

Wallace Honiball

Elandspoort 357-JR



UNIVERSITEIT VAN PRETORIA
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Wallace Honiball

Elandspoort 357-JR

BUILDING

Address: Elandspoort 357-JR, Pretoria.
Function: Governmental, destination (tourism) and recreation (public)
Research field: Environmental potential.



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Abstract

Any full history of the uses of nature would be a history of human thought.

- Raymond Williams on Nature

(FORTY, 2000:220).

The architect must be a form-artist; only the art of form leads the way to a new architecture.

- August Endell on Form

(FORTY, 2000:149).

Landscape design and architecture adhere to the similar principles of form making. These have been affiliated with nature through history, sharing dialogues of philosophy. As theoretical premise, an investigation at the relationship between form and programme in the Western world (*from Antiquity to the 21st Century*). The conclusion was that there is a relationship between form and programme, that different periods in history have drawn varying conclusions regarding this relationship. My conclusion views the *idea* as the most important aim of architecture, that the relationship between form and programme influences/guides/shapes the *idea* through the design process.

The urban framework aims to preserve, to link and enhance open space in the Pretoria Central Business District. The theoretical investigation and framework directed the need for a site that would allow me to convey my own conclusion regarding the relationship, ingrained with the idea of preserving and linking open space in the focus area of Pretoria. The Union Buildings as selected site, orientated around its natural landscape, is layered with different interventions representative of relationships between form and programme, presenting the opportunity to explore my premise. The site is dominated by biota or nature, allowing the assessment of the terrain in terms of how landscape (more specifically plants) as a programme influences architectural form.

Interventions focused on the *Vredenhuis* complex (sited on the Union Buildings grounds) function as the focus of the argument. The site is classified as a botanic garden. The programme of botany is informed by the site history; residential (1880-1914), botanic gardens (1914-1975), nursery (1915-1950), greenhouse (1918-1975) and entomology/plant pathology division (1914-2007). A further investigation of plants informs the function and programme of the design.



THEORY

Theory on Form

The paradigm of the architect passed down to us through the Modern period is that of the form giver, the creator of hierarchical and symbolic structures categorized on one hand by their unity of parts and, on the other by the transparency of form to meaning.

- Bernard Tschumi on form.

(TSCHUMI 1987: 207)

Historic changes are to be understood primarily in terms of changes in the mode of vision – in other words, that vision has its history as well as architecture.

- Adrian Forty on History and Form

(FORTY, 2000:149).

The complex nature of architecture include varied relationships, themes and hierarchies of elements. Architecture and landscape design uses form to communicate varied philosophic arguments. Programme/brief is used as a formal structure, describing the broader objectives of the design profession. Architectural history provides a dais of transformations, discussing previous directions and their responses. My theoretical premise will investigate the possible relationship between architectural form and programme.

The search for form resulted in an extensive quest leading to a variety of philosophical arguments. The study is focused on assimilating ideas on form in architecture and landscape design. The time-line discusses the historiography of form. The document assimilates research on form, identifying significant accounts that shape the practice of architecture and landscape design.

The theoretical investigation focused on two aspects:

1. How architecture views form and programme.
2. *Form in landscape architecture.*

The theme of form is concurrent in the discussion. Central to the research is the use of *diagramme in landscape design*, the diagrams guides architectural and landscape developments. A brief account of landscape history focuses on *use* and *form* in garden design. The historic account of architecture was limited to seminal works of architects and philosophers, who influenced thinking about the perception of form.

2000BC – 1000 BC

Antiquity (i)

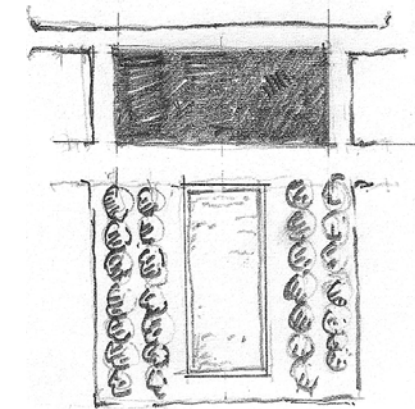
The understanding of architecture was associated with two qualities: learning and the gift of invention. Imhotep, a famous architect of ancient Egypt, supposedly had knowledge of astronomy, magic and healing. Theory of architectural design was pragmatic and minimally indebted to the laws of mathematics; the principles of measurement used the *cubit* (subdividing the hand into 7 parts). Plan and elevations used axial lines and summitry. Architecture was used as tools for social and economic power. (KOSTOF, 1977).

GARDENS IN ANTIQUITY

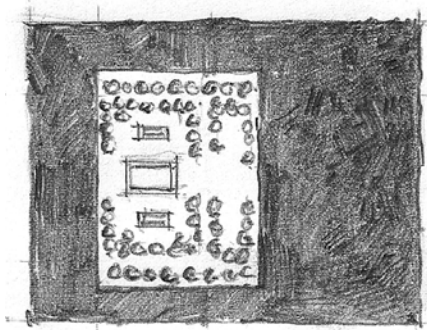
Garden design was influenced by the interrelationships between God, man and nature. Religious/Astronomical compounds reflected the importance of the gods, in control of nature. Design reflected ritual and sacrifice in temple and pyramid designs. If kings become gods after death, temples and gardens were designed for their use in the afterlife (TURNER, 2005).

Use: Domestic gardens were part of the house, containing outdoor 'rooms' with water and trees for shade.

Form: Houses were of brick and mud, the roof was used for cooking. Water was carried from wells.



Fig_1: Antiquity: diagramme illustrating the typology of Domestic Garden.



Fig_2: Antiquity: diagramme illustrating the typology of Palace Garden.



Fig_3: Antiquity: diagramme illustrating the typology of Egyptian Sancturay.

CONCLUSION

In Antiquity (i) form was minimally influenced by mathematics, it was derived from the empirical influence of gods and ritual sacrifices in temple and pyramid designs. Architecture and landscape embodied the religious beliefs and spiritual places of the civilization.

Use: Palaces were the living quarters of royalty, fruit trees were cultivated in the courtyards.

Form: Palace gardens were planned symmetrically, palace compounds were rectangular buildings with internal courts (TURNER, 2005).

Use: Temples recreated the nature of the world and social orders of the time, the temples contained sacred groves and lakes. Secondary uses include storehouse for food and vegetable gardens.

Form: Built of stone and adobe. Axial lines used with a-symmetrical building geometry. Internal spaces were used in ceremonial activities (TURNER, 2005).

1400 BC – 500 AD

Antiquity (ii)

The expansion of the Greek empire in the Hellenistic period produced extensive programmes, resulting from vast conquests. Architects, with new building typologies, redeveloped traditional design principles to create new forms in temples, treasuries, theatres and stadiums. Roman architects invented hydraulic engineering, surveying and new forms in building. Greek architecture influenced Roman design, this flux resulted in a cross-programming of stylistic counterparts between the two civilizations. Hellenistic architecture of the 4th century AD was significantly influenced by Christianity in the Roman Empire (KOSTOF, 1977).

ARCHITECTURAL THEORY IN ANTIQUITY

Theory in the Classical period was based on objective foundations and explained the source of artistic ideas. Divinely determined forms were drawn from geometry e.g. the Doric temple. Building typologies evolved through cultural traditions, representing the timeless and universally objective truths of 'the orders'.

PLATO

Plato's world had two realms, the existential realm of physical objects and the metaphysical realm of ideal forms (GELERNTER, 1995:42). Plato believed that the world organises itself according to the timeless mathematical relationship of precision, believing in the existence of a perfect world accessible to those who reason about nature. Known as the Theory of Forms, Plato believed that universal forms must exist before particular individuals can exist. He sought to identify generic types in form (TURNER, 2005).

VITRUVIUS

Vitruvius's *De architectura libri decem* is the only remaining testimony of theory in Antiquity, written between 33 and 14 BC. History has proven that the main dialogue in literary theory from the Renaissance onward, was based on Vitruvius's ideas.

In the treatise, the origin of architecture and its primary motivation is the human need of protection against the elements. Vitruvius postulates that the earliest dwellings were imitations of natural forms (caves, leafed huts or swallows' nests), "men are by nature given to imitations and ready to learn" *homines imitabili docilique natura* (VITRUVIUS II.ii.3). Imitations extended into rules as architecture evolved from uncertain/vague observations to fixed rules of symmetry (VITRUVIUS II.ii.3). Vitruvius views symmetry and laws of architecture in unity with that of the cosmos and the fundamental principle in nature (the Vitruvian man). (KRUF 1994: 24).

Vitruvian theory relating to programme and form:

Architectura libri decem; Book I, Chapter 2:

The fundamental principle of architecture is defined as *ratiocination*; the intellectual apprehension of architecture. This concept subsequently became the central conversation of architectural theory in the 19th Century (KRUF 1994:25).

Architectura libri decem; Book I, Chapter 3:

The three fundamental requirements needed for architecture to satisfy are *firmitas* (strength), *utilitas* (utility) and *venustas* (beauty). This covers construction, materials, building function and aesthetics. Vitruvius remarks that proportion is the most important aesthetic requirement in architecture. Under *venustas* six models are listed, affecting the formal relationship of architectural form. These concepts use mathematics and proportion to create correct building forms. These models stipulate what the correct appearance of a building should be. Two of these are:

- *Decor*: the appearance of building form and content, rejecting the application of applied embellishment.
- *Distributio*: the concept of architecture parlante (describe where this comes from), buildings should be an expression of its function to its occupants (KRUF 1994: 25).

1400 BC – 500 AD

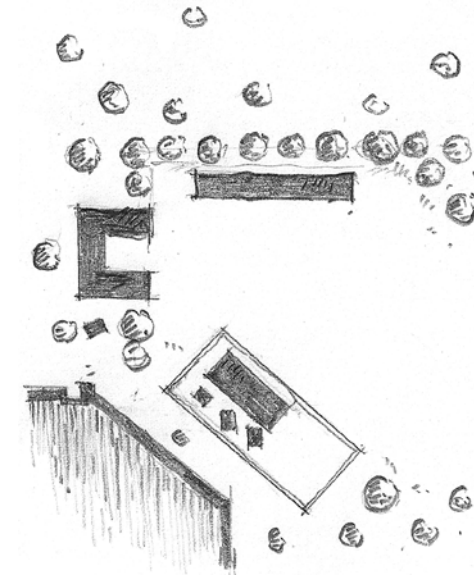
Use: The Greek belief in deities necessitated places where offerings could be made. Usually walled in stone boundaries, sanctuaries were sacred landscapes/ places of spiritual enlightenment where discussions, offerings, education and exercise (gymnasium) took place.

Form: Usually built outside of towns; groves were walled sanctuaries adorned with a statue of a god, architectural elements and ornamental planting. Formed round a court and stadium for races, gymnasiums/ palaestra had roofed colonnades and seating for spectators (Philosophers also taught here).

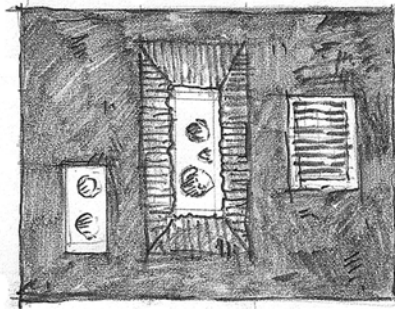
CLASSICAL GARDENS IN GREECE & ROME

* *Formal elements of the Greek sanctuary is the sacred landscape, second to which is the building.*

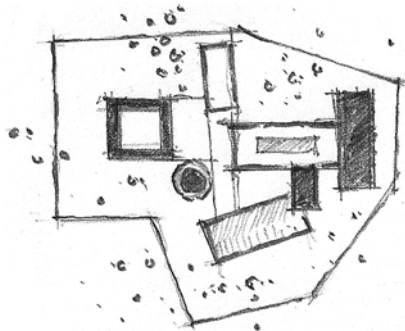
Historic examples of temple garden types are divided into categories satisfying different needs. The idea of beauty in Ancient Greece viewed 'form' as the shaping element of the physical world, exemplified in Plato's 'intoxicating delight of understanding'. He believed that the existence of a perfect world is only accessible to those who reason about nature (TURNER, 2005).



Fig_4: Antiquity: diagramme illustrating the typology of Greek Sanctuary.



Fig_5: Antiquity: diagrammes illustrating the typologies of Greek and Roman Courts.



Fig_6: Antiquity: diagramme illustrating the typology of Roman Villa.

CONCLUSION

By the term Venustas (Beauty) Vitruvius expresses the pleasure of form, made possible through the use of proportion. Form in the second discussion of Antiquity, the formal relationship between form and programme focussed on two aspects: the aesthetic in nature and its rational composition.

Use: Built in a walled city, court space was a valuable commodity, associated with wealth and status. Greek domestic courts were unroofed living spaces.

Form: Walled for security and privacy, there are three types of Roman courts; the atrium, the peristyle and the xystus.

Use: Palace-estates with subsidiary buildings and gardens, in rural and urban settings. Places of entertainment, recreation and court business; villas had outdoor enclosures, domestic courts, sacred courts (gymnasiums), temple gardens, parks and grottoes.

Form: Buildings were axially planned (a-symmetrically placed) and grouped in a protected enclosure. Influenced by Roman patterns and eastern 'paradise' gardens.

600 AD – 1500 AD

The Middle Ages

ARCHITECTURE IN THE MIDDLE AGES

“The predominance of the philosophical, theological and geometrical aspects of the subject clearly shows that the concern with architecture was nourished from heterogeneous sources”

- Krufft on the Middle Ages

(KRUFFT 1994:40).

Complete faith in the belief that God will supply knowledge of the Divine to artists, the individual did not contribute to the making of form. Theoretical discussions of the Middle Ages took place in various locations. Until the Abbot Suger of Saint-Denis, all writing on architecture had referred to the views of Vitruvius.

ABBOT SUGER OF SAINT-DENIS

Suger (1081 – 1151) was the first to describe the process of construction. In new additions made to the abbey church of Saint-Denis Suger observed an aesthetic “concern in the consistency and the coherence of the old work with the new” (BISCHOFF 1981: 97). Suger is acknowledged for his aesthetic terminology in the Middle Ages (KRUFFT 1994: 32).

VILLARD DE HONNECOURT

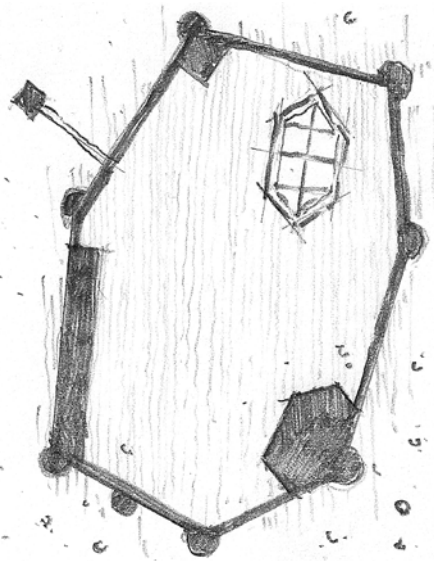
Villard de Honnecourt's (1081 – 1151) lodge-book (written between 1225 and 1250) is the only manuscript of the High Middle Ages devoted to architecture. The book, intended to provide understandings of masonry and construction, describes the lodge traditions of the time. Hans R. Hahnloser (c. 1848) divides the logbook in seven headings. Honnecourt's plate 36, the representation of portraiture (draughtsmanship) illustrates “the method of depicting [a figure] through drawing, as taught in the art of geometry, in order to facilitate work...” (HAHNLOSER, 1935). The plate applies geometric systems to human/animal forms. Honnecourt *plate 36* motivates proportion from geometry (circle, square, pentagon, and triangle) (KRUFFT 1994: 38).

PLOTINUS

Plotinus (204 –270 AD) developed the theory of Neoplatonism: artists should view many particulars to gain a clear impression of the elemental forms. Known as the Ideal Theory of Art (its influence shaped the western world); 'art should imitate nature'. Nature, in the view of Plotinus, implies that forms are pre-existing in the metaphysical realm (TURNER, 2005).

MEDIEVAL GARDENS

* Medieval Christianity viewed nature as a chain extending from God to all organisms. Medieval gardens embody the idea of nature revealed to man through religion, gardens function as places of contemplation (TURNER, 2005:125).



Fig_11: Middle Ages: diagramme illustrating the typology of Castle Garden.

Use: Forts were occupied by soldiers, nobles and their families. In wartime the internal space was used as protection for soldiers and the surrounding population. Castle gardens were planted either inside or outside the fortification.

Form: Castle gardens were small enclosures varying in form (hexagonal, irregular or rectangular). Outside the compound there were orchards, pleasure- and hunting parks.

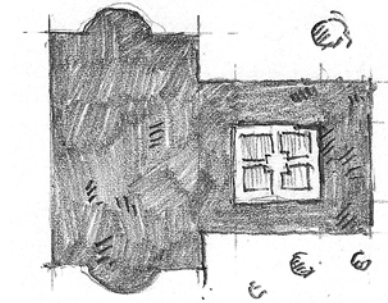


Use: Recreation, contemplation and rituals of the monastery took place in the garden, which gave access to adjacent buildings in the complex.

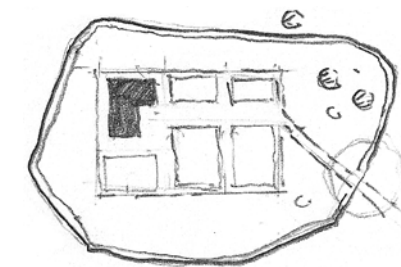
Form: Typically square, the garden was surrounded by a covered walk. The cloister garden evolved from its humble origins to the Renaissance ornamental gardens and later into the 19th Century gardenesque gardens.

Use: The middle class lived on enclosed plots. Gardens were for food, medicine and recreation.

Form: Irregular in shape, the gardens were bounded by adjacent buildings, walls, fences, ditches and hedges. Covered with beaten earth and gravel floor surfaces optimally using available outdoor space.



Fig_12: Middle Ages: diagramme illustrating the typology of Cloister Garden.



Fig_13: Middle Ages: diagramme illustrating the typology of Medieval Garden.

CONCLUSION:

Architecture embodied all aspects of Christianity (knowledge, theology, morality & history), arranged in the structure of the building. Nature was seen as the physical embodiment of Christianity, resulting in the idea of 'imitating' through ornamentation. Antiquity derived proportions from organic forms (Honnecourt) with an underlying theme of transcendental/metaphysical. Scholastic philosophy of the Middle Ages prescribes that the relationship between architectural form and programme should adhere to an aesthetic approach shape by a divinely inspired geometric proportions.

Renaissance

ARCHITECTURE IN THE RENAISSANCE

Plato's work was revisited by the Humanists during the Renaissance, re-introducing the importance of mathematical proportions (as in Greek and Roman architecture). Classicist architecture was made to imitate the Platonic Forms contained in nature through proportion.

HUMANISTS

"The Humanists rejected the medieval, romantically worshipping everything ancient, studying and copying the works of antiquity."

- Mark Gelernter on Humanism
(GELERNTER, 1995:96)

The Humanists reasserted the Classical notion of individual power, reviving the ancient disciplines of art, architecture and philosophy. The medieval assessment, viewing reality as preordained, replaced rational thinking and individuality by two alternative mindsets:

Aristotilianism: Derived from Aristotle's empiricism - understanding is gained through human knowledge, not through an intuitive grasp of supersensual ideals or forms.
Platonism: Derived from Plato's rationalism, all objects in the sensory world are only imperfect copies of metaphysical ideas (experience through knowledge) (IBID, 1995:97).

ALBERTI & PALLADIO

Alberti (1404 -72) and Palladio (1508 -80) were influenced by Plotinus and Neoplatonism. Palladio based his architecture on the circle, the square and harmonic proportion. Imitation of these forms enabled the production of buildings that partaking in the essence of the universe, imitating the nature of the world (TURNER, 2005:17). Alberti defined beauty as characteristic of nature having unchanging norms. Inspired by Classicist architecture, he attempted to discover 'ideal forms'. He derived proportional ratios from nature, arguing that nature is rationally organised according to principals of mathematics. (GELERNTER, 1995:105)

1350 AD – 1650 AD

Use: Occupied by noblemen early, Renaissance castles provided security; the gardens were used for social gatherings.

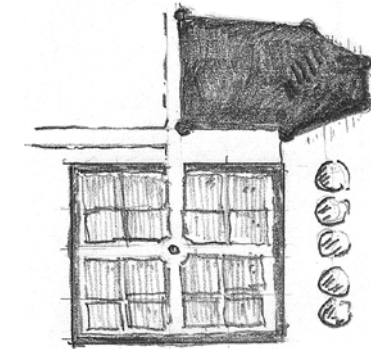
Form: The value of garden design was signified by the additional space emerging as a result of castle conversions into manor houses. Square and rectilinear design elements were combined, with structured patterns, to create order in garden design at the time.

Use: Gardens no longer faced inwards, the open spaces were used for recreation. Collections of antique statues were displayed.

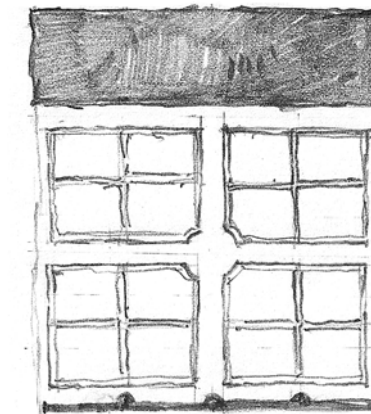
Form: Developed by Bramante, a central axis is integrates garden and house. The axis created a distinct composition, fusing rectilinear enclosures and terraces on different levels.

RENAISSANCE AND MANNERIST GARDENS

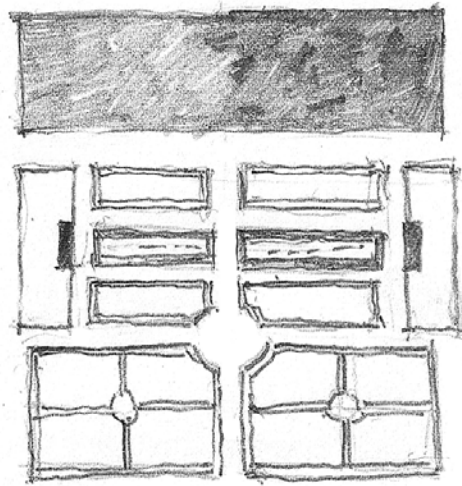
** Nature is the source of form, the Renaissance return to the classical traditions of from. Garden designs should resemble the styles of antiquity. (GELERNTER, 1995:141)*



Fig_13: Renaissance: diagramme illustrating the typology of Early Renaissance.



Fig_14: Renaissance: diagramme illustrating the typology of High Renaissance.



Fig_15: Renaissance: diagramme illustrating the typology of Mannerism.

CONCLUSION

The Renaissance reasserted the Classicistic notion of form, derived from nature through rational thinking. Influenced by the Neoplatonic and Neoclassical, nature was perceived as the source of form and the rules of proportion. Designers imitated these principles to achieve an empirical reality. The relationship between form and programme was mathematically determined through rationalism, proportion derived from nature should resemble the styles of antiquity.



Use: The principles of the Renaissance reached the apex of perfection in underlying principles of symmetry. Gardens became places of novelty/allusion displaying the patrons' wealth.

Form: Recreating emotions through movement and drama became important (as in Mannerist painting). Houses were considered as ornaments sited/composed in a dramatic setting. Advances in hydraulic technology allowed for elaborate water features.

1600 AD – 1750 AD

Baroque

BAROQUE ARCHITECTURE

Baroque distanced itself from the classical notion that the universe was organically formed. Humanist influences sought new meaning in the rational/mechanistic, proving that existence is derived from this point of view. The epoch synthesises the Classicism of the Renaissance's with the emotional tensions of the Mannerists. (GELERNTER, 1995:121)

DESCARTES

Descartes (1596 - 1650) believed that the only reliable knowledge is found in the reasoning mind. Descartes's 'geometric method' is a deductive reasoning philosophy that leads artists, architects and philosophers to base design theories on self-evident axioms/proverbs. His theory separates the metaphysical world of the mind and the physical world of reality in two distinct spheres, the mind can conceive form in the conveying body without being an integral part of it (TURNER, 2005:17).

LOCKE

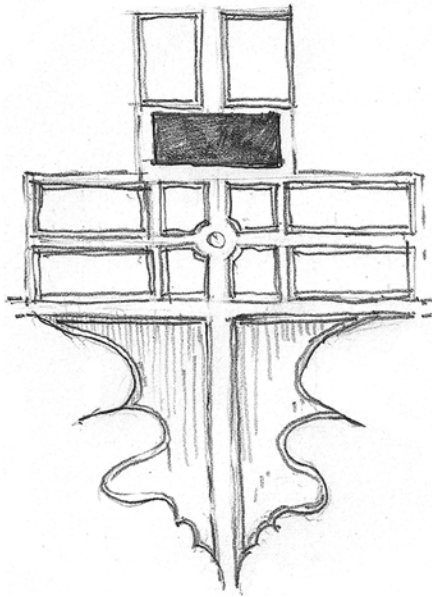
Locke (1632 - 1704) postulates that the mind gains knowledge by experience. The mind is at birth a "tabula rasa", the experience of form creates mental impressions of the outside world. The theory of experiential knowledge assumes that objects in the physical world have physical qualities (solidarity, extension, colour and taste). Such qualities cause ideas to appear in the mind of a perceiver, if the mind does not know the qualities directly, mental ideas are given to what the qualities are (GELERNTER, 1995:130).

BLONDEL

Blondel (1675-98) believed that timeless Classical principles shape building form by order, enabling the mind to understand architectural form. Architecture is construed through specific projects, these present different building problems to be expressed in building form. Architecture must not be disillusioned with the fantasies of individual minds, it should follow laws of nature and reason (IBID, 1995:174).

BAROQUE GARDENS

** Rational thinking influence by the rationalist philosophy of Descartes and Cartesian geometry*



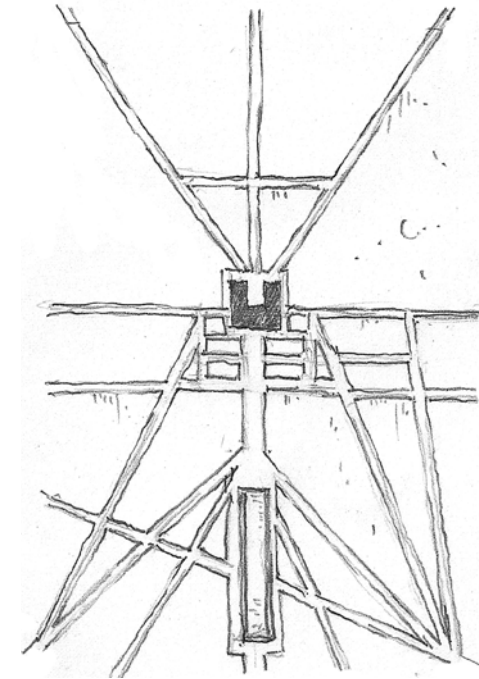
Fig_16: Baroque: diagramme illustrating the typology of Early Baroque.

Use: Re-establishment of power to the prelate and princes produced garden designs echoing the supremacy of authority. City walls were replaced by guns and military power. Baroque gardens facilitated court gatherings, larger parks were used for hunting.

Form: Axial lines were projected beyond garden enclosures, focusing on external landmarks. Discoveries in optics, perspective and geometry translated into dramatically planned avenues.

Use: Gardens reflected aristocratic government e.g. the gardens of Versailles.

Form: Cartesian geometry rationally composed the natural landscape. Using perspective, the high baroque gardens integrated a central building with landscape elements (e.g. avenues and fountains).



Fig_17: Baroque: diagramme illustrating the typology of High Baroque.

CONCLUSION:

The epoch saw a development in the theory of rationalism (Descartes). Form is derived from reason and rational structures. Philosophy of the epoch separated the idea of form in two mental spheres; the primary objective qualities and secondary subjective qualities. A belief in reason, orderliness and timeless principles of form referenced the Classical shapes of building and landscape form. The relationship between form and programme sought to reflect functional problems presented by different projects.

Enlightenment

ARCHITECTURE IN THE ENLIGHTENMENT

The Enlightenment contributed to the idea of style, archaeology and the acceptance that different times in history viewed values and forms of artistic expression differently. The positivist attitude developed from advances in science and objective knowledge; scientific knowledge was entrusted to predict and control future events. (GELERNTER, 1995:155)

HERDER

Herder's (1744-1803) new idea of history introduced three concepts: the archaeological, the eclectic and the modern. For Herder the unit of aesthetic taste is derived by shared cultural values, out of this he derives the notion of style / collective taste. Different from Classical architecture, his concept of style does not deny the idea of different but equally valid design approaches. (IBID:164)

BOULLÉE

Boullée (1728 - 1799) viewed architecture as a fantastic art of pure invention. The source of form is conceived by 'pictures in the mind' (imagination). He revisited Plato's platonic solids to illustrate the limits of architectural form, in the shape of spheres, cubes and triangles. (IBID:172)

NEOCLASSICAL AND ROMANTIC GARDENS

** Enlightenment was a response to the Baroque. Plato's theory of forms were revisited 'art should imitate nature'*

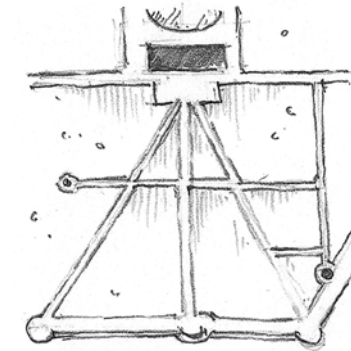
1700 AD - 1810 AD

Use: The name is derived from Stephen Switzer; it is a style inspired by existentialist rural living. Central to the style is a renewed interest in agriculture and forestry. Estates had planted avenues to create new/reshape existing forests in the landscape.

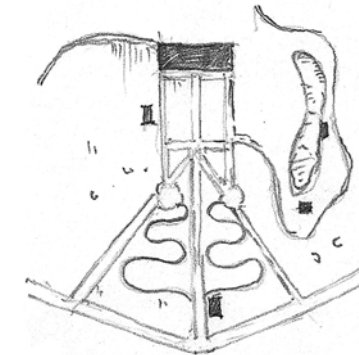
Form: The style was concerned with perspective, attained by the use of radial geometry.

Use: Inspired by ancient Rome, the style reflects the Classical landscapes of antiquity. Landowners who travelled used these gardens to display their 'voyage souvenirs'.

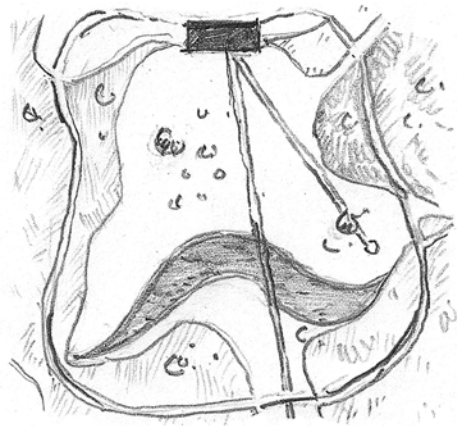
Form: Placing of garden elements (groves, water, sanctuaries and temples) took priority over plan geometry.



Fig_18: Enlightenment: diagramme illustrating the typology of Forest Style.



Fig_19: Enlightenment: diagramme illustrating the typology of Augustan Style.



Fig_20: Enlightenment: diagramme illustrating the typology of Serpentine Style.

CONCLUSION:

During the Enlightenment, contrasting views on form were shaped by Positivism, Romanticism and Neoclassicism. Kant's theory on sensibility and understanding distinguishes form in two minds; intuition (immediate impressions of sense) and understanding (the mind's ability to conceptualise). Carlo Lodori (1690 – 1761), views the use of ornament as illogical, form ought to be entirely shaped by its function (GELERNTER, 1995:155). The Enlightenment view was that form should conform to function, necessity and honesty in materials.

Use: The values of the Enlightenment admired the 'natural' in style, in the productive use of grazing on the estate grounds. The landscape was designed round a circumferential access track, allowing guests to experience the parkland.

Form: The house was positioned in the centre of lawns, trees and parameter landscaping with a carriageway and a serpentine lake. Known as English gardens, the style abstracts the use of line. Influenced by Lancelot Brown, free-flowing/serpentine lines were used to compose the garden of lakes and woodlands.

1800 AD – 1900 AD

19TH Century

ARCHITECTURE IN THE 19TH CENTURY

By the 19th Century the objective foundations of the Classical had been eroded. The period inherits a pastiche of eclecticism from the Enlightenment. The predominant influence of Realism caused a stylistic confusion in the discipline of architecture. The era of Eclecticism juxtaposed all previous stylistic traditions. Known as a time of relativism, the use of styles was justified by functional, aesthetic, or religious suitability for a particular project. (IBID:187)

DURAND

Jean-Nicolas-Louis Durand (1760-1834) examined the Classicist in architecture as generic principles. He argues that good architecture satisfies essential requirements of building. Durand focuses his argument on economy, construction, commodity and beneficial conditions. The principles of Classic architecture are broadly discussed through rational geometric planning. (IBID:176)

ÉCOLE DES BEAUX-ARTS

The French school of architecture re-establish the objective principles of Classical architecture. Archaeology advocated the revival of the Classic traditions, allowing aesthetic primacy of design over practical matters of construction. It was divided into ateliers, where students were taught building, design and practical aspects of construction. Historically, this was the first time students could study architecture without prior working experience or experience of construction. (IBID:193)

CHOICY

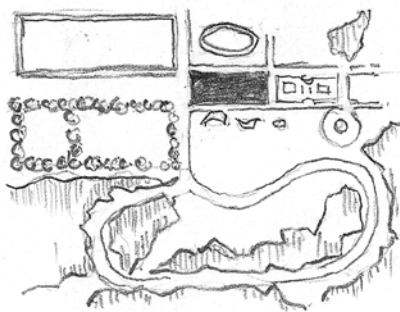
Choicy (1841-1909) believed that architectural form followed logically from technical constraints, designers operate within a stylistic expression offered by available technology of the time. Choicy underplayed the role of the individual in building design, having little or no say in the development of the forms. He argued that form emerges as a result of conceptual necessity. Termed constructional fatalism by Reyner Banham, Choicy has a strict deterministic view on architectural history. (IBID:211)

LOOS

Loos's essay "Ornament and Crime" was directed against decoration in architecture. He believed that all building material possessed an inherent language of form. Ornament is additive form that interferes with the inherent language of design. Loos promoted the idea of honesty in material form, advocating against the notion to copy or assimilate the inherent properties of one material (a notion derived from Semper). (FORTY 2000:161)

ECLECTIC GARDENS

** In the 19th Century, the botanical appearance of plants became important (TURNER, 2005).*



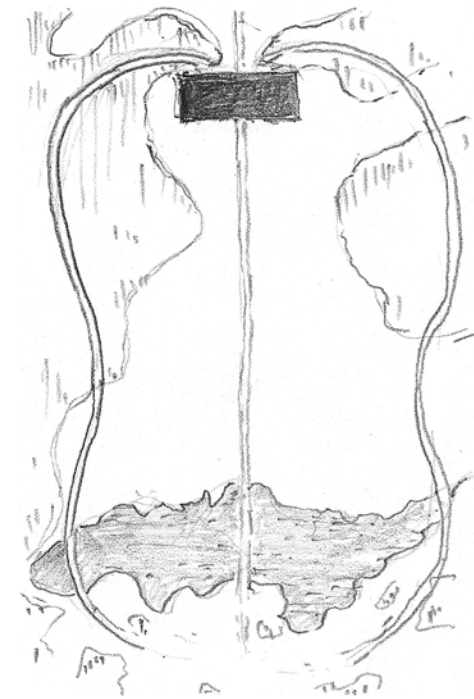
Fig_22: 19th Century: diagramme illustrating the typology of Mixed Style.

