CHAPTER 8: DESIGN TECHNIFICATION

BIOPOOL 1

The first biopool has the lowest interaction levels between man and the natural environment. The purification planting has been seperated from the swimming area entirely, preventing interaction. The pool will make use of the existing dam as a water supply when water levels drop. Each pool is an individual circulating system, keeping the volume of water running through the pumps and UV filters relatively small for an effective cleaning and purification standard. The system makes use of a UV filter for the removal of harmful pathogens from the water and is not responisble for any stormwater management. All storm water is diverted away from the Biopools to prevent sedimentation from occuring in the pools. The first bipool provides a splash and very shallow pool for use by children as well as close location to the lifeguard towe. The design of a lawn area surrounding the pool is allows for the passive surveillance by users and a space of relaxation for parents while watching their children.

Figure 2.8.1: Section through biopool 1. (Author, 2015)

TECHNICAL DETAIL BIOPOOL 1

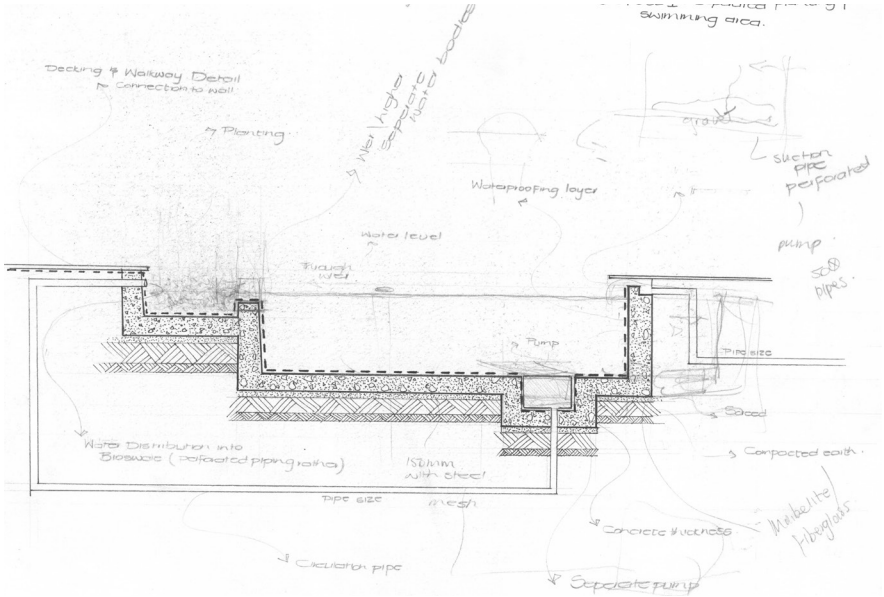


Figure 2.8.2: Detail sketch of Biopool 1 (Author, 2015)

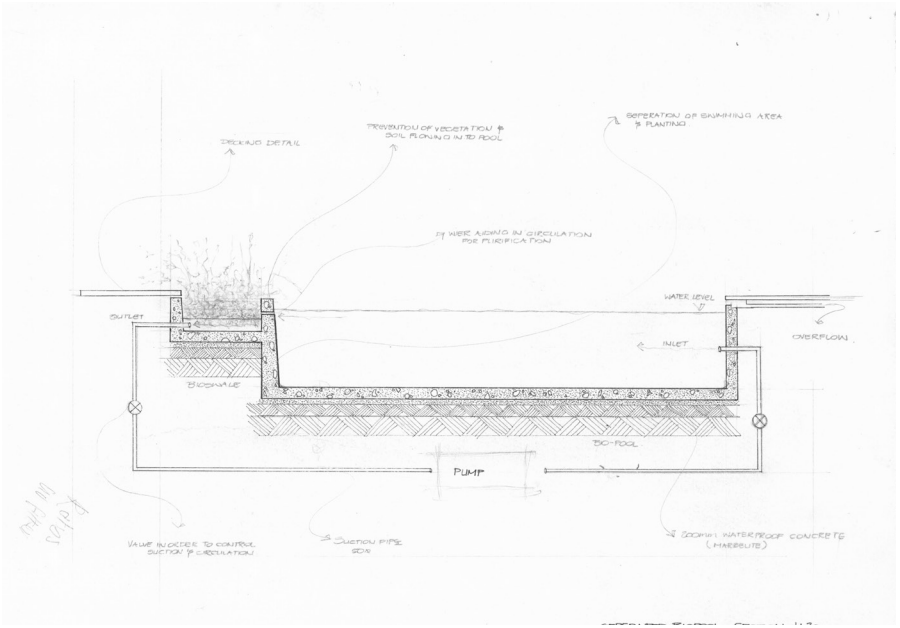


Figure 2.8.3: Detail sketch iteration of Biopool 1 (Author, 2015)

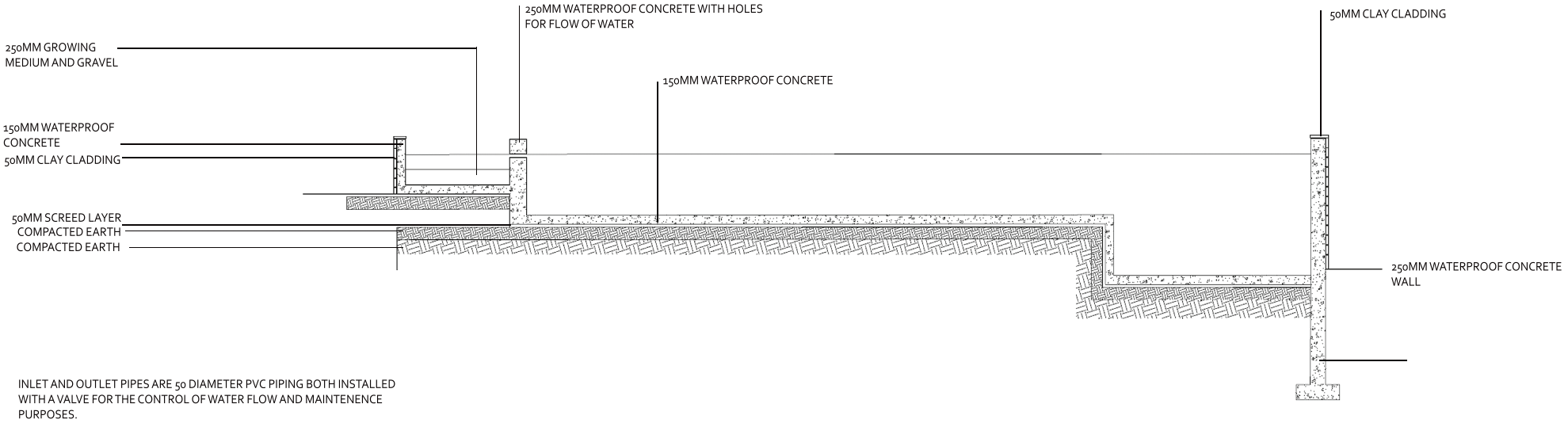


Figure 2.8.4: Construction detail of Biopool 1 (Author, 2015)

BIOPOOL 2

The second biopool is responsible for the initial interaction between man and the natural environment. The planting has been incorporated into the swimming experience, with minimal barriers or restrictions of movement for the user between the planted areas and the swimming areas. The interaction with the natural environment is completely dependent on the user, while all pools allow for a view over the natural environment and rehabilitated post industrial quarry.

