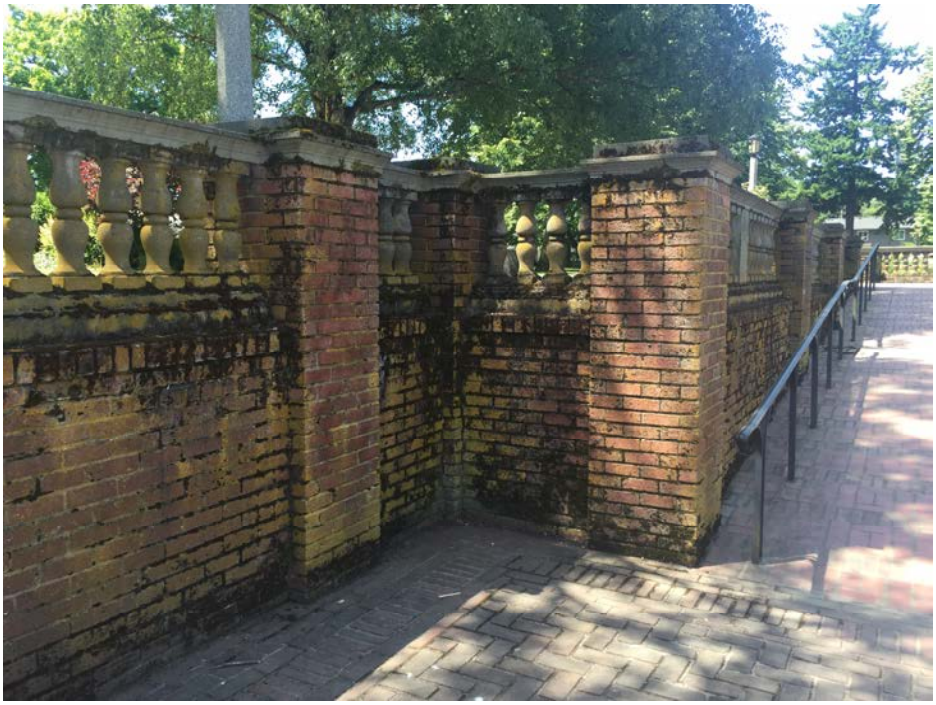
a. **Repointing of vertical surfaces**: The brick walls of the Peninsula Park Rose Garden contain mortar that is softer and more plastic than that of the flatwork in the garden. These mortar joints should be cut back at least 5/8" and repointed with mortar of like lime/portland cement/sand ratio as the existing mortar.
In some places, the vertical walls demonstrate fissures that run the full height of the wall, as below certain parts of the cast concrete bannister. These fissures should be prioritized as water and other elements entering through such fissures poses a threat to the longevity of the masonry.

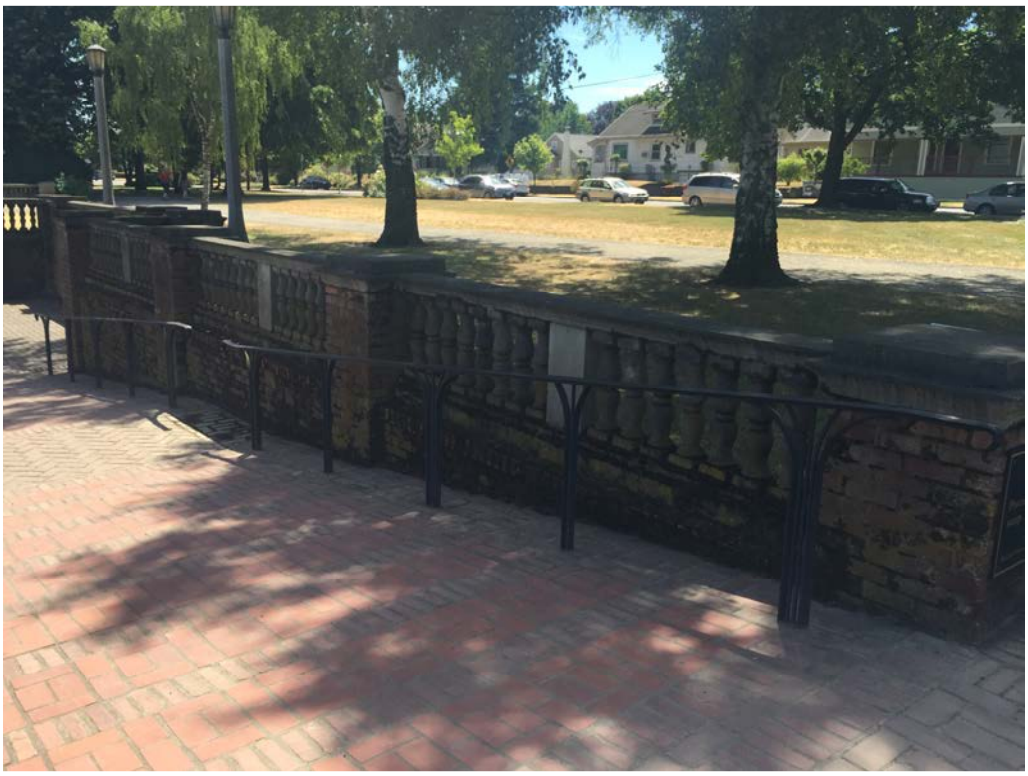


Brick wall below cast concrete balustrade. Note long vertical crack infilling with moss and wider at the top than bottom. Crack extends to coping above.