Use: Influence by the gardenesque and 19th Century occupations with travelling, the style produced gardens displaying stylistic collections through landscape history.

Form: The eclectic collections comprised of mixed zones laid out in different styles.

Use: Landscape-style gardens are divided into three zones; the dwelling zone, a farm zone and a scenic zone.

Form: Stylistic employment of the zones comprise a rectilinear design for the house garden, free-form/serpentine for the farm and irregular/natural design for the scenic zone.



Fig_23: 19th Century: diagramme illustrating the typology of Landscape Style.

CONCLUSION

The 19th Century was characterised by Eclecticism, the arts and crafts movement saw art as the creative expression of the designer. The Classicist quest for correctness over originality undermined the subjective, producing stylistic form. The epoch endorsed the use of existing forms; good architecture should use them without question and rather focus on the art of construction. Form was influenced by economy and the expense involved in the production. The relationship between form and programme was driven by efficiency in its production.



20TH Century

The 20th Century was dominated by two seminal movements; the Modern and the Post-Modern.

The Modern Movement was the inception of Walter Gropius and the ideas of the Bauhaus school. The *Language of Vision* matured to become the accepted philosophy of the avant-garde in Europe. Two groups were formed, the Congrès Internationaux d'Architecture Moderne (CIAM) in 1928 and the Modern Architectural Research Group (MARS) in 1933. They offered the 'International style' as a replacement for all previous ones, arguing that the new approach would bring about architecture that would functionally, rationally and economically satisfy architectural requirements (GELERNTER, 1995:250).

Post-Modern is a reaction against the Modern and all other subsequent philosophies and architectural movements that asserted themselves in the belief that philosophy, technology and science could solve complex human behavior. The term Post-Modern evolved in the mid-1970's and is associated with a reorientation against the ideas of Modernism and its proposed solutions to complex problems (IBID:278).

GUADET

Julien Guadet (1834-1908) questions pure rational and analytical thinking, viewing intuition as the true generator of artistic ideas. He assimilated universal principles of Classicism in architecture, defining it not as a particular style but as a general attitude to design. He was against copying archaeological forms without understanding their underlying logic. Gaudet argued that forms are created in universally objective design elements and compositional principles. Gaudet believes that a designer should first conceive the idea of the building form, the realization of architectural resources will shape the idea through the process of design (building technique, finance, programme/brief).

1900 AD – 2000 AD

He argued that architects select elemental forms (wall, door, window, column, vaults and stairs) and add them together according to geometrical principals (axiality, symmetry and proportion). Varied beliefs, climates, cultures and sites require different arrangements of these universal elements. The brief or programme influences and determines the design idea. Gaudet argues that, although the brief provides the designer with requirements and relationships of building elements, it should not impose the combination or geometry thereof. Architectural form is conceived in the mind (IBID:228).

NEO-PLASTICISM & MOHOLY-NAGY

The stylistic movement implemented by de Stijl painters was launched in 1917 by Piet Mondrian. The Neo-plastic movement aims to break free from individual inclinations and sentiments of pre-existing experience and to express form through pure geometry, freeing art from the fixed objective laws of plastic composition (IBID:234).

Lazlo Maholy-Nagy was the principle architect of the 'language of vision' at the Bauhaus. He reasserted a neo-classical belief in a universal objective language of design. Termed the language of vision, the theory deconstructs architecture into elements (lines, plane, masses and colours) and different compositions (principles of balance, proportion and rhythm). Maholy-Nagy's theory is based on the simplification of planar styles and elements and consequently formed the normative guide to the Modernist aesthetic. (GELERNTER, 1995: 247).

ECLECTICISM & VENTURI

In the 1950's the Post-Modernists revisit subjective formalism for its visual possibilities playfulness and free forms, rummaging through history, they selected fragments of forms from previous stylistic expressions. The collected styles were reassembled to gain a new meaning in a different context (IBID:280).

1900 AD – 2000 AD

Robert Venturi's 1966 treatise *complexity and contradiction in architecture* attacks the Modern. Venturi based his assault on two accounts: the rejection of tradition and that the objectification of the primitive/elementary at the expense of the diverse/sophisticated. He preferred the visual complexities in the Mannerist, Baroque and Rococo periods. Venturi revived the 19th Century concept of eclecticism. He derives form from historic precedents (IBID:282).

STERN

Robert Stern viewed the Classical as an essential component to the evolution of architecture. He postulated a theory he termed 'humanist'. Using the analogy of style as a language that continually evolves in time Stern argues that style is composed of two components; syntax (form) and the rhetoric (context). He criticizes the Modern Movement for rejecting the traditional (rhetoric) but keeping the syntax (form). Sterns' humanist theory generated the Post-Modern notion of context, the return to the classical rhetoric (IBID:284)

DECONSTRUCTIVISM

The movement was founded in the 1970's by Jacques Derrida as a reaction against Western philosophy's rationalist belief that in absolute knowledge and truth. The Deconstructivists undermined all previous concepts of theory and reasoning without supplying anything in its place; nothing means anything, and anything means nothing. In architecture the source of form was conceived by Peter Eisenman, Daniel Libeskind, Zaha Hadid and Bernard Tschumi. They fused ideas with the Russian Constructivists of the 1920's. Form expressed a world without order or logic through disorientated and dynamic geometry enforcing the idea that order is an illusion (IBID:285)

1900 AD – 2000 AD

Use: Seen as rewarding and spiritually satisfactory, owners were involved in design and maintenance of gardens.

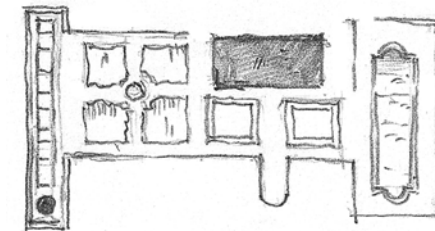
Form: Garden design was based on principles of the arts and the crafts involved in the making thereof. The technique produced two zones, a geometrically designed- and a naturalistic zone.

Use: Driven by the machine ethic of the modern, gardens were designed spaces for outdoor living, exercise and recreation.

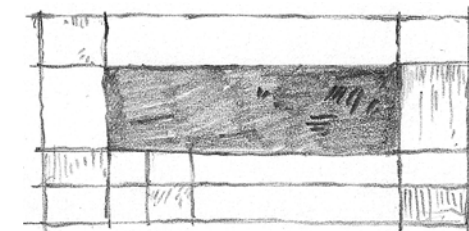
Form: The abstract style of Mondrian (de Stijl) provided the predominant source of form. Curvilinear and rectilinear designs were expressed in new materials (concrete, glass and steel).

ABSTRACT AND POST-ABSTRACT GARDENS

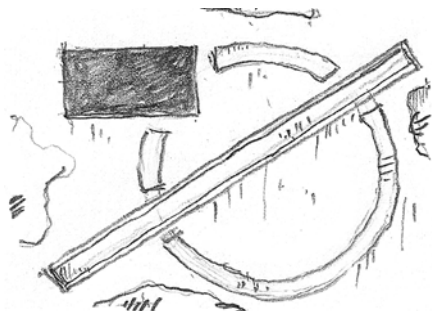
Modern/Abstract gardens: Nature is understood through scientific analysis, gardens should be based on the principles of abstraction. Post-Modern/Conceptual gardens: The understanding of nature depends on individual perceptions, these individual concepts should manifest in garden designs. (TURNER, 2005:273).



Fig_24: 20th Century: diagramme illustrating the typology of Arts & Crafts Style.



Fig_25: 20th Century: diagramme illustrating the typology of Abstract Style.



Fig_26: 20th Century: diagramme illustrating the typology of Abstract Style.

CONCLUSION

The Modern Movement's language of vision was the most important source of form in the first half of the 20th Century, the new approach was developed to satisfy building requirements of function and economy. The Post-Modern was the predominant source of form in the second half of the 20th Century. Affirming the belief in classical philosophy, form is derived from historic precedents and context.

The relationship between form and programme in this epoch is influenced by different -isms:

Neo-plasticism: The Modern relationship is based on the rationality of the machine ethic.

Eclecticism: The Post-Modern relationship is based on the subjective opinion of context.

Deconstructivism: The Deconstructivist relationship is based on the irrational and nihilistic.

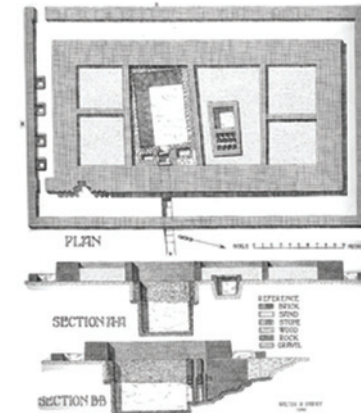
Use: Experimentation deconstructed all previous ideas of garden design, resulting in a multifaceted postmodern structural garden composition.

Form: Landscape form resulted through the process of layering, deconstruction and fractured geometry.

2000 BC – 1000 BC

In Antiquity form was minimally influenced by mathematics. It was derived from the empirical influence of gods and ritual sacrifices in temple and pyramid designs. Architecture and aesthetic gardens embodied the religious beliefs of spiritual places.

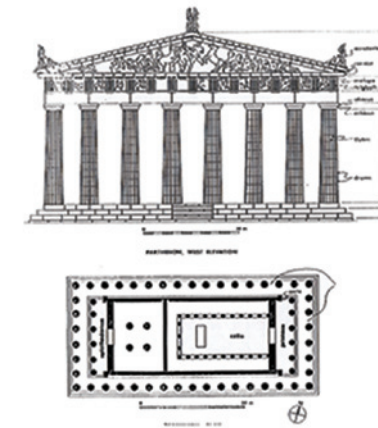
Synthesis of theory



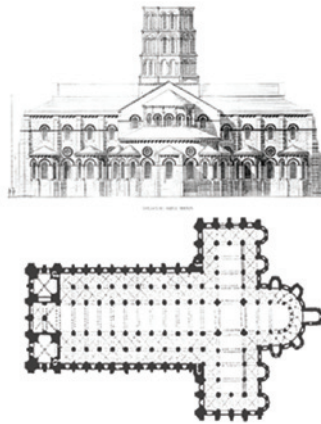
Fig_31: 1st Dynasty Egyptian tomb.

1400 BC – 500 AD

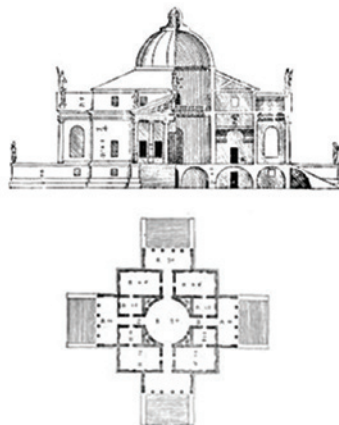
In the term Venustus (Beauty) Vitruvius expresses that the pleasure of form is made possible by the use of proportion. Form in Antiquity (ii) prescribed focus on the aesthetic in nature; a formal relationship between form and programme is rationally composed.



Fig_32: Parthenon.



Fig_33: Basilica of St. Sernin.



Fig_34: Palladio: Villa Rotonda.

600 AD – 1500 AD

Architecture sought to embody all aspects of Christianity as an arraignment in the building structure. Antiquity derived proportions from organic forms, with an underlying theme of transcendental/metaphysical. Scholastic philosophy of the Middle Ages prescribes that the relationship between architectural form and programme should adhere to an aesthetic approach moulded by divinely inspired geometric proportions.

1350 AD – 1650 AD

The Renaissance reasserted the Classical notion of form, derived from nature through rational thinking. Nature was perceived as source of form and rules of proportion. The relationship between form and programme was mathematically determined through rationalism and proportion. Form should resemble the styles of antiquity.

1600 AD – 1750 AD

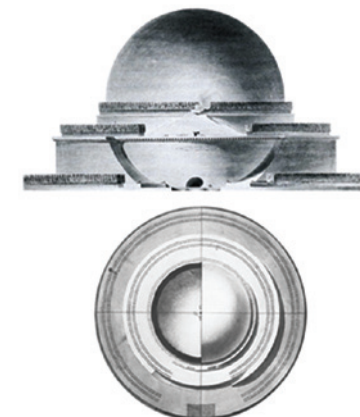
The epoch saw a development in the theory of rationalism. Form is derived from reason and rational structure. A belief in reason, orderliness and timeless principles of form referenced the Classical shapes of building and landscape form. The relationship between form and programme sought to reflect functional problems presented by different projects.

1700 AD – 1810 AD

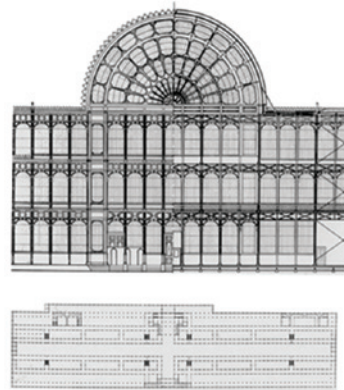
During the Enlightenment, contrasting views on form were shaped by Positivism, Romanticism and Neoclassicism. The Enlightenment held that form should conform to function, necessity and honesty in materials.



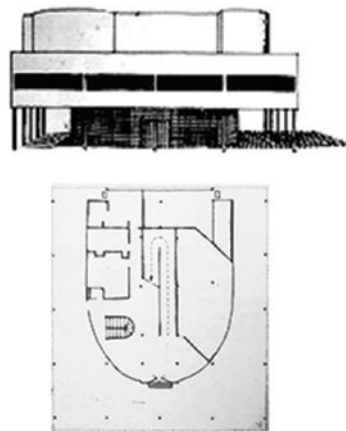
Fig_35: Borromini: San Carlino.



Fig_36: Boullée: Cénotaphe a Newton.



Fig_37: Paxton: Crystal Palace.



Fig_38: Le Corbusier: Villa Savoye.



1800 AD – 1900 AD

The 19th Century was characterised by the eclectic, the arts and crafts movement saw art as the creative expression of the designer. Form was influenced by economy and the financial expense involved in the production thereof. The relationship between form and programme was driven by efficiency in its production.

1900 AD – 2000 AD

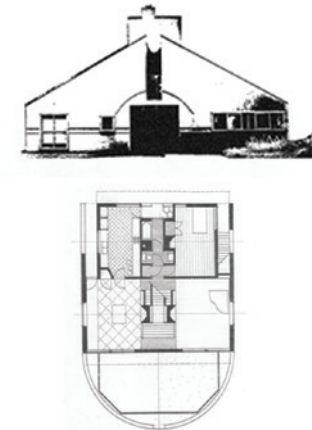
The Post-Modern was the predominant source of form in the second half of the 20th Century. Affirming the belief in classical philosophy, form is derived from historic precedents and context.

1900 AD – 2000 AD

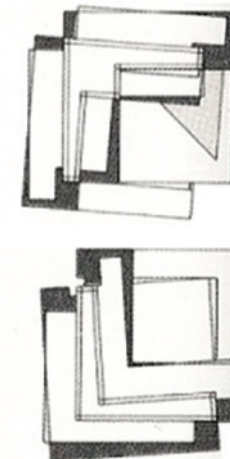
The Modern Movement's language of vision was the most important source of form in the first half of the 20th Century, the new approach was designed to satisfy building requirements of function and economy.

1900 AD – 2000 AD

The Deconstructivists undermined all previous concepts of theory and reasoning without supplying anything in its place, nothing means anything, and anything means nothing. Form expressed a world without order or logic through disorientated and dynamic geometry enforcing the idea that order is an illusion. The Deconstructivist relationship is based on the irrational and nihilistic.



Fig_39: Venturi: Vanna Venturi House.



Fig_40: Eisenman: Diagrammi concettuali.

Architectural form

** The diagramme on page 47 illustrates different relations between architectural form and programme. The pairing is an abstract synthesis, like an argument. It uses objects to illustrate the external logic. The search for form has concluded that architectural form making derives from either one or a combination of five different theoretical positions.*

FORM IS SHAPED BY ITS INTENDED FUNCTION

Buildings are shaped by the functional requirements it is expected to perform. The source of architectural form pre-exists in the functional aspects of building requirements (client's needs, climatic conditions, community values etc.), through this process, the diligent designer discovers form. Form and programme have a direct relationship.

FORM ORIGINATES FROM THE CREATIVE IMAGINATION

Buildings are conceived by drawing on the imagination for form. The process of the 'creative genius' does not conform to methodological processes of rational thought. Architectural form originates from the creative expression of the subjective mind, determined by the inner resources available to the designer. The theory views collective ideas pre-existing in the metaphysical world. These ideas manifest in the physical world through the process of design. The relationship between form and programme depends on the intuitive capacity of the designer.

FORM IS PRODUCED BY THE PREVAILING SPIRIT OF THE AGE

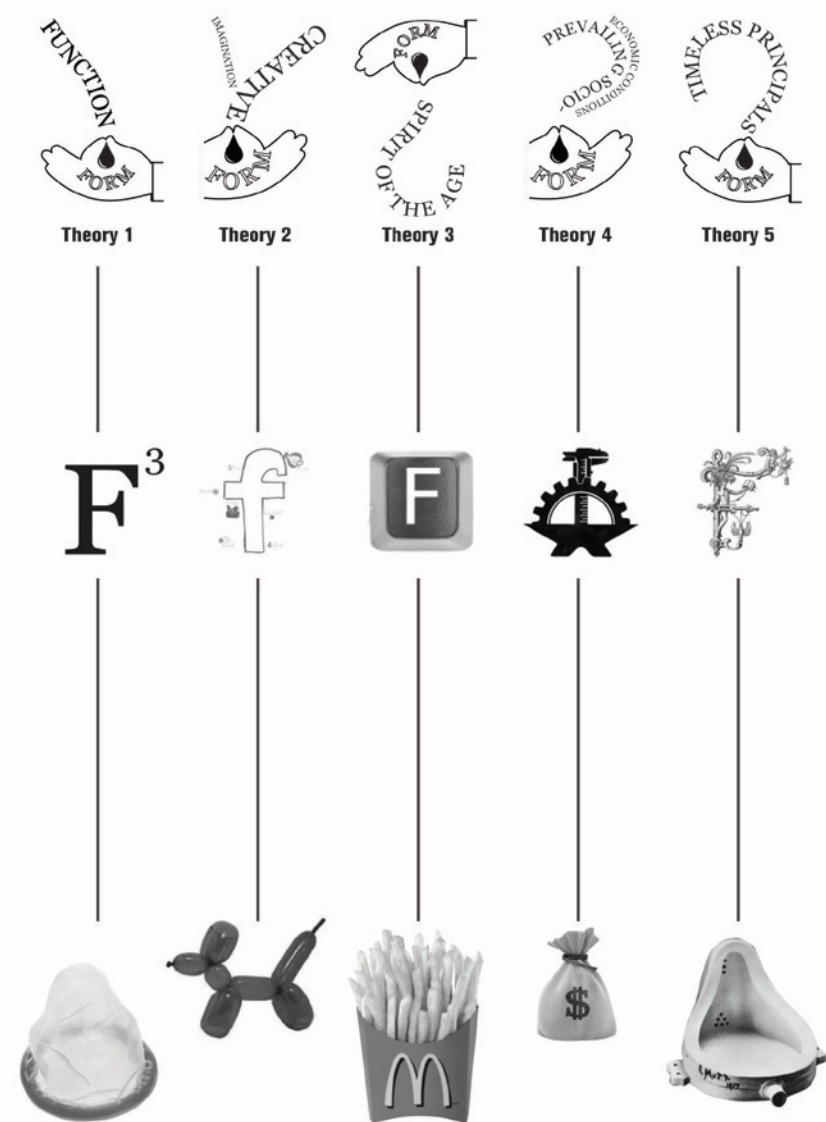
Taste and artistic values pervade from social views and shared attitudes in different cultures. The individual designer unconsciously responds to a collective world-view of artistic taste. Artistic design is formed by two attributes; the overriding characteristics of the epoch and individual skills exhibited by the designer. Form and programme have a direct relationship determined by specific social norms.

FORM IS DETERMINED BY SOCIAL AND ECONOMIC CONDITIONS

Shared economic and social forces shape individual artistic efforts. Socio-economic systems play a further role in the production and distribution of building materials, shaping the design and making of building forms. The relationship between form and programme is dependent on a larger context/culture that determines the trade and industry of the built environment.

FORM EXISTS AS AN UNCHANGING LANGUAGE THAT TRANSCEND ANY PARTICULAR CULTURE OR TIME

Universal forms underline the discipline of architecture; these principals transcend the boundaries of history and culture. Universal principles of form translate into building typology. Variations and original types are geometrically determined, building through logic and historic precedents. The relationship between form and programme is preconfigured for specific types of buildings.



Fig_41: Diagramme of theories on form.

CONTEXT

Urban framework

FRAMEWORK vs. MASTER PLANNING:

There are countless examples of authoritarian, simplistic, erroneous and coercive acts of mapping, with reductive effects upon both individuals and environments.

- James Corner on Mapping

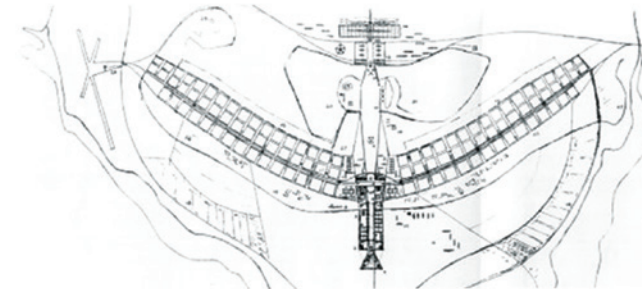
(COSGROVE, 1999:213)

The failure of bureaucratic regimes to embrace the complexity and fluidity of urbanism and of culture had reductive effects upon both individuals and their environments. The limits of the master plan strategies for capital cities negate to address the probability of prospective growth under uncertain conditions. This diminishes the likelihood of embracing the improvisation and uncertainty that exist in urban conditions. The reality of urban conditions does not conform to a single operative strategy. (GRAAFLAND, 2000:6)

The failure of a universalistic approach associated with master planners lies in politico-ideological models of state-controlled schemes (GRAAFLAND, 2000:6). A framework is more than an instrument of an authoritarian regime; it functions as an instrument anticipating urban growth and addresses future needs of uncertain conditions, an aspect that is not present in master planning. Master planning and the eidetic factors associated with politico-ideologies leads to the stagnation in urban conditions.

- Frameworks accept spatial needs in a city, providing future infrastructure.
- Frameworks are a means to re-work what already exists, drawing from open space, movement, historic events, political interests and programmatic structures in the urban condition.
- Frameworks aim to create a city as a place of living spaces, allowing flexibility in elements that create urban form.

Particularly relevant to Pretoria, with ever changing urban conditions a proposal framework aims to create a city with new possibilities. Antiquated design principles are reorganised, shifting the focus from objects and functions to diversity and innovation.



Fig_42: 1956 Master Plan for the capital of Brazil, Oscar Niemeyer. An example of failed politico-ideological master planning (shaped in the form of an airplane).



Fig_43: 1999 Public Realm Strategy for Park Royal, 5th Studio. An urban framework using a layered approach to improve Europe's largest industrial area. The diagramme illustrates the integrated strategy of targeted interventions.

METHOD

Various planning schemes initiated by the local government and national departments provide similarities in future development for the capital core of Tshwane. The framework was reviewed and acquired from more than 20 development frameworks and strategies initiated by the City of Tshwane and the National Department of Public Works.

The focus of the project was:

1. Open space in the city.
2. Movement and public transport.

The framework identifies open space and movement as structuring elements influencing densities and the fabric of the city. The study reviews natural ridges, river edges, green open space, movement routes and public transport networks limited to the inner city of Tshwane.

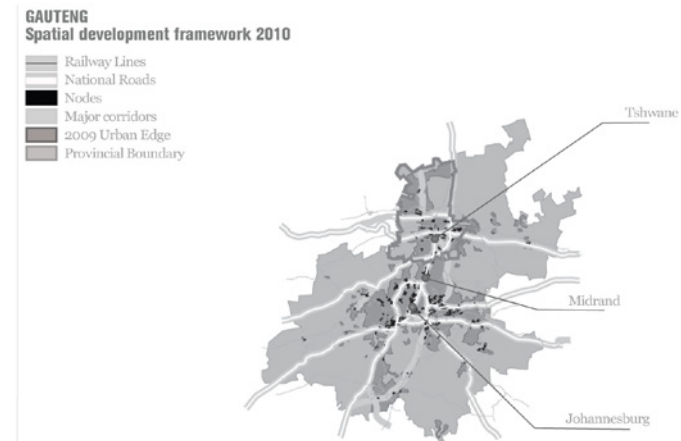
INTRODUCTION

In 2001 the National Cabinets finalised the decision that all national government offices will remain or be located within the Inner City of Tshwane. This was followed by the National Department of Public Works's Re Kgabisa proposal, a planning scheme aimed at developing government-owned buildings and property in the inner city of Tshwane. (INNER CITY SDF 2007:5)

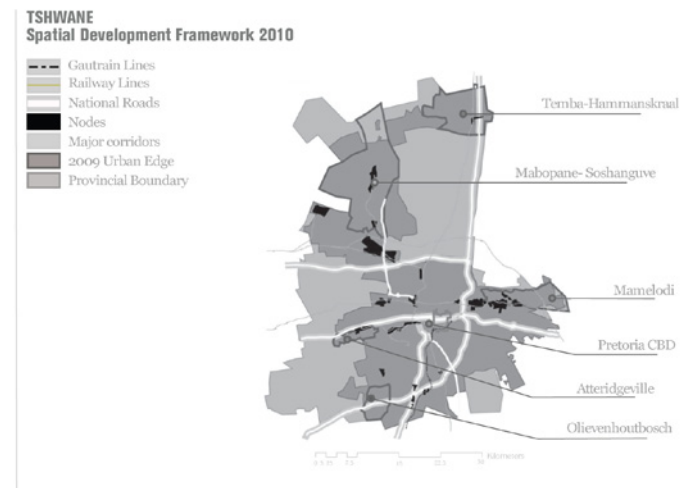
The document supports objectives and guidelines in different development areas as indicated in frameworks by the City of Tshwane and the National Department of Public Works. The Re Kgabisa Framework focuses on the development of three major nodal points in the Central Business District, the Union Buildings, Freedom Park and Church Square (RE KGABISA TSHWANE 2005:33).

The framework allows the development of social exchange for people using the City. The approach of the framework is based on the belief that the public urban environment plays an important role in the social and economic life of the city and its inhabitants. This framework sets out guidelines and design principles for the public urban environment of Tshwane inner city.

** Diagrammes on page 51 give an overview of movement, boundaries and nodes on a metropolitan and local scale.*



Fig_44: Gauteng: Metropolitan strategy.



Fig_45: Tshwane: Local context.

STUDY AREA

The study area extends from an east-west axis (the Showgrounds to the Union Buildings) to a north-south one (the National Zoological Gardens to Pretoria Station). The area is not defined along clear-cut cadastral boundary. Restrictions were drawn up to include the Central Business District and the eastern expanses that feed into it (Arcadia, Sunnyside and Hatfield). The inner city is distinctive, although not cut off from areas beyond its boundaries. It contains the majority of public buildings falling under the management of the National Department of Public Works, encapsulating the administrative core of the City.

DESIGN GUIDELINES

** Extracts from the framework's guidelines are discussed. The framework is modelled on 'nodes' and 'ways' illustrating the underlying principles of conserving open space and improving movement in the city. These influence the spatial quality of the urban fabric and the scale of building in it.*

1. Open space: Tshwane's Inner City is located between two ridges, the framework focussed on conserving the natural elements by network system of open space. Structuring elements relating to open space; natural ridges, river edges, parks, sport grounds, and green open spaces.

- *GREENways*: Identified as green open space, GREENways are the fundamental components of the city structure e.g. the green/open character of Tshwane's natural ridges. Protected as areas of ecological sensitivity, attempts must be made to retain GREENways in their natural state. Protection of indigenous vegetation and strict control of development is essential.

- *BROWNways*: BROWNways are linking routes that aim to connect the GREENways in the city. BROWNways are linear elements aiming to enhance the spatial character of the city, e.g. trees defining the space of movement routes.

2. Movement: The framework analysed existing movement systems, witch are focused on private and public e.g. Gautrain, Metrorail, public- and private transport systems.

- *REDways*: Defined as throughways, REDways form the vehicular road networks that link districts to the Inner City. Identified as areas of potential commercial activity and socio-economic interaction the character of REDways are cultivated by informal activities and landscaping.



Fig_46: The development framework for Tshwane's capital centre. Open space and movement indicate where future urban development will occur, anticipating the future growth of the city

* Fig_47 (Next Page): Urban framework model.



URBAN FRAMEWORK CONTEXT

• 1. OPEN SPACE:

• 2. MOVEMENT:

• 3. PUBLIC TRANSPORT:

SITE BOUNDARY//GREENway//GREENnode//YELLOWnode//BROWNway//BROWNnode//BLUEway •

GAUTRAIN//METRO RAIL//MAIN ROUTES//CEREMONIAL ROUTES//DESTINATIONS •

BRT 1 (EAST 500m)//BRT 2 (NORTH 500m)//FEEDER ROUTES (200m)//HOP-ON-HOP-OFF (TOURISM ROUTE) •



SETTING

Site

CONTEXT:

To understand history is essential for the formation of architecture.

- Ernesto Rodgers on Context

(FORTY, 2000:220).

Context was introduced as part of the architectural vocabulary as a critique on the first generation of Modernist architects. Ernesto Rodgers criticized the way Modernist schemes applied abstract concepts on the grounds of them being indifferent to locality. The critique argued that architecture should relate to its surrounds, connecting with the historic continuum and with its immediate environment. Termed '*le preesistenze ambientali*' or '*ambiente*' the English word '*context*' argues for a responsiveness of architecture to location and history (FORTY, 2000:132). Context enables architecture to investigate and react to the archeological compositions in the setting of a place. The understanding of a place can connect architecture, on an emotional and social level, with history.

ELANDSPOORT357-JR:

The theoretical investigation and framework directed the need for a site that would allow me to convey my own conclusion regarding the relationship between form and programme. Ingrained with the idea of preserving and linking open space in the focus area of Pretoria, the Union Buildings were selected as site. The site is located on Meintjeskop hill, the old eastern boundary Elandspoortrand. Established in 1855, Elandspoortrand was one of two farmlands that became Pretoria (RENCKEN 1989:1). Orientated around its natural landscape and layered with interventions representative of different relationships between form and programme, the site presents a paramount opportunity to explore my premise.

METHODOLOGY:

The context and historic background to my site is discussed in three parts:

- Part 1: Historical narrative of events that took place on the terrain.
- Part 2: Heritage assessment and site specific analysis.
- Part 3: Form analysis of interventions on site.

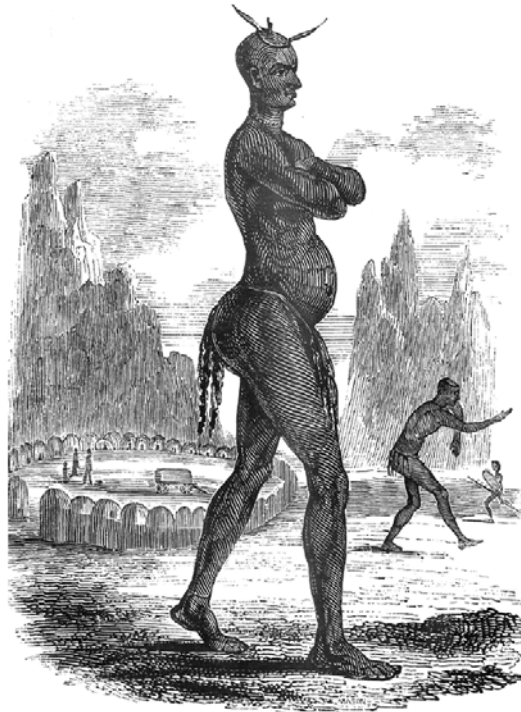


Fig_48 : Allegorical scene: the muse Clio and time chained. Cover Illustration of Clio - the muse of history, from Samuel von Pufendorf's 'Introduction to modern history, and general policy of the Universe', 1753.

Part 1

PRE-COLONIAL OCCUPATION:

Two thousand million years ago volcanic eruptions created the Pretoria group rocks, Meintjeskop is located on one of the ridges created by faulting and up-tilting of sedimentary rocks (VERWEY & SONDERLING 1995). From 1600 AD, late Iron Age communities settled in the Pretoria area. In 1825-1832 the Matabele kingdom based in Pretoria. Their king, Mzilikazi governed the area from his royal village, located to the North of Meintjeskop. (ANDREWS 1989:16).