Figure 2.8.5: Section through Biopool 2 (Author, 2015)

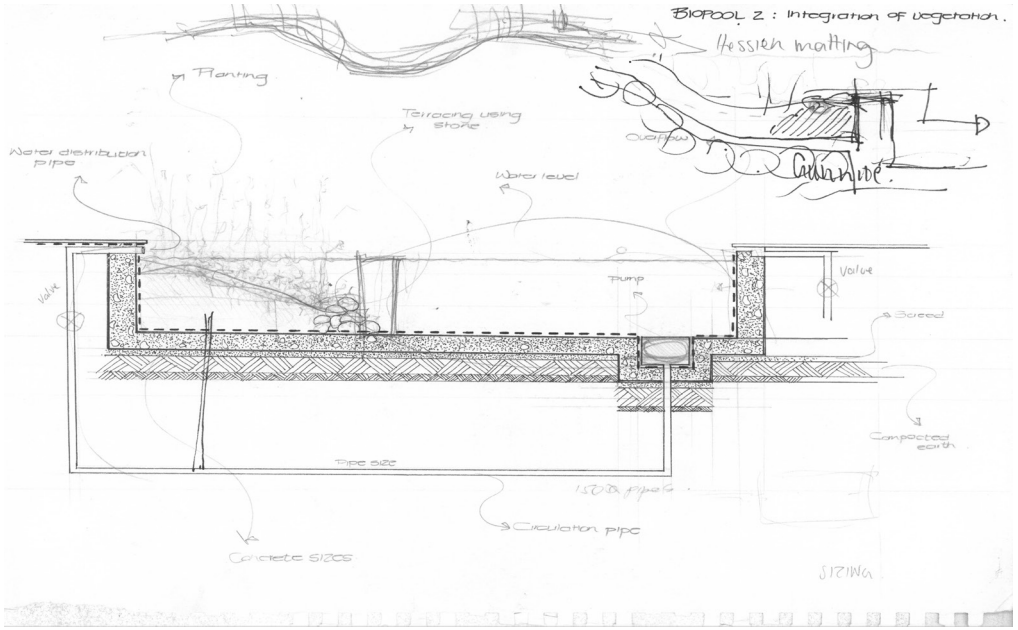


Figure 2.8.6: Deatil sketch of biopool 2 (Author, 2015)

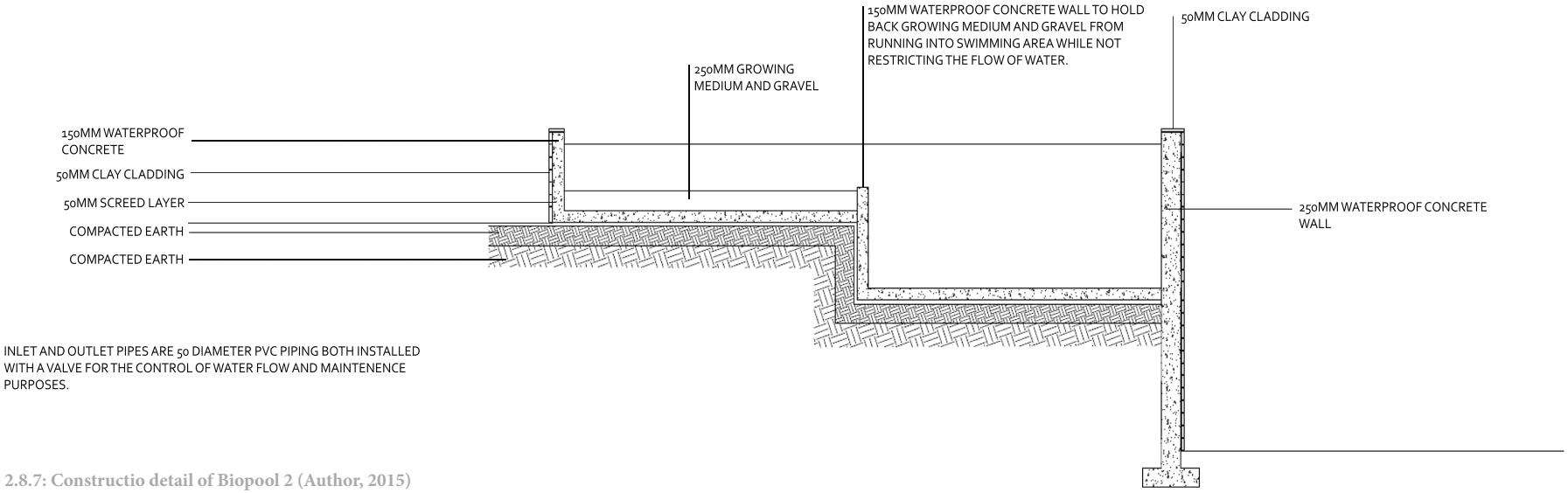


Figure 2.8.7: Constructio detail of Biopool 2 (Author, 2015)

AQUAPONICS SYSTEM: AQUACULTURE TANKS AND RETAINING WALL

The fish rearing tanks require shade and were designed to sit into the site of the mountain currently existing on site. The creation of a stable retaining wall and shade structure was designed for the fish tanks. Seating and walking space was included and a main movement route and walkway was developed on the site. This allowed for the integration of the public in to the aquaponics ayatem, making the system accessible .

Figure 2.8.8: Section through aquaculture tanks and retaining wall. (Author, 2015)