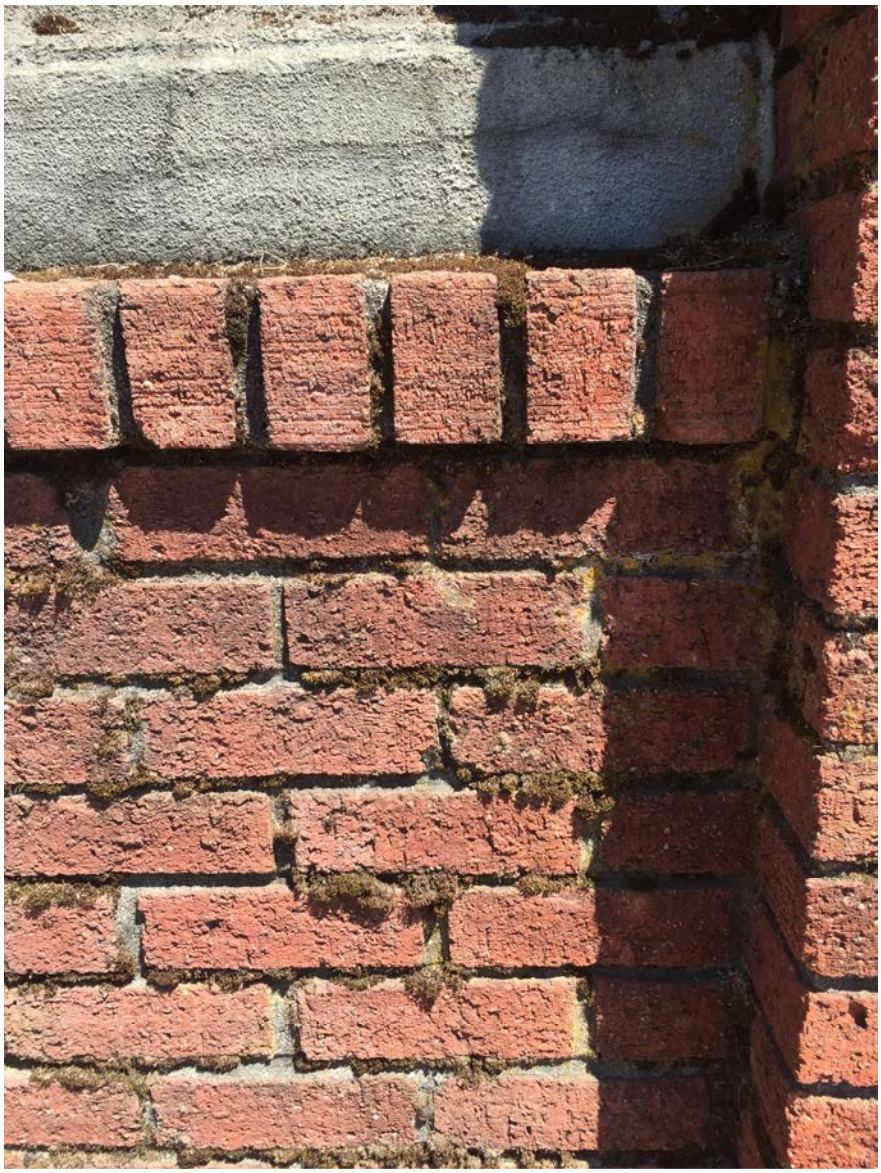


Wall and columns in need of repointing. Vertical joints in brick that overhangs face is in greatest need of repoint. For efficiency and uniformity of repair, sections of app. 200-350sf should be chosen for repoint at one time, beginning with areas in greatest disrepair.





Heavy accumulation of moss on vertical wall below balustrade; moss must first be removed with a wire brush to prevent accelerated decay and to assess relative need for repoint.



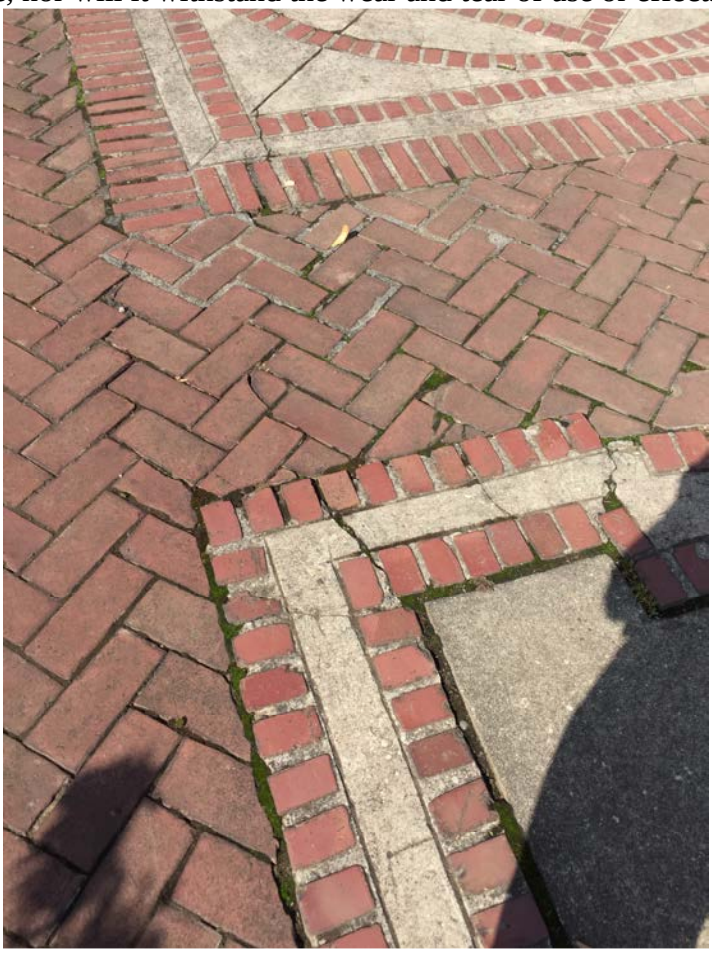
Detail of wall during summer, showing accumulation of moss in deteriorated mortar. Note that moss finds a toehold in deteriorated mortar joints while accelerating the growth of these defects.

b. **Repointing of horizontal surfaces**: The flatwork of the garden consists of concrete and high-fired (semi-vitreous) brick. Here, a sand-mix consisting of portland cement and sand rather than a mortar consisting of lime, portland, and sand has been used and should be used to reset and repoint existing brickwork. This will ensure that the flatwork can withstand the additional stress of precipitation and the load-bearing stress of pedestrians, wheeled devices, temporary structures, and dropped objects.