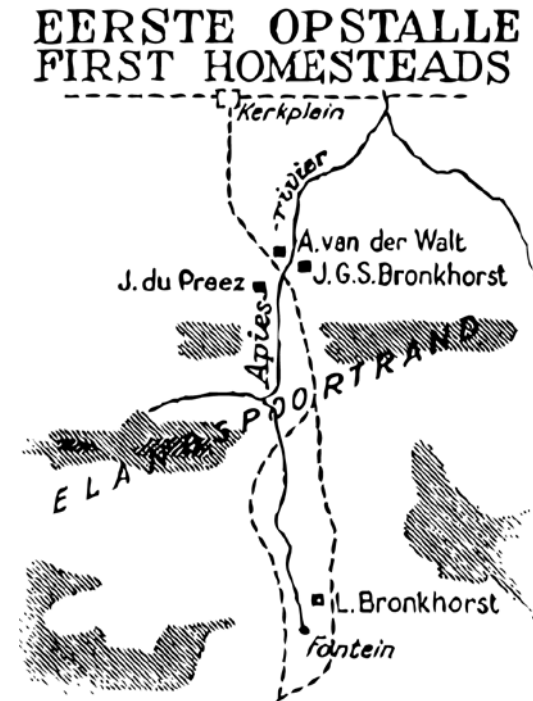
Fig_49 : 1825 - Chief Mzilikazi: According to legend Mzilikazi, chief of the Matabele kingdom, resided his royal village North of Meintjeskop.

2000 BC-1829 AD

1829 AD - 1858 AD

BOER SETTLEMENT:

In 1829 the first white travellers, McLuckie and Schoon visited Pretoria. 1836 - 1842 Voortrekker groups arrive, the brothers Gerhardus and Lucas Bronkhorst established the farm Elandspoor in 1842. Thirteen years later the town of Pretoria was established on 16 November 1855. In 1858 Andries du Toit (the first magistrate), bought the eastern part of Elandspoor (including Meintjeskop) and named it Arcadia (ANDREWS 1989:27)



Fig_50 : 1858 - First Homesteads. A map of the first homestead in Pretoria.



PRE-WAR DEVELOPMENT:

On 7 April 1865 Andries du Toit sold the farm Arcadia. Stephanus Jacobus Meintjes (after whom Meintjeskop is named) acquires the hill on Arcadia (PRETORIANA 1962:39/40). In 1887 Eddie Meintjes inherited Arcadia from his father (ANDREWS 1989:11). Three years later in , 1890 Eddie Meintjes builds a house for his wife (Vredehuis) on the south-western slope of Meintjeskop. (ANDREWS 1999:13).



Fig_51 : 1889 – Pretoria from Meintjeskop, early 20th Century

1865 AC-1890 AD

1890 AC-1910 AD

ANGLO-BOER WAR:

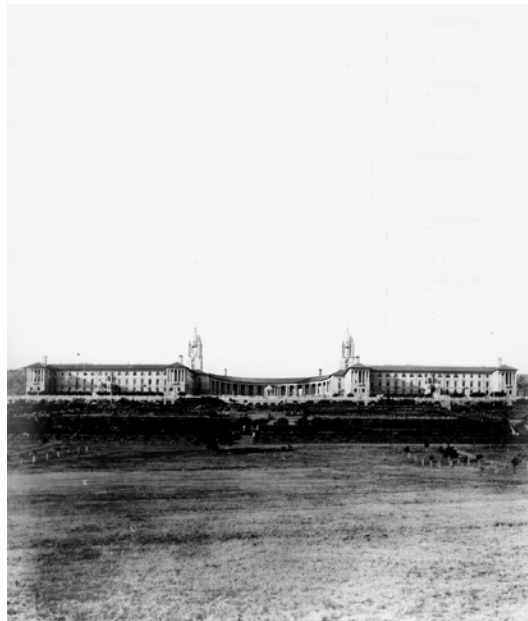
Arcadia was sold to Carel Ziervogel, who registers the site under the name Ziervogel Estate (ANDREWS 1999:81). During the Anglo-Boer War Ziervogel estate was used as a British army hospital. In 1901 a British blockhouse was erected on the western tip of Meintjeskop (VERWEY & SONDERLING 1995). In 1902 Eddie Meintjes bought back the Vredehuis portion of Ziervogel Estate (ANDREWS 1999:64).



Fig_52 : 1902 – Lisdogan Park Hospital, established on the southern slopes of Meintjeskop.

SOUTH AFRICAN ACROPOLIS:

After the war the Natal Colony, Durban Colony, Transvaal Republic and Free State Republic united as one Union. It was decided to build the administrative capital for the new Union of South Africa in Pretoria. Sir Herbert Baker was appointed as architect, and chose Meintjeskop as the site for the new Union Building. The design was significantly influenced by the slope of Meintjeskop. Since its completion in 1914, the building has undergone many political changes, but remains the seat of the South African government (RENCKEN 1989:1).



Fig_53 : 1920 – Union Buildings after construction, seen from Church Street.

1910 AC-2010 AD

Part 2

STATEMENT OF SIGNIFICANCE:

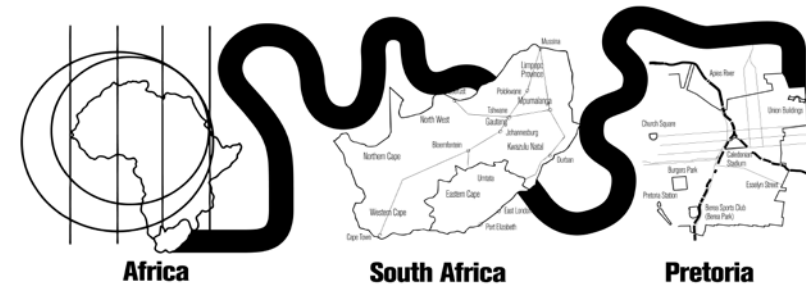


Figure 54: Coordinates: 25°44'25.68"S 28°12'43.28"E 25.7404667°S 28.2120222°E, the location of the Union Buildings Estate.

The site is on Meintjeskop hill, the old east boundary of Elandsportrand (established in 1855) one of the first farms in the Pretoria area (RENCKEN 1989:1). The Union Buildings estate is located in the Eastern Boarder of the capital core of Tshwane. The layout is dominated by the 1910 Baker scheme, but remnants dating back to the 1850's form part of the property.

The estate has undergone various maintenance programmes i.e. the 1983 conservation programme by Roelf Botha Landscape Architects and was proclaimed as National Monument in 1994. Under the National Monuments Act a Conservation Management Plan (CMP) for the estate ground was conducted (MULLER & YOUNG 2005:2).

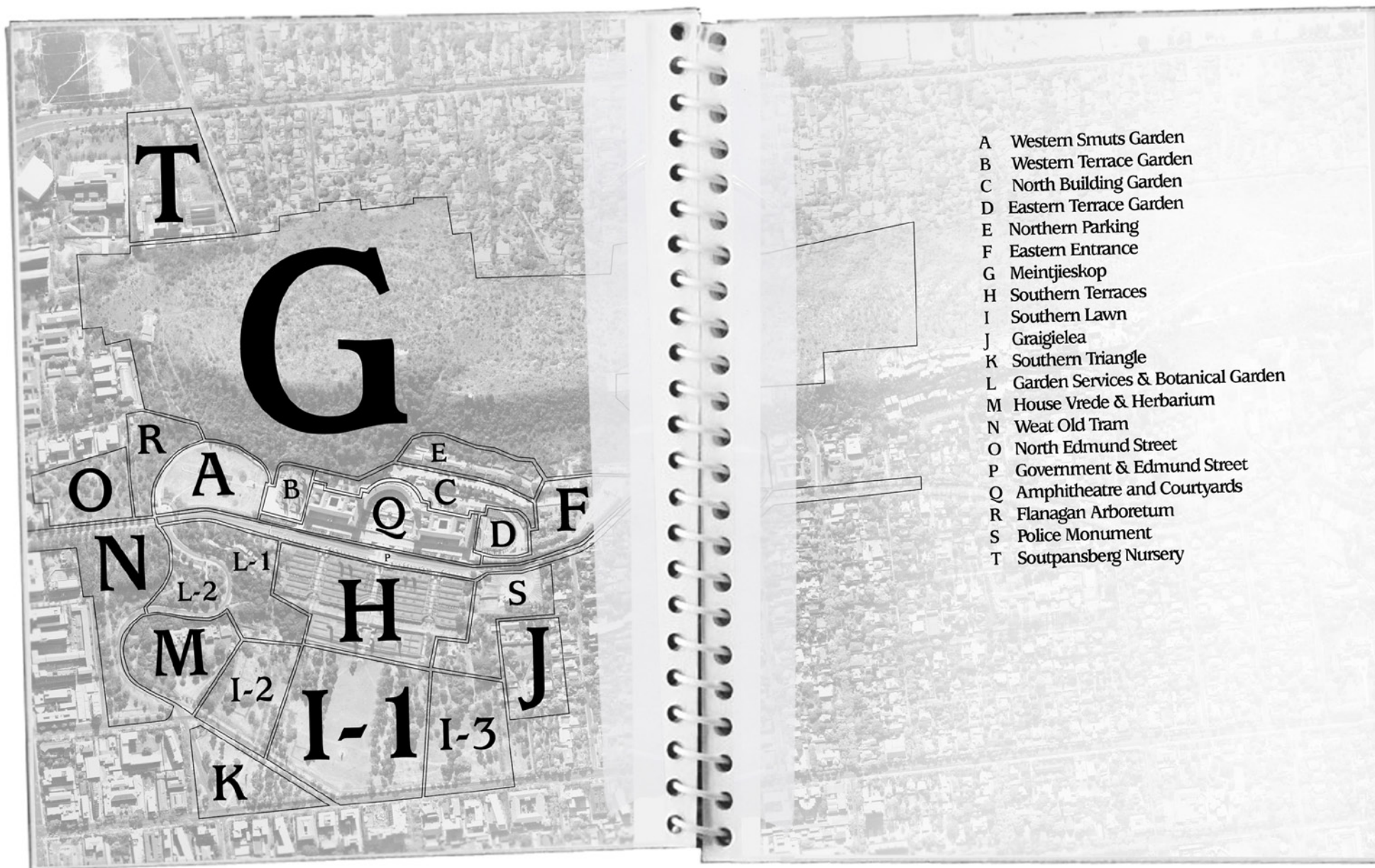
The CMP was initiated by Cultimatrix and Newtown Landscape Architects. In 2004 their approach divided the estate into separate areas, each with is of a distinct character. The CPM focuses on the setting (landscape form and character), the current state and the site history (MULLER & YOUNG 2005:2).

Figure 55: (Opposite Page) The CPM of the Union Buildings estate. The estate is divided in twenty parts (letters A to T) each with a specific character and form.



CONSERVATION MANAGEMENT PLAN

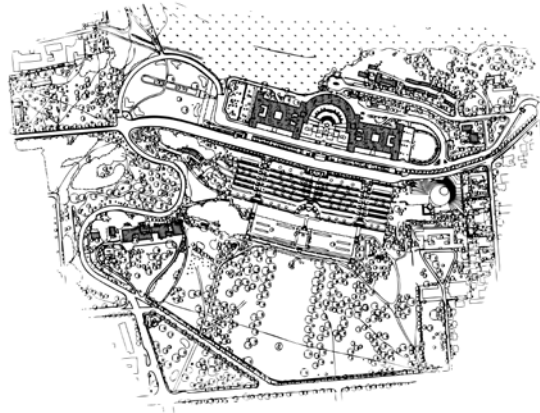
AREA DESCRIPTION



- A Western Smuts Garden
- B Western Terrace Garden
- C North Building Garden
- D Eastern Terrace Garden
- E Northern Parking
- F Eastern Entrance
- G Meintjieskop
- H Southern Terraces
- I Southern Lawn
- J Graigielea
- K Southern Triangle
- L Garden Services & Botanical Garden
- M House Vrede & Herbarium
- N Weat Old Tram
- O North Edmund Street
- P Government & Edmund Street
- Q Amphitheatre and Courtyards
- R Flanagan Arboretum
- S Police Monument
- T Soutpansberg Nursery

Part 3

FORM ANALYSIS:



Fig_56: Union Buildings Estate, Diagramme of Elandspoort357-JR

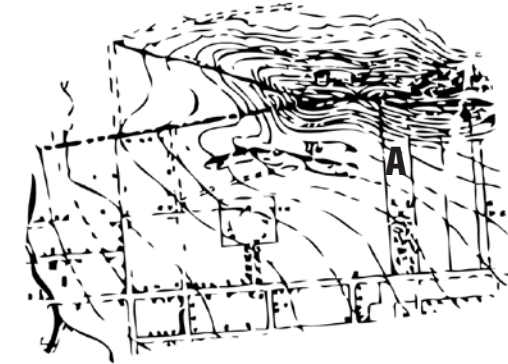
The assessment of buildings on the estate have been evaluated according to area definitions. The estate is layered with memories of events. These include historic boundaries of farms transversing Meintjeskop, three estate buildings on the premises (House Vrede, Engelenburg House and Craigielea), a historic tramline, war memorials and historic pathways (MULLER & YOUNG 2005:2). Although there are many relationships of form on the estate, a graphic illustration will focus on landscape interventions on the site. Not all the area definitions are discussed.

PRE-BAKER:

A - 1888 AD

Use: Used as a farmhouse the estate is in the middle of a rectilinear plot stretching from the top of Meintjeskop to Church street.

Form: The original house was square and of plastered brick on a stone plinth. Following the typology of farmhouse, a verandah was added in front. The house had a passage that running the length of the house (CULTMATRIX & UBA 2005:149).



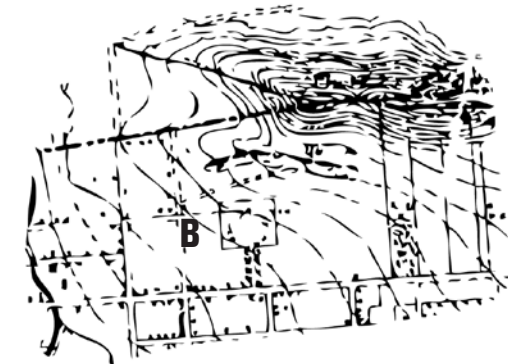
Fig_58: 1888 - Craigielea (area J on the CPM).

A: In 1888 Hugh Crawford established his home at Craigielea on the eastern slope of Meintjeskop (VERWEY & SONDERLING 1995:185).

B - 1890 AD

Use: Built on a slope the lavish residence took up a considerable area to host six horse stables, a cowshed, coachhouse, tennis court, croquet lawns, orchards and a large flower garden (CULTMATRIX & UBA 2005:158).

Form: The main entrance is shaped in a half circular driveway as access to the site services i.e tennis court and the orchard (CULTMATRIX & UBA 2005:158).

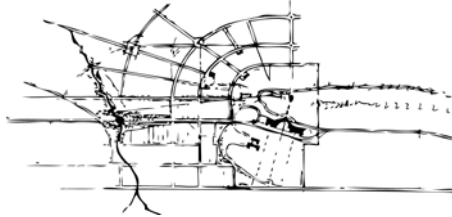


Fig_57: 1890 - Vredehuis (area M on the CPM)

B: 1890 Eddie Meintjes build a house for his wife (Vredehuis) on the south-western slope of Meintjeskop. (ANDREWS 1999:13).

Site -2010 AD

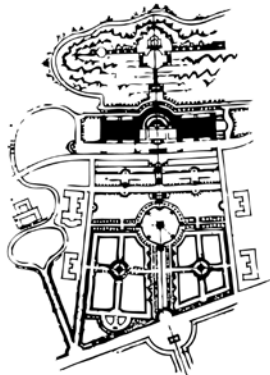
SIR HERBERT BAKER:



Fig_59: 1909- H. Baker's vision of the town planning scheme.

1. BAKER'S VISION:

In 1909 Baker designed the building for the newly united government. The building is designed to be a symbol of pride and unity. The Meintjeskop site was selected specifically by Baker. He aimed to create an Acropolis on the hill that would connect to the city with and the distant hills of the Highveld (MULLER, L. & YOUNG, G. 2005).



Fig_60: Sketch plan designs for the Union Building.

2. BAKER PROPOSAL:

Baker refined the design and it was approved by the Cabinet on 24 September 1909 (MULLER, L. & YOUNG, G. 2005).



H Baker - 1909 AD

Use: The master plan of the site was intended to host the new seat of government, including the parliament and some municipal buildings.

Form: Inspired by the classical Greek acropolis the relationship between building and city is designed in a neo-classical style using radiating axis to connect with the city.

H Baker - 1909 AD

Use: For national ceremonial use by the government, public recreation.

Form: The building is designed in a neo-classicist Italian Renaissance style. The semi-circular Open Court is symmetrically flanked by a colonnade. The building is designed round a central axis, radiating into the garden. A temple of peace terminates the axis on top of the hill (RENCKEN 1989:33).

H Baker 1913 AD

Use: Seat of Government

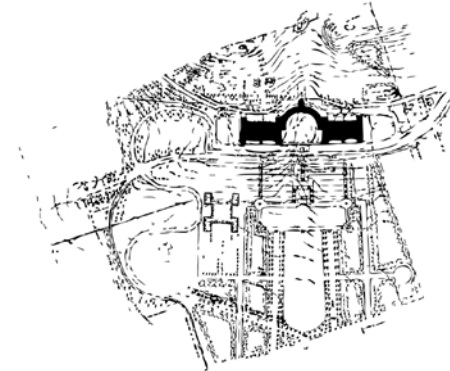
Form: The Neoclassical Italian Renaissance layout of the garden is part of the building. The site is organized by a central axis stretching the length of Meintjeskop.

1910 AD - 1920 AD

Use: Government residence for ministers and guests of the newly formed Union.

Form: The L-shaped farmhouse building was converted to serve the new government. The entrance and site services were maintained (CULTMATRIX & UBA 2005:158).

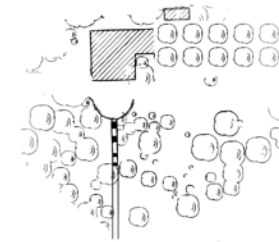
BAKERS DESIGN:



Fig_61: H Baker's terrain plan after construction finished in November 1913.

The Union Building was built between 1910 and 1913. The 1910 scheme linking the site with the city has since lapsed. The temple of peace (never built) and original garden design has been disregarded (RENCKEN 1989:9).

HOUSE VREDE:



Fig_62: 1910 -1920 Vredehuis used as government residence (area M on the CPM).

After the government bought the land from Eddie Meintjes in 1910, Vredehuis was converted to a luxury 10 room estate. Used by General JBM Hertzog from 1910-1912 during his reign as Minister of Justice for the new Union Cabinet (ANDREWS 1999:81).



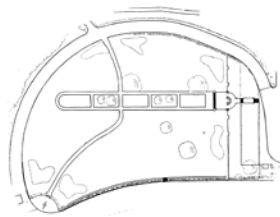
POLE EVENS AT VREDEHUIS:



Fig_63: House Vrede - adapted through time

In 1912 IB Pole Evans (Chief of Entomology and plant Pathology) requested some land at the Union Buildings to be at the disposal of the Chief of Plant Pathology and Mycology. House Vrede (adjacent to the gardens nursery) was selected as site (MULLER, L. & YOUNG, G. 2005).

MONUMENTS:

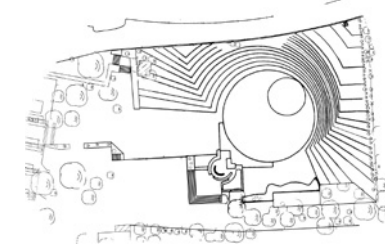


Fig_64: Jan Smuts Memorial (area A on the CPM)

1. JAN SMUTS MEMORIAL:

Commissioned by the Jan Smuts Memorial Committee, the monument was made by sculptor Danie de Jager in 1975 (MULLER, L. & YOUNG, G. 2005).

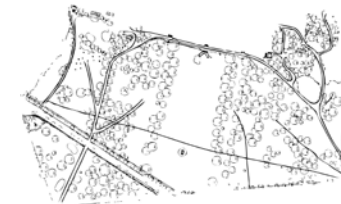
2. POLICE MEMORIAL:



Fig_65: Police Memorial (area S on the CPM).

Built on the old tennis court of the Craigielea estate it commemorates policemen who died on duty. The monument was designed by Maree and Els Architects in 1983 (SA BUILDER. 1982)

PAVED BEACH AND WALKWAYS:



Fig_66: 1910 -1920 Vredehuis used as government residence (area I-1 on the CPM).

Site management initiated in 2001 started to rebuild roads and walkways as part of the site renovation. Overseen by WR Partnership Engineers, the renovation is poorly executed without regard to the original garden design (MULLER, L. & YOUNG, G. 2005). Located on the bottom lawn of the site the renovation aims to recreate the old footpaths and road networks.

1912 AD - 2010 AD

Use: Research facility, herbarium and botanical gardens. The property has been occupied from 1913 by various institutions (State Vet, Plant Pathology and Mycology, National Herbarium and Biosystematics department) (RONG & BAXTER 2006:3).

Form: Too small to occupy the plant collections, the farmhouse was adapted for this use (RONG & BAXTER 2006:3). Two major additions were made in a neoclassical Georgian style, a single storey building adjacent to House Vrede in 1913, and a second story addition with an additional Plant Pathology building in 1933 (ANDREWS 1999).

1975 AD

Use: Memorial

Form: Post-Modern abstract style with a classical influence in the column arcade.

1983 AD

Use: Amphitheatre and a monument to honour the South African Police force.

Form: The circular design is symbolically charged, relating to the idea of growth. A visual connection in the central wall provides glimpses of the Voortrekker Monument. Several columns are joined together to represent different levels of service in the SAPS (SA BUILDER. 1982).

2001 AD - 2003 AD

Use: Recreation and public functions.

Form: Curved pathways follow the old footpaths and roads networks of the Renaissance garden.

PROGRAMME



South African Botany

The primary aim of a botanic garden, as opposed to a park, is to provide practical acquaintance with the plant world.

- Donal McCracken on Botanic Gardens

(McCRACKEN & EILEEN 1988:1)

South Africa has nine national botanical gardens spread across five provinces (Free State, Hantam, Harold Porter, Karoo Desert, Kirstenbosch, Lowveld, KwaZulu-Natal, Pretoria and Walter Sisulu National Botanical Gardens). These gardens aim to create an awareness of the local vegetation in South Africa. The formation of The South African National Biodiversity Institute (SANBI) in September 2004 proclaimed the National Environmental Management Biodiversity Act (NEMBA) and is the managing body of the nine national botanical gardens. SANBI's main focus is to document, study and conserve indigenous South African plants (WILLIS, C.K. & MORKELE, A.T. 2007:2).

EARLY BEGINNINGS:

1. CAPE COLONY:

The mother of South African gardens (the Gardens in Cape Town) was planted a mere 23 days after Jan Van Riebeeck landed at Table Bay in 1652. Originally laid out under master gardener Hendrick Hendricxen Boom, it served different functions at times. Its present layout is the result of Simon van der Stel's 1676 proposal to enclose the company gardens for recreational purposes. The first botanical garden in South Africa was started by the 19th century British settlement (in the Cape of Good Hope) with the establishment of the National Botanic Gardens of South Africa at Kirstenbosch in 1913 (McCRACKEN & EILEEN 1988:ix).

2. TRANSVAAL REPUBLIC:

In 1873, under president Francois Burgers, the Zuid Afriaanse Republiek (Z.A.R) established a botanical committee in Pretoria. John Hunter McLea (appointed as state botanist) established the Transvaal botanical gardens on a 5ha. plot in the centre of Pretoria. The intention behind the 1874 garden was to represent flora of the four hemispheres (the two Boer republics and the two British colonies). The scheme never materialised as a result of the steady financial decline in the Republic (McCRACKEN & EILEEN 1988:111).

After the British annexation of Z.A.R in 1877, Theophilus Shepstone created a new "model farm and botanical gardens" three kilometers outside Pretoria. The 200 ha. plot served as an education facility for farmers. The scheme came to a halt at the end of the British annexation in 1881. The old botanic gardens in Pretoria deteriorated to little more than an open space (IBID).

In 1886 Melrose House was built, overlooking the derelict site. The restoration of the old botanic garden was redesigned in 1890, but it became little more than an attractive public park (IBID). In 1958, 68 years after Burger's Park, Pretoria's National Botanical Garden was established on a 76 ha plot 8km to the east of Pretoria's city centre. (http://www.sanbi.org/index.php?option=com_content&view=frontpage&Itemid=1).

3. RIVALRY FROM THE HIGHVELD:

In 1898 the South African Republic appointed Mrs. Pott-Leendertz, a trained pharmacist and botanist, as curator of the new Transvaal Museum. Between 1901 and 1904 Mrs. Pott-Leendertz began to build up a collection for the Transvaal Museum Herbarium. In 1913 I.B Pole Evans amalgamated two strands of botanical enterprises (the National Herbarium and plant pathology) as part of the Department of Agriculture. The Division of Botany and Plant Pathology was based at House Vrede on the Western slope of the Union Buildings (McCRACKEN & EILEEN 1988:111).

By 1913 the botanical garden of Durban was dilapidated. A state decision was made to move the National Herbarium to Pole Evens's new division at House Vrede (the new Botanical Gardens at Kirstenbosch did not have herbarium at the time). Pole Evens's department grew following the establishment of a small botanical garden on the premises. The department's main focus was to survey botanical specimens in South Africa. In the 1940's the botanical garden at House Vrede expanded, the garden was developed in conjunction with the University of Pretoria (McCRACKEN & EILEEN 1988:111).

By 1958 the modified farmhouse at House Vrede (occupied by Pole Evans) could no longer cope with the expanding collections of plant specimens. The National Herbarium was relocated in 1975 to Pretoria's National Botanical Garden (RONG & BAXTER 2006:3). Although the department moved from the Union Buildings the 1940 idea to keep the botanical garden as part of the National Herbarium remained (http://www.sanbi.org/index.php?option=com_content&view=frontpage&Itemid=1).

Brief

THE 10th SANBI GARDEN:

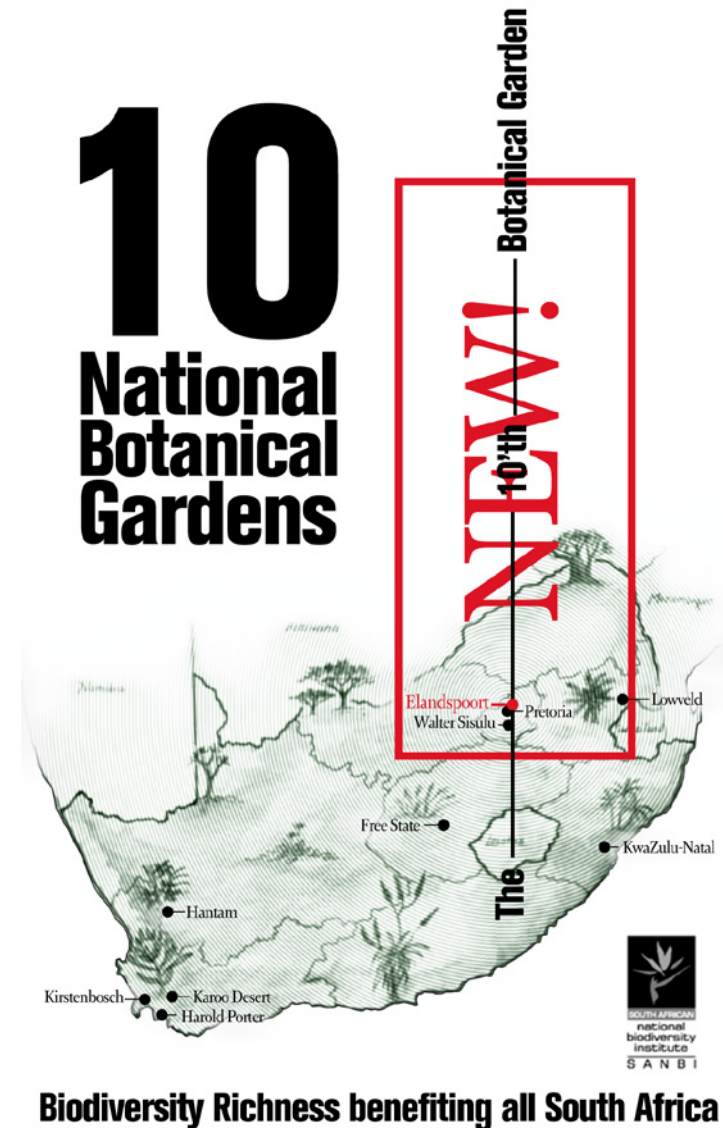
The National Botanic Gardens of South Africa started to extend its activities outside the Cape Province in 1967. The programme of expansion was to provide sites where South Africa flora could be cultivated. To make botanic gardens accessible to as many people as possible, the various botanic gardens are situated near large educational centers. A new garden was founded on the site of the Union Buildings. It's function is to be part of the National Botanical Gardens, serving as an outpost garden in conjunction with Pretoria's National Botanical Garden.

PROGRAMME:

The new SANBI garden is comparatively small and will function as advertisement garden for tourists and visitors at the Union Buildings Estate. The programme of botany is informed by the site history (1914-1975). The 1.3 ha garden will exhibit the diversity of South African biota.

The garden will employ the following staff members:

- One curator, to manage the garden and staff compliment.
- Two horticulturists.
- One admin officer, handling all the administration, staff records and secretarial work.
- An office receptionist dealing with all the telephone calls and bookings for the guided tours.
- Plant records clerk to keep the records for all accessioned plants grown in the Garden.
- An interpretation officer to interpret the garden and produce story boards and pamphlets on the garden.
- Marketing/PR officer, that would market both gardens as tourist destinations.
- Two full time registered guides.
- One qualified building/infrastructure maintenance person.
- One tractor/vehicle driver, one groundsman/gardener per 0,5ha of high maintenance section.



Fig_67: Elandsport Botanical Garden.

DESIGN

Introduction to form

There is a radical error, I think, in the usual mode of constructing a story. Either history affords a thesis – or one is suggested by an incident of the day... I prefer commencing with the consideration of an effect. Keeping originality always in view – for he is false to himself who ventures to dispense with so obvious and so easily attainable a source of interest – I say to myself, in the first place, “of the innumerable effects, or impressions, of which the heart, the intellect, or (more generally) the soul, what shall I, on the present occasion, select? (Reiser, & Umemoto 2006: 100)

- Edgar Allen Poe, *On Composition*

THEORY ON FORM:

The search for form has concluded that architectural form making derives from either one or a combination of five different theoretical positions. My conclusion states idea as the most important aim of architecture, that the relationship between form and programme influences/guides/shapes the idea through the design process. (see pages 14 -47)

FORM ON URBAN SCALE:

The first introduction to form was the urban analysis, aiming to preserve, link and enhance open space in the Pretoria Central Business District. The framework restructures the urban fabric through a series of layers, adding new functions to anticipate urban growth and address future needs of uncertain conditions. (see pages 50 -57)

SITE AND FORM:

The site is orientated round Meintjeskop hill. The natural landscape has a history layered with interventions. Of these, the most prominent is the Neo-classicist 1910 Baker scheme. Form on this scale deals with the archaeological, preserving and enhancing the existing context. (see pages 60 -75)

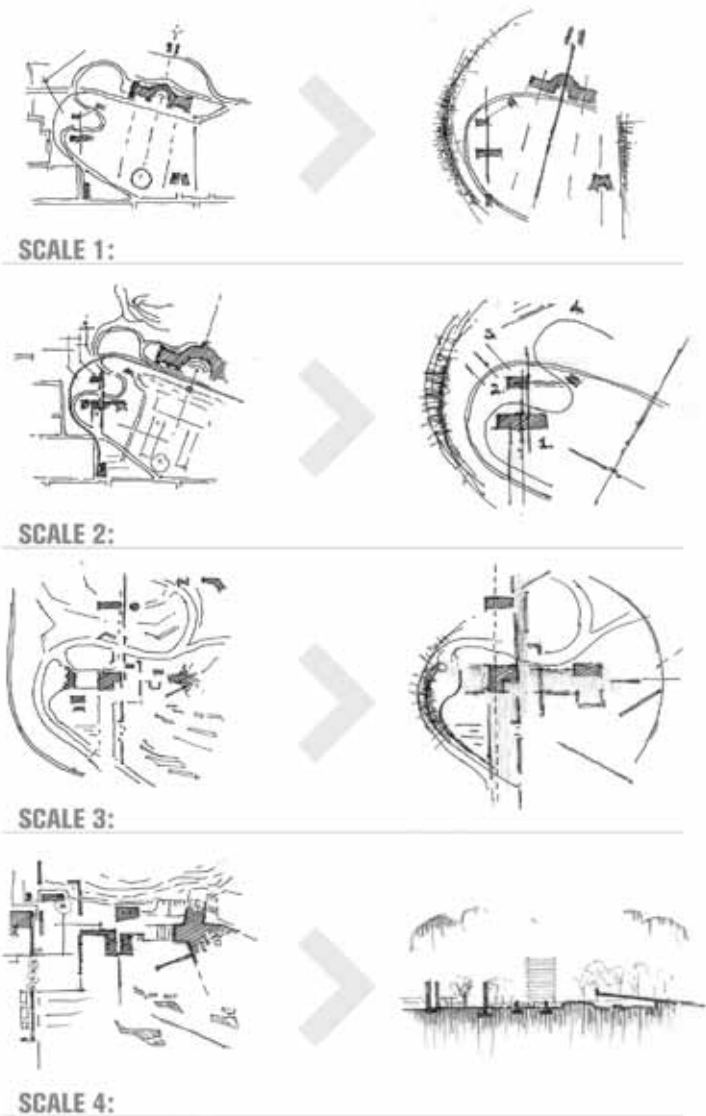
PROGRAMME AND FORM:

The site is historically coupled with nature, while the design of the botanical garden is determined by typography and historic narratives. The site allows the possibility of conveying my own conclusion regarding the relationship between form and programme. The botanical garden is rooted in the idea of architecture for plants, preserving and linking open space on the Union Buildings estate. (see pages 78 -81)

METHOD:

The project deals with immeasurable scale differences, examined in this chapter under various topics. Separate designs are discussed according to difference of scale, arranging the desertion as parts to a whole.

Scale 1: The Union Buildings estate, site development plan for the Neo-classicist Baker scheme.
Scale 2: Elandsport National Botanical Garden, site plan and organisation strategy.
Scale 3: Entrance Garden, landscape and design development of the botanic garden.
Scale 4: House Vrede and associated exhibition buildings, design and technical resolution.



Fig_68: Order: Diagrams on four scales.