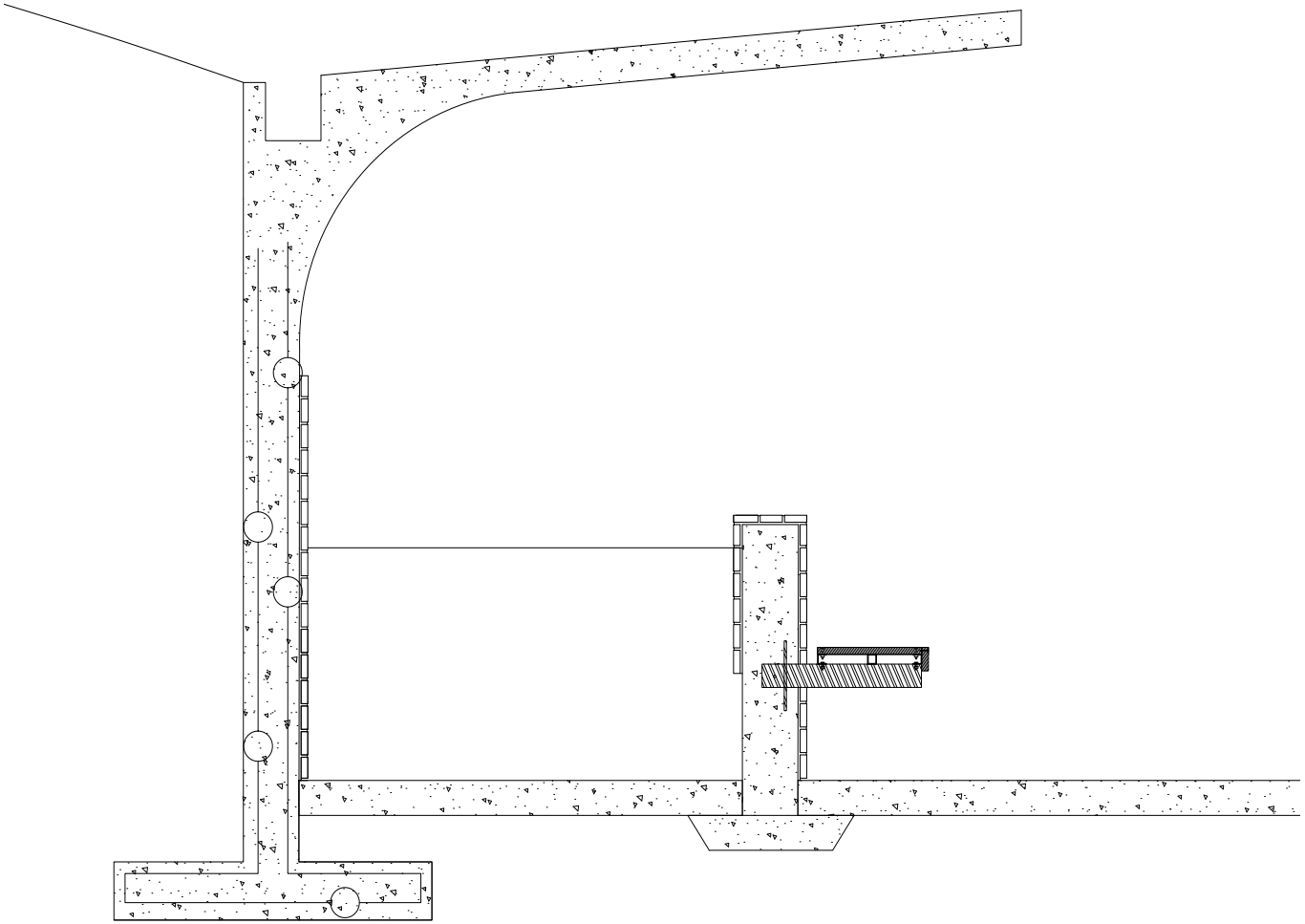
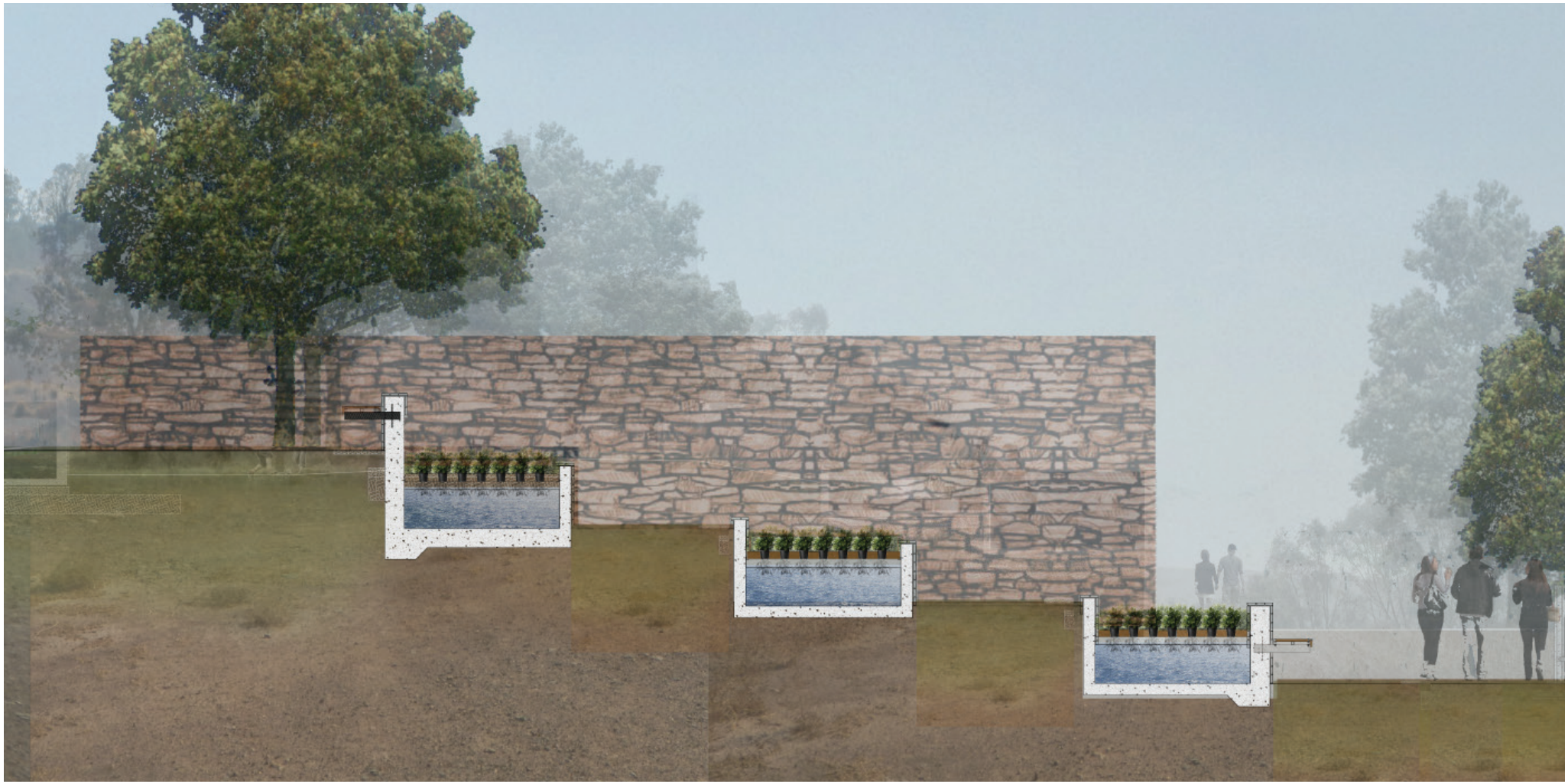


Figure 2.8.9: Construction detail of retaining wall and aquaculture tanks. (Author, 2015)

AQUAPONICS SYSTEM: HYDROPONIC BEDS

The hydroponic beds have been terraced in to the side of the quarry, the terracing allowed for the creation of public space and movement corridors between the beds. Incorporated seating was designed for the promotion of lingering by users in the area. THe beds are open for the education and inclusion of users in to the productive system for the understanding of the importance of water in the production scheme.

