**Observation**

For clarity and identification purposes, refer to the schematic diagram illustrating the mechanism of the observed collapse and failure mode within the brick retaining wall in **Appendix A**.

Inspection was undertaken at the subject property in the presence of the Insured to which the following was noted:

# Observations

1. From our on-site inspection and measurement, we noted the approximate height of the collapsed retaining wall varied from 0.70m to 1.8m which constructed in 230mm thick double brick material. **Images 8**
2. We also noted a steel wire mesh fence has been installed in front of the subject retaining wall. **Image 8.**
3. We observed the subject retaining wall has been partially collapsed about the western alignment of the tennis court. **Images 2-7.**
4. We also noted the steel wire mesh fence adjacent to the collapsed retaining wall has been rotated as a result of the impact from retaining wall collapse. **Images 5.**
5. From our inspection of the collapsed soil behind the subject retaining wall, we were unable to identify any subsoil drainage or draining material. **Image 11**
6. In addition, we noted the eastern section of the subject retaining wall has also been rotated towards the tennis court which in our opinion, is as a result of an on-going failure within the wall over the time. **Images 9-10.**
7. We also identified trees and vegetation grown just behind the subject retaining wall. **Image 2.**
8. We also noted no make safe work has been undertaken by the contractor around the collapsed section of the retaining wall in restricting the public access to site. **Image 8**

**Discussion**

## **Review of retaining wall construction**

1. From review of the brick retaining wall construction, the subject retaining wall is a cantilevered “gravity” based system, where capacity to resist soil, surcharge and hydrostatic pressure reliant on the self-weight of the retaining wall structure.
2. In this case, from our on-site observations, the subject wall was 230mm thick double brick wall retaining a maximum fill height of 1.8m.
3. In-line with general engineering principals, generally the thickness of the base of gravity-based system is 0.6 x height of the wall, which in this case would be approximately 1000mm.
4. We have undertaken structural review of the capacity and stability of the subject gravity-based retaining wall, and confirm that the weight of the retaining wall is grossly insufficient to withstand the applied loading from active soil pressure, surcharge, hydrostatic pressure and root growth of the vegetation within the subsoil.
5. As such, we confirm that the construction and the design of the subject retaining wall **was not in-line** with general engineering principles to withstand the typical applied loading onto a retaining wall.

## **Proximate Cause of Retaining Wall Collapse**

1. We have undertaken inspection of the subject brick retaining wall to which we note that the other sections of the wall (particularly eastern alignment) are in a rotated state.
2. We note that the previous damage within the retaining wall may have occurred as a result of an ongoing failure within the wall.
3. From the retaining wall design point of view, the subject “gravity” retaining wall is grossly inadequate to withstand the applied loading from active soil pressure, surcharge, hydrostatic pressure and root growth of the vegetation within the subsoil.
4. Given the above, in our opinion, the following are the underlying contributing factors to the retaining wall collapse:
5. Insufficient size of the retaining wall to act as a gravity system to withstand the typical applied loading.
6. Omission of sufficient subsoil drainage which has allowed build-up of hydrostatic pressure behind the subject retaining wall.
7. Root growth of vegetation within the subsoil.
8. **To this end, in our opinion, the proximate cause of the retaining wall collapse was due to inherent construction issues and rooting pressure from vegetation grown within the subsoil.**

**Conclusion**

From structural review, the weight of the “gravity” retaining wall is grossly insufficient in weight to withstand the applied loading from active soil pressure, surcharge, hydrostatic pressure and root growth of the vegetation within the subsoil.

In addition, it is clearly seen from the remaining brick retaining wall adjacent to the collapsed section is in on-going failure state.

Based on our review, in our opinion, the following are the underlying contributing factors to the retaining wall collapse:

1. Insufficient size of the retaining wall to act as a gravity system to withstand the typical applied loading.
2. Omission of sufficient subsoil drainage which has allowed build-up of hydrostatic pressure behind the subject retaining wall.
3. Root growth of vegetation within the subsoil.

**To this end, in our opinion, the proximate cause of the retaining wall collapse was due to inherent construction issues and rooting pressure from vegetation grown within the subsoil.**