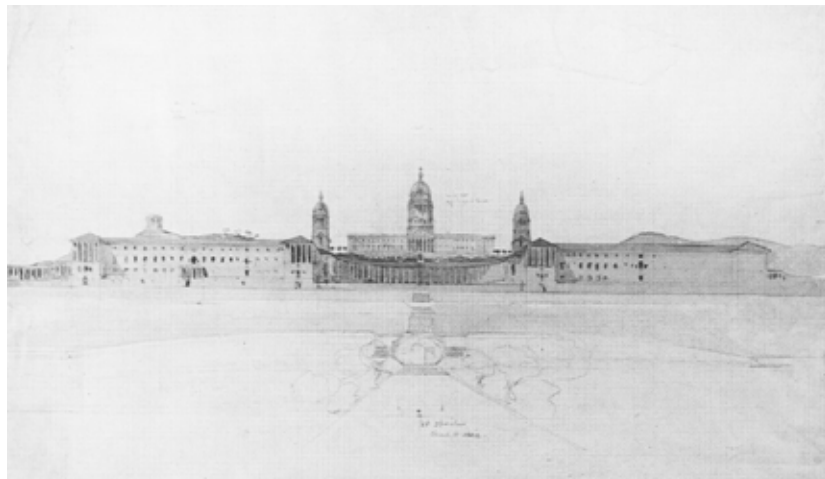
Order

SITE PLAN:

The Union Buildings and its rich political symbolism are the crowning achievement of Sir Herbert Baker's South African career (RENCKEN 1989:1). Based on the premise of reconciliation, the design is a symmetrical plan orientated round a North-South axis transversing Meintjeskop. The scheme is based on a Neo-classicist Renaissance form. A key factor in the development of the design is the association with nature. The Union Building gardens are integrated with the architecture through a series of geometrical relationships. A dominant central axis links terraced lawns with a great flight of stairs. Classicist statuary and clipped hedges adorn the axis, terminating in a colonnaded.

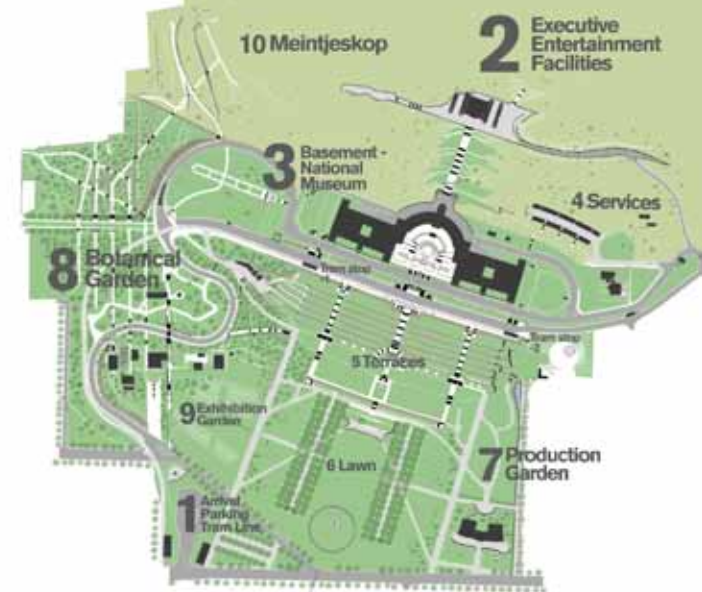
In recent years, the estate has undergone a series of conservation and management schemes, none of which addresses design on a scale equivalent to that of Baker's 1910 vision.

** Figure 70 (Opposite page) is a scheme of the proposed redevelopment plan for the Union Building estate. The site plan incorporates the historic significance of existing form with new programmatic pressures on the premises.*



Fig_69: H. Baker perspective of the Union Building estate

1. Arrival Parking & Tram Line
2. Executive Entertainment Facilities
3. Basement - National Museum
4. Services
5. Terraces
6. Lawn
7. Production Garden
8. Botanical Garden
9. Exhibition Garden
10. Meintjeskop



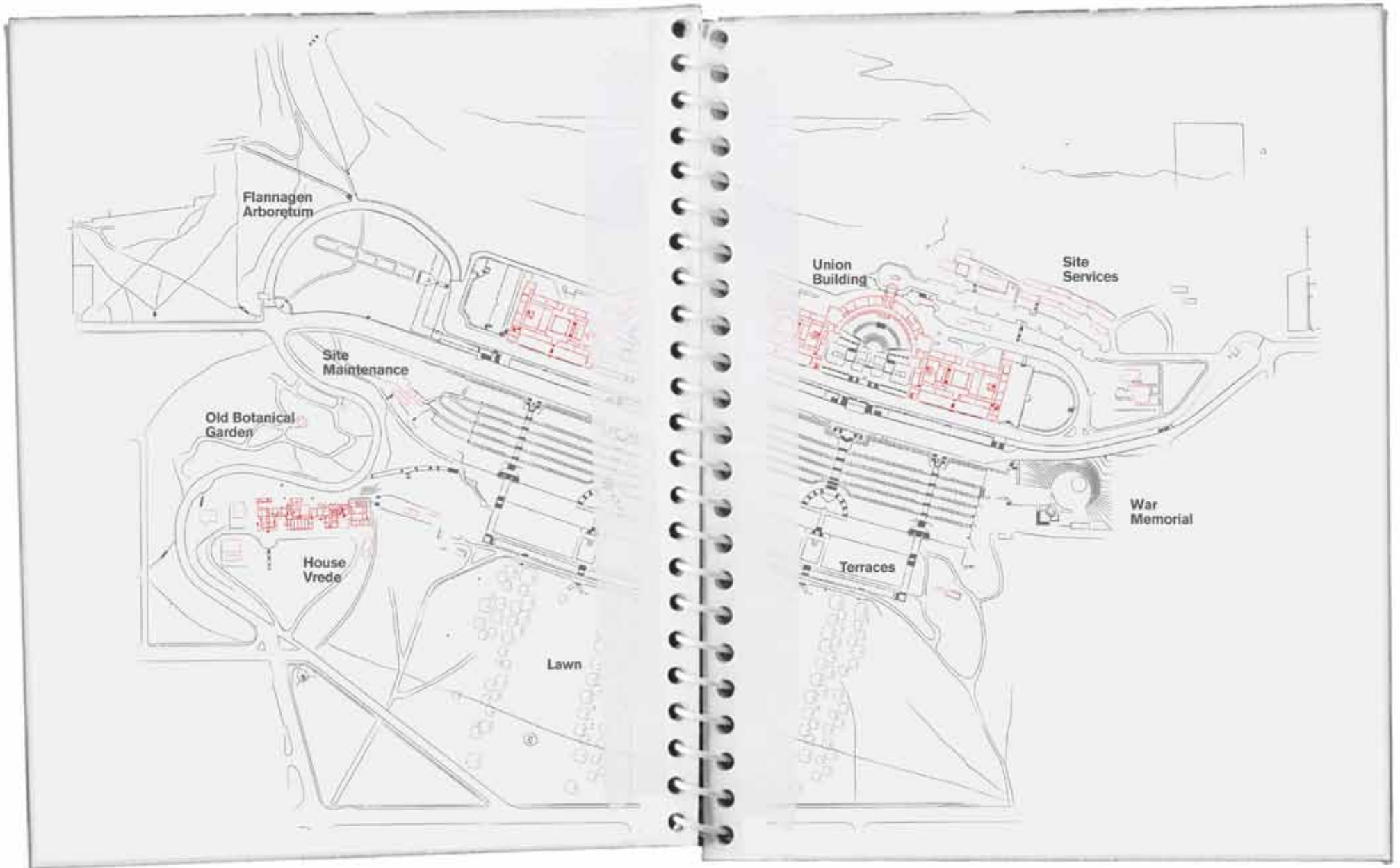
* The Union Building estate, site development plan for the Neo-classicist Baker scheme.

Fig_70: Site Plan of the Union Building Estate.

SITE PLAN EXISTING



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SITE PLAN NEW



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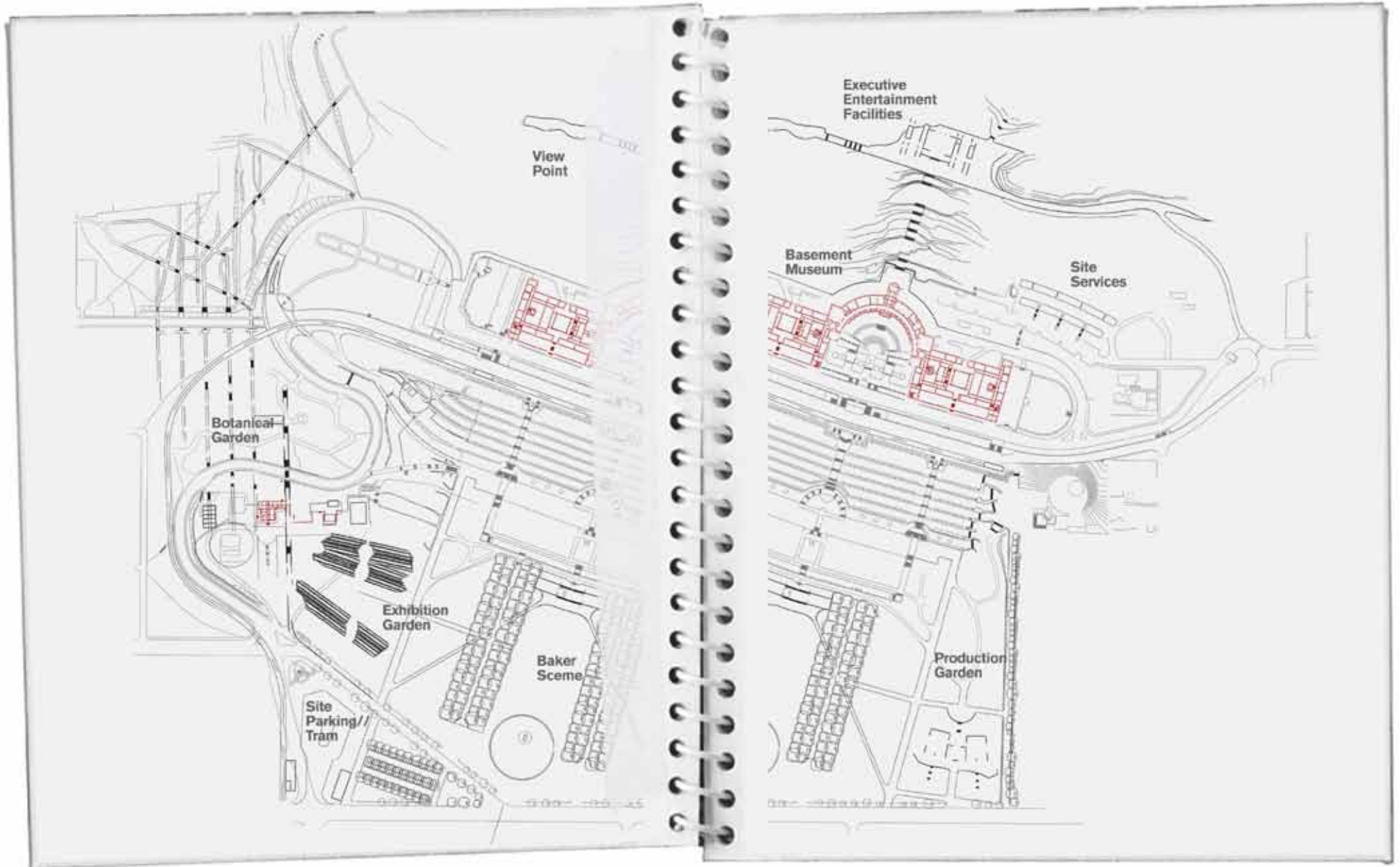


DIAGRAMME DEPLOYMENT:

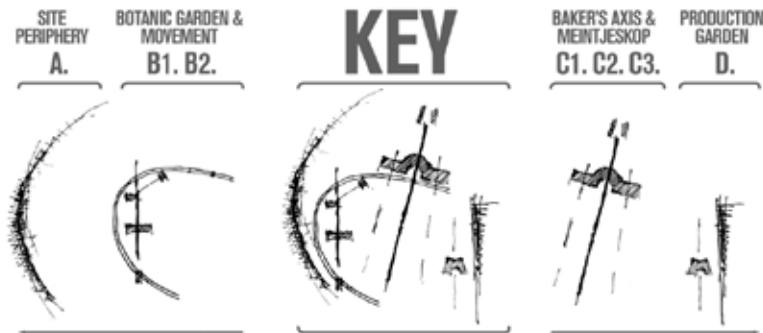
A: LEFT SIDE BOUNDARY - The proposed redevelopment retains the existing character of an open space, linking the site with the city. In changing the existing periphery to become more welcoming, the currently blunt inner-city edge becomes a more active one that engages with its context.

B1: BOTANICAL GARDEN - The National Botanical Garden re-establishes botany as a historic programme. The garden forms the left boundary of the site, curving to define a peripheral green space that links with the city. House Vrede's 1890 axial connection with Church street is exaggerated to connect four separate biomes in the garden. The new botanical axis uses the same organisation as the 1910 Baker scheme, archeologically applying the idea of symmetry to link terraced gardens through a great flight of stairs.

B2: MOVEMENT - Designated as a space for movement, the triangular portion south of the estate is designed as a bus station, parkade and tram line. A new movement strategy restricts vehicular access to roads on the site. The southern island is the predominant gathering space from which most pedestrian activity will disperse on the site. The tram line will run on its old track, designed in 1914, the tram is the primary way of moving people up the site.

C1, C2 & C3: BAKER'S AXIS & MEINTJESKOP - The form reinstates Baker's 1910 vision. An entertainment facility on Meintjeskop is proposed to serve the dual purpose of completing the 1910 Neo-classicist Renaissance axis and provides facilities for presidential functions.

D: EAST EDGE - The Augustan style production gardens draw on the vision of classical Roman landscapes. The form uses the programme of agriculture to establish the Eastern edge of the site. The garden displays the productive aspect of gardening to the public, providing the estate with vegetables and plants .



Fig_73: Diagramme of Site Plan.

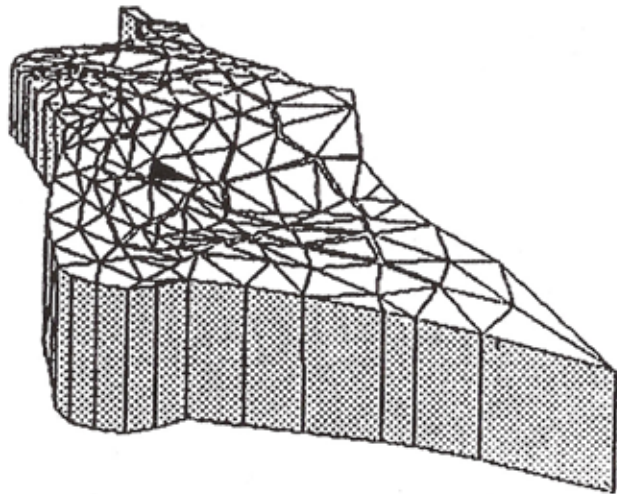


Fig_74: Perspective of the 2010 site development plan.

Botanic garden

TYPOGRAPHY - ORGANIZATION OF CONTOURS:

* Barcelona Botanic garden.
Barcelona, 1999
Carlos Ferrater, Bet Figueras and Jose Luis Canosa.



Fig_75: Ferrater's vision of the 'fishnet stocking' concept for the Botanic garden in Barcelona.

The design is based on a taut net. Stretched to cover the slope of the site, project architect Carlos Ferrater imagined the design as "some sort of fishnet stocking going over the land". Different slopes are reflected in the triangular geometry of the net, giving structure to the layout. The sizes of the net holes establish different slopes and areas in the botanic garden. The lattice is emphasized by three meter wide paths and retaining walls of concrete and cor ten steel (CROFT 2004:188).

The Barcelona's Botanical garden was designed by an interdisciplinary team of architects, landscape designers, horticulturists and biologists. Located on the Montjuic, a green headland in Barcelona the size of the garden is 1.2 hectares. The project was completed in 1999 on a derelict rubbish tip. (http://www.jardibotanic.bcn.es/11_eng.htm#inici)

The garden contains plant collections from the five Mediterranean regions. Plants are exhibited according to their ecological affinity, recreating landscapes as they are found in their natural environments.

SETTING - ORIENTATION AND TYPOGRAPHY:

* Walter Sisulu Botanical Gardens.
Johannesburg, South Africa.



Fig_76 & 77: View of the 40 m waterfall and meandering river, Walter Sisulu botanical garden is organized around a meandering river. Water is used as organizing element.

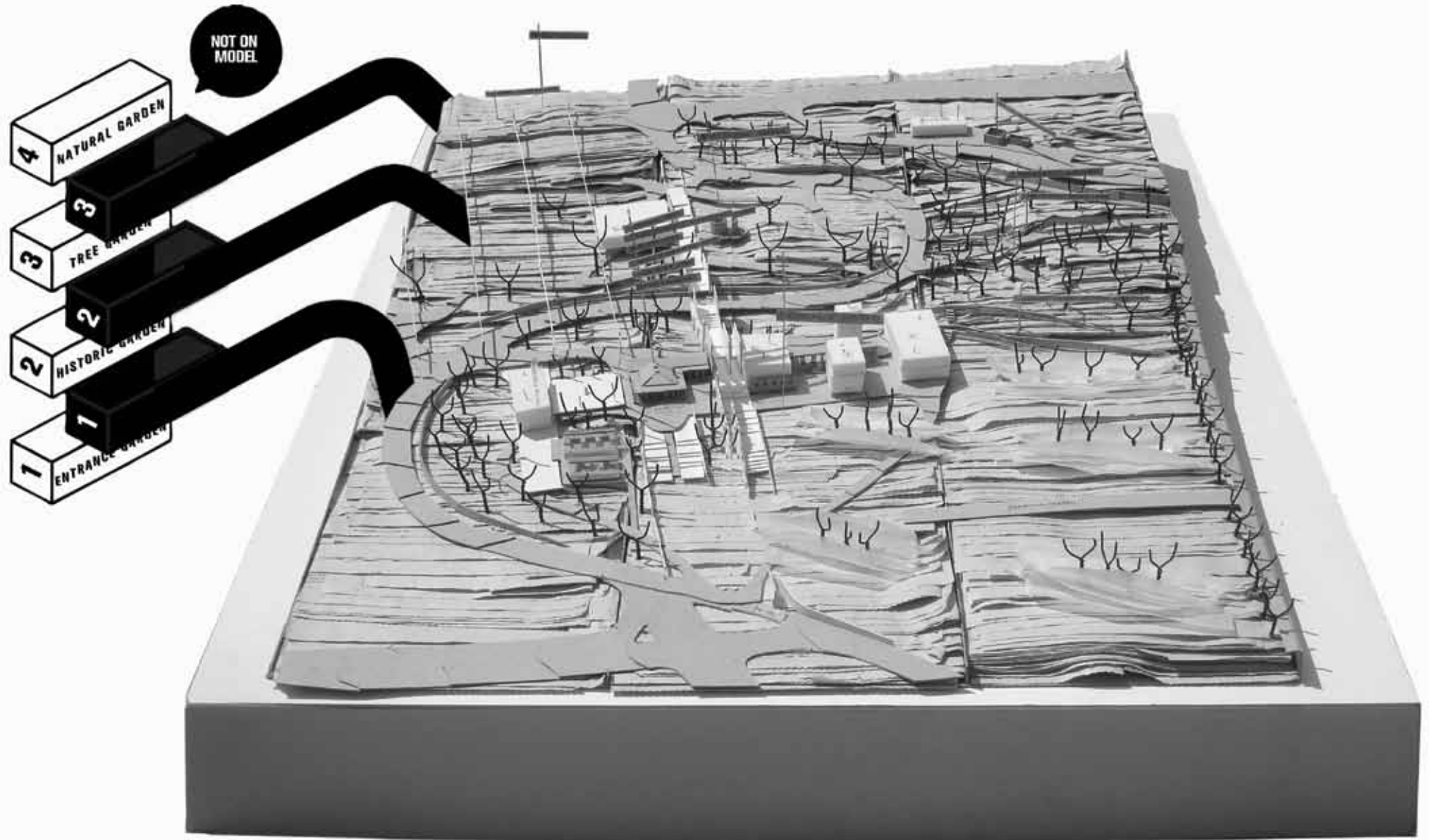
Walter Sisulu botanical garden is located on the West boundary of Johannesburg. It is positioned in a spectacular valley surrounded by hills. Designed around the meandering river, natural geometry is used to organise and familiarise people in the garden. Visitors are guided to the source of the river, the main attraction in the garden, a 40 m high waterfall.

ELANDSPOORT BOTANICAL GARDEN

CONCEPT MODEL



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FOUR GARDENS:

The botanical garden stretches across a steep 1.3 hectare portion of land, west of the Union Buildings. An strategy was needed to provide a logical organisation on the site. Layered by different designs, five prominent programmes make up the current garden form (House Vrede, the old botanic gardens, site maintenance buildings, Flanagan's arboretum and Meintjeskop hill).

Modelled on various precedents, the schematic proposal for the new garden (visitors centre and historic gardens) divides the site into four parts.

PART 1 - ENTRANCE GARDEN:

The intermediate scale garden uses House Vrede's (1890) axial connection with Church street. The historic axis is extended into the landscape to create the organising geometry of the first two gardens. The garden will showcase a series of permanent and temporary plant exhibitions.

PART 2 – HISTORIC GARDEN:

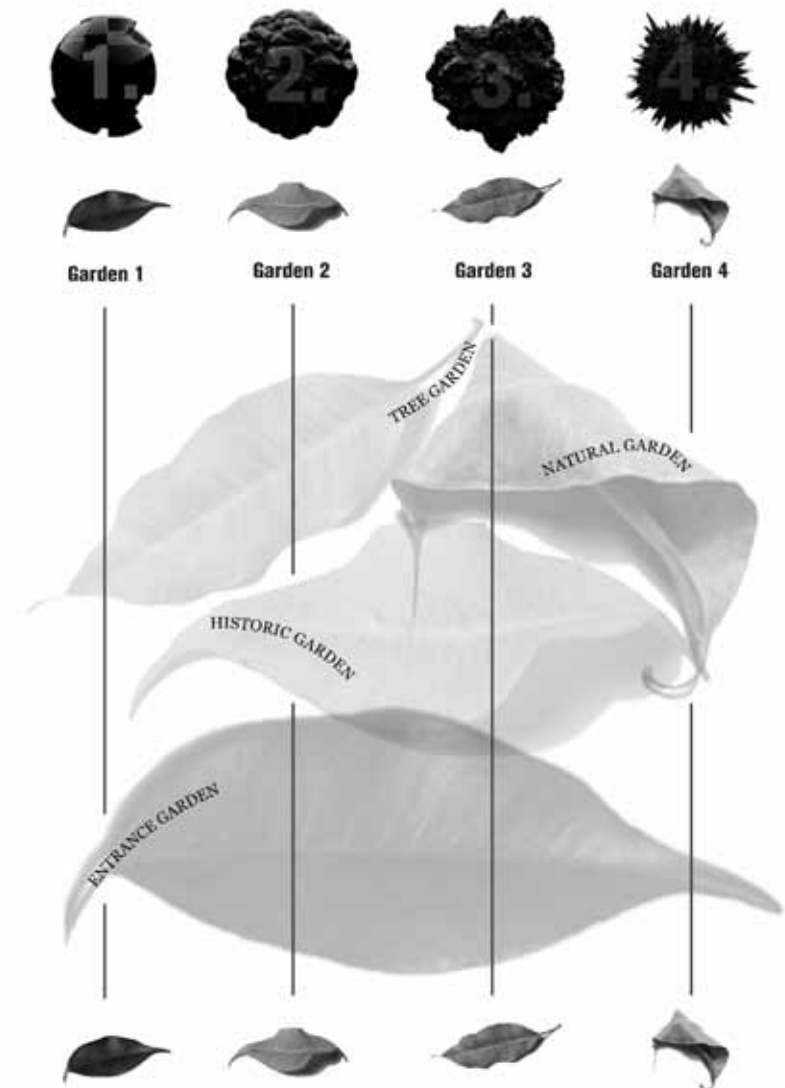
The larger scale garden uses a series of ramped and inclined plains to manage the slope of the site. Designed to display the grand collections of the old botanic garden, triangular steel and concrete planters are used to guide visitors to and from the axially organised entrance garden. A prominent feature of this area is a pine tree plantation that was planted as part of the 1910 Baker scheme.

PART 3 – TREE GARDEN:

Flanagan's arboretum (planted in 1920) houses more than 50 indigenous trees. The character of the garden is open, creating an environment to view and appreciate trees. Pathways through the pine forest connect the relatively isolated site with the historic and entrance gardens.

PART 4 – NATURAL GARDEN:

Meintjeskop forms the natural backdrop to the Union Buildings. Currently overgrown by alien plants, the garden re-establishes the site as part of the Magaliesburg mountain range. Cycads, aloes, and other South African plants will replace the overgrown thicket. The garden is linked to the arboretum with footpaths that zigzag the koppie.



Fig_79: Diagramme illustrating the organization of the four gardens on Elandsport National Botanical Garden.

WEST SITE PERIPHERY BEFORE



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NDSAPOORT BOTANIC GARDEN AFTER

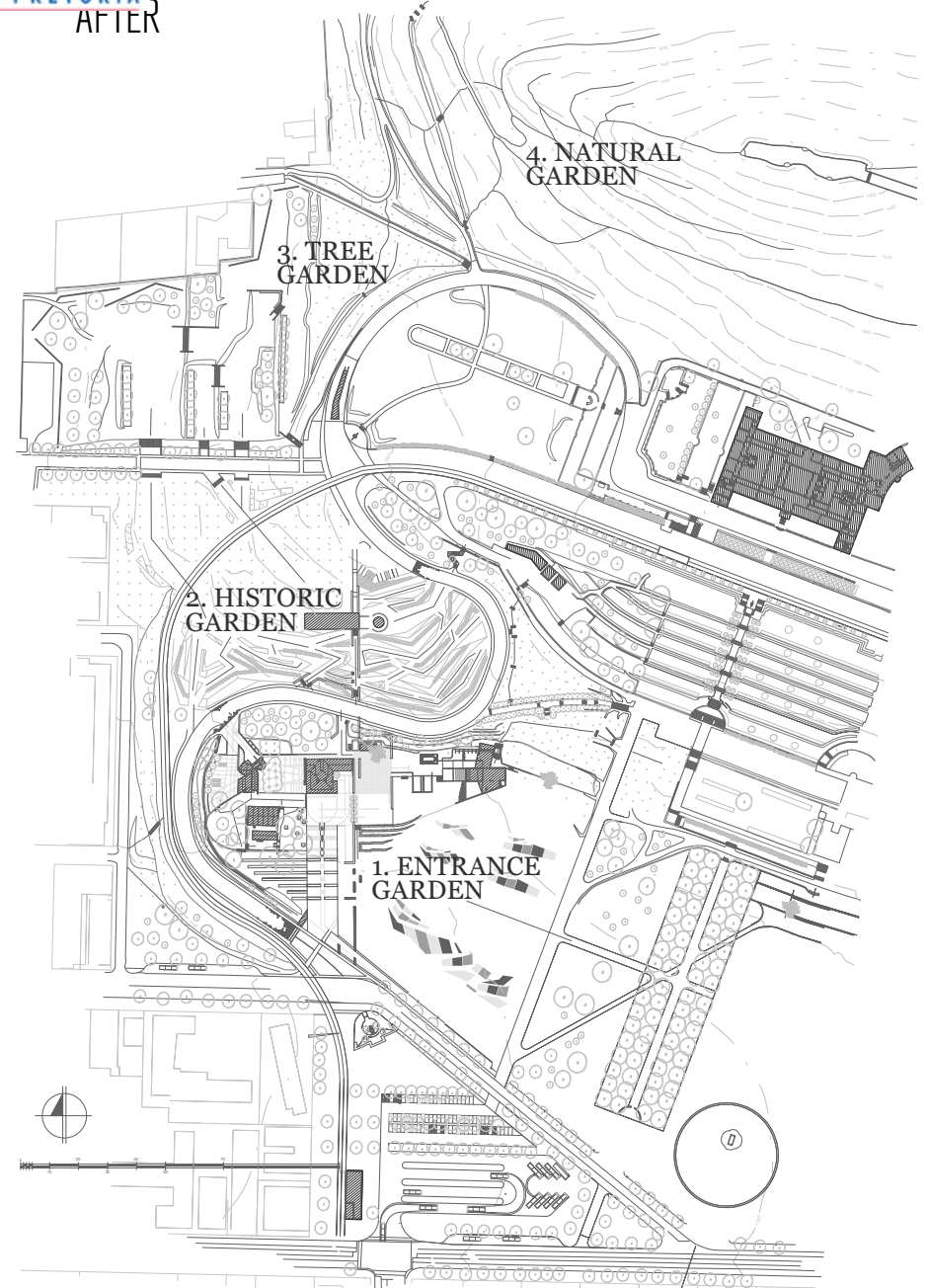
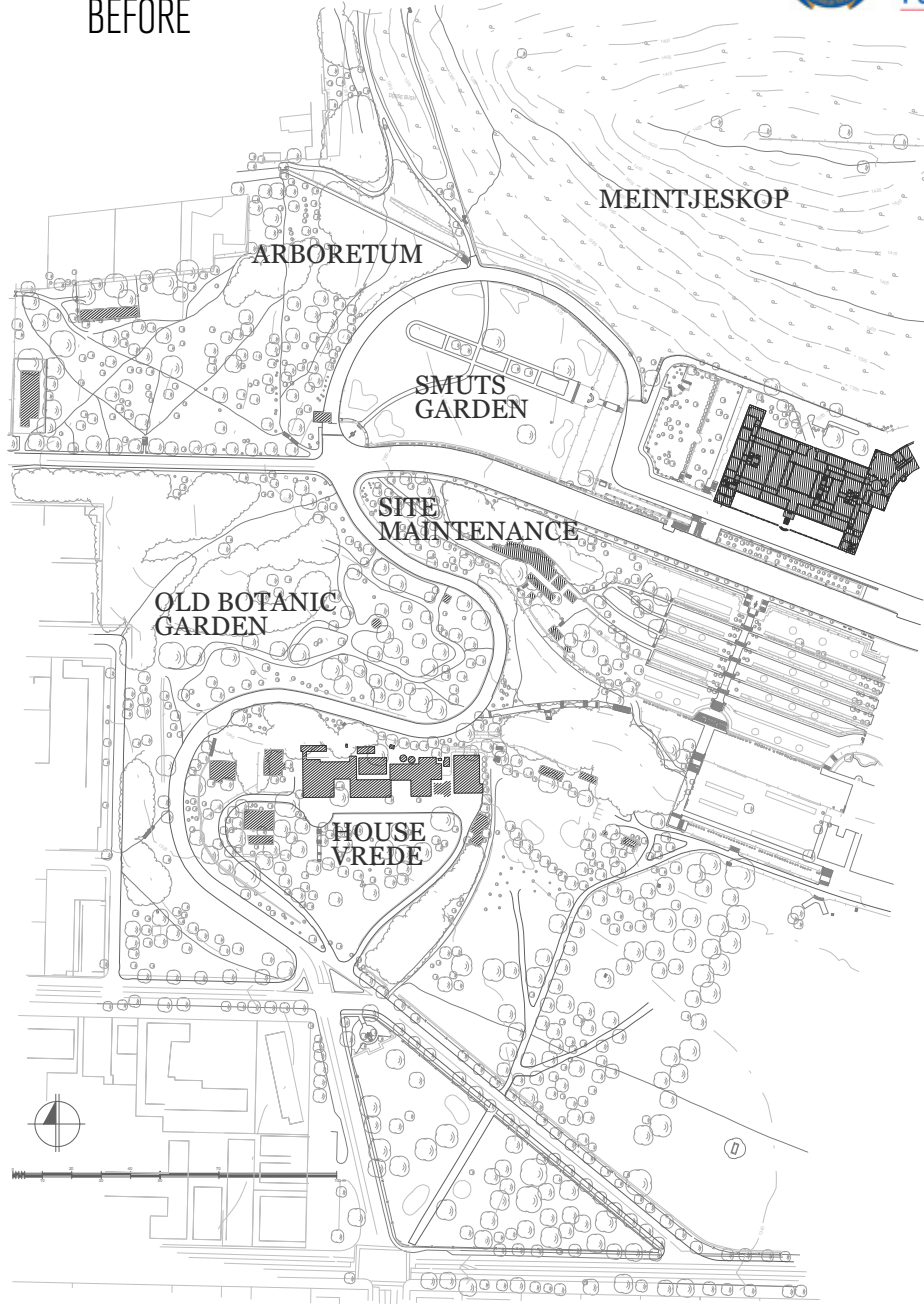


DIAGRAMME DEPLOYMENT:

A: WEST BOUNDARY – The western boundary of the botanic garden is planted with a forest of *Pinus pinaster* trees. Characterised by tall pine trees, the design of the sloped area was shaped by the tramway passing through the site.

B: BOTANICAL GARDEN – The organising principles of High Renaissance gardens developed by Baker for the Union Buildings, uses a central axis to integrate building and landscape. The botanical garden reinterprets House Vrede's 1890 axial connection with Church Street. Programme, movement and smaller gardens are disposed in relation to the axis.

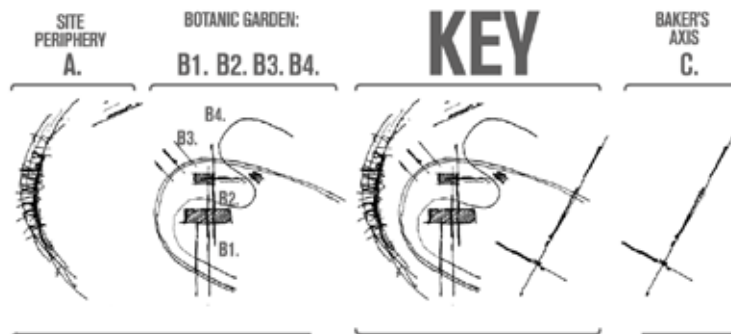
B1: ENTRANCE GARDEN - The importance of movement and drama (characteristics of Mannerist gardens) underline the key principles in the entrance garden design. Buildings are displayed as ornaments in an outdoor composition.

B2: HISTORIC GARDENS - The garden design uses a Post-Modern response to the site. A new layer of geometry introduces fractured triangles over the historic 'landscape garden'.