Figure 2.8.10: Section through hydroponic beds. (Author, 2015)



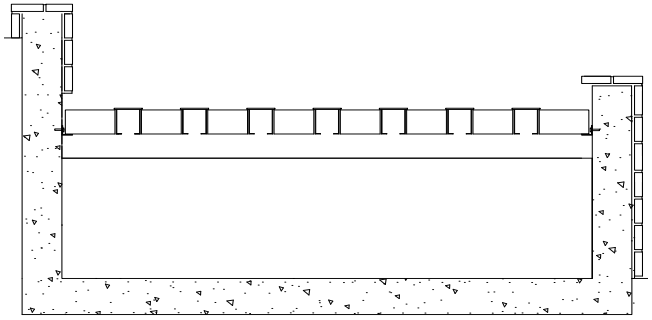


Figure 2.8.11: Construction detail of hydroponic bed with raft construction (Author, 2015)

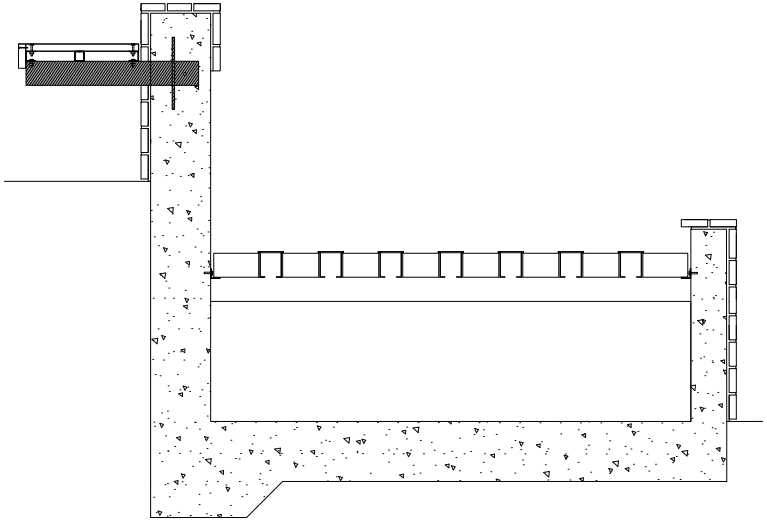


Figure 2.8.12: Construction detail of hydroponic bed with raft construction and incorporated seating. (Author, 2015)

GREEN ROOF DETAILING

GREEN ROOF TECHNICAL CONSIDERATIONS:

in order for the green roofing system to be functional and successful, there are a number of technical considerations that must be met and incorporated into the design and construction of the roof. The visual appeal that a green roof can create and the value that it will add to a space needs to be structurally and systematically adressed. The construction of a green roof will require the location and proposed design of the structure to be checked by an engineer in order to determine weather or not the structure would be able to bear the load of the green roof, the planting as well as technical layering required for a successful green roof as well as the people who are expected to be on the green roof at any time are all taken into consideration when determining the suitability of a structure for green roof construction.

Access - A green roof, like any other designed landscape, will be required to be accessible for maintenance purposes. The area will need to be maintained, even if not regularly, the systems and layers within a green roof structure will need to be maintained as well. The access is not required to be a permentant element, as long as it is possible to gain access to the space.

Waterproofing layer - The roof surface that is to be greened requires a very reliable waterproofing and root penetration protection layer. If the waterproofing and root barrier layers are not done up to standard, it would lead to the leaking of the structure in which case it would be a highly costly exercise to lift and repair the proofing layer. For the root barrier, it is essential that no roots are able to penetrate the existing roof structure as this has the potential to cause serious structural problems. The waterproofing layer needs to be extended way above the top level of the growing medium in order to ensure that no water or roots are able to enter behind it. A protective
geotexile may sometimes be recommended to place over the waterproofing and root barrier layer in order to protect it from any damage that may take place during the following construction of the green roof.

Drainage layer - The drainage of the green roof system is enssential for both preventing water logging of the soils leading to root rot, as well as the added weight that access water would add to load supported by the existing structure. The lightweight drainage layer will collect excess water drained through the soil and allow the water to be removed from the roof structure.

Seperation layer - Between the growing medium and the drainage layer, a thin geotextile will be incorporated into the layering of the green roof construction, this will allow for particles to be removed or prohibited from entering into the water drainage layer.

Growing medium - the growing medium is one of the most important considerations when designing a green roof, the growing medium for a structure that has not been designed to be able to support a very heavy load will require the soil to be lightweight, yet still well drained that will give the highest amount of water retention, also promoting plant growth without water becomming waterlogged.

Vegetation - Appropriate planting choices need to be made in order to ensure that the planting will survive the conditions experienced. Planting on a green roof will require vegetation choices of plants that are drought resistant, high temperature and wind resistant, easily reproduce and have non-agressive root systems. Planting with the species I have chosen, representing the Grassland and Rocky Grassland veld types are generally characterised by hardy plants that are easily established and meet many, if not all of the reqirement of green roof species.

TECHNICAL DETAIL SHOWING LAYERING OF GREEN ROOF CONSTRUCTION:

Layer 1 - Vegetation
Layer 2 - Growing Medium
Layer 3 - Seperation Barrier, geotextile
Layer 4 - Drainage Layer
Layer 5 - 50mm Screed Layer acting as root barrier protection, can be substituted for a grotextile.
Layer 6 - Water Proofing and Root Barrier
Layer 7 - Existing Structure