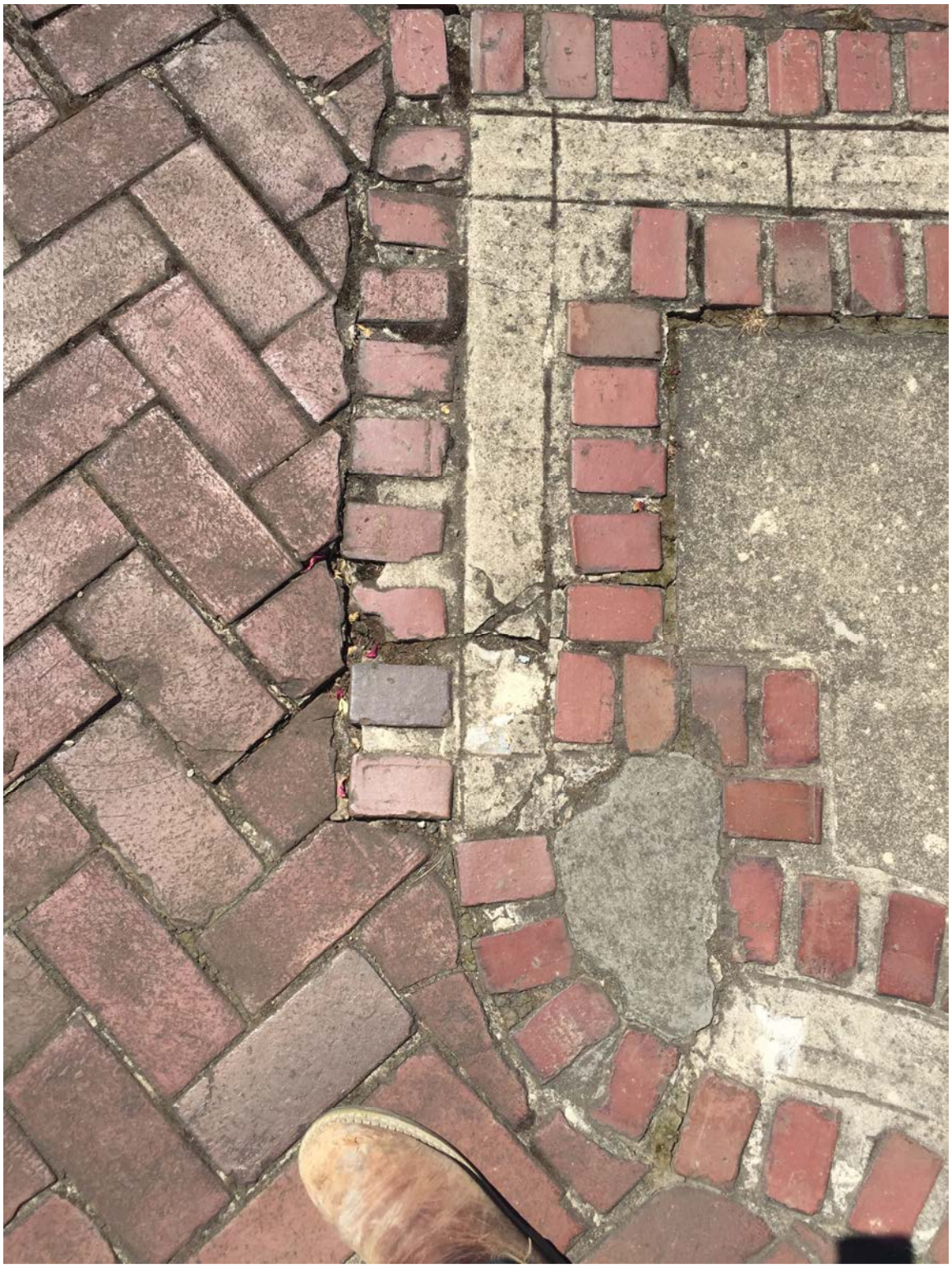
2. Resurfacing of Concrete Flatwork and Repair of Cracks in Concrete Borders and Fountain Surrounds

There are a number of areas within the garden where the existing concrete flatwork has deteriorated to the degree that it should be resurfaced. The concrete that retains the soil around the flatwork areas and the concrete that forms the footing for the balusters is also in disrepair.Additionally, the concrete structure surrounding the fountain exhibits various cracks.

This work will be similar to that performed in 2014 by our company. A topping mix (or sand mix – consisting of sand and portland cement only) should be used in these areas. Mortar should *not* be used, as it will not match the appearance of the surrounding work over time, nor will it withstand the wear and tear of use or effects of precipitation.



Flatwork exhibiting fissures between herringbone brick and concrete border



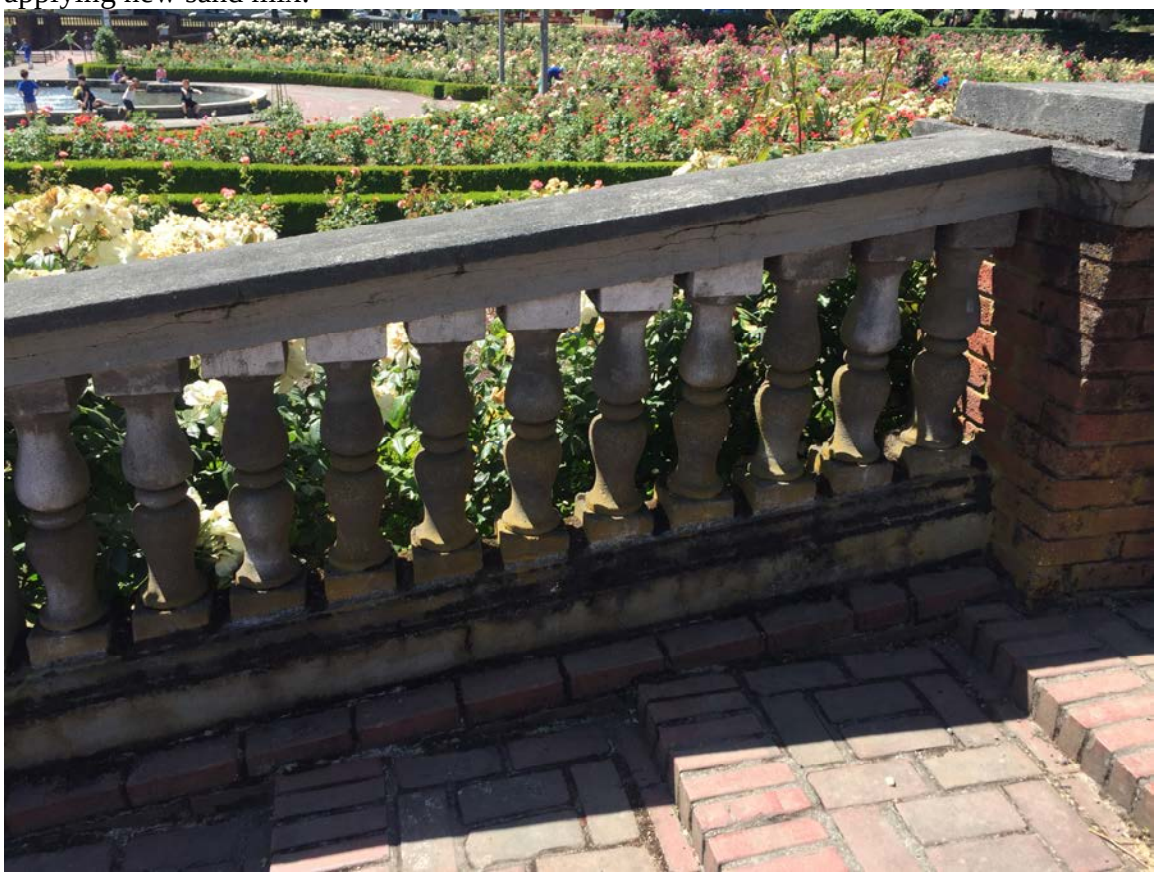
Area of Flatwork requiring a variety of techniques to resurface: Herringbone brick requires repointing with sandmix and may need to be reseated; brick-end border requires repoint and sandmix top surface requires attention.