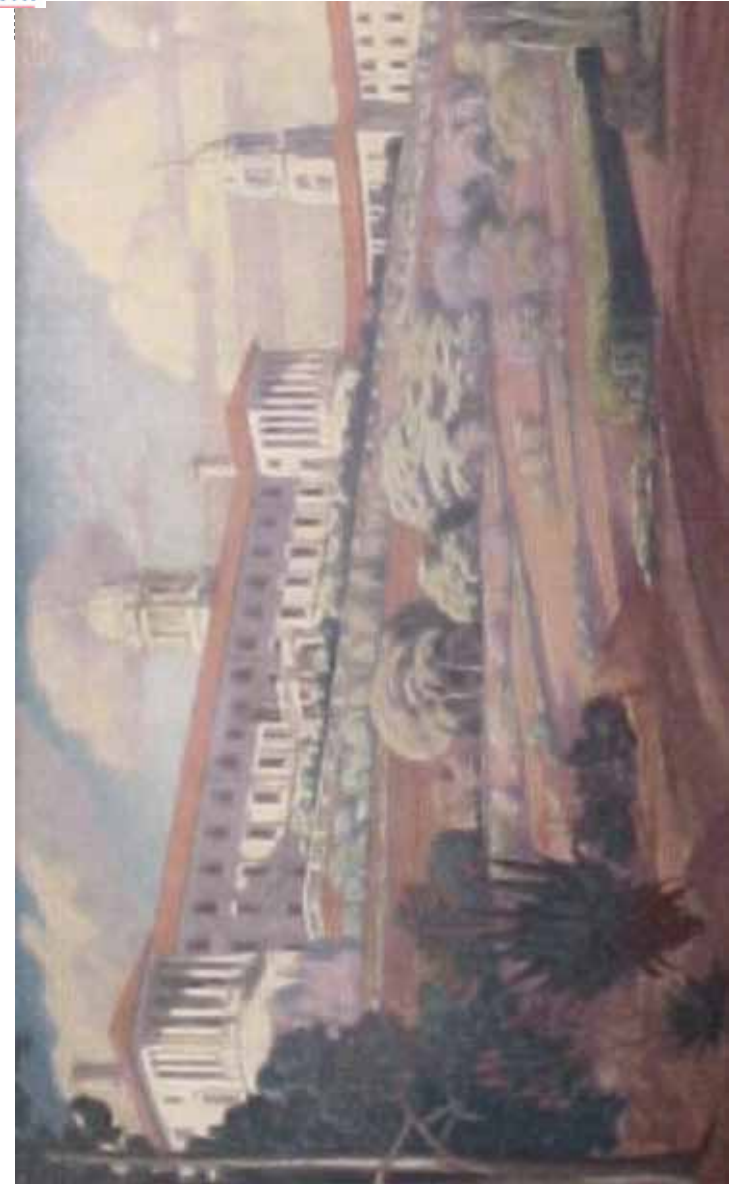
B3: TREE GARDEN – The typography is used to display woods, grassland and the existing arboretum. Connected by a series of paths, trees are grouped to form enclosed spaces. The grove exhibits trees in an outdoor sanctuary.

B4: NATURAL GARDEN – Planning of Meintjeskop re-establishes indigenous vegetation on the hill. Greenways on the site are designed for recreation, hiking and nature conservation.

C: BAKER'S AXIS – The Renaissance garden's projected axis brings the mountain, landscape and the Union Buildings into one composition. A line of view is introduced to the design, the avenue (on the lower lawn) connects the axial geometries of the Baker scheme and the Botanical garden.



Fig_82: Diagramme of botanic garden.



* 1915 Painting by Pierneef.

Fig_83: Perspective of Union, building, with old botanical garden in foreground.

Entrance garden

NATURE AS INSPIRATION FOR ARCHITECTURAL FORM:

Architecture and organization principles of what it might be, has (for the past five hundred years) viewed nature as principal source of inspiration.

- Adrian Forty on Nature

(FORTY 2000:220).

Plants in architectural design is used as decorative elements in buildings e.g. trellis and pergola. If used to control light and temperature in the built environment the foliage on these structures can adapt to seasonal change in winter and summer (JEKOT 2008).

Plato's concept of nature is based on the idea that nature is constructed out of rationally defined geometrical proportions (FORTY 2000:220). Viewed in the Baroque as the source of beauty and in the 19th century as the origin of architecture, nature significantly influenced architectural theory.

My premise is based on the idea that architectural form should express its programme. Architecture has derived form from nature as a geometrical relationship that satisfies aesthetic criteria for buildings. The entrance garden proposes the idea of architecture for plants. Buildings deal with the programme of nature, used not merely in a geometrical sense but as part of the architectural envelope.

** Nature as the origin of architecture:*

Essai Sur l'Architecture, illustration by Marc-Antoine Laugier. Architecture points to the natural building, and instructs humanity in its principles. (The supposed form of the first architecture, primitive man built huts from tree trunks)



** Fig_ 84: Essai Sur l'Architecture, illustration by Marc-Antoine Laugier.*

POLYCHROME EFFECTS ON PLANTS:

* Colour and light transmittance through protective covers.
 North West University, South Africa.
 Prof. Leon van Rensburg.

Plants have inherent adaptive characteristics both in terms of light quality and quantity. Plant growth and development can be altered with protective covering.

- Prof. Leon van Rensburg on protective covers.

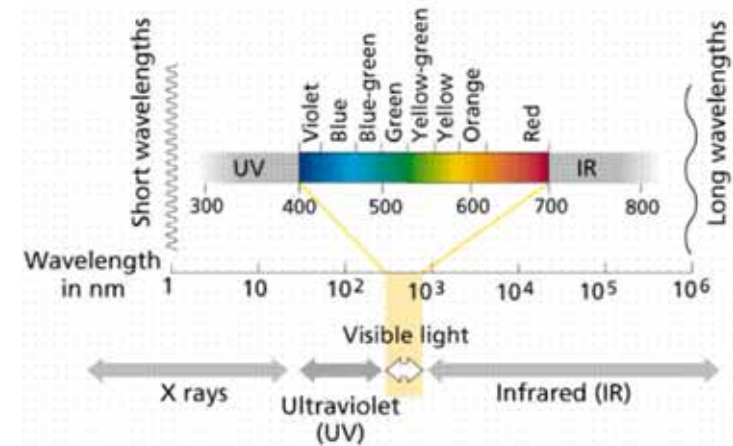
(VAN RENSBURG. 2007)

Prof. Leon van Rensburg studied the effect of light on plants. By manipulating the quality and colour of light one can speed up the process of plant growth. Case studies on grapes and apples examine the process of photosynthesis, whereby plants are exposed to different environments of light (intensity and quality). His research provides different colours for covered netting that can be woven to speed up plant production (VAN RENSBURG. 2007). Although the colour theory focuses on the agricultural value of plant production, the possibility of colour and polychrome covers for greenhouses are limitless.

* Opposite page: Figure 85 illustrates the typical transmittance spectrum of light. Strawberries are grown under and the transmittance spectrum of 58% red Knitpol® shade netting.

TROPHOBIOSIS:

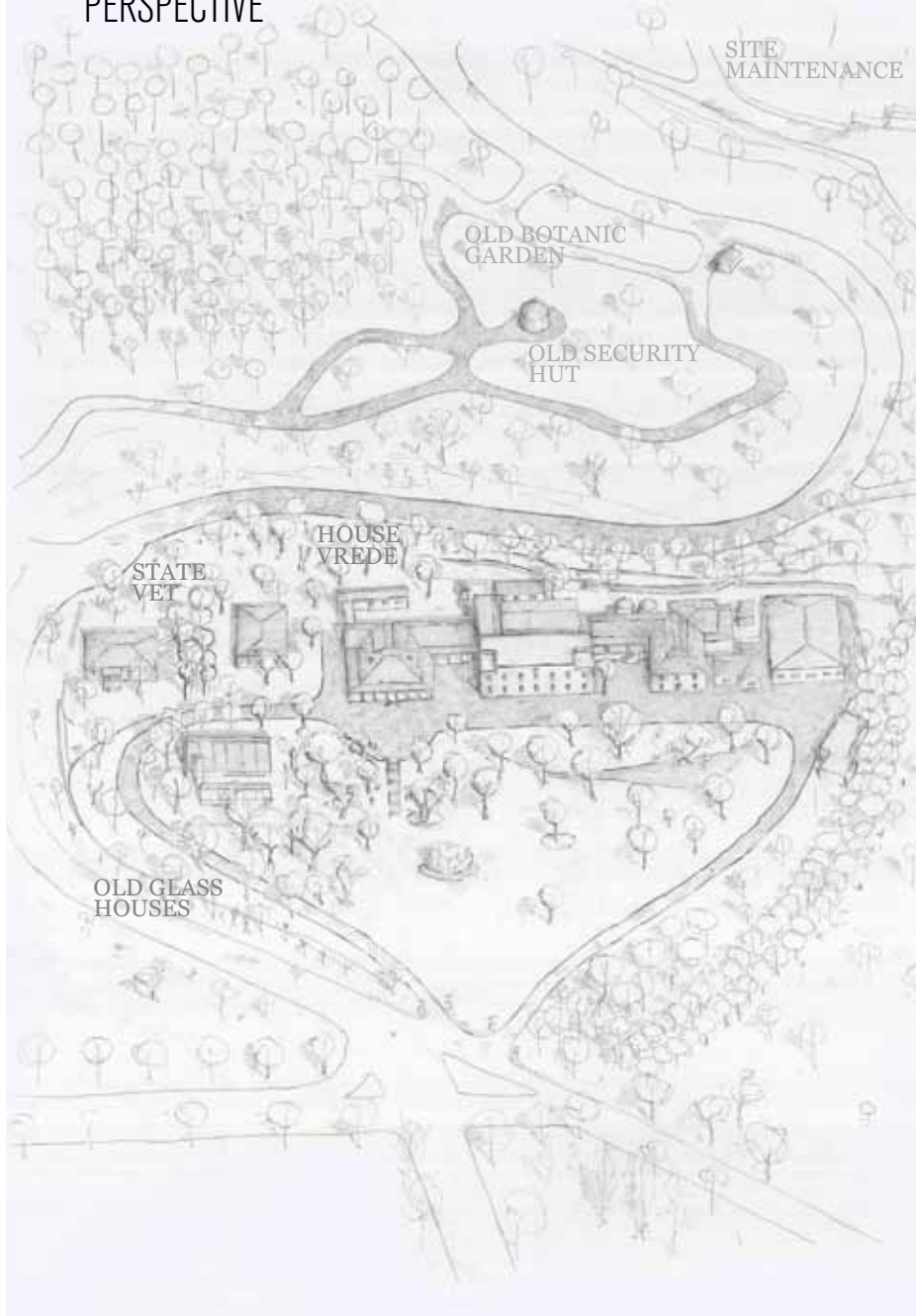
There is the common experience that pesticides used on crops lose their efficacy after a few applications. Developed by French botanist Francis Chaboussou, the theory of trophobiosis explains the reason why. Plants have the natural ability to be disease free. Ironically the chemical warfare against pesticides in effect progressively weakens plants. Weakened by the pesticides, plants become imbalanced, not being able to manage their own nutrients. Imbalanced plants tend to destroy themselves. The only way for a plant to do this is by providing pests or insects with nutrients to speed up the process. Essentially trophobiosis is the process whereby a plant deteriorates to a state of suicide (PAULL 2007:22-24).



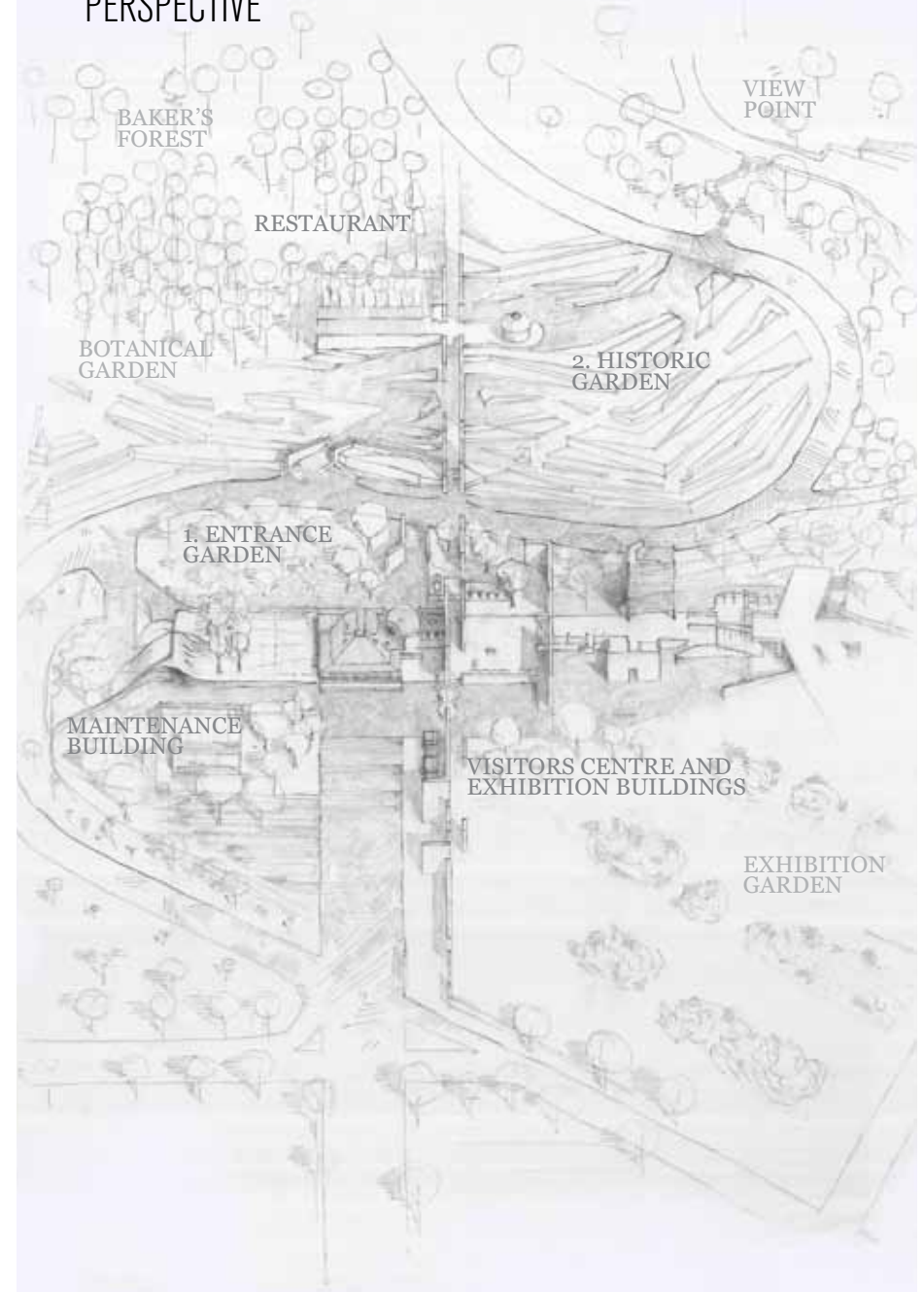
Fig_85: $\text{Light} + 6\text{H}_2\text{O} + 6\text{CO}_2 = \text{Photosynthesis}$.



HOUSE VREDE - EXISTING PERSPECTIVE



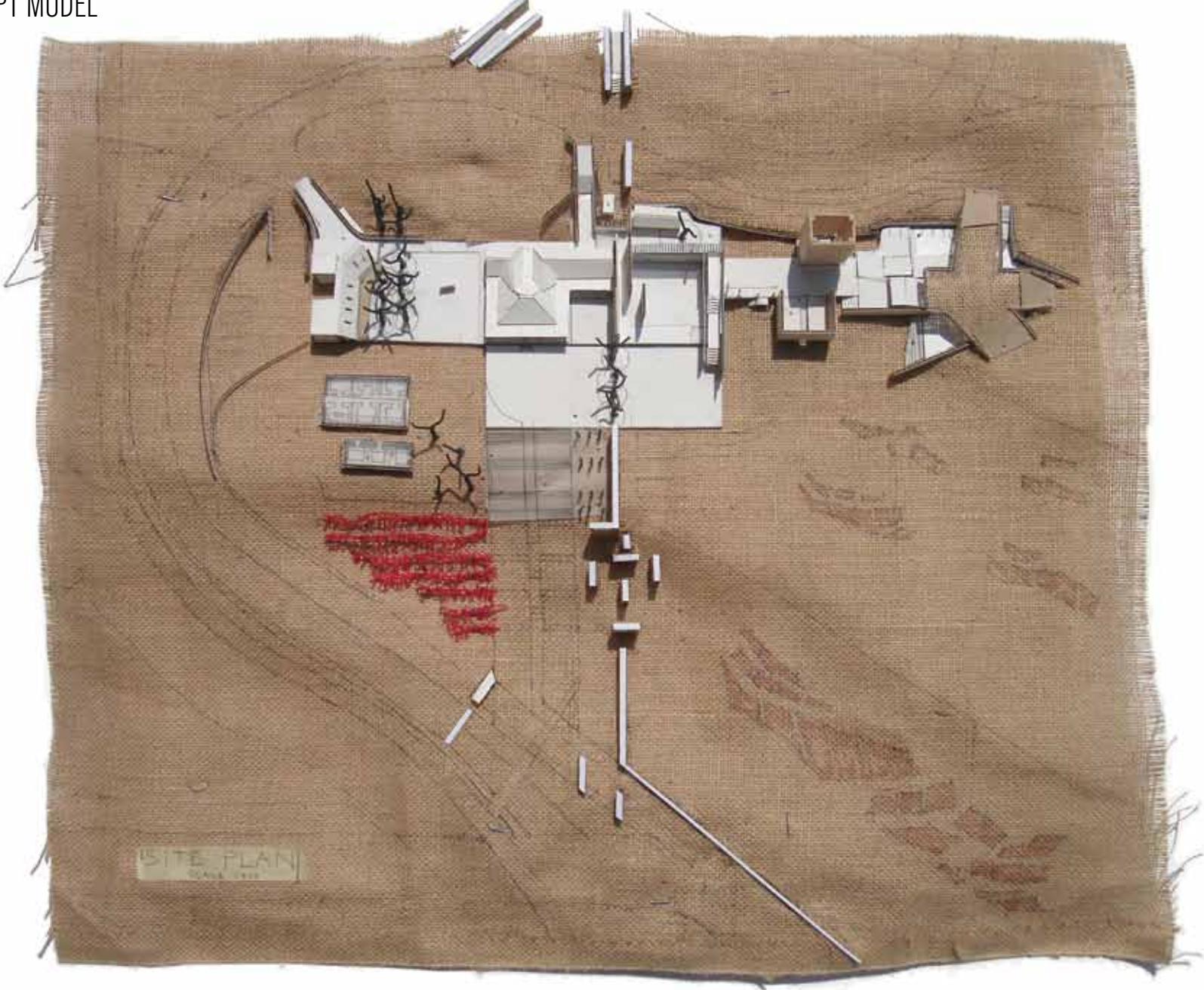
RANCE GARDEN - NEW PERSPECTIVE



ENTRANCE GARDEN CONCEPT MODEL



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SITE PLAN

ENTRANCE GARDEN

BAKER'S PINE FOREST,

FOREST WALK

2. HISTORIC GARDEN

FERN GARDEN

CLIVIA WALK

RESTAURANT

OUTSIDE SEATING - 100

ADMIN OFFICE
OLD SECURITY HUT

FRAGRANCE GARDEN

SANBHI OUTPOST GARDEN

ALOE GARDEN

ALOE GARDEN

SUCCULENT GARDEN

ANNUALS

ALOE GARDEN

ALPINE GARDEN

YVIGIES

KOETSWEGPAD

MAGALIESBURG
KRANS

SERVICE ACCESS

ADMIN PARKING

SERVICE ACCESS

NURSERY COURT

E • PERM. EXHIBITION,
TIMBER FOLLY

MAGALIESBURG
KRANS

A • ADMINISTRATION
BUILDING

GLASSHOUSE

GREENHOUSE (1914)

OLD POTHOUSE

B • HOUSE VREDE &
ARRIVALS

ARRIVAL COURT

ENTRANCE WALK

W.C.

W.C.

W.C.

FIGUS GARDEN

PLANTED
GREEN WALL

C • TEMPORARY
EXHIBITION SPACE

EXHIBITION BUILDING COMPLEX

THE COLOURS OF AFRICA
TEMPORARY EXHIBITION SPACE

EXPO
LECTURE

OLD - PLANT PATHOLOGY
BUILDING // LILLY POND

D • PERM. EXHIBITION,
LILLY POND



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TO U.B. LAWN

EXHIBITION GARDEN

1. ENTRANCE GARDEN

ANTE-GRADEN
HORTICULTURAL PROPAGATION

HISTORIC AXIS

SECURITY POINT

KOETSWEGPAD

BUS STOP

TO PARKING

70

50

40

30

20

10

100 m



DIAGRAMME DEPLOYMENT:

A: SITE PERIPHERY – The entrance garden is closed off on its west boundary by Koetswegpad. Planned by Baker, the movement route winds up the hill to the presidential wing of the Union Buildings. The difference in level created by the road forms an edge for the site.

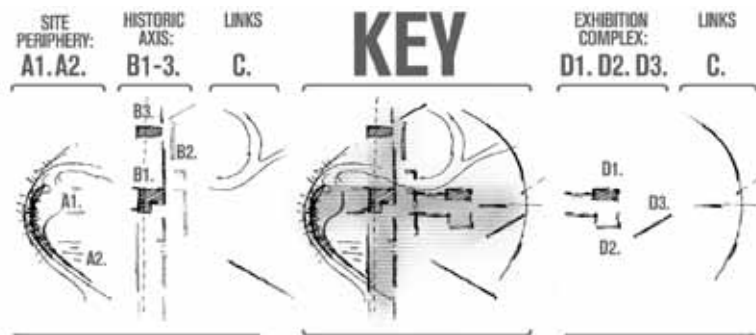
A1: ADMINISTRATION – Located next to the koetswegpad, vehicular access on the western edge of the site provides the opportunity for programmatic functions dealing with production. Based on the idea of displaying activities of production, the concept for the administrative building is designed to exhibit processes of production.

A2: HORTICULTURAL PROPAGATION – Plants propagated in agricultural environments are usually grown in tunnels. The propagation garden, next to the garden entrance is designed as a series of exhibition tunnels. Coloured netting will be used for solar control.

B1-3: HISTORICAL AXIS – Gardens surrounding House Vrede resemble the Picturesque style. A sweeping lawn (in front of House Vrede) is encircled by trees and a perimeter driveway. The axis from Church Street to House Vrede is extended to the koppie. Neoclassical geometry is used to connect three programmes on the site (Exhibition at House Vrede, a restaurant and viewing point).

C: LINKS – The Eastern part of the site was used as a nursery for the Union Building gardens. The only remnants of the nursery are historic terraces and old pathways. The site is designed with the idea to open up the space, connecting it with the rest of the site.

D1-3: EXHIBITION COMPLEX – Forming part of a East-West axis that intersects the North West botanic movement, three exhibition buildings are designed on the footprints of the old herbarium and plant pathology buildings.



Fig_90: Diagramme of the entrance garden.



Fig_91: Concept models: Exhibition garden and shade netting for the horticultural propagation tunnels.

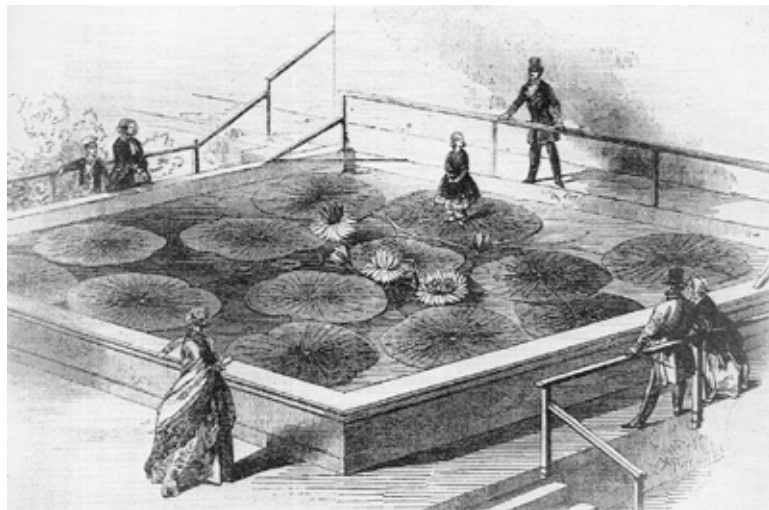
Exhibition Buildings

SIR. JOSEPH PAXTON

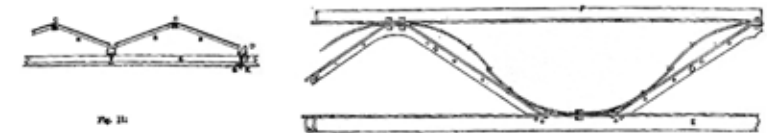
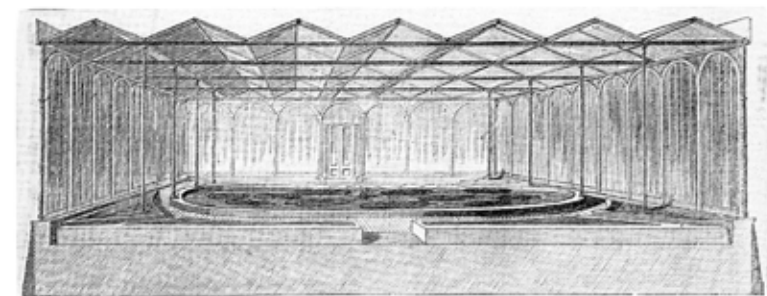
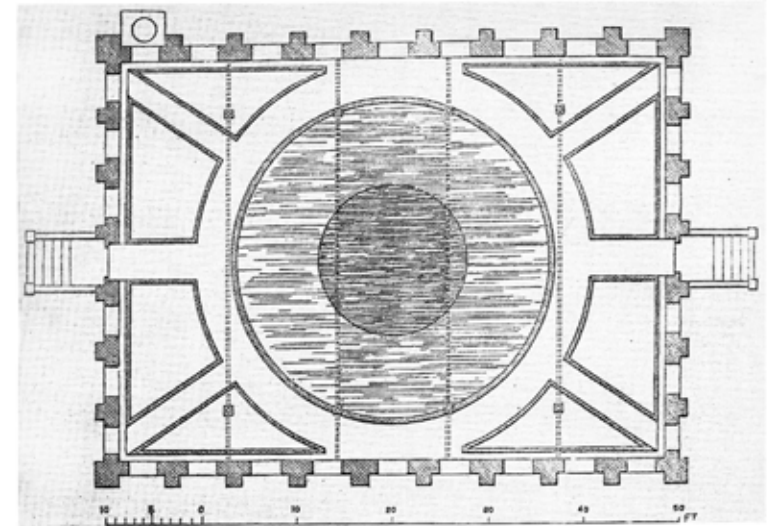
* The Great Conservatory at Chatsworth.
Chatsworth Park, England 1841
Joseph Paxton.

Trained as a gardener, Paxton had a pioneering approach to the architecture of glass houses. The chief innovation attributed to him was the approach to structural framework and glass. At Chatsworth, the conservatory was designed for the propagation of the tropical *Victoria regia* water lily.

Paxton developed a curvilinear ridge and furrow roofing system with a cast iron support frame to achieve the span for the large specimen (CHADWICK 1961:79). Although the form of the Great Conservatory was determined by pragmatic issues of techtonics, it is important to note that the building form (designed for a *Victoria regia* lily) is influenced by its relationship to nature i.e. the elliptical plan and large span interior space.



Fig_92: *Victoria regia* at Chatsworth: Paxton's daughter Anne on a leaf.



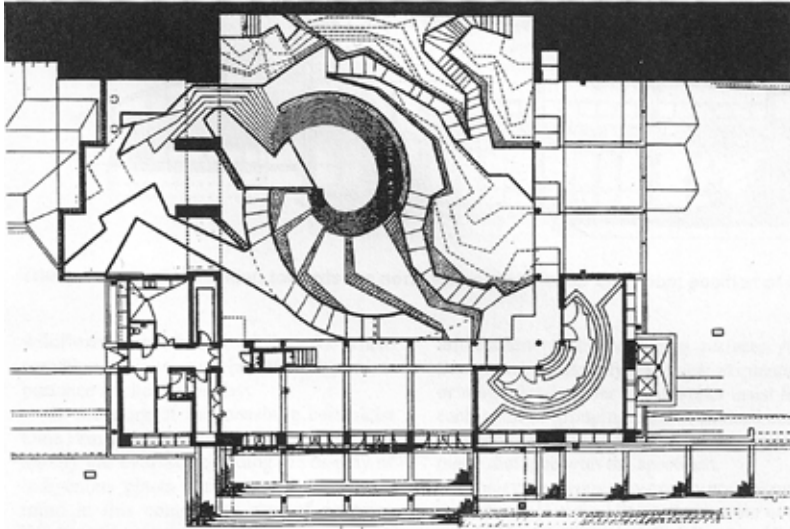
Fig_93: *Victoria regia* lily house, Chatsworth. Plan, interior and roof detail.

FOUR CHAPELS AND A CATHEDRAL:

* Kirstenbosch Visitors' Centre.
 Cape Town, South Africa 1997
 GAPP Architects & Urban designers, David Lewis Architects

The schematic proposal for the conservatory at Kirstenbosch was developed by architect Julian Elliot. Cut into the sloping site, the building's relationship to the site is dominated by a three-part pyramidal roof. The form of the building is profiled by the landscape, relating to the open character of the surrounding gardens at Kirstenbosch.

The plan layout of the central garden spirals around a large baobab tree. Connected to the permanent central exhibition space are four corner display rooms for specific plant collections. There are two movement routes in the building, both follow a gradual rise towards the rear of the space. Visitors can use the spiral path in the central area or move along the square layout of the periphery ambulatory (DE JAGER 1997).



Fig_94: Plan of the central garden: the path system as originally planned in 1994.

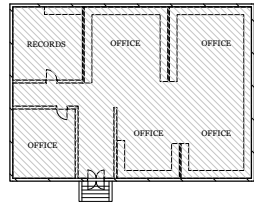


Fig_95: View from entrance: central garden and interior space.

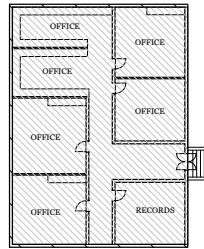
HOUSE VREDE - EXISTING BUILDING PLAN



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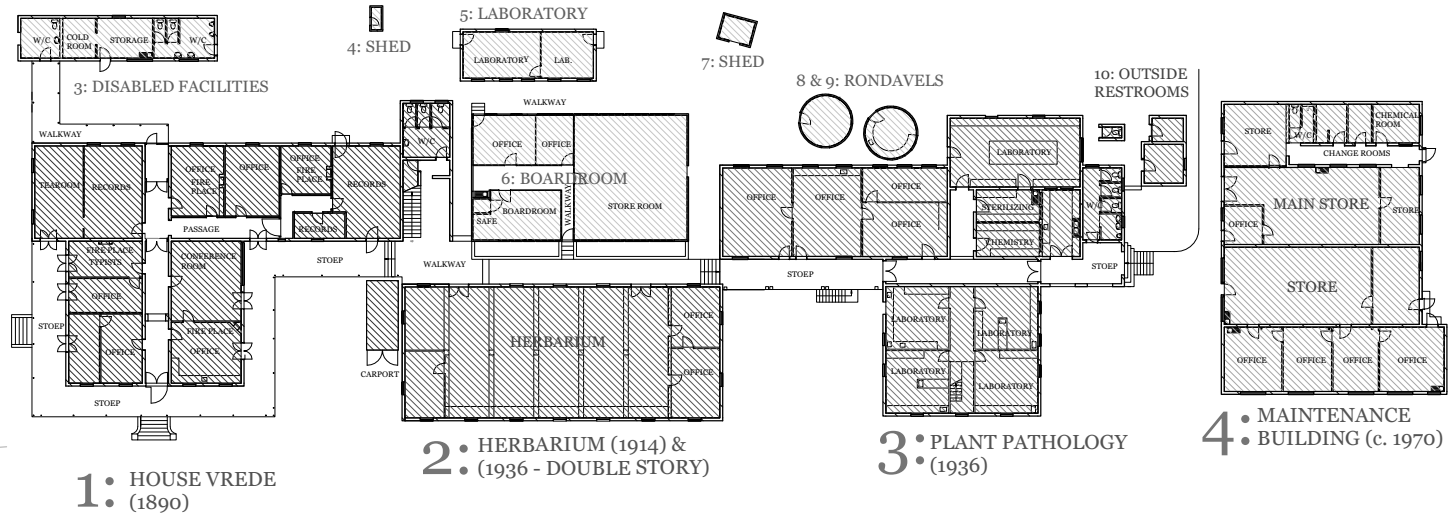


1: WOODEN SHED 1



2: WOODEN SHED 2

5-10:
MISCELLANEOUS
BUILDINGS





EXISTING STRUCTURE:

In fact, all architecture proceeds from structure, and the first condition at which it should aim is to make the outward form accord with the structure.

- Viollet-le-Duc on Structure

(Forty 2000: 276)

Designed as a lavish estate for Eddie Meintjes's wife, the first buildings adjacent to House Vrede included six stables, a cowshed, a coach house, a tennis court, croquet lawns and large flower gardens. After the 1910 Baker proposal the boundaries were changed to a circling tree belt with a perimeter carriageway (CULTMATRIX & UBA 2005:159).

After its appropriation by Pole Evans, the structure on the estate has seen the addition of haphazard buildings. The form of House Vrede's farm-house typology currently shares its structure with ten other buildings (see figure 98, previous page). The overall arrangement shares blends of Classical architecture.

Due to the extreme dilapidated condition, most of the buildings are structurally unsound. House Vrede has a high historical and architectural value, even though the many alterations of the structures around the building render it of low historical value (CULTMATRIX & UBA 2005:163).

** Figure 98 (previous page): Plan of the buildings on the site. Indicating their significance, the buildings are numbered from one to ten.*

** Figure 99 – 103 illustrates photographs of the structures' history: residential in 1889, appropriation by Pole Evans (department of Plant Pathology and Herbarium) in 1914 and extensions done from 1914 to 2010.*

NEW STRUCTURE:

New structures on the site are governed by two overlapping geometries, the North-South botanic axis (House Vrede's exaggerated axial connection with Church Street - 1890) and the existing East-West podium created by structures on the site. The existing programmatic functions (of the ten hap-hazard buildings) are redesigned to form a coherent experience of the site. Located on the footprints of the old structures new buildings on the East-West connection are informed by the archeological i.e building placement, proportion and height.

** Figure 104 (next page): Concept model for the proposed redevelopment of the administration and exhibition buildings.*



Fig_99: House Vrede, 1913.



Fig_100 & 101: Old Herbarium 1918 & 2008.