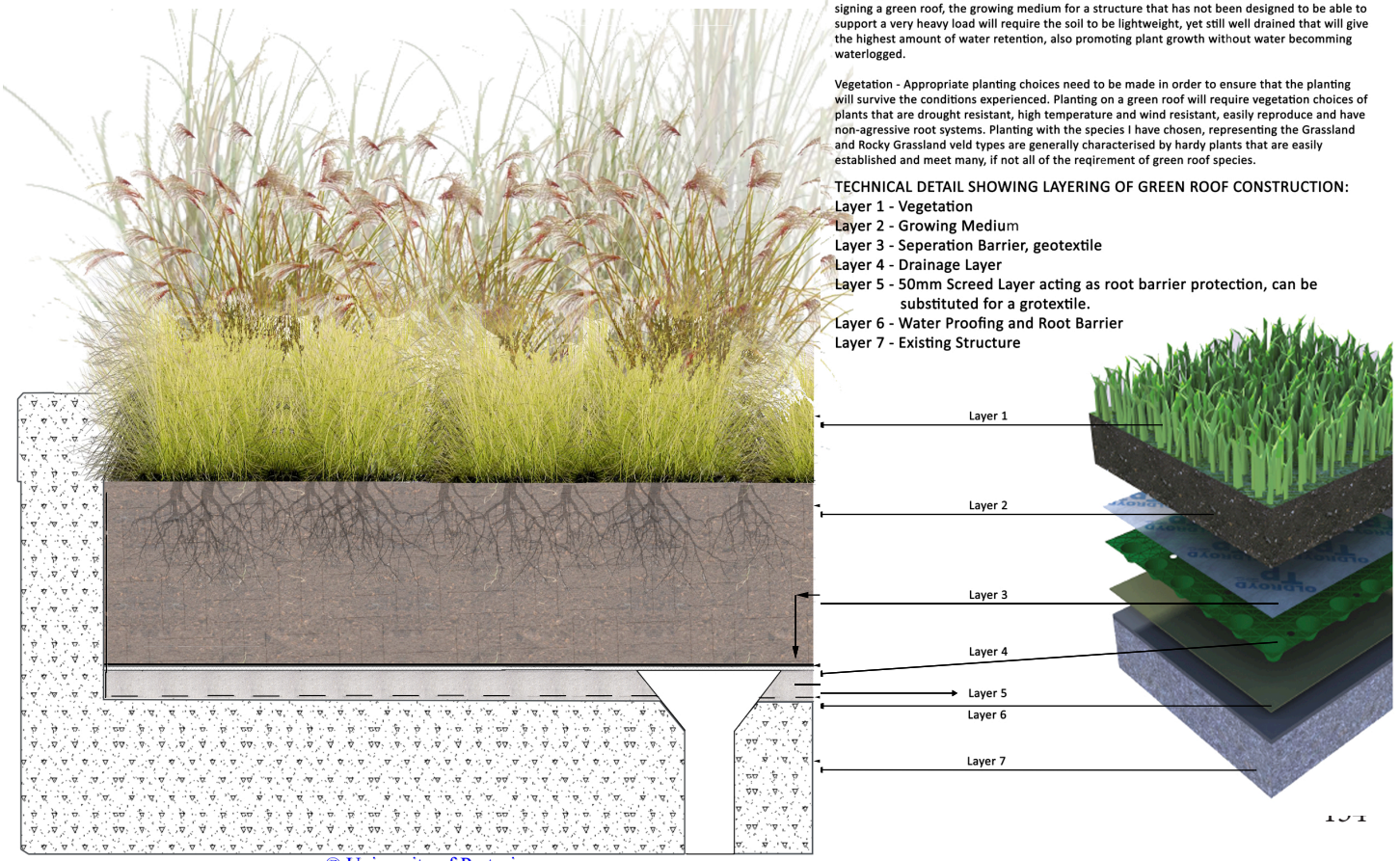


Figure 2.8.13: Green roof technification (Author, 2015)

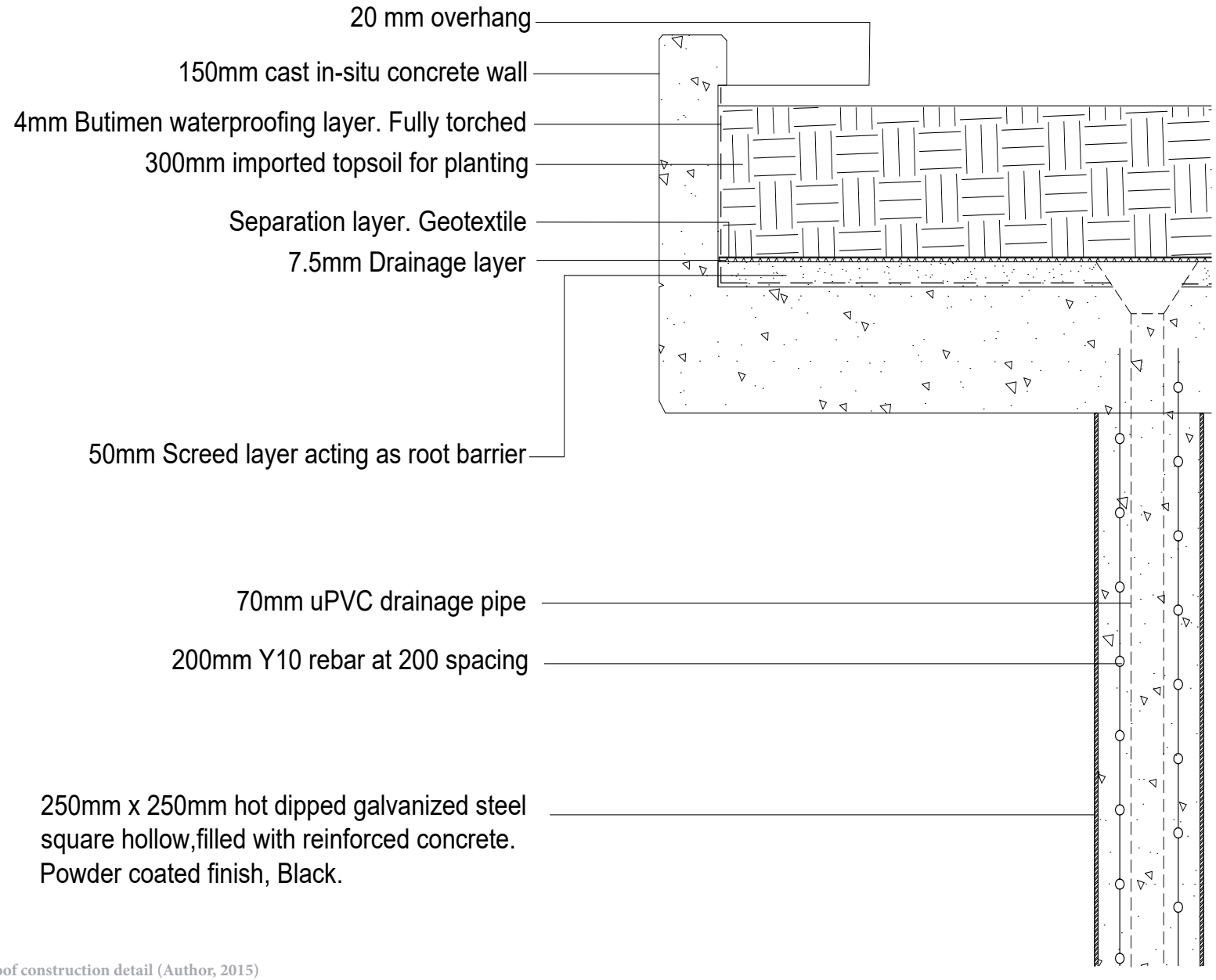


Figure 2.8.14: Green Roof construction detail (Author, 2015)