3. **Rehabilitation of Sand Mix Surfaces:**

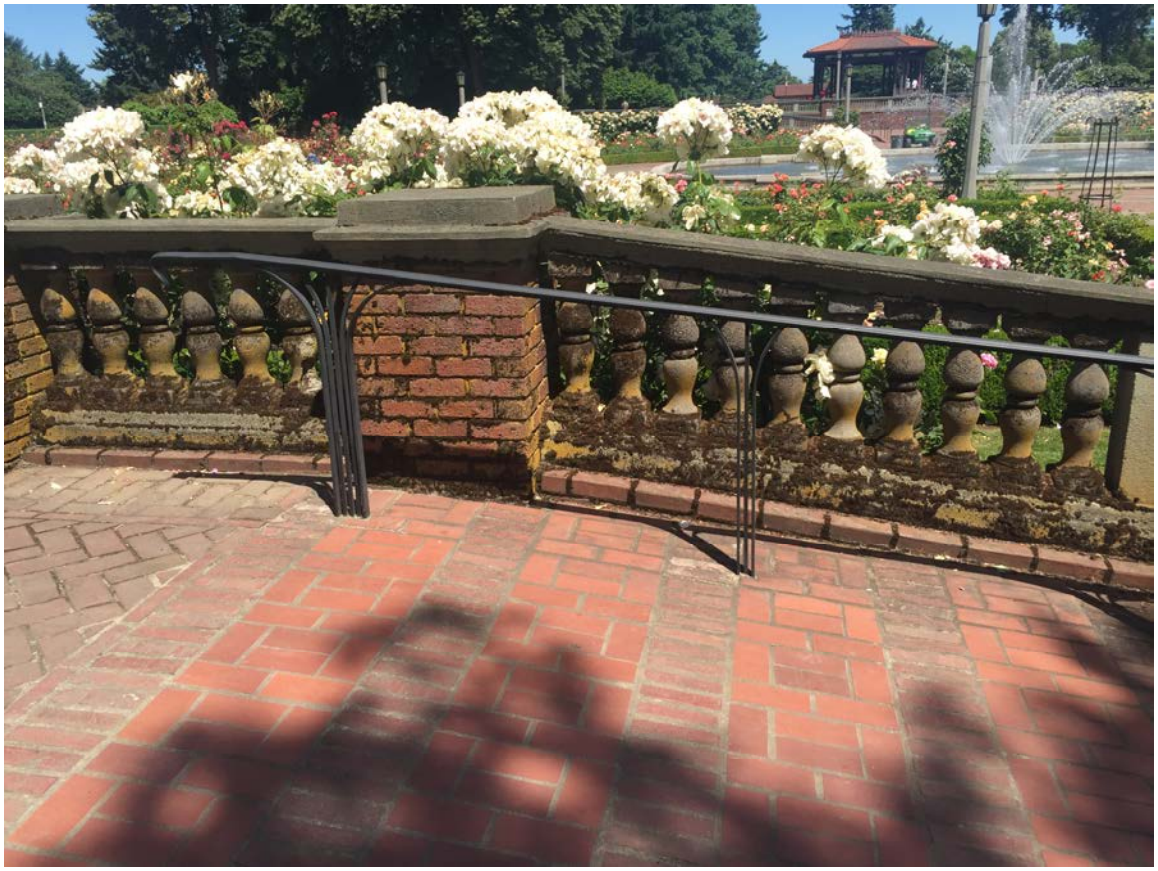
The balustrades and pier caps in the garden are suffering differing degrees of deterioration. Pier caps, copings, and balusters in the garden consist of metal-reinforced concrete surfaced with a brushed sand mix. In many instances, the caps, balusters, and copings exhibit surface cracks. In others, the underlying concrete has begun to crack, spall, or disintegrate.

The sand mix at the surface of these elements prevents water and organic matter from entering into the underlying concrete. In the case of pier caps, the integrity of the overlying concrete sealed with sand mix prevents water and organic matter from entering into the brickwork below. Once water and organic matter enter into the interior of masonry elements via cracks or other defects, the deterioration of the brick and mortar progresses more rapidly and new issues, such as the deterioration of mortar within the wall, arise.

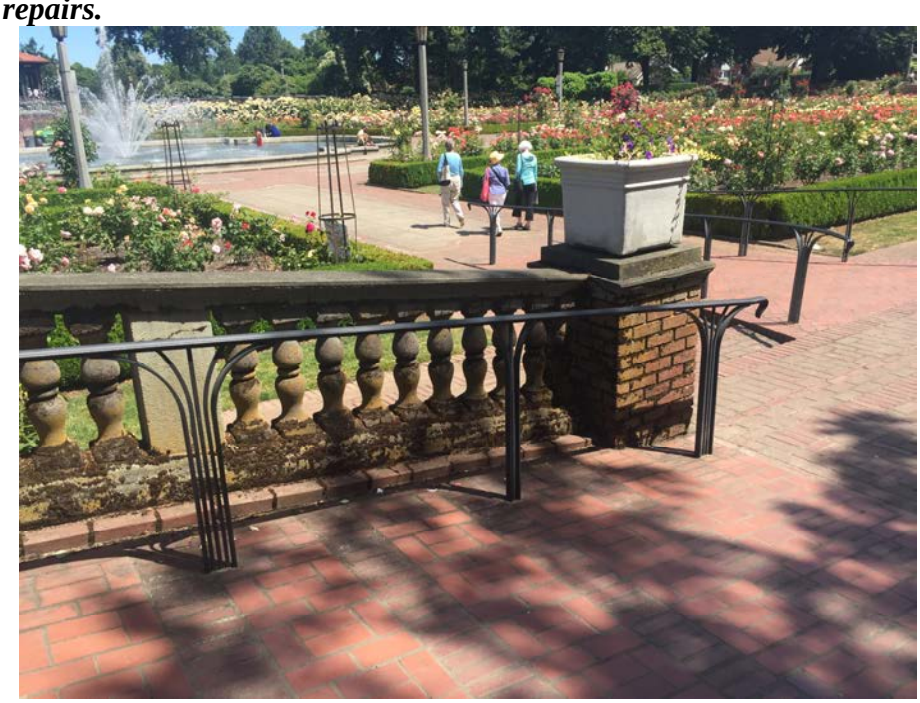
All cracks and other defects in the sand mix surface of the pier caps and balustrades should be repaired by excising failing sand mix with a diamond blade and applying new sand mix.



Bannister with various small cracks, accumulation of moss.