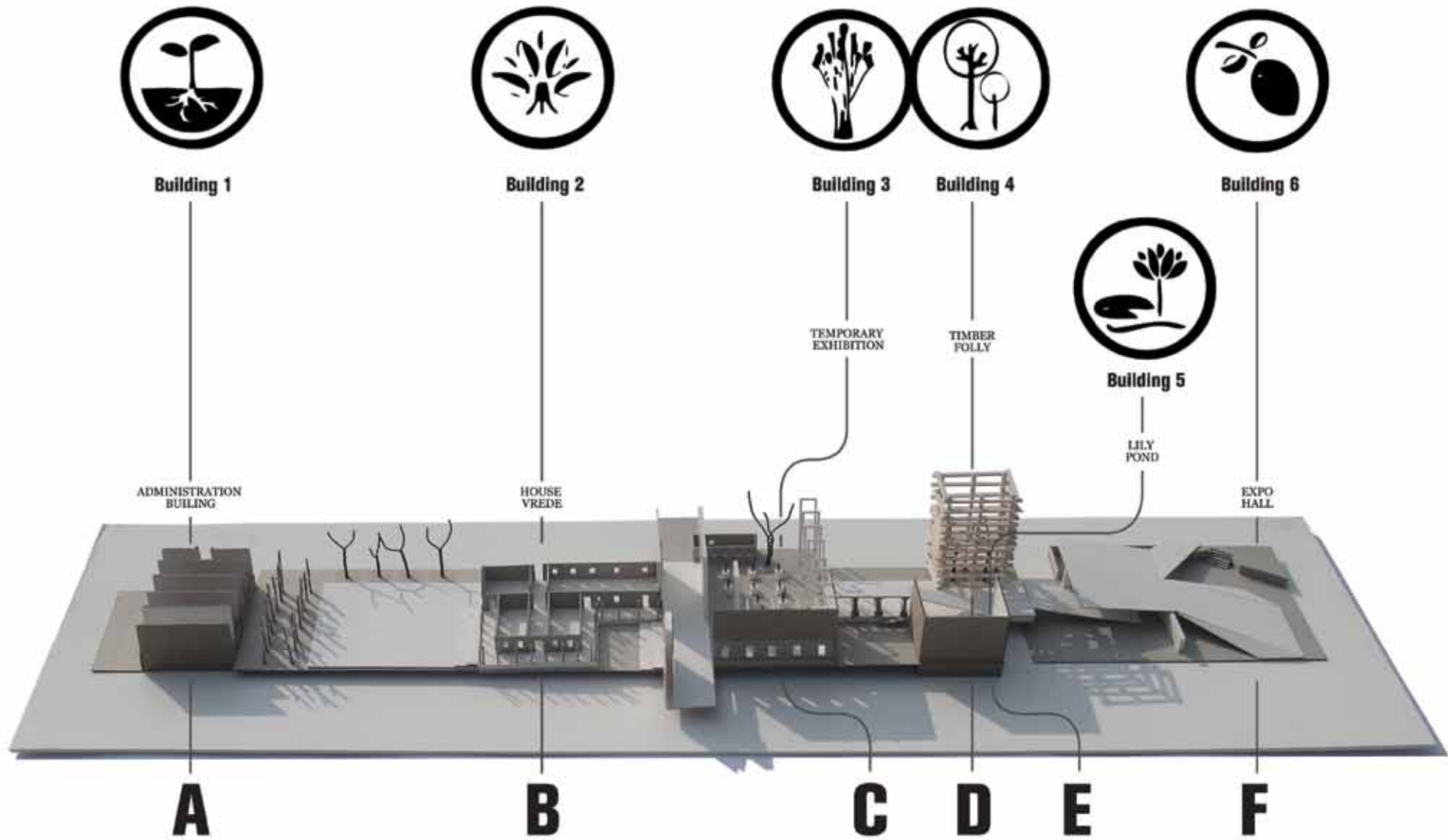


Fig_102 & 103: House Vrede c. 1932 & 1947.

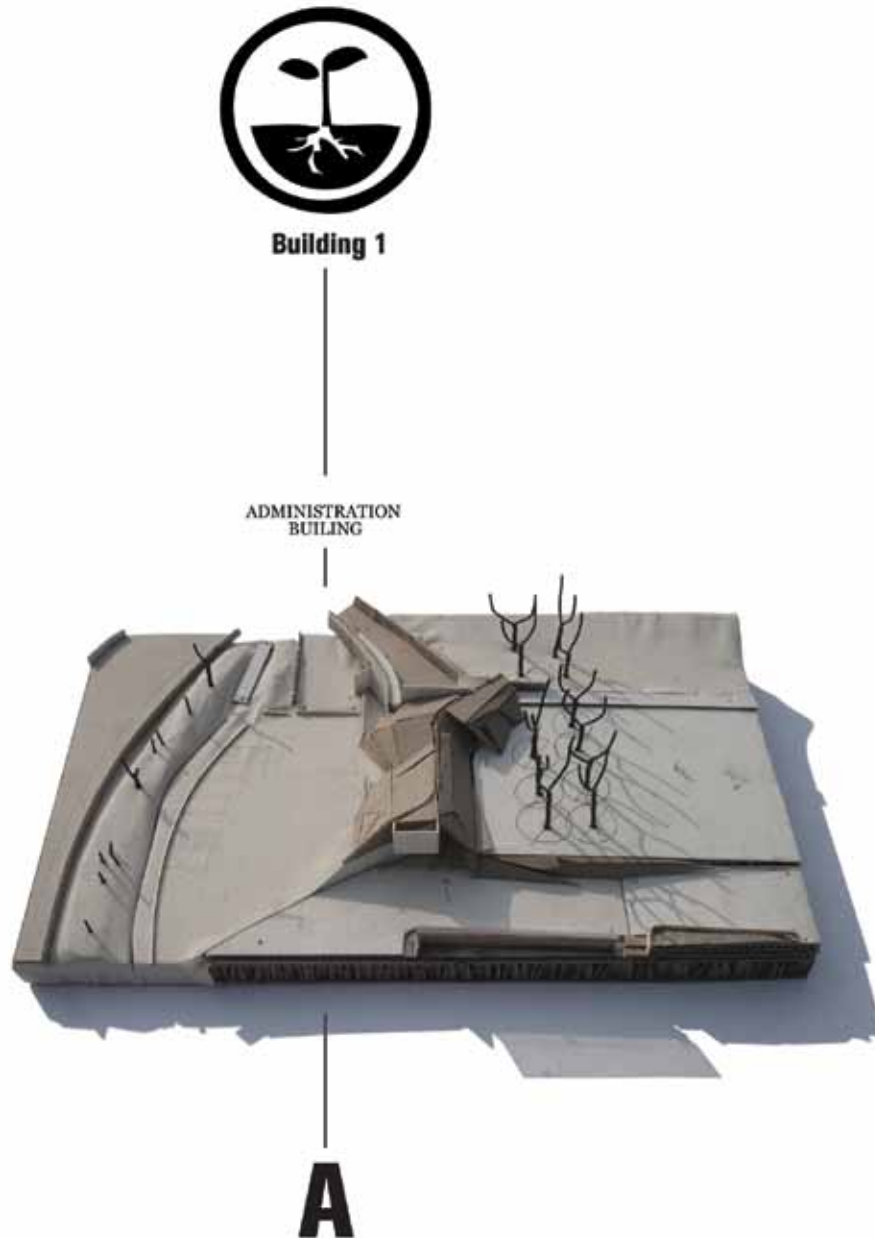
** Historical images of buildings at House Vrede.*

HOUSE VREDE & EXHIBITION BUILDINGS

CONCEPT MODEL



BUILDING 1 - ADMINISTRATION BUILDING CONCEPT MODEL



A – ADMINISTRATION BUILDING:

BRIEF AND ASSIGNABLE AREA - With a schedule area of 420 assignable square meters, the building incorporates the programme of production into the administrative center of the botanical garden. Administrative activities include a lower-ground floor - (two horticulturists, a plant records clerk and a administration officer) and ground floor office block (curator, deliveries and building infrastructure maintenance).

SITTING AND BUILDING PLANNING - Located on the western edge of a platform formed by existing structures, the building is cut into the site. A three meter level difference is accommodated by creating two levels in the building. Facing west, the entrance and parking are placed on a lower ground floor, close to access from Koetswegpad.

FORM - The building form is dominated by its roof, a 100 mm concrete shell clad with masonry paving that folds over the structure. The idea behind the folding roof integrates the building on two levels, connecting a square on the upper level to the lower parking area. The form terminates the Western end of the entrance podium as an undulating shape in the landscape. The buildings tectonic expression is influenced by the cast-iron glass and potting houses.

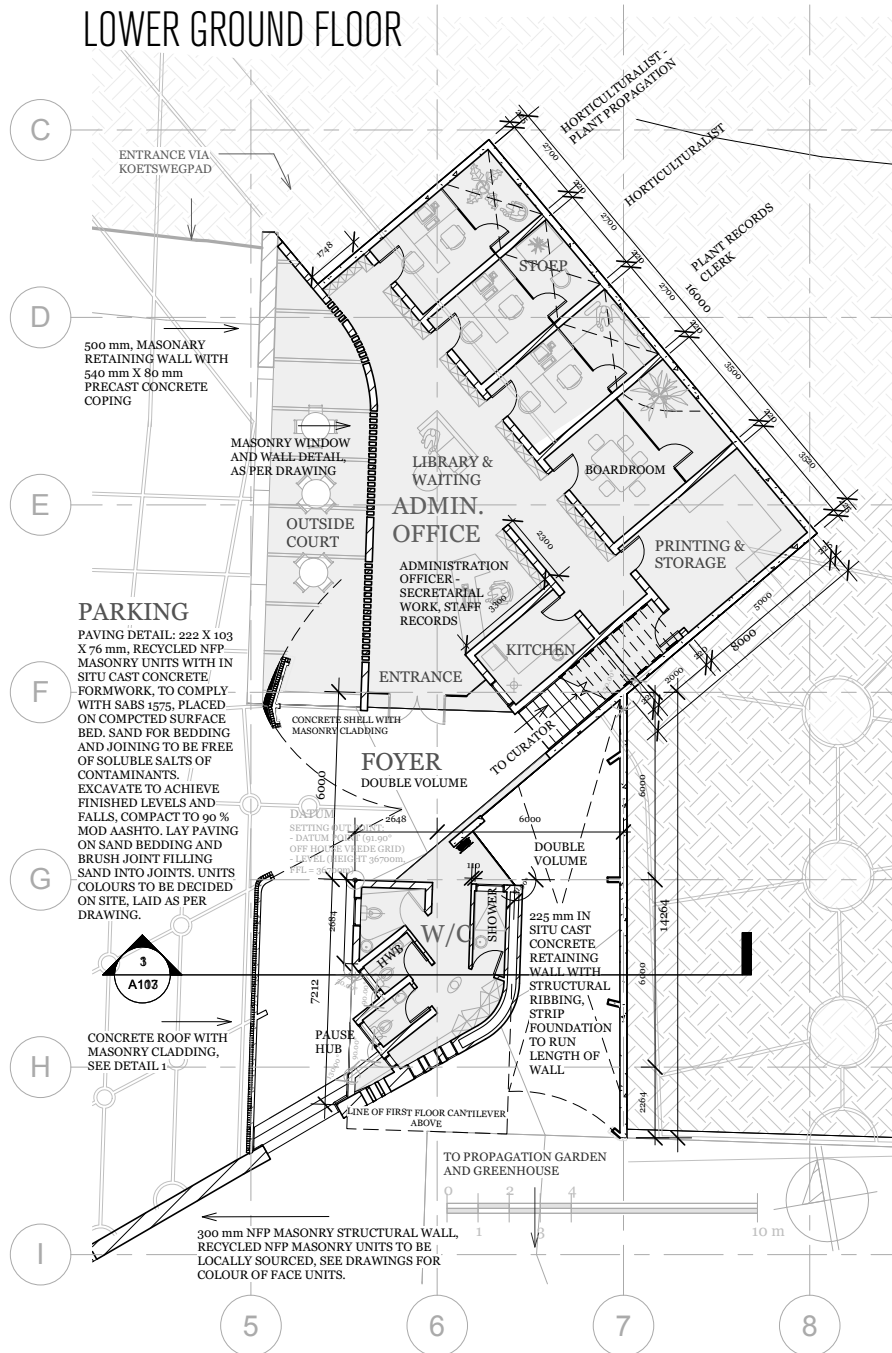


Fig_106: Victorian cast-iron potting house: c. 1914

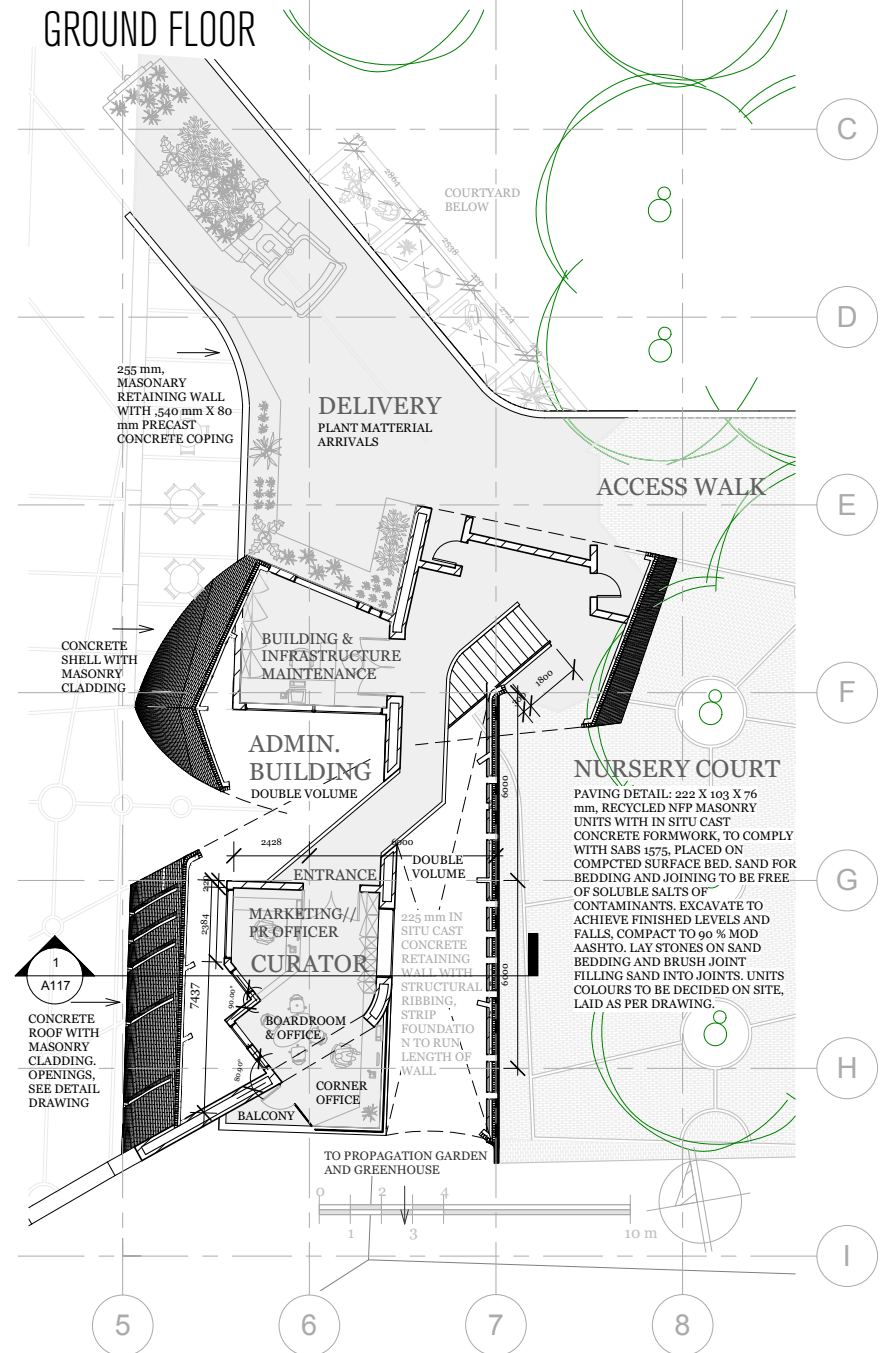


Fig_107: Roof detail with timber louvers.

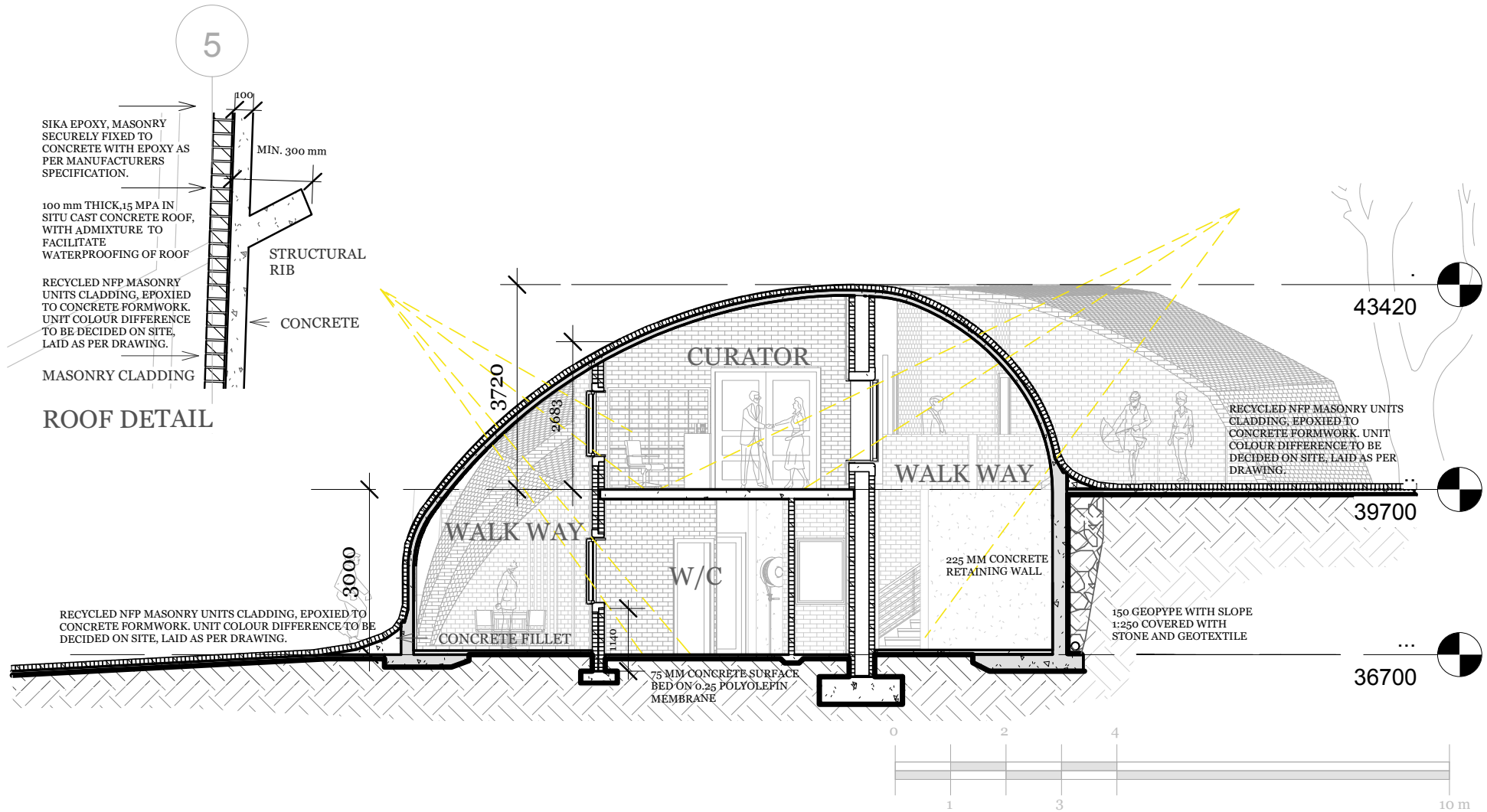
ADMINISTRATION BUILDING LOWER GROUND FLOOR



ADMINISTRATION BUILDING GROUND FLOOR



ADMINISTRATION BUILDING SECTION



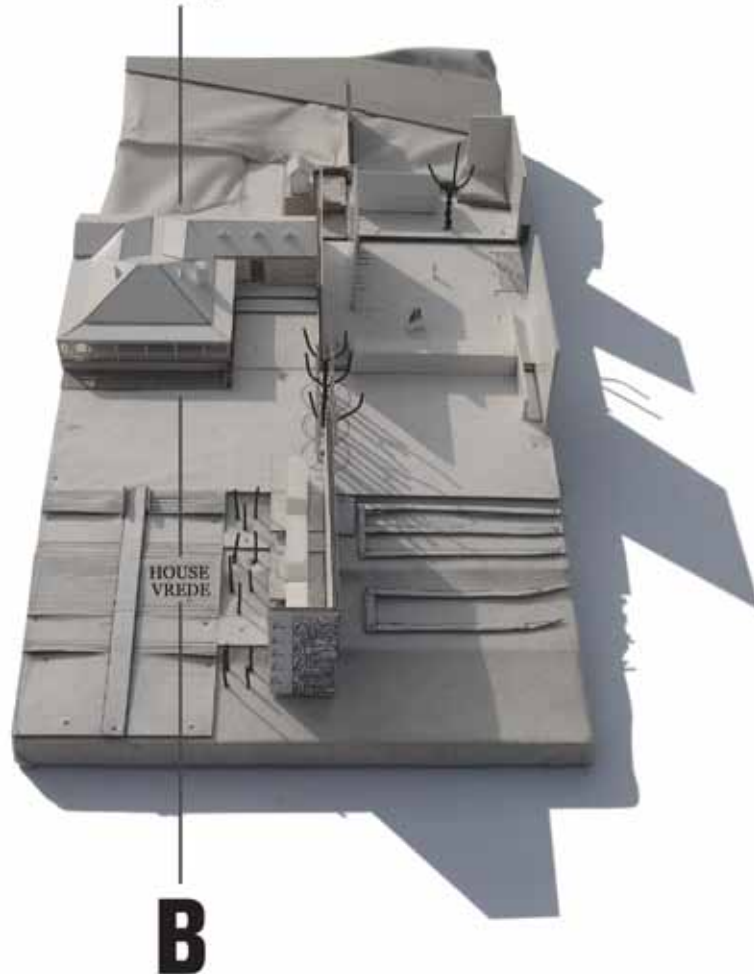
BUILDING 2 - HOUSE VREDE

CONCEPT MODEL

137



Building 2



B – HOUSE VREDE:

Ultimately, we can say that type is the very idea of architecture, that which is closest to its essence.

- Aldo Rossi on building types.

(Forty 2000: 304)

The classification of architecture uses functional (programmatic classification, church etc.) and morphological (shape and form particular to design elements e.g. courtyard) types to define buildings and elements within it (Forty 2000: 304).

EXISTING FORM - The 1889 square structured house is set on a natural stone plinth. On the front of House Vrede a plinth forms a verandah bordered by timber lattice work. Openings have louvered shutters and are made of vertically proportioned timber frames. The main façade faces Church Street. The house is axially planned with a straight garden path that leads to a series of small entrance steps. The L-shaped house has details of late 19th Century British Colonial architecture.

NEW FORM - The restoration of the building references the use of typological elements. Generous open space is created around the building by a nursery-, entrance- and arrival court. The open character is determined by the residential scale of the building.

TYPE - VERANDAH - The verandah of House Vrede acts as a threshold between the outer and inner world. A tree replaces part of the structure. Nature mimics the function of separation between interior and exterior space.

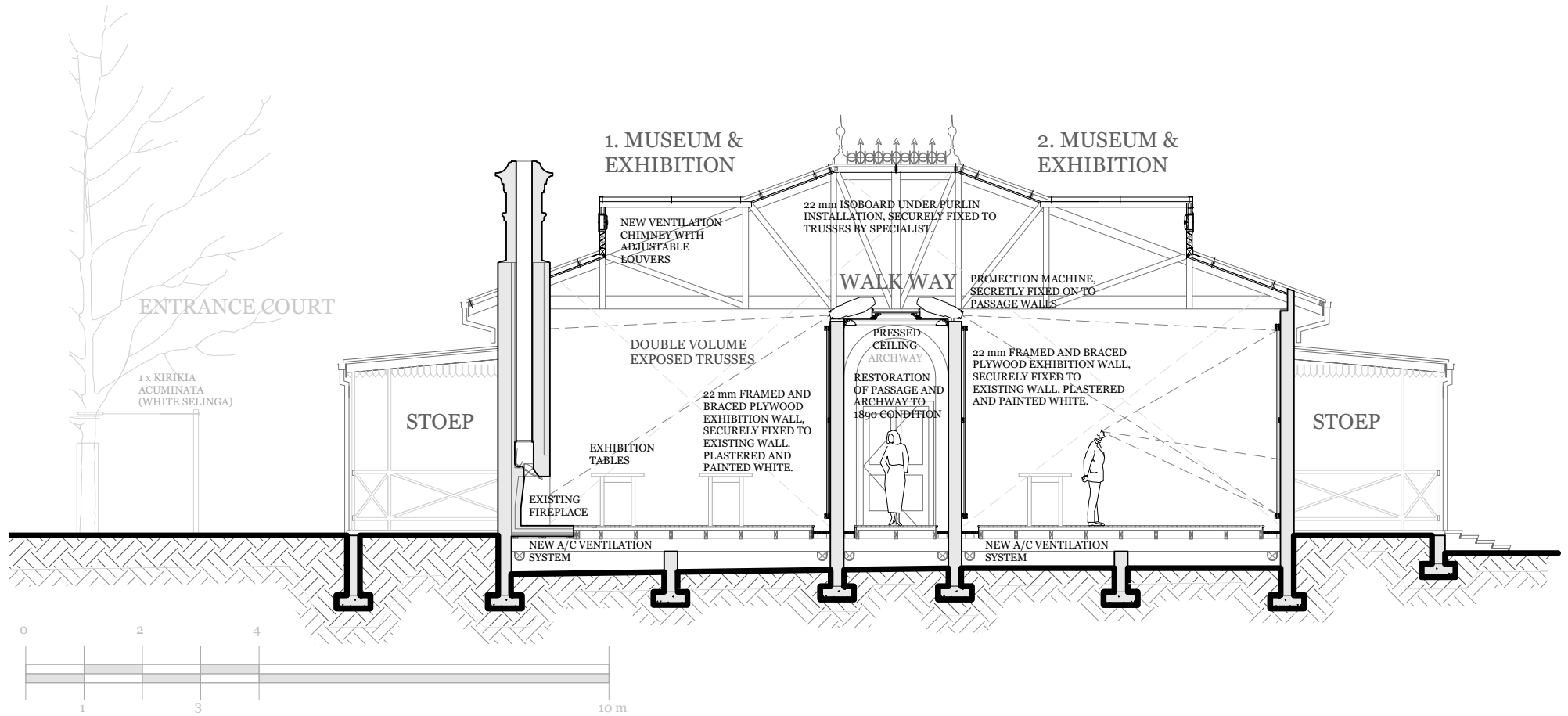
TYPE - PASSAGE - By moving the main entrance to the side, the original axial quality of the house is undermined. An entrance court and pond guides movement from the arrival court.

TYPE - STAIRS - Based on the idea of an appropriate scale for trees, the straight garden path is exaggerated to form a dramatic entrance stair.

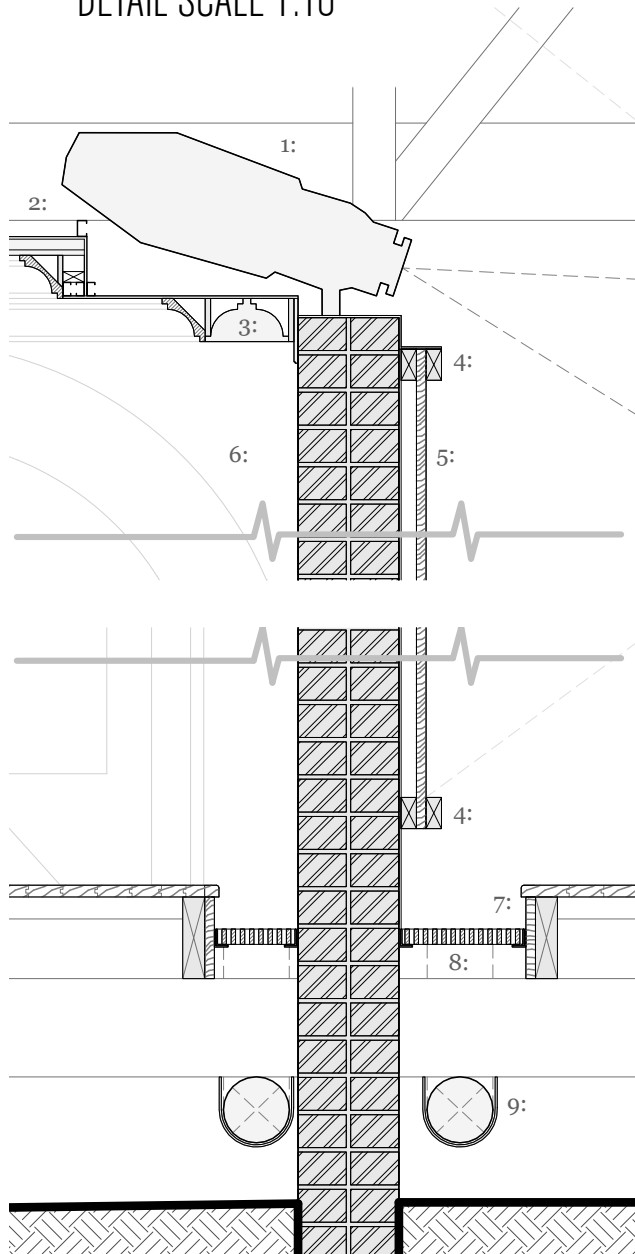
BRIEF AND ASSIGNABLE AREA - With a schedule area of 360 meters, the arrival center hosts the programme of museum, tour guides, book store and education centre.

SITTING AND BUILDING PLANNING - The building is located in the middle of a platform formed by structures on the site. The typology of the old house is symbolically opened to three of its four façades, recreating its original setting. The fourth façade connection to the old Herbarium is preserved.

HOUSE VREDE SECTION



HOUSE VREDE DETAIL SCALE 1:10



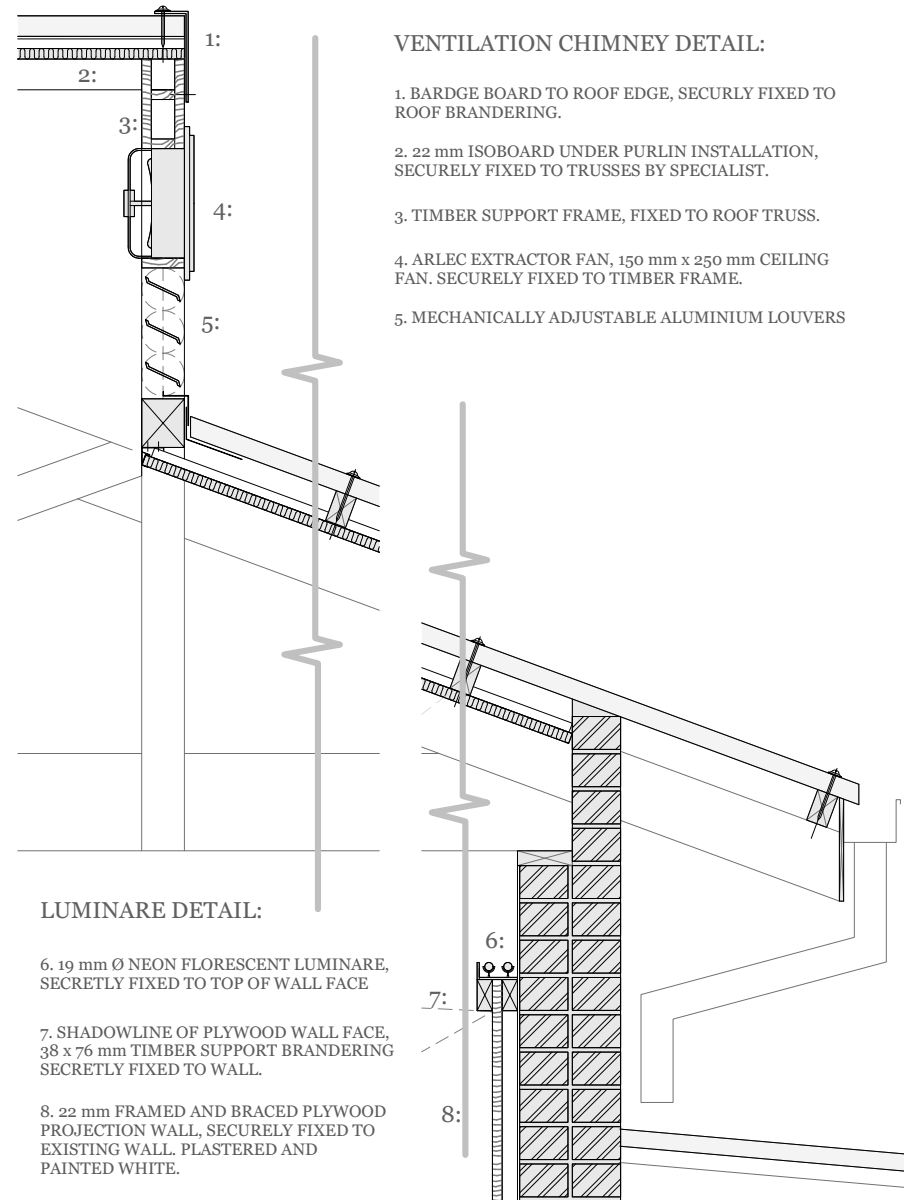
WALKWAY DETAIL:

1. PROJECTION MACHINE, SECRETLY FIXED ON TO PASSAGE WALL. AS PER SPECIALIST.
2. PRESSED CEILING DETAIL, FIXED TO ROOF TRUSS WITH LAFARGE GRIDLOCK LIGHTWEIGHT STEEL BRANDING, AS PER SPECIALIST.
3. LUMINARE SHADOW LINE
4. SHADOWLINE OF PLYWOOD WALL FACE, 38 x 76 mm TIMBER SUPPORT BRANDING SECRETLY FIXED TO WALL.
5. 22 mm FRAMED AND BRACED PLYWOOD EXHIBITION WALL, SECURELY FIXED TO EXISTING WALL. PLASTERED AND PAINTED WHITE.
6. RESTORATION OF PASSAGE AND ARCHWAY TO 1890 CONDITION

A/C VENTILATION SYSTEM:

7. COVER BOARD, 22 mm TIMBER SECURELY FIXED TO FLOOR BEAM.
8. TIMBER AND STEEL A/C GRILL, PLACED LOOSE ON 3 x 24 x 41 mm STEEL SUPPORT FRAME.
9. EVAPORATIVE COOLING DISTRIBUTION PIPE, 150 mm Ø AIR VENTILATION FIXED WITH PURPOSE MADE STEEL BRACKET TO UNDERSIDE OF TIMBER BEARING BEAM.