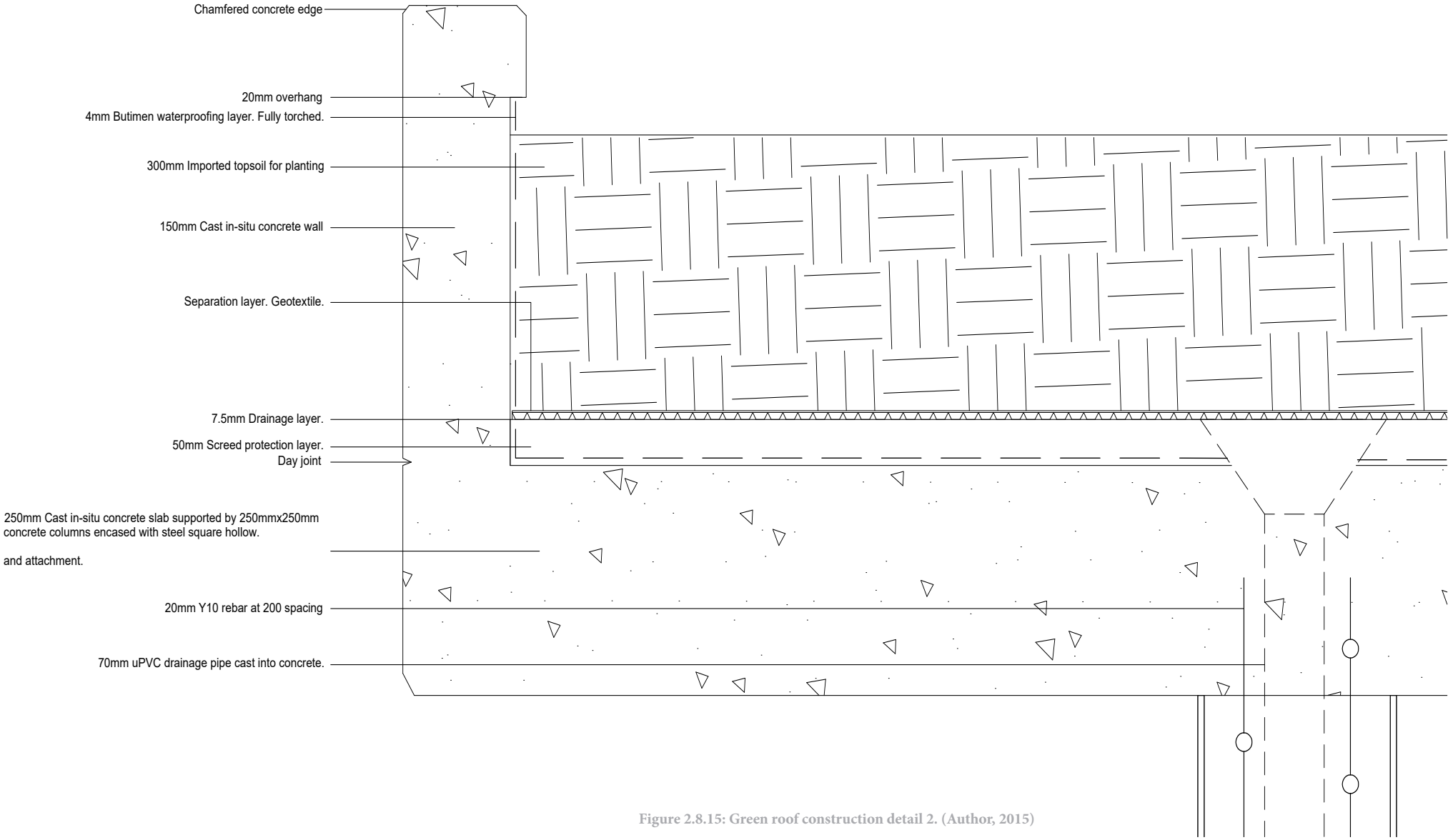


Figure 2.8.15: Green roof construction detail 2. (Author, 2015)

TECHNICAL DETAILS FOR SEATING BENCHES:

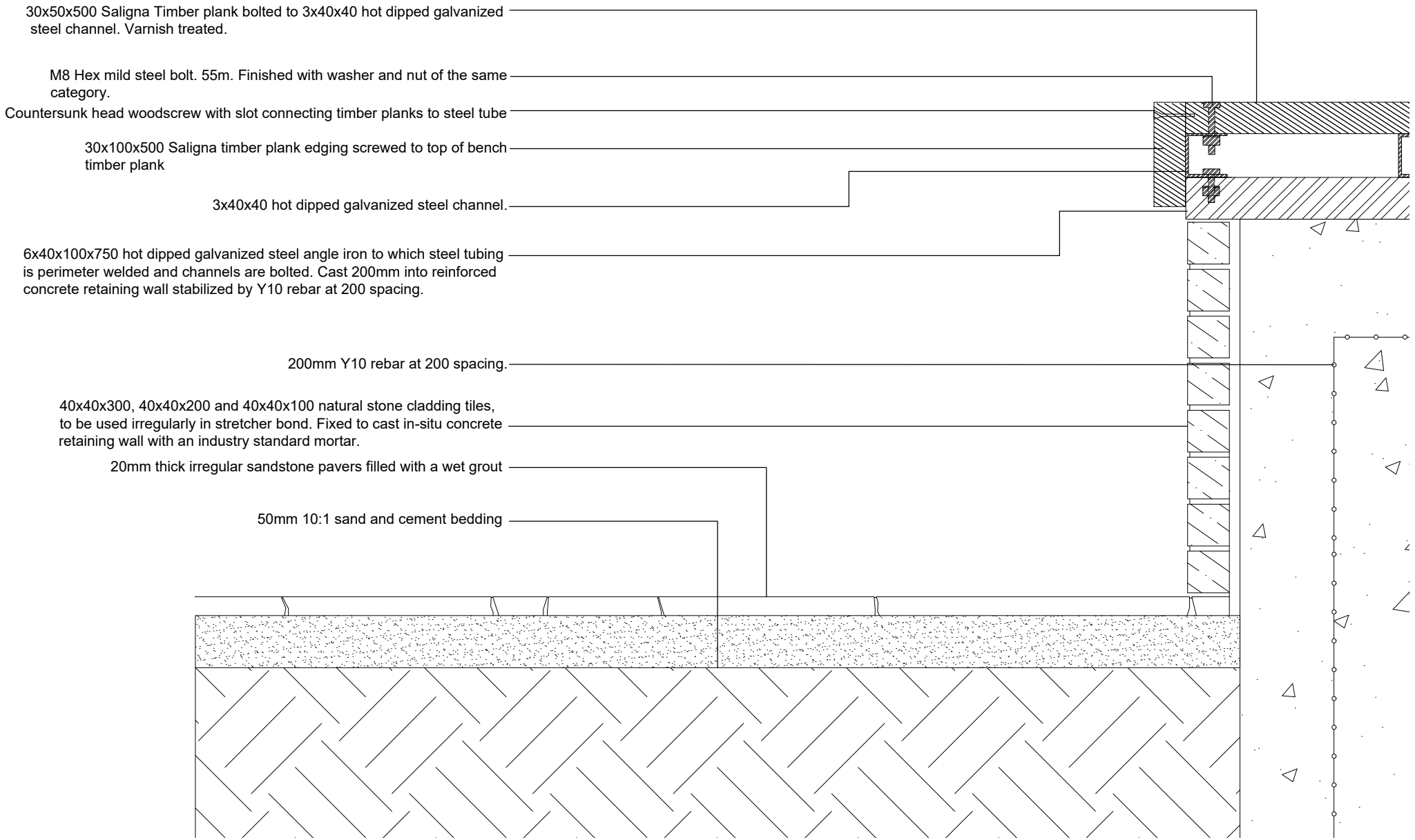


Figure 2.8.16: Seating bench for green roof construction detail (Author, 2015)