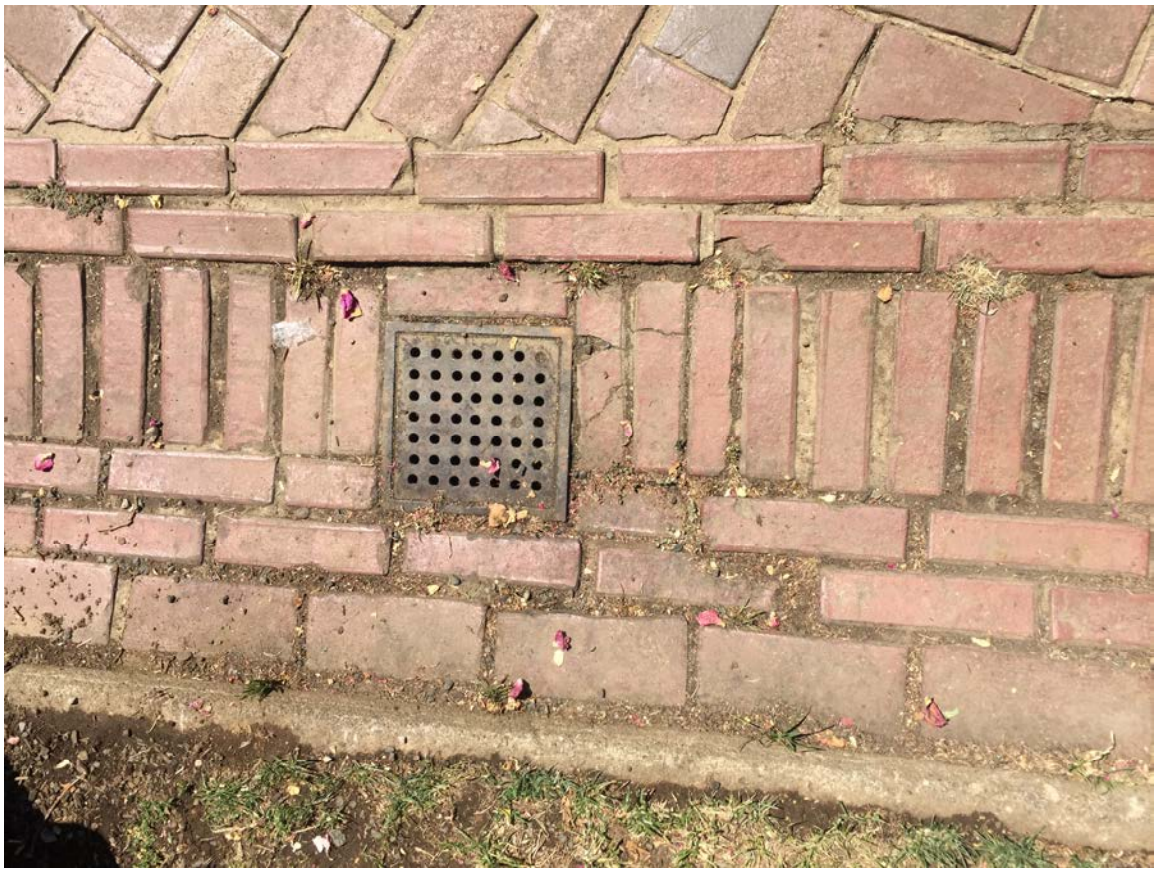


Balustrade with heavy accumulation of moss. Cracks in base of banister are evident by linear distribution of moss. Moss must first be removed in order to assess damage and make repairs.



4. Regrading of Masonry

Some of the flatwork in the gardens, most notably in the brick-lined drains at the outside edge of the circuit around the fountain, have either sunk or raised slightly. These areas will require careful removal of existing brick and resetting to restore the original grade of the work. The existing brick is no longer available, so every effort should be made to remove existing brick without damaging it so that it can be reset. All work should be done with sand mix instead of mortar.



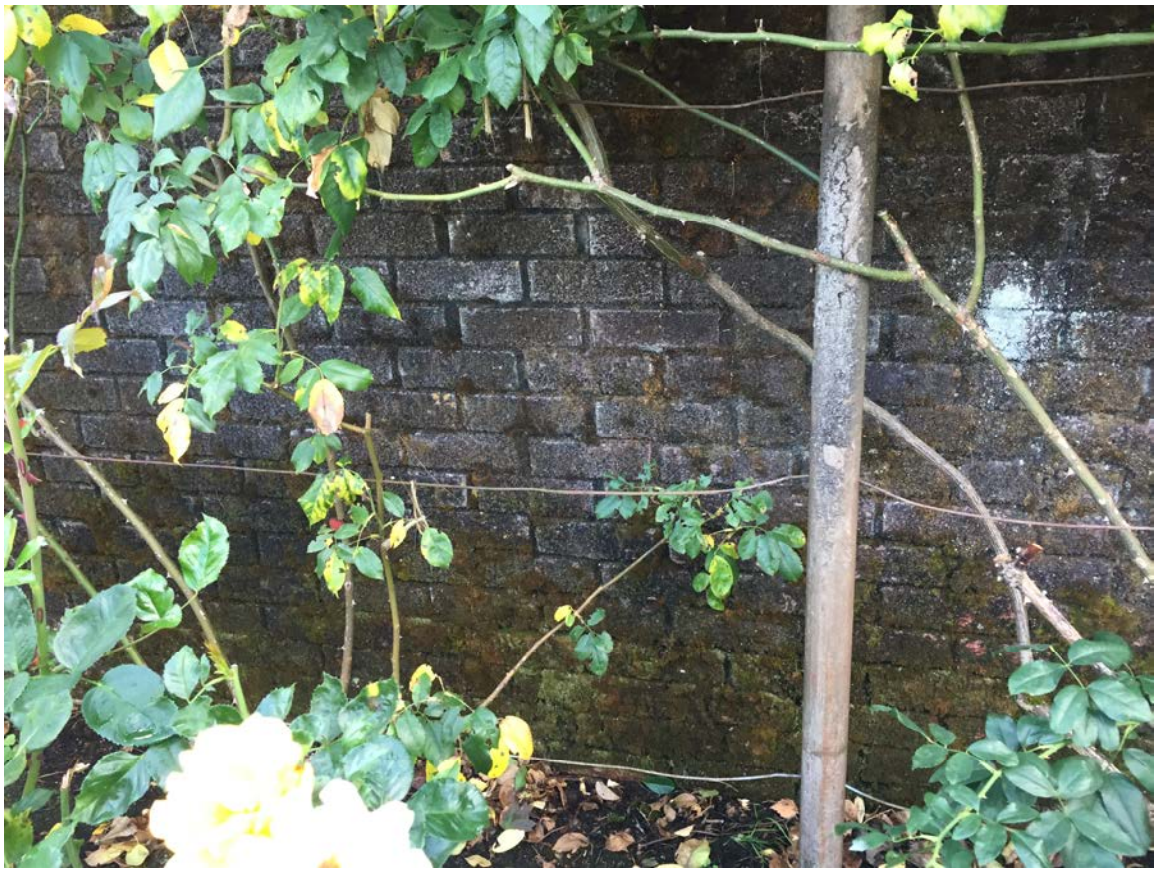
Border Gutter with metal drain. Note that brick to the left of the drain is lower than than the drain top. Repointing and, where necessary, regrading this brick will allow water to escape directly through drain instead of lingering or moving through defects in the masonry.