HOUSE VREDE DETAIL SCALE 1:10



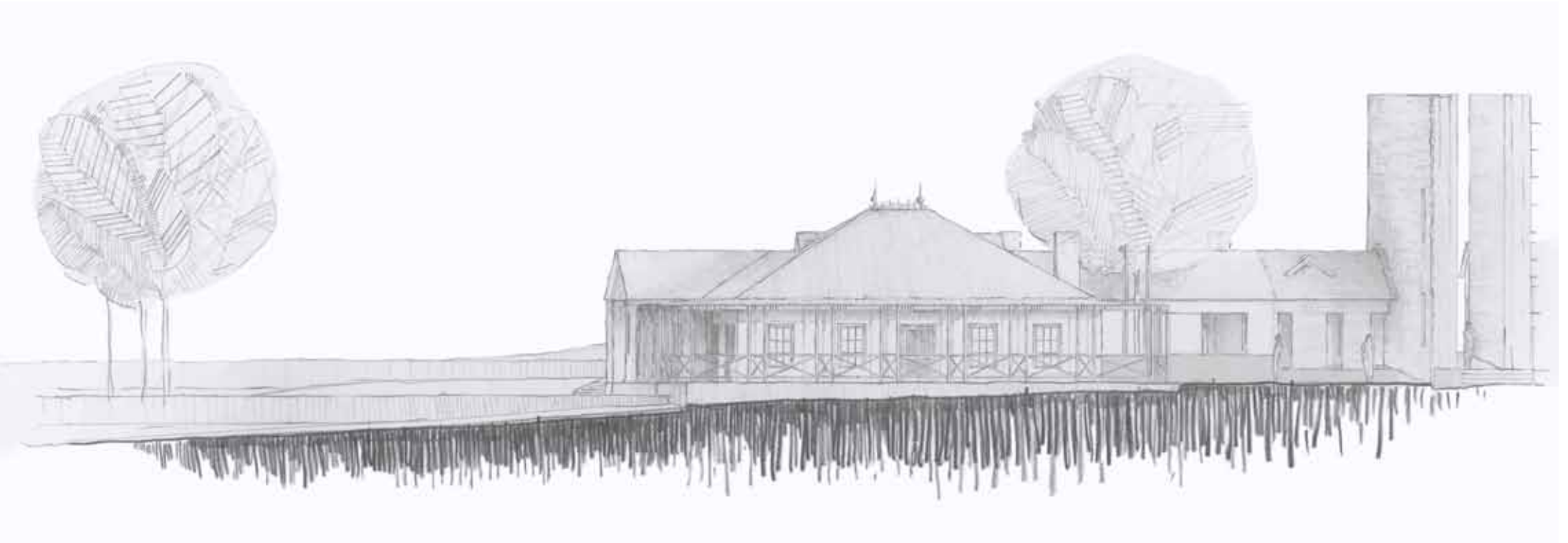
VENTILATION CHIMNEY DETAIL:

1. BARDGE BOARD TO ROOF EDGE, SECURLY FIXED TO ROOF BRANDING.
2. 22 mm ISOBOARD UNDER PURLIN INSTALLATION, SECURELY FIXED TO TRUSSES BY SPECIALIST.
3. TIMBER SUPPORT FRAME, FIXED TO ROOF TRUSS.
4. ARLEC EXTRACTOR FAN, 150 mm x 250 mm CEILING FAN. SECURELY FIXED TO TIMBER FRAME.
5. MECHANICALLY ADJUSTABLE ALUMINIUM LOUVERS

LUMINARE DETAIL:

6. 19 mm Ø NEON FLORESCENT LUMINARE, SECRETLY FIXED TO TOP OF WALL FACE
7. SHADOWLINE OF PLYWOOD WALL FACE, 38 x 76 mm TIMBER SUPPORT BRANDING SECRETLY FIXED TO WALL.
8. 22 mm FRAMED AND BRACED PLYWOOD PROJECTION WALL, SECURELY FIXED TO EXISTING WALL. PLASTERED AND PAINTED WHITE.

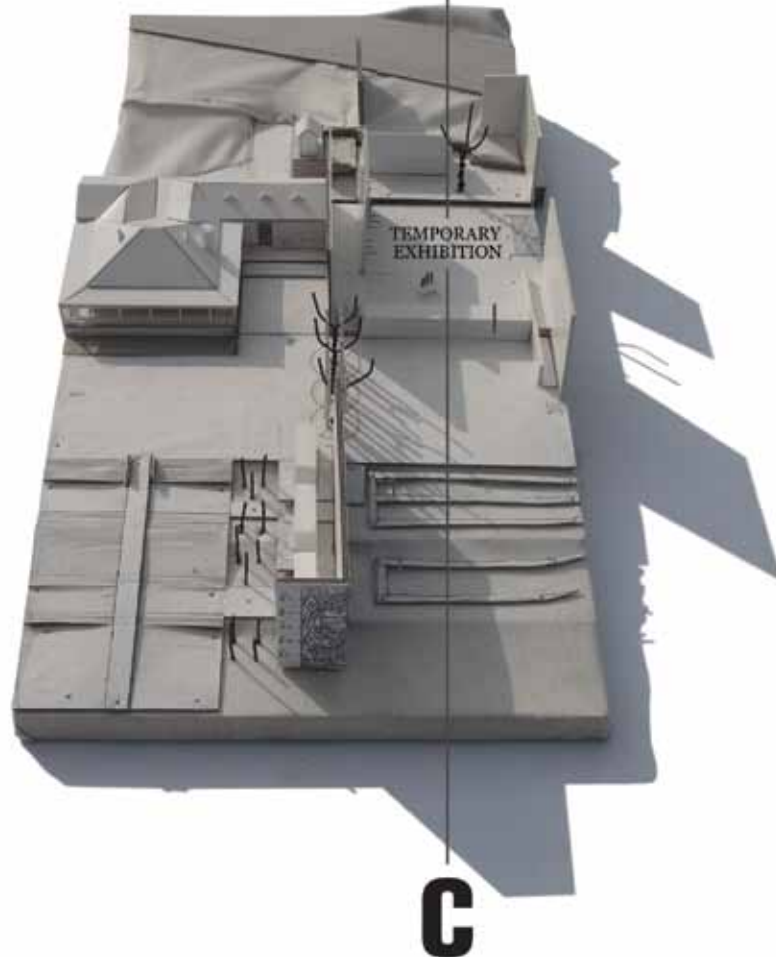
ADMINISTRATION BUILDING NORTH ELEVATION



BUILDING 3 - TEMP. EXHIBITION CONCEPT MODEL



Building 3



C - TEMPORARY EXHIBITION:

** The building occupies the footprint of the old Herbarium building. The building structure is argued on two ideas, the scale of the existing relationship between buildings and hortus cunclusus (walled gardens).*

BRIEF AND ASSIGNABLE AREA - Linked to the geometry of the 1889 axial connection of House Vrede, the 540 square meters building is located adjacent to the garden entrance. The exhibition space is developed as an outdoor environment, deferring from the standard practice of enclosed exhibition i.e. in a conservatory.

SITTING AND BUILDING PLANNING - Evacuated in 2008, the derelict Herbarium building is structurally unstable. Part of a series of haphazard additions, the programme of botanical exhibition is introduced to re-establish nature as function of the building. Located in the middle of House Vrede's East-West platform, walls in the building are opened to create an exhibition space.

MOVEMENT - The historic axis of House Vrede is used as key circulation route between the entrance and historic gardens. Made up of freestanding walls, the space is designed to resemble a Magaliesburg krans (ridge), planted with aloes and ficus trees, the walls recreate a vertical garden of plants growing in the surrounding Magaliesburg mountain range. Public bathrooms are located at the South end on the axis.



Fig_116: Magaliesburg krans: Walls recreate a vertical garden for plants growing in the surrounding Magaliesburg mountain range.

THE HOUSE AND THE TREE:

The theoretical investigation has concluded that up until the 19th Century, there was no differentiation between garden design and architecture. The exhibition space is designed round an existing tree (*Kirkia Acuminata*) that is located next to a small building (1929 Plant Pathology Shed). These elements are framed by the ten meter walls that enclose the space (referencing the proportion of the old building). The design is based on the classic idea of a walled garden (*hortus cunclusus*). The perception and representation of landscape is reinterpreted to create a spatial character for the exhibition of plants.

* *Figure 118 (Opposite page): Image of the Selinga tree and old laboratory shed, existing elements reused as focal elements within the exhibition building.*

NATURE AS INSPIRATION FOR ARCHITECTURAL FORM:

Apart from referring to the height of the existing building, the scale and proportion of the walls that enclose the exhibition space are influenced by the idea of creating an appropriate scale for the Selinga tree. Freestanding concrete walls are cast with a grid that can accommodate the vertical exhibition of plants. Designed to accommodate plant collections on the horizontal plane, the ground floor is designed with movable tables for plant collections. The envelope and floor plane that encloses the programme of exhibition becomes in itself the exhibition.

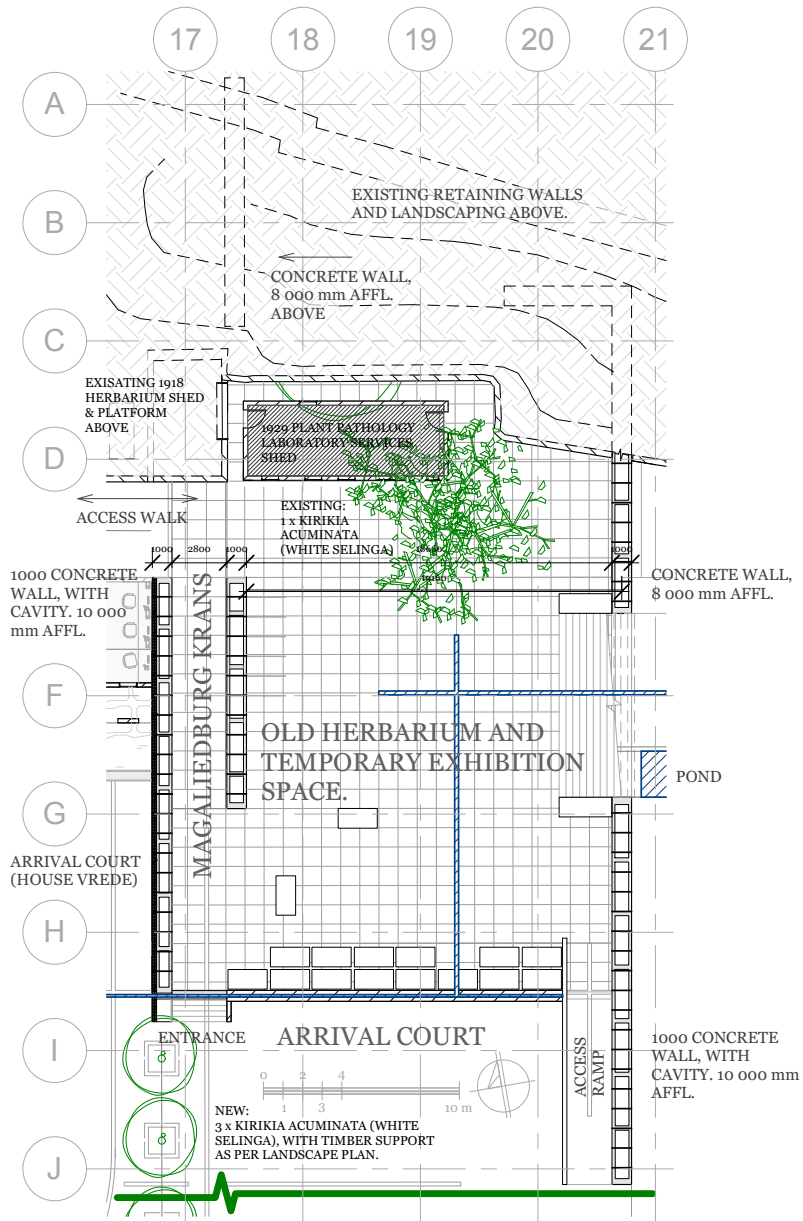


*Fig_117: House Vrede and the old Herbarium:
Existing relationship between the two buildings.*

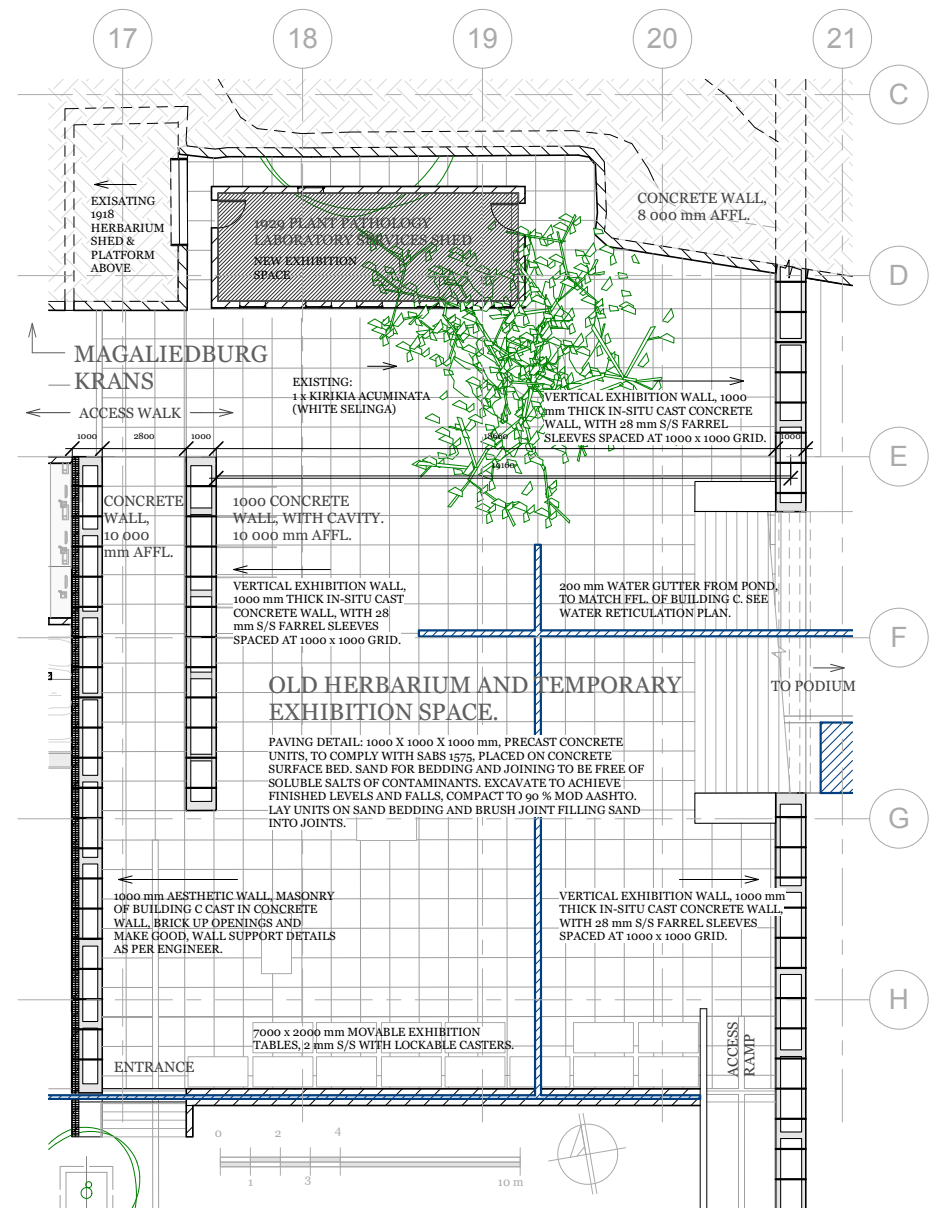


Fig_118: Kirkia Acuminata (White Selinga) and 1929 Plant Pathology shed.

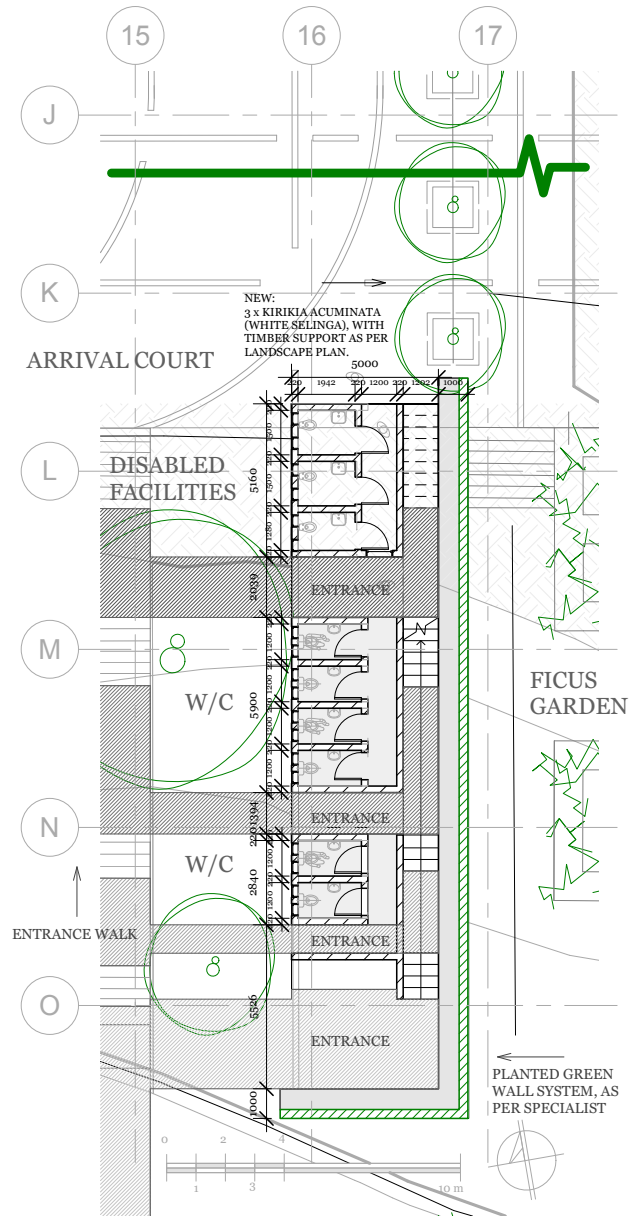
TEMP. EXHIBITION GROUND FLOOR PLAN



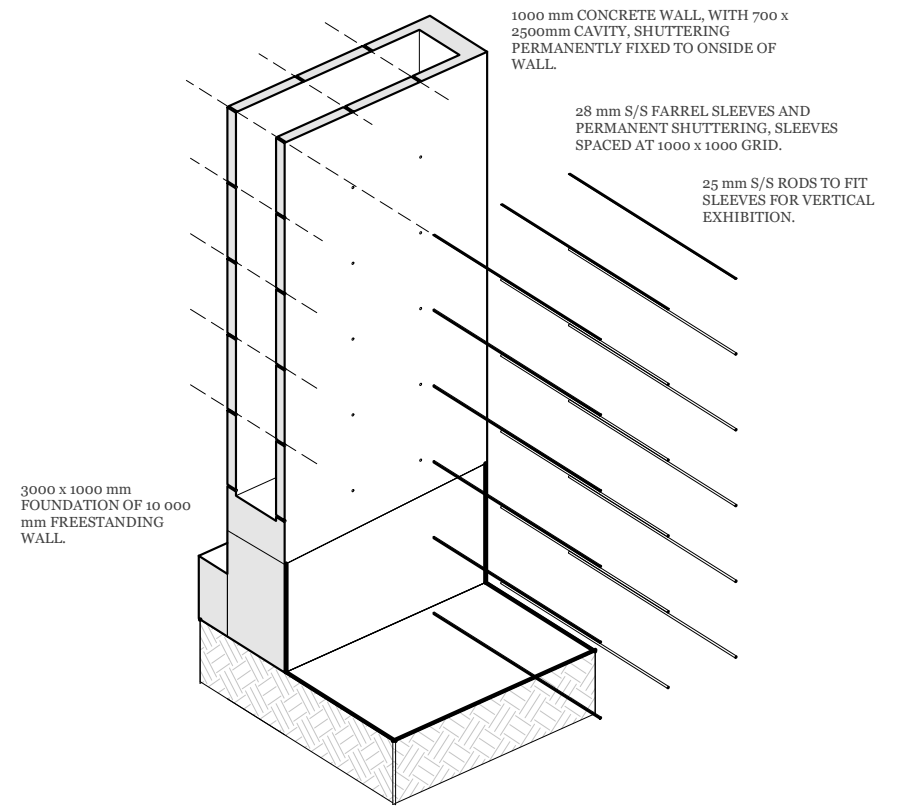
TEMP. EXHIBITION DETAILED PLAN



TEMP. EXHIBITION W/C PLAN



TEMP. EXHIBITION WALL DETAIL



BUILDING 4 - TIMBER FOLLY

CONCEPT MODEL



Building 4

TIMBER FOLLY



D

D - TIMBER FOLLY:

Leaves are the most conspicuous and physiologically possibly the most important organs of a green plant.

- Prof. Kristo Pienaar on leaves.

(PIENAAR 1979:22).

INTERSPECIFIC COMPETITION - In ecology the term is used to describe the process whereby individuals of different species compete for resources e.g. food or living space. For a tree to survive in a dense forest, it must grow taller than its neighbours, absorbing as much sunlight as possible (BEGON, TOWNSEND & HARPER 2006:5).

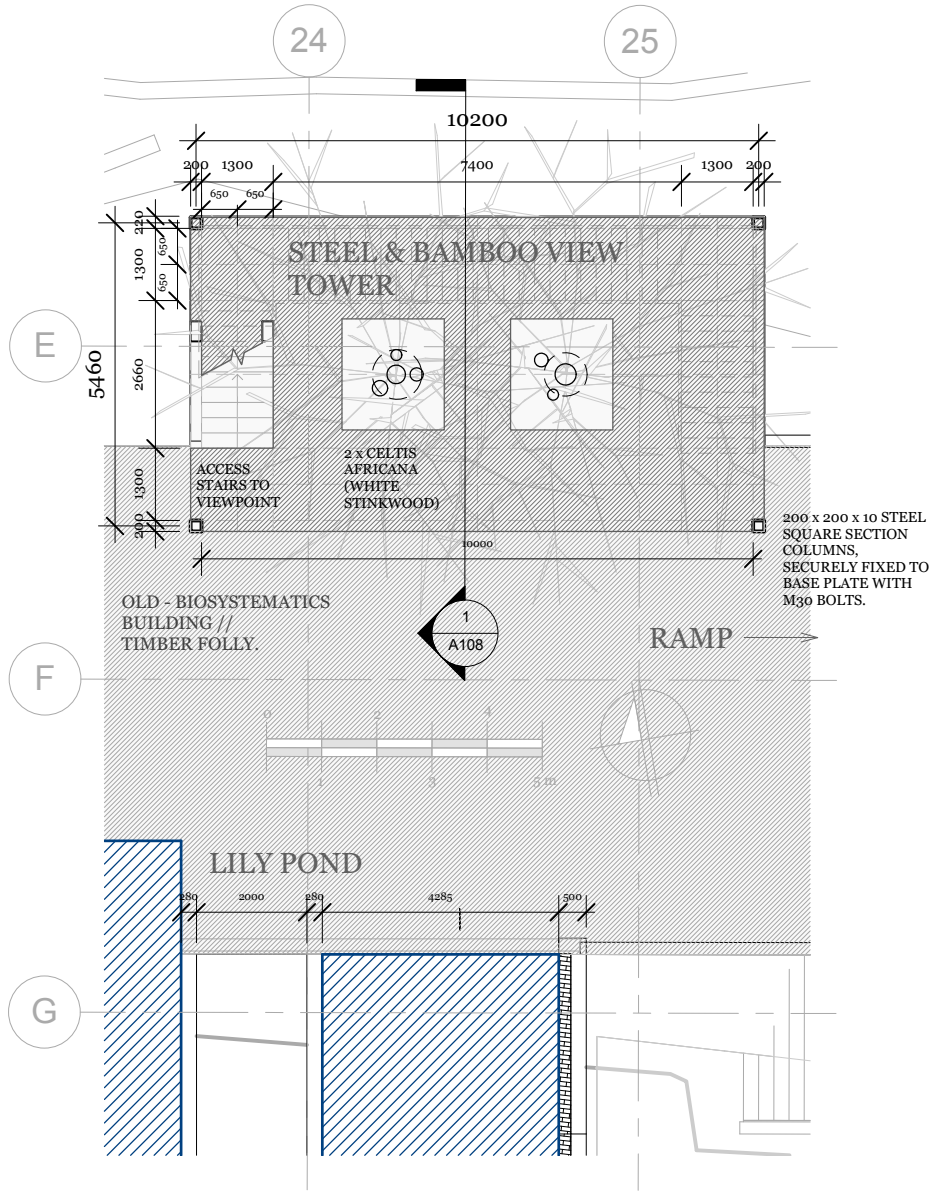
FORM - The building is planned on the Northern tip of the old Plant Pathology building. The eighteen meter high building relates to the scale of the Union Building. The idea behind the building was to recreate a forest environment through the architectural envelope, recreating an environment in nature through the building. A spiraling staircase guides visitors up the tree canopy to two viewing decks. The upper deck is a platform overlooking the Union Buildings.



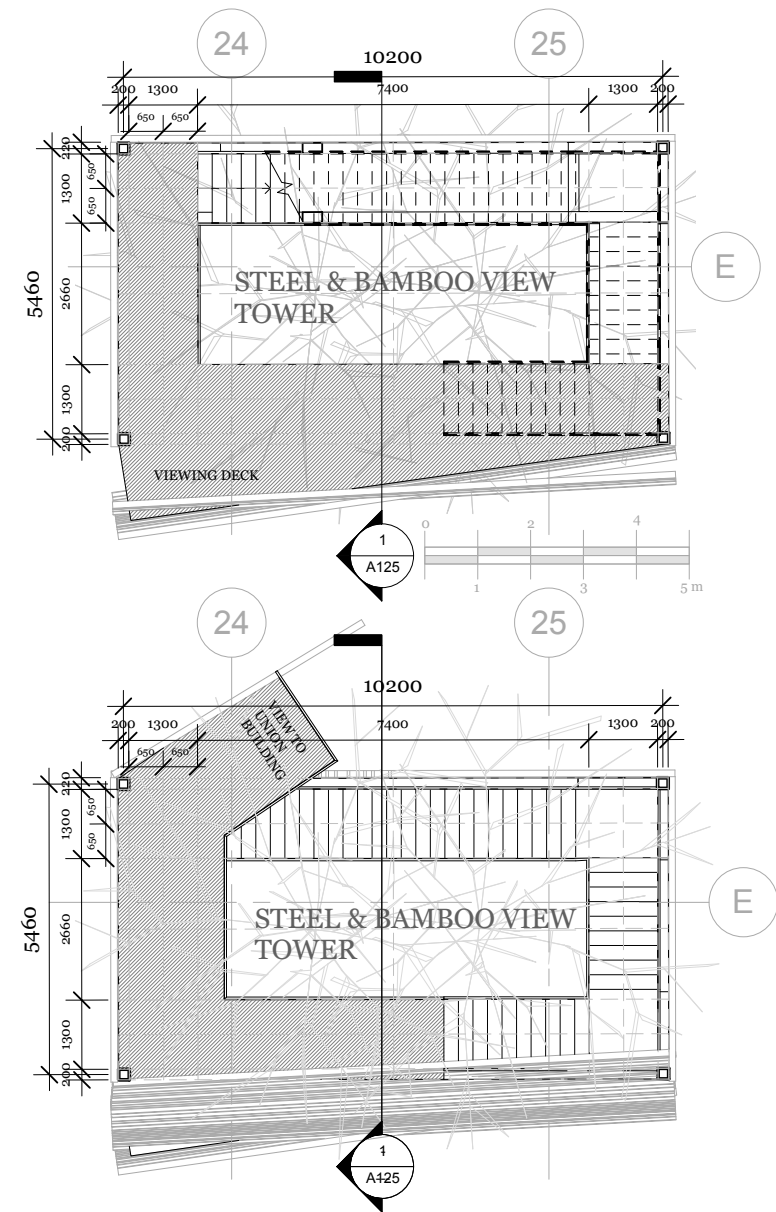
Fig_124: The Social Struggle of plants: Two different specimens of white oak (Quercus alba). The specimen on the left is a free-standing tree, while the tall, slender tree on the right grew in a forest.



TIMBER FOLLY GROUND FLOOR PLAN



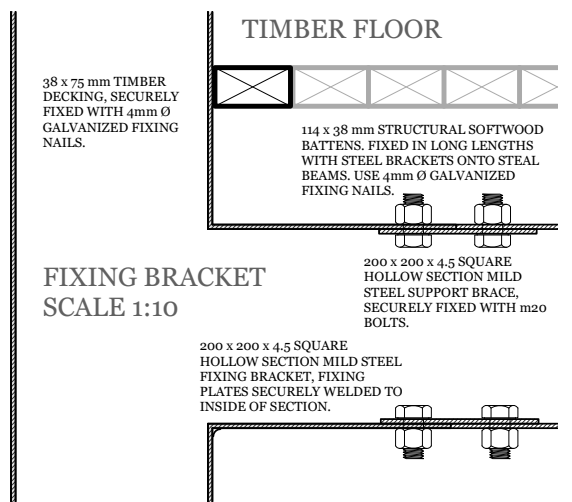
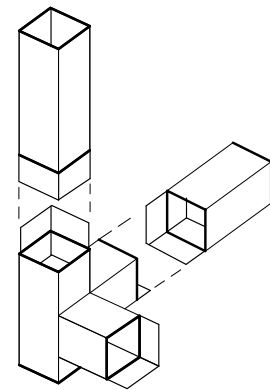
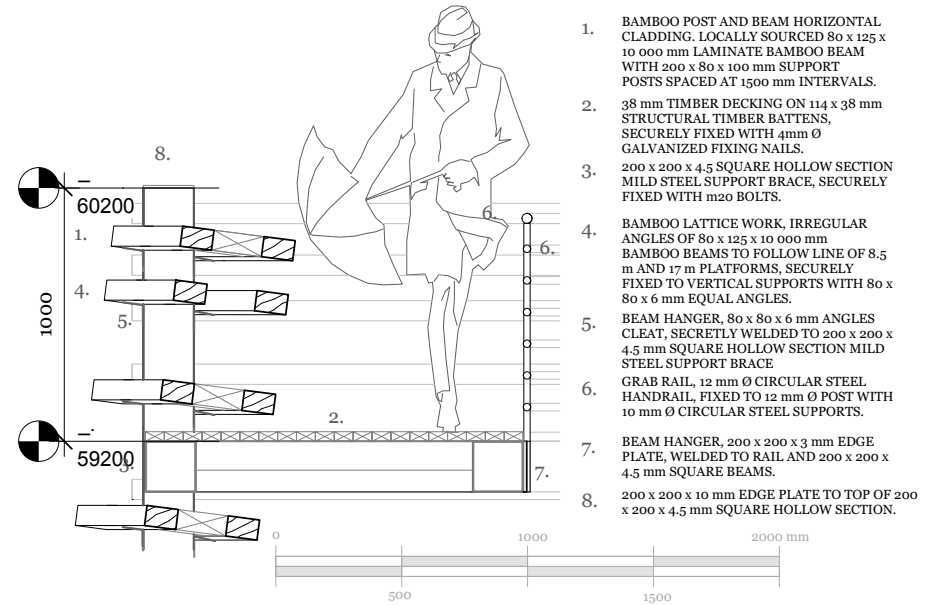
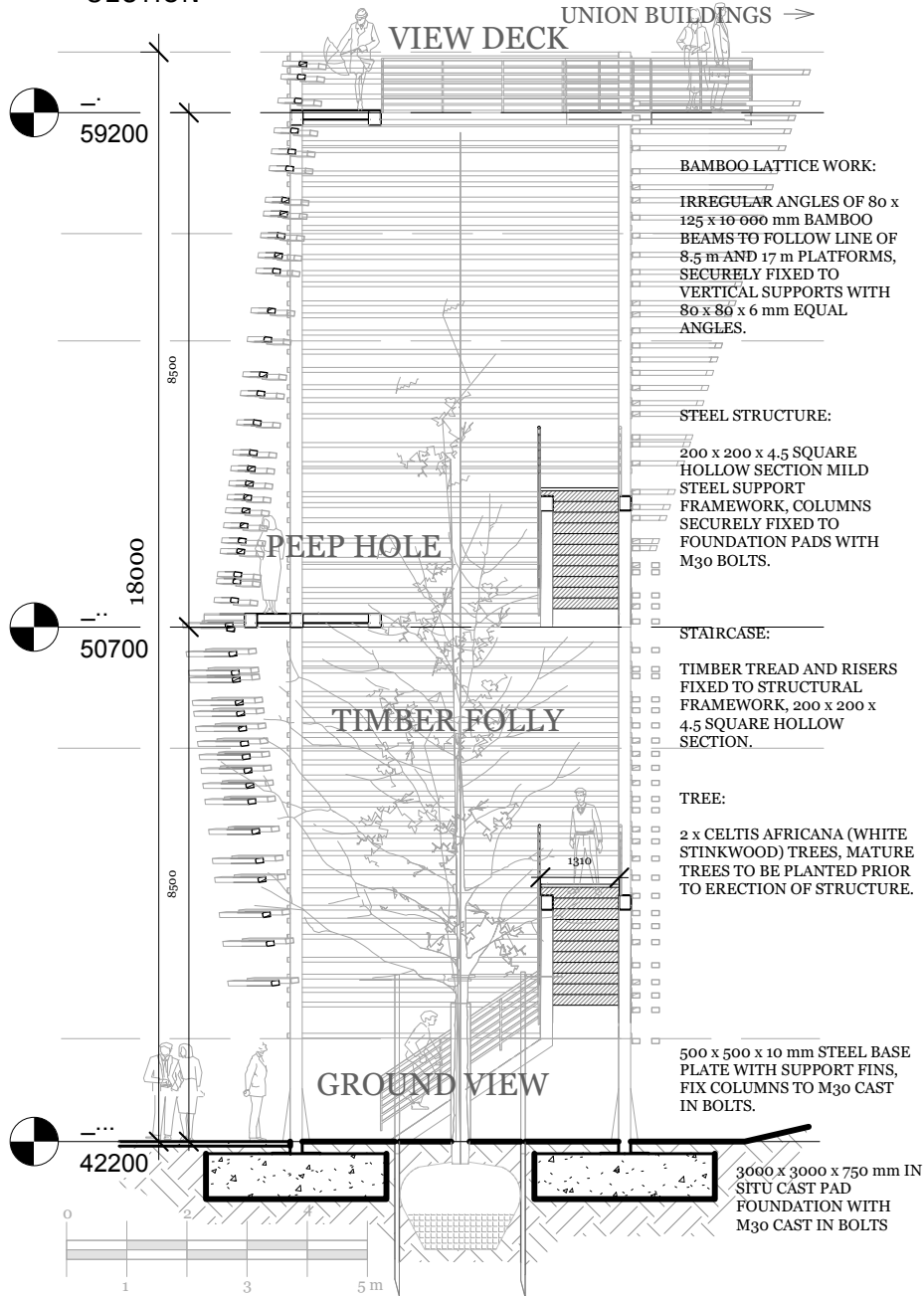
TIMBER FOLLY FLOOR PLAN: 6M & 18M



TIMBER FOLLY SECTION



TIMBER FOLLY DETAILS



BUILDING 5 - LILY POND

CONCEPT MODEL



Building 5



LILY POND

E

E – LILY POND:

A fountain is perhaps the most delightful of all the ornamental accessories that go to complete a garden, and one in which the sculptor may find the greatest scope and freedom of his fancy and skill.