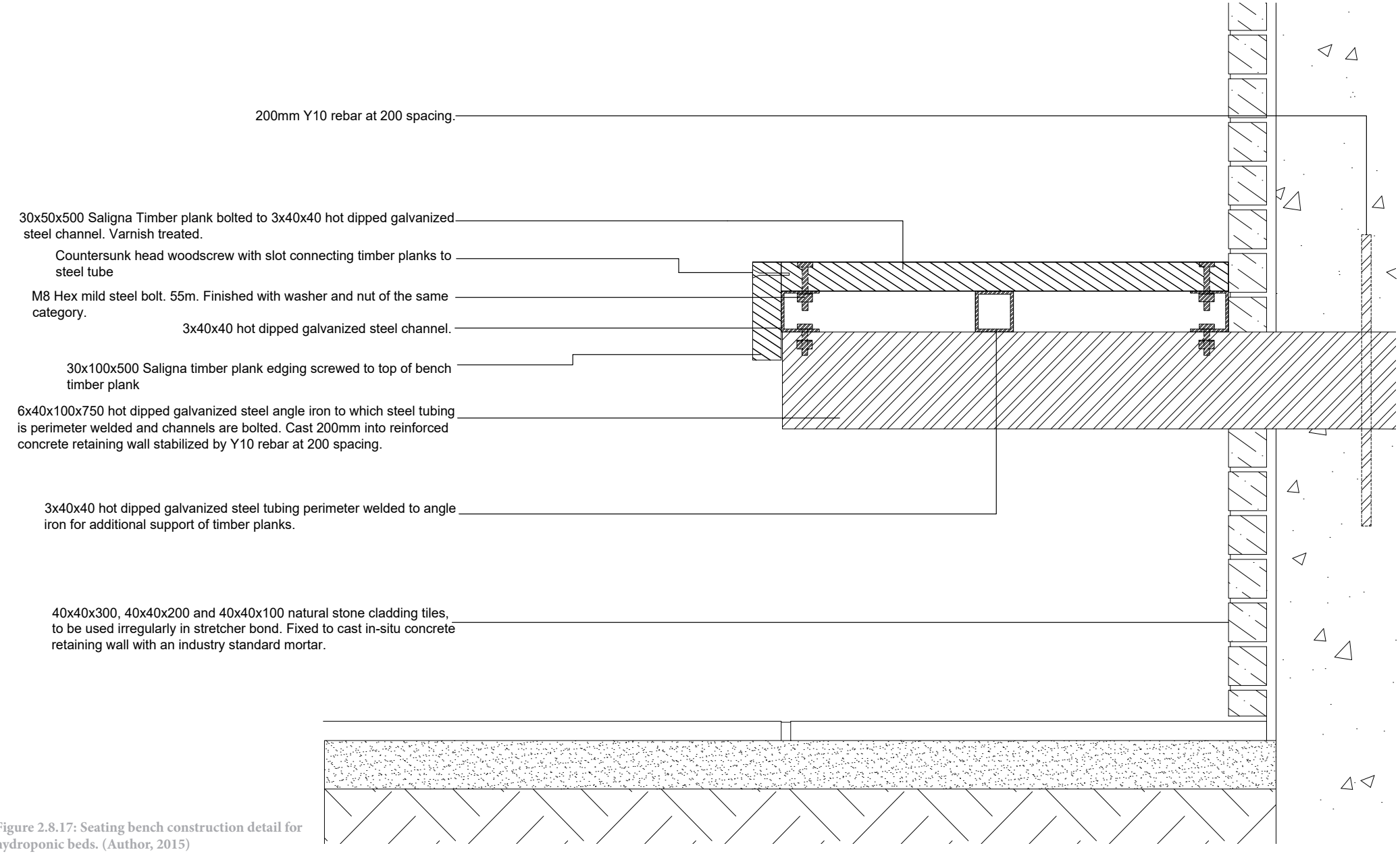
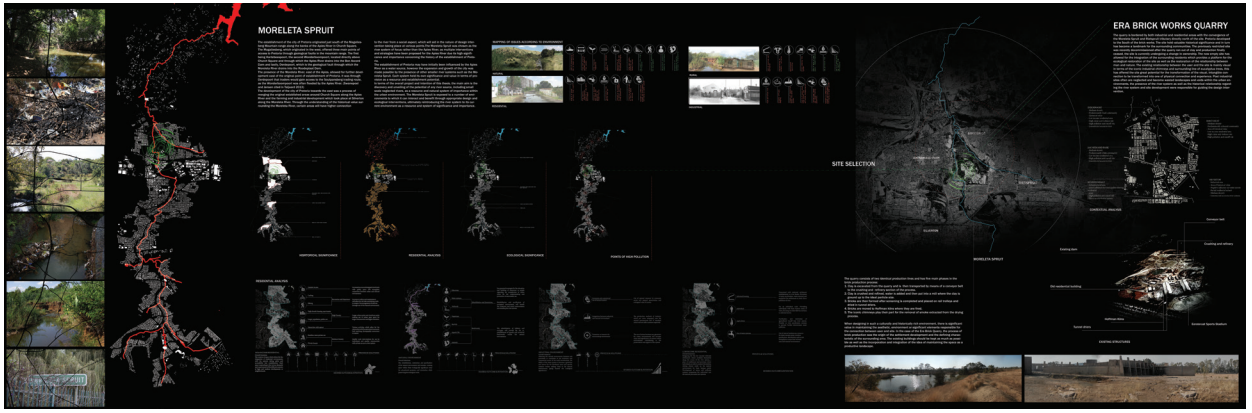
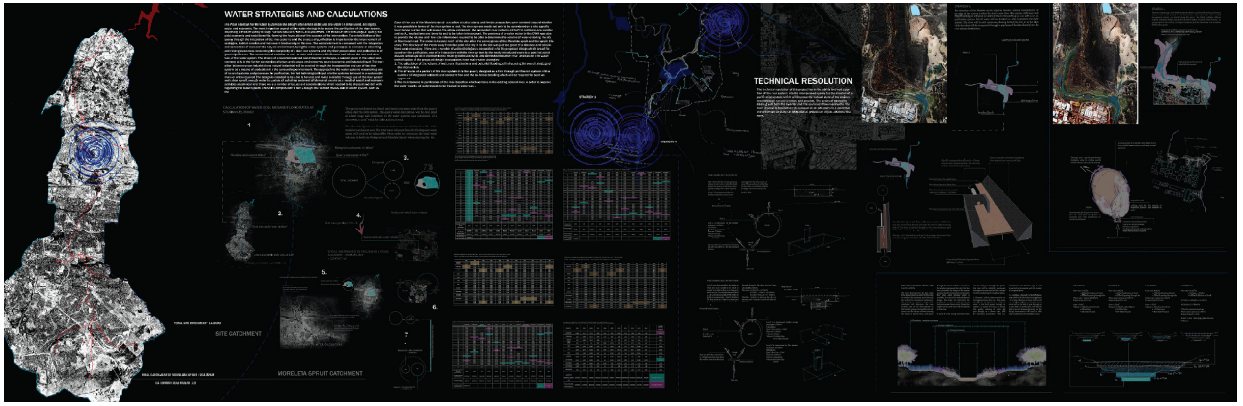
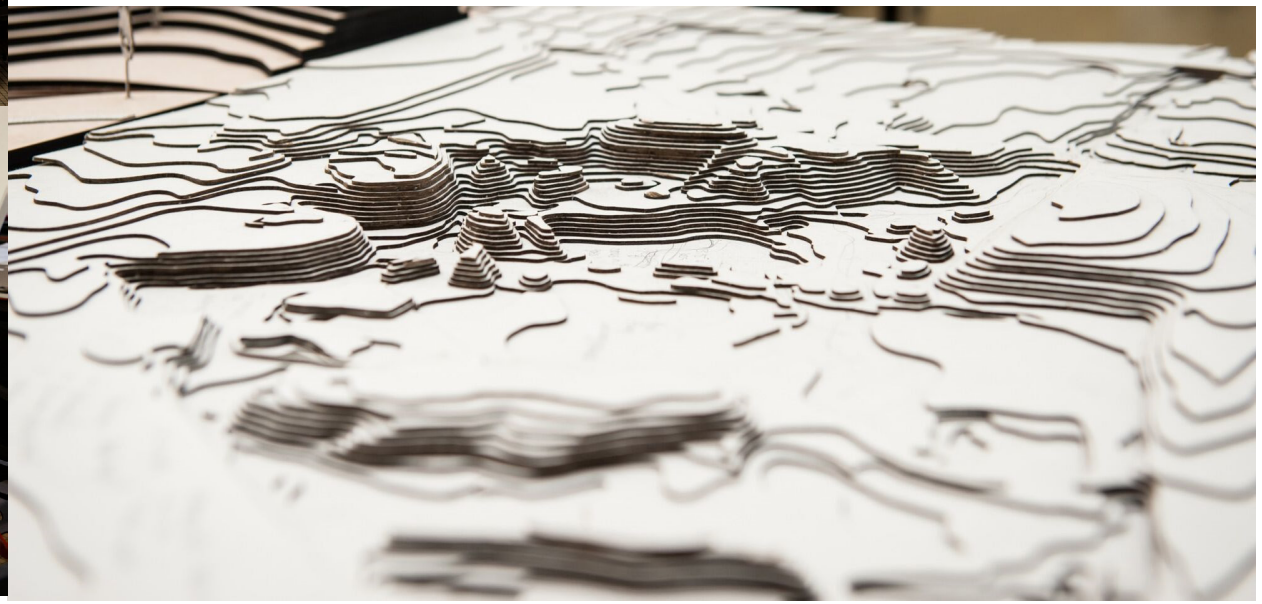