5. Removal of Organic Material from Existing Masonry

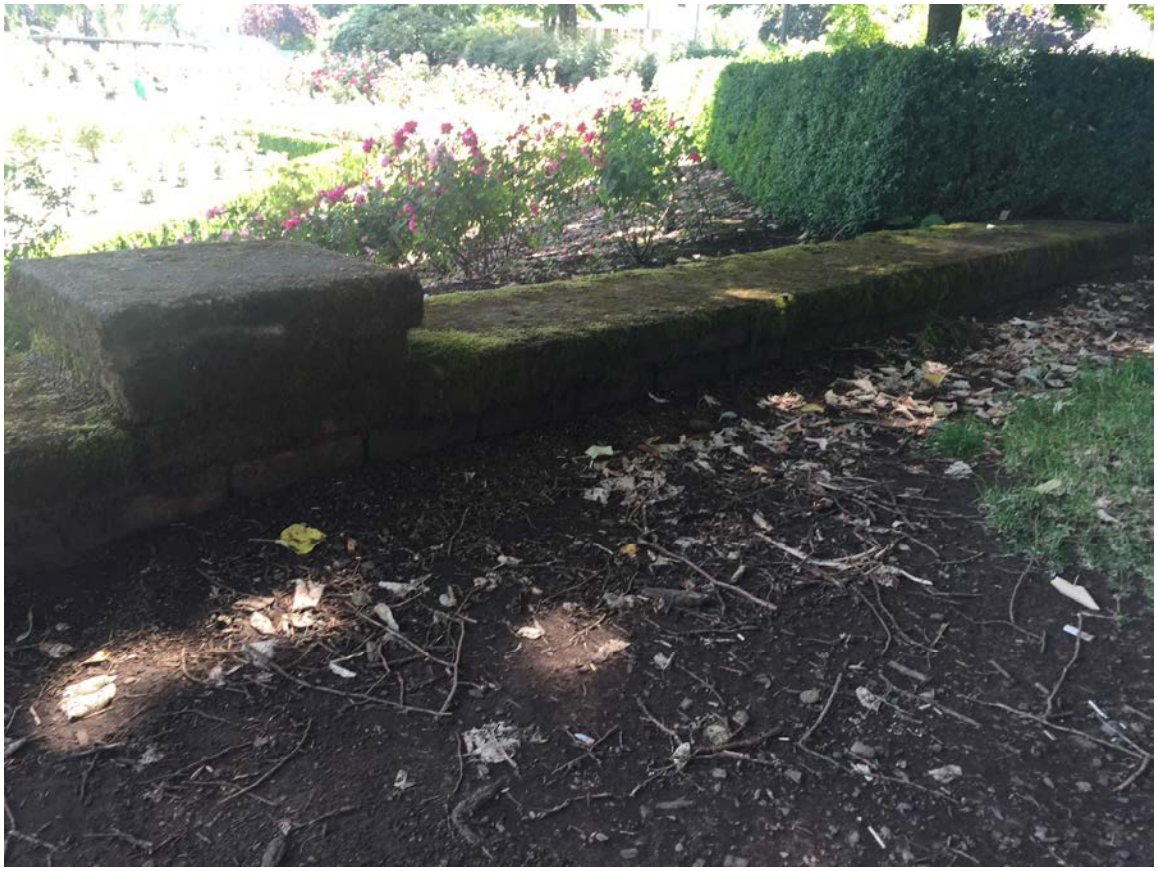
The brick walls, piers, and balustrades are to greater and lesser degrees colonized by moss and other plants. Additionally, organic debris has accumulated in the mortar joints and other crevices in these structures.

Moss and decomposing organic matter lowers the ambient pH and accelerates the dissolution of mortar.

All moss and organic material should be removed from existing masonry with the use of wire brushes and water. Masonry should not be pressure washed at any time. Masonry that is in disrepair or exhibits defects is especially susceptible to damage from pressure washing.



Heavy accumulation of moss on lower portion of this wall. The level of the soil at the base of the wall may be higher than originally intended. Ideally, brickwork begins above level of surrounding soil, atop a concrete or otherwise durable footing. Soil should be removed in a discrete area to see what the ideal level may be. Repointing should be done with a Type S mortar to 18" above ground to prevent deterioration.



This portion of the outer wall is nearly overgrown with moss. It should be removed immediately. It is recommended that a trench of clear, crushed rock be applied next to the wall for at least 4” so that organic matter does not easily find itself onto the wall. This will extend the life of the wall after repointing.

Prioritization of Work in Peninsula Park Rose Garden and Associated Costs:

Masonry repair in the garden should be prioritized in order of necessity. The work that will prevent the greatest degree of further deterioration and subsequent incurred cost should be done first. Below is a prioritization of work to be done in the garden and what it will cost if I and my company are hired to do the work. This will provide a guide for friends of the garden and provide a basis of comparison for with future bids from other masons and their companies.

1. Defects in the Flat Border Drains of Walkways

The walkways of the garden are sloped to either side into shallow concave surface drains that are in turn gently sloped to metal drains. Throughout the garden, the masonry of these concave surface drains at either side of walkways is deteriorating.

Repair of these areas should be prioritized for the following reasons:

a. There a greater volume of water flowing through these areas than any other. This increased volume increases the overall effect of water.

b. These areas are at the edges of the masonry where the masonry and the underlying slab are more likely to fail and where soil from the surrounding planted areas as well as the substrate under the slab is likely to shift. Soil from surrounding areas is able to infiltrate the brickwork, further exacerbating degradation of the structure. Shifting of material due to erosion below the slab results in the slab either sinking or rising as the slab fails.

c. If not corrected, this problem can result in large scale failure of the slab underlying the walkways, which will incur far greater cost to correct and may permanently alter the overall appearance of brick in affected areas, as the brick is no longer available. Permanent correction of defects in the slab may not be possible in a piecemeal fashion.

To correct these defects, the following measures should be taken:

a. All eroded and failing sandmix between bricks should be removed and replaced with new sandmix.

b. In all areas where the slope and contour of brickwork in the drains has been disrupted, the brick should be removed and reset to restore original slope and contour.