- Abstract from *Sex in the Garden*.

(RIKER & ROTTENBERG 1976:139)

WATER HYDROLOGY - Ecologists view water as a defining part of all ecosystems. Through the process of erosion, water has grafted the form of almost all our physical landscapes. Water shapes all living ecosystems by its quantity, amount, distribution and occurrence (BEGON, TOWNSEND & HARPER 2006:65).

FORM - Built on the footprint of the old Plant Pathology building, the lily pond is a gathering place for water in the entrance garden. A stream of water flows from the pond to House Vrede, indicating the movement route to visitors. The pond is designed to exhibit indigenous water plants.

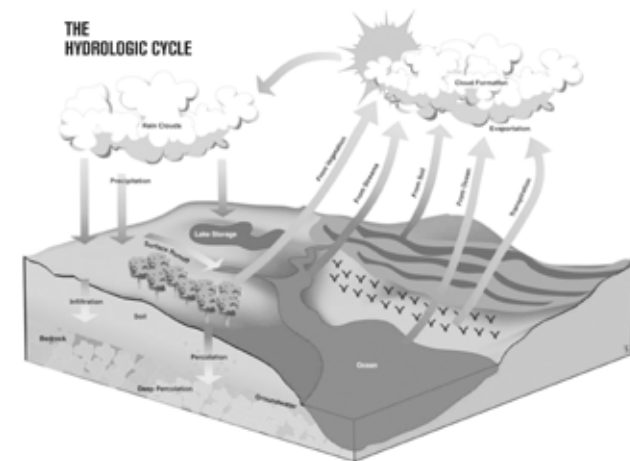
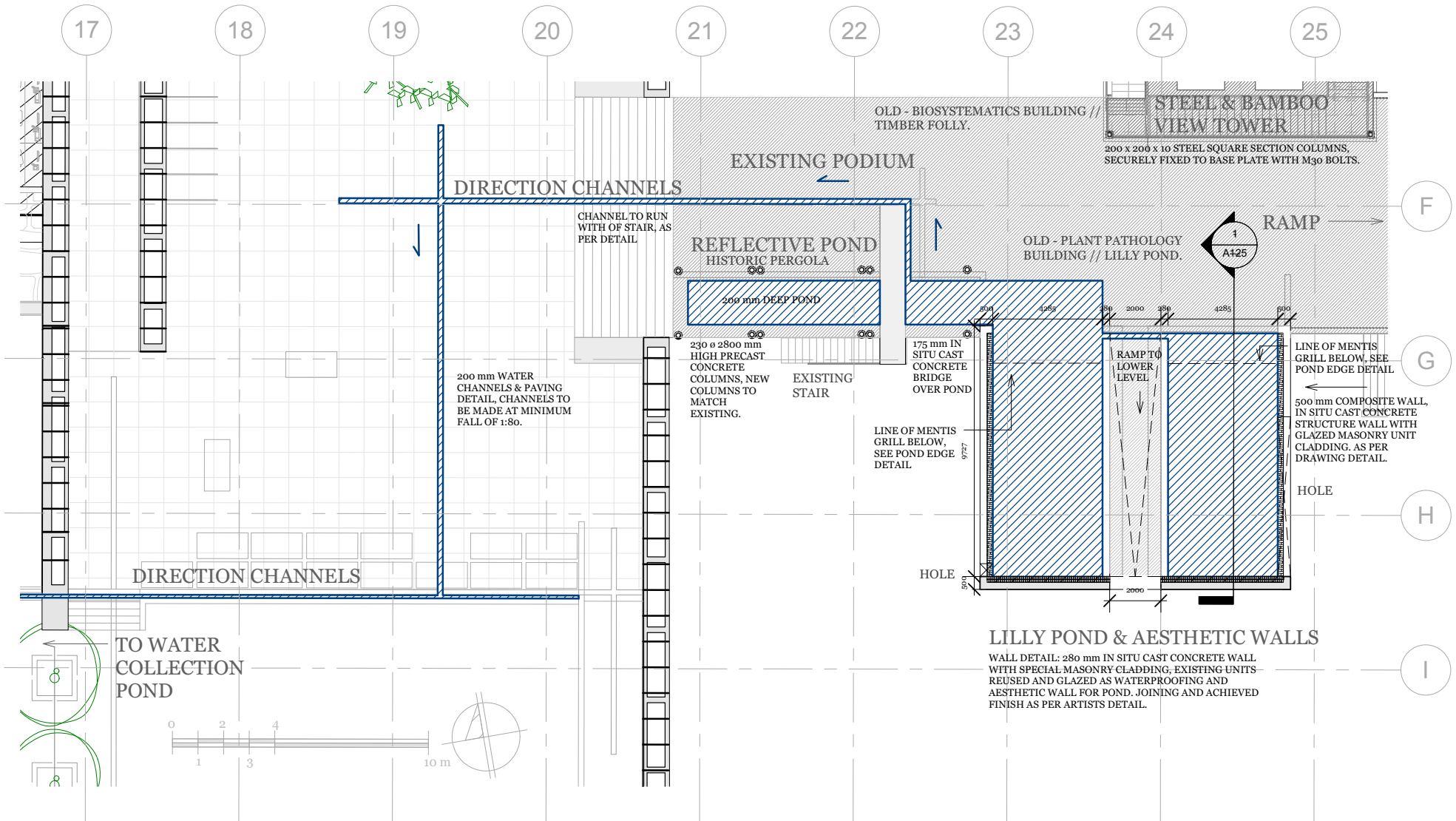


Fig. 131: Hydrologic cycle: The water cycle plays a key role in ecosystem functions and processes.



LILY POND PLAN



TO WATER
COLLECTION
POND

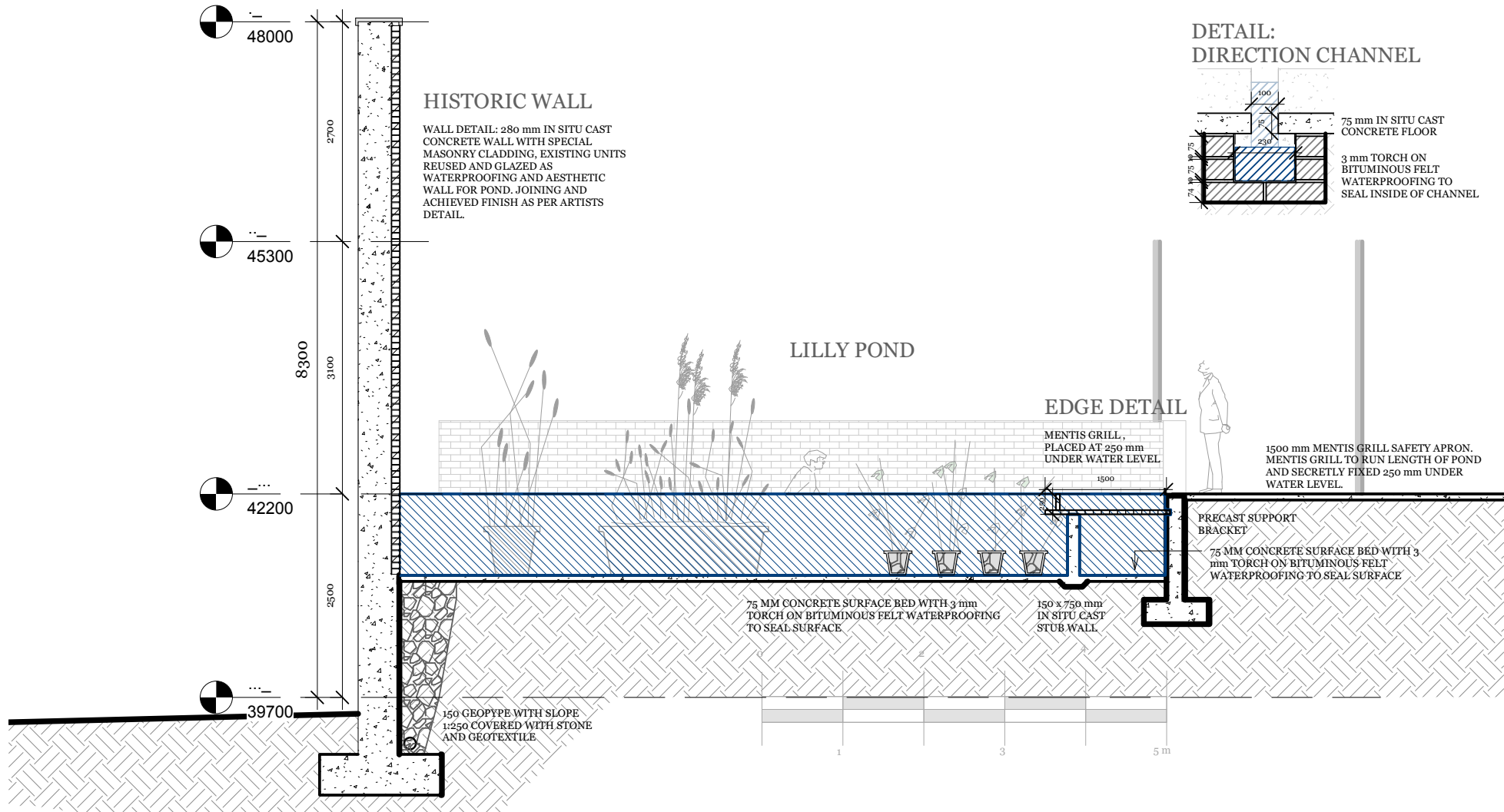


LILLY POND & AESTHETIC WALLS

WALL DETAIL: 280 mm IN SITU CAST CONCRETE WALL WITH SPECIAL MASONRY CLADDING, EXISTING UNITS REUSED AND GLAZED AS WATERPROOFING AND AESTHETIC WALL FOR POND. JOINING AND ACHIEVED FINISH AS PER ARTISTS DETAIL.

LILY POND

SECTION & DETAIL



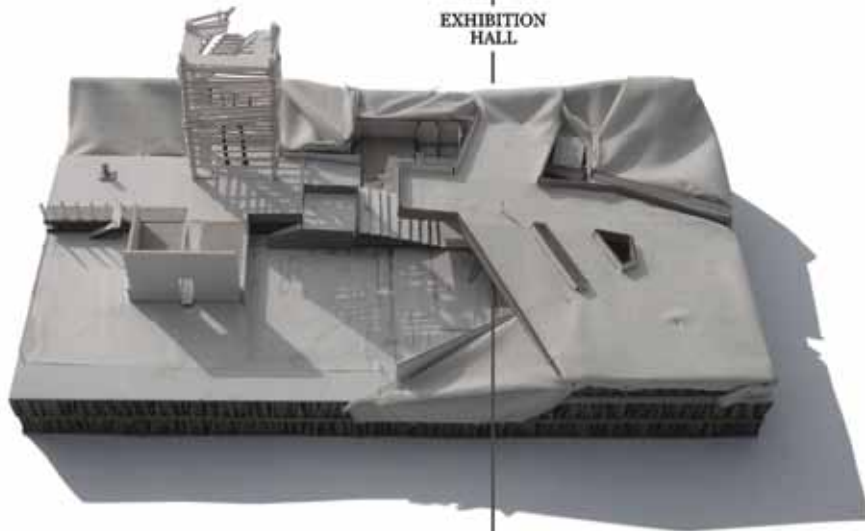
BUILDING 6 - EXHIBITION HALL

CONCEPT MODEL



Building 6

EXHIBITION HALL



F

F – EXHIBITION HALL:

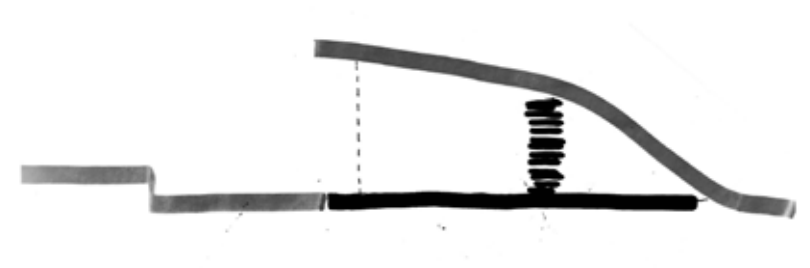
IDEA - The aim of the building is to create a shielded environment for the exhibition of plants. The roof of the building encloses the space to form a sheltered place. Shaded and protected from the African sun, the space mimics a cave like atmosphere for the exhibition of more sensitive plants i.e. orchids and other epiphytes.

BRIEF AND ASSIGNABLE AREA - With a floor area of 1080 square meters, the exhibition hall has a schedule area of 220 assignable square metres. Built on the footprint of the old maintenance building, the programme of education and exhibition are covered by a large-span green roof. The education facilities include an outdoor amphitheater and stage for workshops and lectures.

SITTING AND BUILDING PLANNING - Located on the east edge of a platform formed by structures on the site, the building is cut into the landscape. A two meter level difference is accommodated by a access ramp. Facing west, the programmes in the building are arranged round the ramp. Movement and functions in the building are covered by three ten meter wide concrete roofs that open up to the east edge of the site - allowing users to access historic trails of the Union Building estate.

FORM - The form terminates the Eastern end of the entrance podium as an cave that connects to the landscape. The building form is dominated by its roof, a concrete roof fans out in three ten meter wide parts that puncture the landscape. The 200 mm thick roof is covered with grass. The idea behind the roof allows the landscape to fold over the structure, connecting the exhibition buildings on the platform to the adjacent Union Building gardens.

INDOOR EXHIBITION - Two light-wells are cut in the slanting roof. Built at a 110° angle to the floor plan, movement in the space is directed by a thirty meter wall. The plane forms a mouth dividing the interior space from the landscape, inviting users to the building.

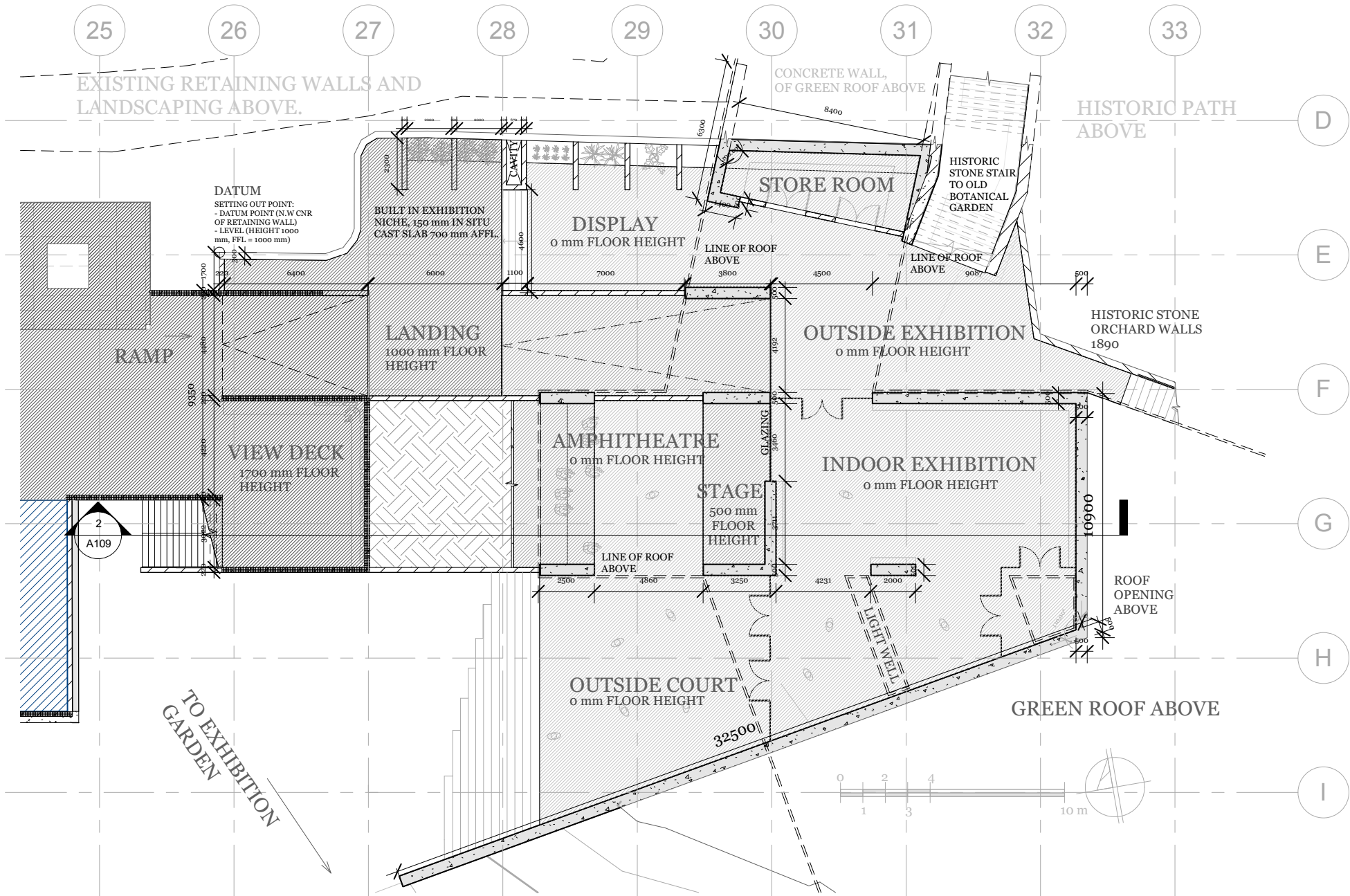


Fig_136: Concept diagramme of the exhibition building.

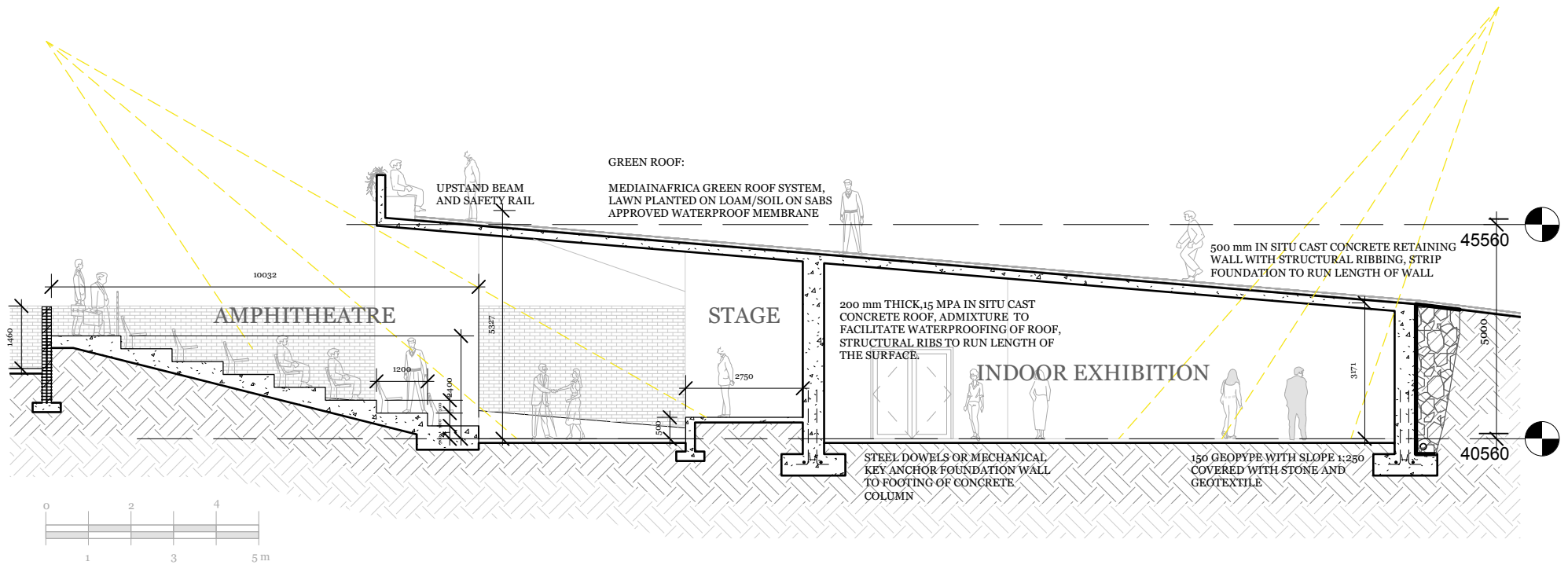
EXHIBITION HALL PLAN



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YUNIBESITHI YA PRETORIA

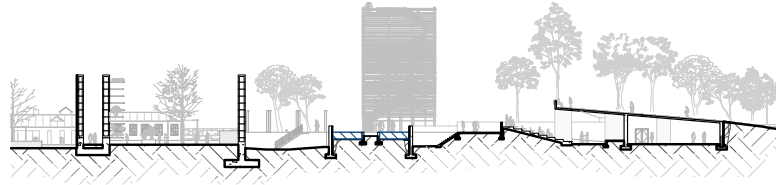


EXHIBITION HALL SECTION

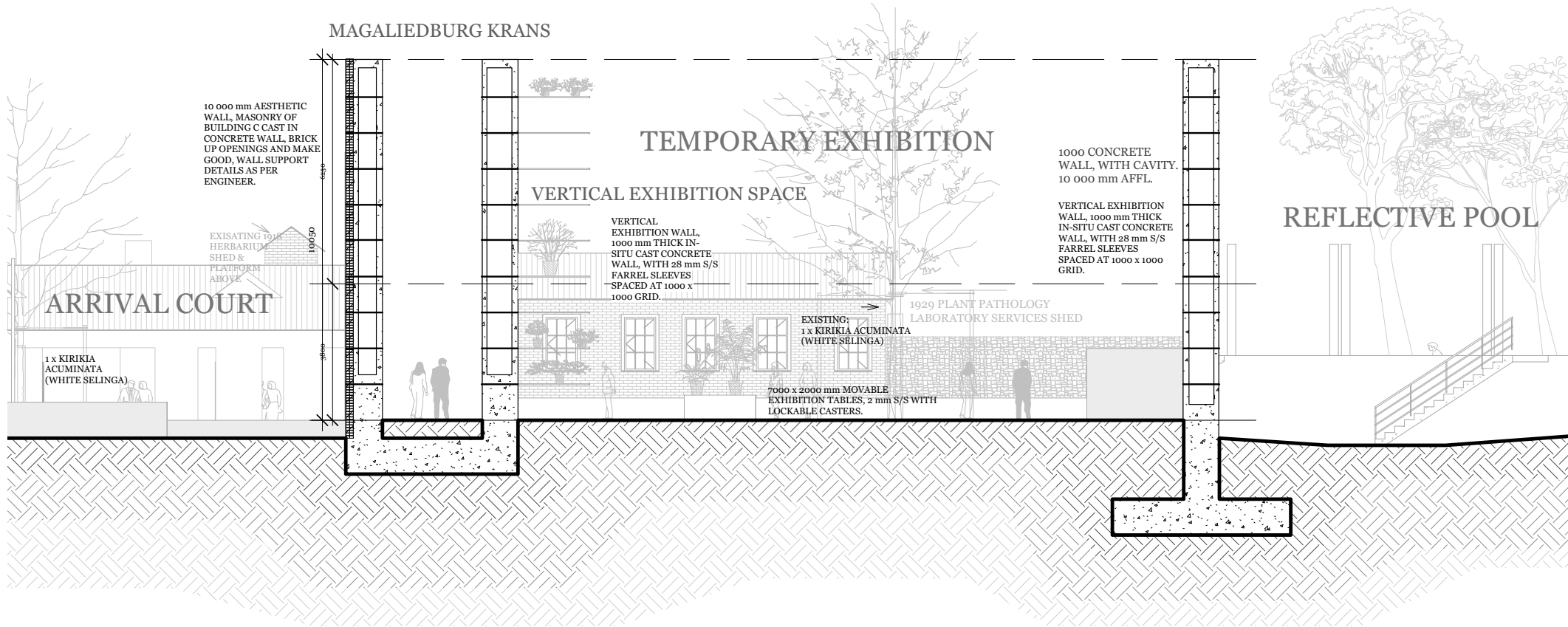


EXHIBITION BUILDINGS

SECTION

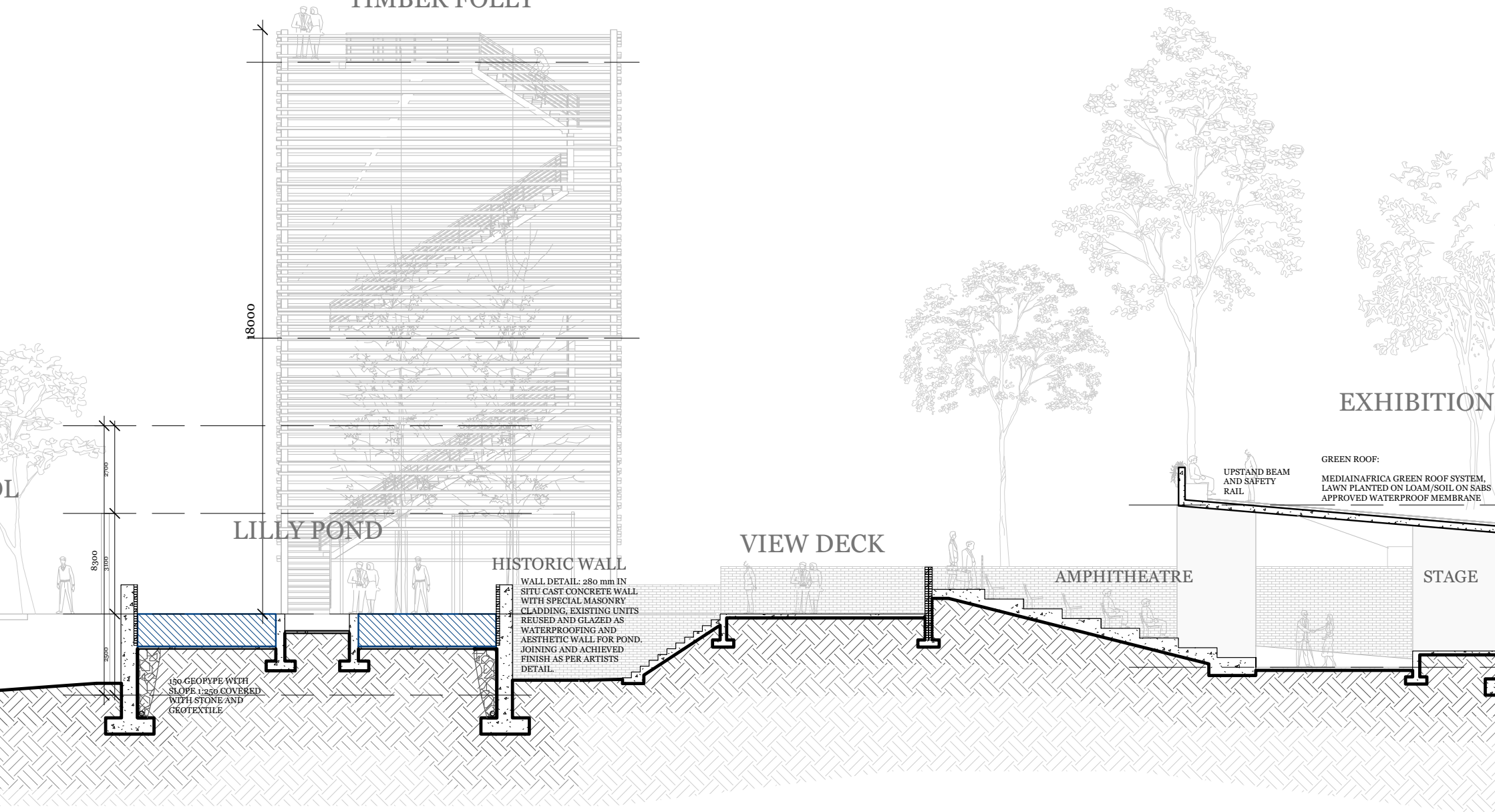


SECTION KEY





TIMBER FOLLY



18000

LILLY POND

HISTORIC WALL

WALL DETAIL: 280 mm IN SITU CAST CONCRETE WALL WITH SPECIAL MASONRY CLADDING. EXISTING UNITS REUSED AND GLAZED AS WATERPROOFING AND AESTHETIC WALL FOR POND. JOINING AND ACHIEVED FINISH AS PER ARTISTS DETAIL.

150 GEOTYPE WITH SLOPE 1:250 COVERED WITH STONE AND GEOTEXTILE

VIEW DECK

AMPHITHEATRE

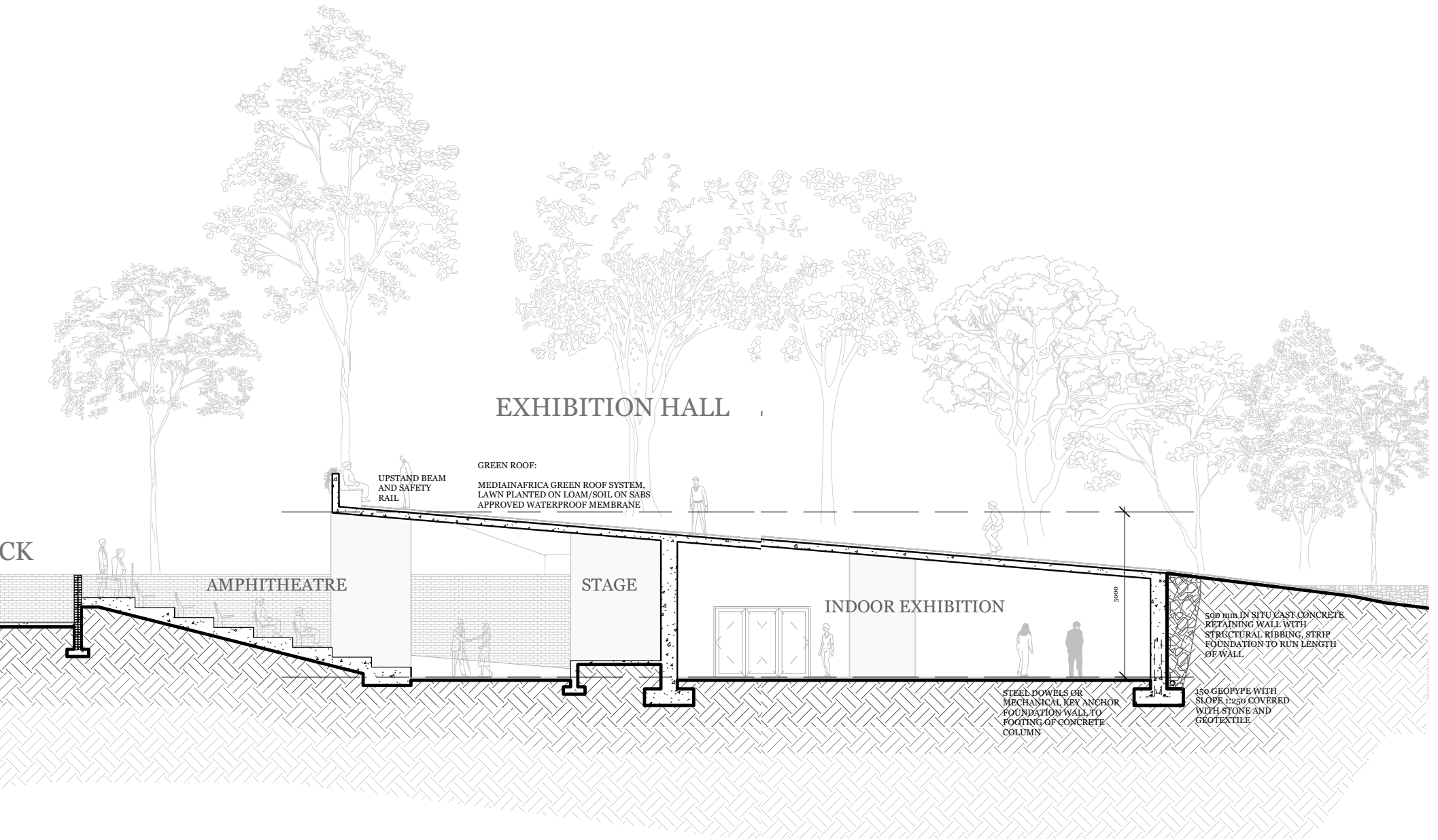
STAGE

EXHIBITION

GREEN ROOF:
MEDIANAFRICA GREEN ROOF SYSTEM. LAWN PLANTED ON LOAM/SOIL ON SABS APPROVED WATERPROOF MEMBRANE

UPSTAND BEAM AND SAFETY RAIL

8300
2700
3150
2500



HOUSE VREDE & EXHIBITION BUILDINGS

FINAL MODEL



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UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA





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