Figure 2.8.17: Seating bench construction detail for hydroponic beds. (Author, 2015)







REFERENCES:

Adams, S (2012). 'After 150 years of faithful service Pretoria's fountains still the cleanest water around'. South African Water Research Commission, 8 January. [Online] Available from: http://www.wrc.org.za/News/Pages/After-150yearsoffaithfulservicePretoria%E2%80%99s-fountainsstillthecleanestwateraround.Aspx [Accessed: 20 September 2015]

Cengiz, B (2013).Urban River Landscapes, [Online] Available from: http://www.intechopen.com/books/advances-in-landscapearchitecture/urban-river-landscapes [Accessed: 21August 2015].

Davis, B & Jensen, A (2015). 'Rivers as Urban Borderlands. A thousand years in Sao Paulo'. Dumberton Oaks Symposium in Garden and Landscape studies, 8-9

Ellis, C (2011). History of Cities and City Planning, [Online] Available from: http://www.art.net/~hopkins/Dons/simcity/manual/history.html [Accessed: 19th June 2012].

Haarhoff, J. Juuti, P & Maki, H (2012). 'After 150 years Pretoria's fountains still a source of life'. The Water Wheel, vol. 7. p. 18-23. [Online] Available from: https://www.academia.edu/4263074/After_150_years_Pretorias_Fountains_still_a_source_of_life [Accessed: 20 September 2015].

May, Dumberton Oaks, [Online] Available from: http://www.doaks.org/research/garden-landscape/scholarly-activities/past/river-cities/abstract-and-bios [Accessed: 20 March 2015].

Taljaard, C (2013). New Era Ceramics: A solvent for the industrial boundary. MProf Thesis. University of Pretoria, Pretoria

May, H (2006). 'Connectivity" in urban rivers: Conflict and convergence between ecology and design'. Technology in Society, vol. 28. P. 477-488.

The Department of Water Affairs (2012). Situational Analysis, GAP Analysis, Action Plan and Stakeholder Engagement for Phase 1 of the Moreleta Spruit Adopt-a-River Project. [Online] Available from: www.dwaf.gov.za [Accessed: 20 February 2015].

Encyclopedia Britannica. (2015). 'Orange River' [Online] Available from: http://global.britannica.com/place/Orange-River [Accessed: 26 September 2015].

Pansengrouw, J (2013). Experiential Ground. Master of Architecture (Professional) Thesis. University of Pretoria, Pretoria.

Wikipedia. (2015) 'Orange River'.[Online] Available from: https://en.wikipedia.org/wiki/Orange_River [Accessed: 18 September 2015].

Von Geyso, C (2013). Barren Praise: An Apiary as a place making interface in the post-industrial context. Master of Architecture (Professional) Thesis. University of Pretoria, Pretoria

Burmeister, M. (2014). Reconnecting man with nature: Post-industrial landscape development. Master of Landscape Architecture (Professional) Thesis. University of Pretoria, Pretoria.

Munica, I. and Rutherford, M.C. (eds.). The vegetation of South Africa, Lesotho and Swaziland. Sterlitzia 19. South African National Biodiversity Institute.

Rosema Group. (2014). Rosema Group. [Online] Available from: http://rosema.co.za [Accessed: 10 May 2015].

Breed, I. (2012). The Transient Aspects of City Life: Their Understanding and Interpretation for Design Purposes in Stoffberg, H. Hindes, H and Muller, L. 2012. South African Landscape Architecture: A Reader, Unisa Press, Pretoria.
Eersterust Urban Vision Group, (2013). The Era Regional Park. Master of Architecture (Professional) Thesis, University of Pretoria. Pretoria.

Kelly, A and Cave, P.E. n.d. Rouge River Gateway Project: Restoration of an Urban River. [Online] Available from: file:///C:/Users/Bridgette/Desktop/rogue%20river%20project.pdf [Accessed: 10 October 2015].

Toronto and Region Conservation (2009). Don River Watershed Plan: Implementation Guide. [Online] Available from: http://www.trca.on.ca/dotAs-set/104197.pdf [Accessed: 12 October 2015].

Syring, D. (2008). The Don River: Reawakening Community Engagement with the Commons. [Online] Available from: http://freshwaterfuture.org/wp-content/uploads/sites/53/2014/08/DonRiverConsecutive-lowres.pdf [Accessed: 12 October 2015].

Fairmount Water Works. A view on cities. (2015). [Online] Available from: http://www.aviewoncities.com/philadelphia/fairmountwaterworks.htm [Accessed: 20 August 2015].

Damon, B. n.d. 'The Living Water Garden' [Online] Available from: http://www.wellnessgoods.com/garden.asp [Accessed: 14 October 2015].

Damon, B (1998). 'The living Water Garden'. [Online] Available from: https://www.codaworx.com/project/the-living-water-garden [Accessed: 14 October 2015].

Health Council of the Netherlands and Dutch Advisory Council for Research on Spatial Planning, Nature and the Environment. (2004). Nature and Health: The influence of nature on social, psychological and physical well-being. [Online] Available from: http://www.gezondheidsraad.nl/sites/default/files/Nature_and_health.pdf [Accessed: 20 May 2015].

The Department of Water Affairs (DWAF) South Africa n.d. History of the Orange River Project, [Online] Available from: https://www.dwaf.gov.za/orange/midorange/overview.html [Accessed: 18 September 2015].