These corrections will ensure that water will run directly to the existing drains without escaping into the gap between the brickwork and the slab or eroding the substrate underneath the slab.

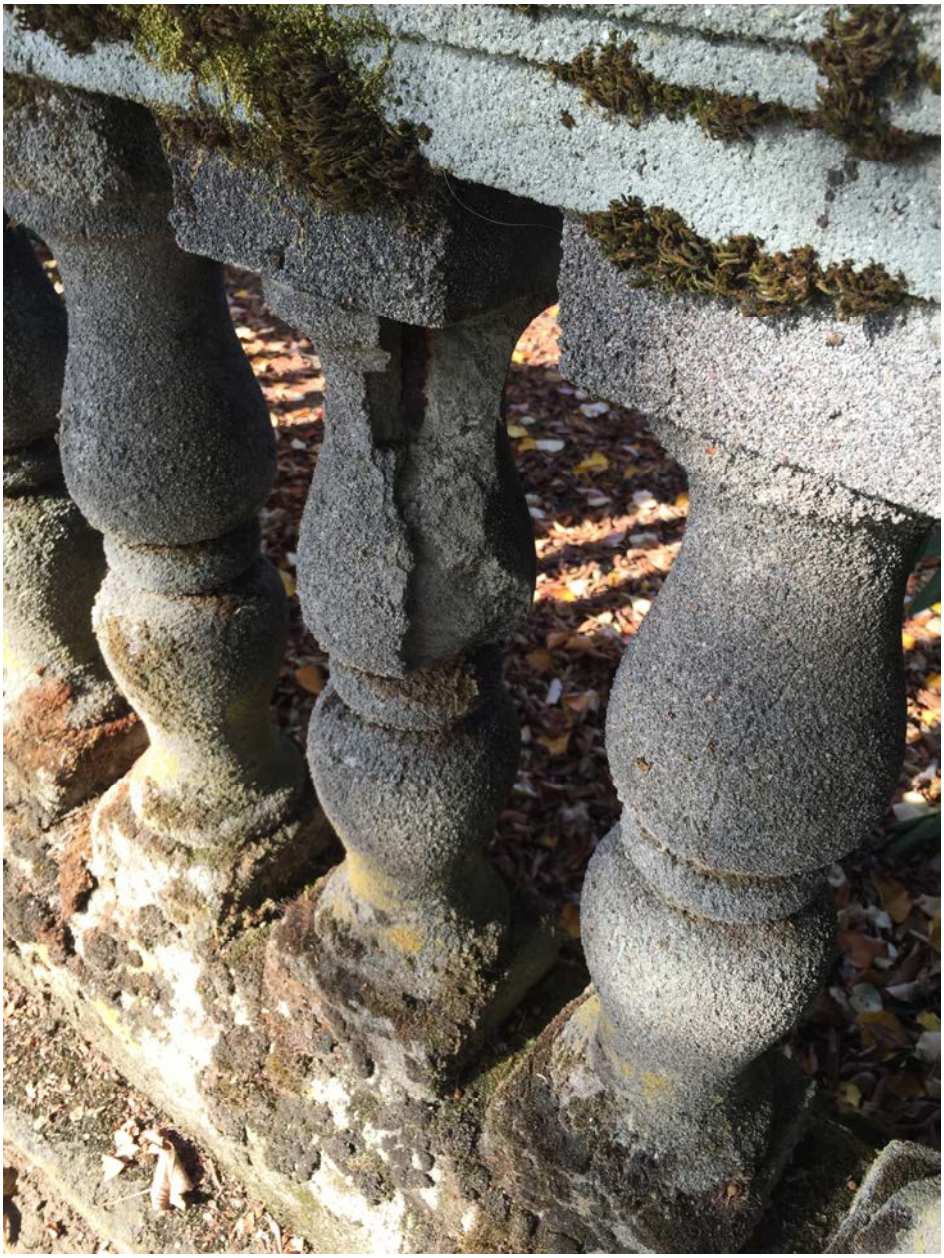
This is one of the largest repairs currently necessary in the garden and can be undertaken in a piecemeal fashion, if desired.

The total cost, if done in one piece, will be $15,580

I would propose breaking this work up into five discrete phases and concentrating on areas that are in worst condition first.

2. Defects in Sandmix copings of Pier Caps, Balustrade Railings, and Balusters

Pier caps, balustrade railings, and balusters should be repaired as soon as possible to prevent further decay and subsequent increase in damage to underlying structures and associated increase in cost.



We can repair open defects in pier caps, balustrade railings, and balusters for $11,800. This work can be broken up into logical phases, repairing the largest defects first.

3. Removal of Vegetation, Organic Matter, and Dirt from Brickwork

At present, deterioration of brickwork in the garden is being accelerated by the accumulation of moss and other organic matter on masonry joints. Removal of this organic matter is a cost-effective way to prevent accelerated deterioration of the brick masonry and is necessary prior to repointing and/or reparation of sandmix surfaces (see above).

Removal should be done with a wire brush and hose. ***Pressurewashing is strongly contraindicated.*** Pressurewashing can greatly exacerbate defects in the masonry and introduce new defects.

We can remove organic matter from brickwork and other surfaces for $5,200. This is a time-consuming process but does not require much in the way of skill. If the friends of the garden would like, we can supervise cleaning of the masonry by volunteers or others for a fraction of this cost.

4. Repointing of Vertical Brickwork

Much of the brickwork in the garden needs to be repointed. In the portland climate, the mortar of well-built brick structures should be repointed every 10-20 years, depending on the degree of deterioration. The mortar in the garden is well overdue for repointing. Repointing now will preclude the high costs associated with having to repair large portions of the brickwork or replace associated structures such as the coped balustrade railings that are tied into the brickwork.

Repointing requires cutting of the existing mortar back to sound mortar and replacement of lost or removed mortar with mortar of like sand/lime/portland cement ratio.

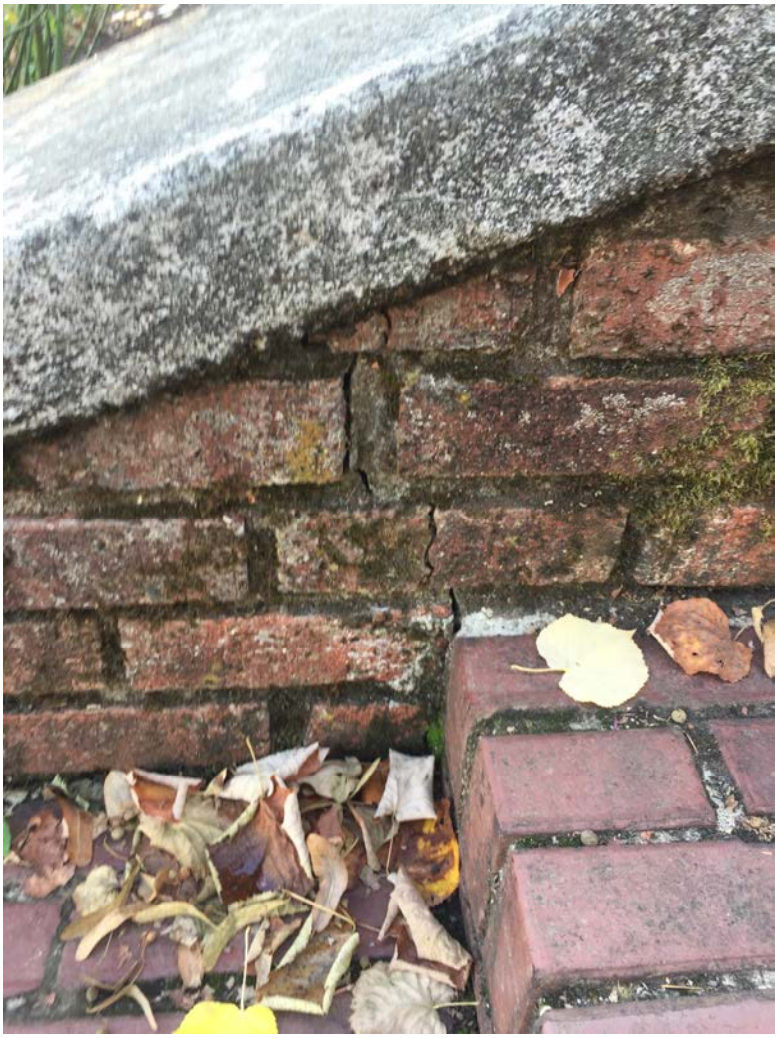
We will repoint 300 sf vertical brickwork for $5000

I have estimated 300sf of vertical brickwork in need of critical repair. This is work where vertical cracks have formed in masonry and where failure to repoint the work will result in further, accelerated deterioration.

In addition, I have identified another 550-650 sf of wall that is well overdue for repointing. These can be broken down into the following areas:

East Side Masonry: 75sf
South Side Masonry: 300sf
West Side Masonry: 40sf
North Side Masonry:220sf

In my opinion, discrete sections of the garden should be repointed at a time, in order that the repaired work does not stand out too noticeably from the older masonry.



5. Repair of Concrete Surrounding Fountain

The concrete surrounding the fountain exhibits a number of cracks. These cracks allow water to enter into the concrete and cause deterioration of the concrete, especially during freezing weather. Repair of these areas is a cost-effective way to preserve the existing concrete structures.

Repair requires cutting of the concrete to a depth of 1” with a wide diamond blade and application of sandmix.

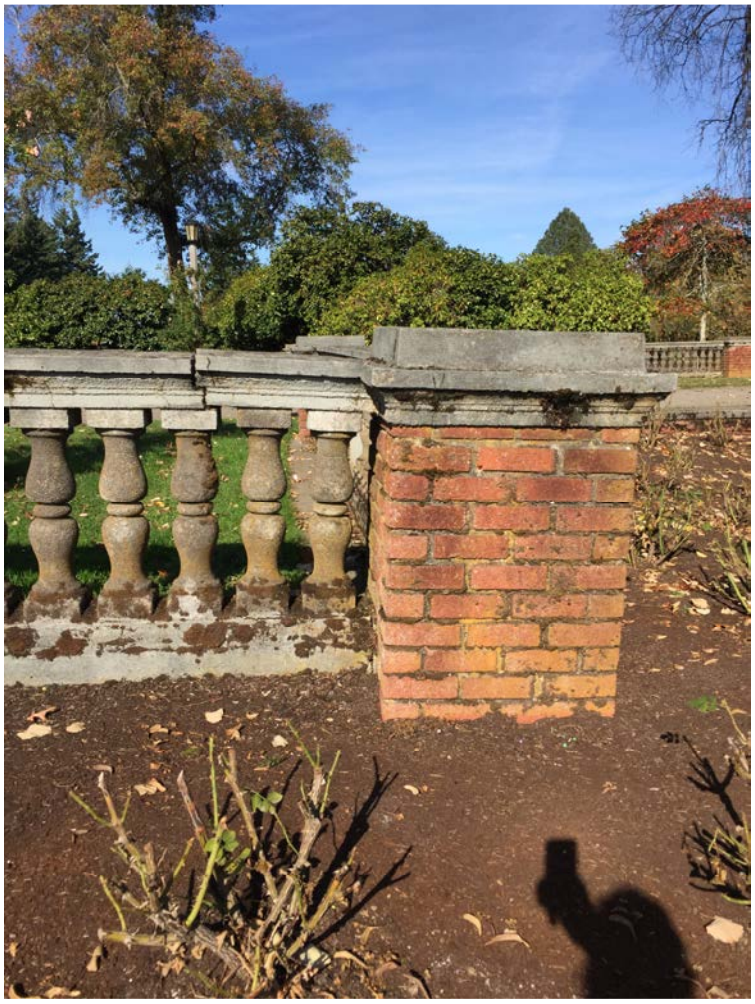
We can repair these cracks and other defects for $1100

6. Repair of Concrete Curb between walkways and Garden Beds

The low concrete curb between walkways and garden beds currently exhibits a number of cracks and other defects. These cracks will worsen over time and water may have the opportunity to cause more significant and costly damage. These should be repaired with sand mix where necessary.

We can repair defects in this concrete curb for $2900

7. Miscellaneous Repairs



At the north side of the garden, east of the stairway that leads from the bandstand area down to the fountain, one of the brick piers has begun to sag, taking with it the balustrade.

An effort should be made to shore up the footing below this pier and to assess how best to restore it to its original position.

Assessment of the footing will require digging around the footing. This will destabilize the pier and accelerate the rate at which it is settling. For this reason, visual assessment of the state of the footing should be done only when the means to restore the footing and reset the pier are on hand.

If the pier can be restored to its original position and shored up from below, this work can be performed for $2800-$4500, depending on the extent of work required.

Summary of Proposed Repairs and Costs

1. Repair of flatwork, including shallow drains:	$15,580
2. Repair of pier caps, balustrade railings, balusters	$11,800
3. Removal of Moss from Brickwork and other Surfaces	$5200
4. Repair of up to 950 sf of Brick Wall	$15833
5. Repair of Concrete around Fountain	$1100
6. Garden Bed Curb repairs	$2900
Total Cost	**$52413**