





7 Technical Resolution

Structural systems
Sustainability
Material overview
Materials

The argument related to technical choices made within the architectural solution. The materials and systems employed with the structure are discussed.

Structural systems

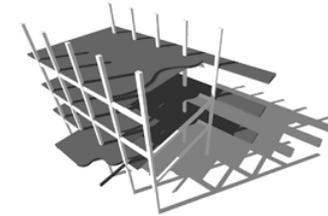
Concrete vs Steel

Concrete and steel were both considered for the structural frame of the buildings, and although concrete is a more cost-effective choice, steel was selected because it is able to span longer distance and can be disassembled and re-used. Steel also matched the intended aesthetic for the development with its lightweight .

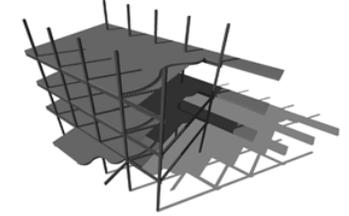
The nature of the separate components (pergolas and roofs) which are attached to the main structure require steel fittings, and although these could also be fixed to a concrete beam or column, the same versatility would not be available, should these fittings have to be removed, extended or adjusted. The challenge of meeting the required fire resistance standards could be solved by the application of intumescent paint to exposed structural steel elements.

Table 7.1: Advantages of using a concrete structure vs steel frame

concrete structure



steel frame structure



cost		
ease of construction		
flexibility		
weight		
span distance		
connection		
disassembly		
intended aesthetic		
fire resistance		
total	4	6

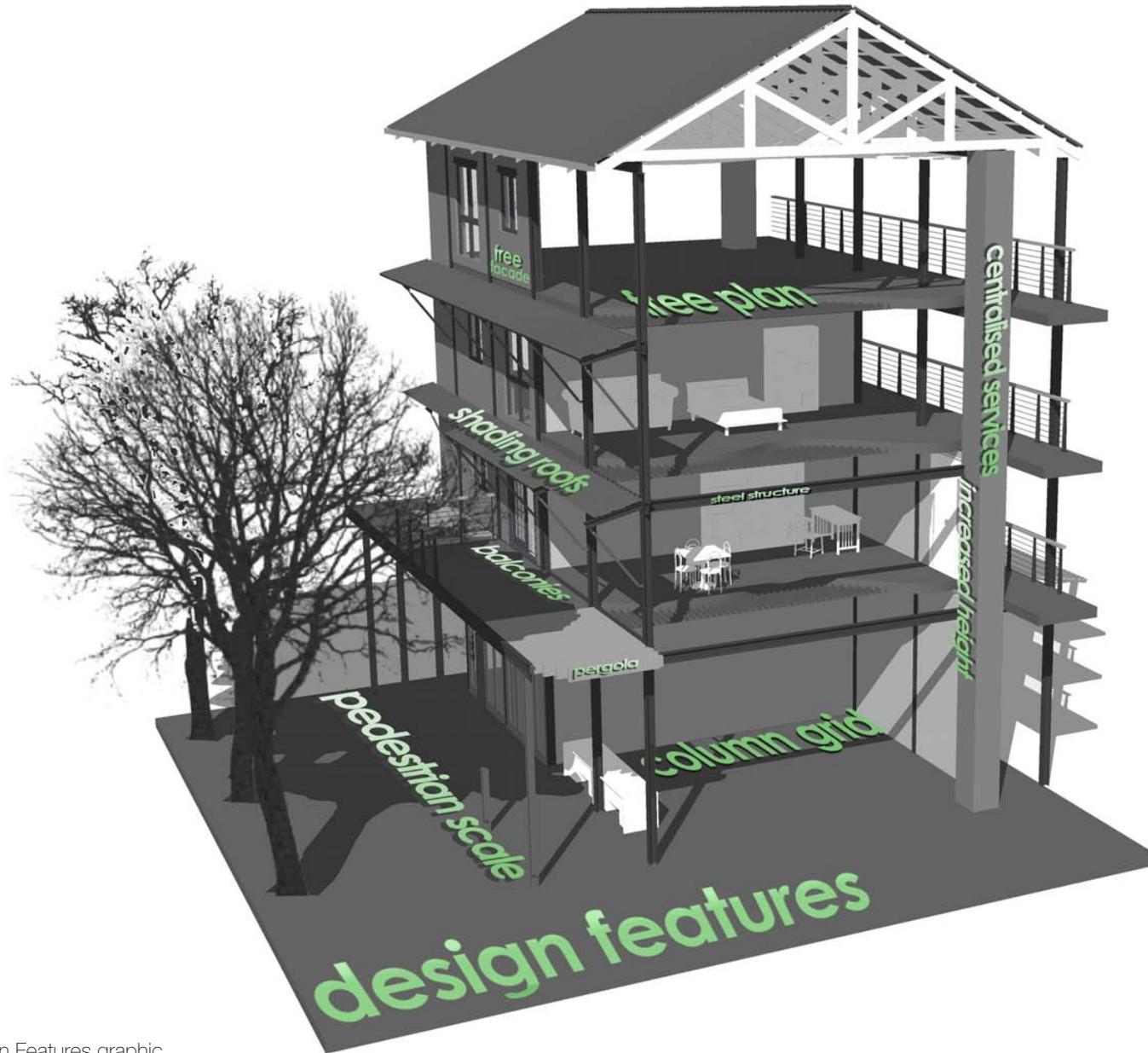


Figure 7.2: Design Features graphic

SUSTAINABLE BUILDING ASSESSMENT TOOL (SBAT-P)

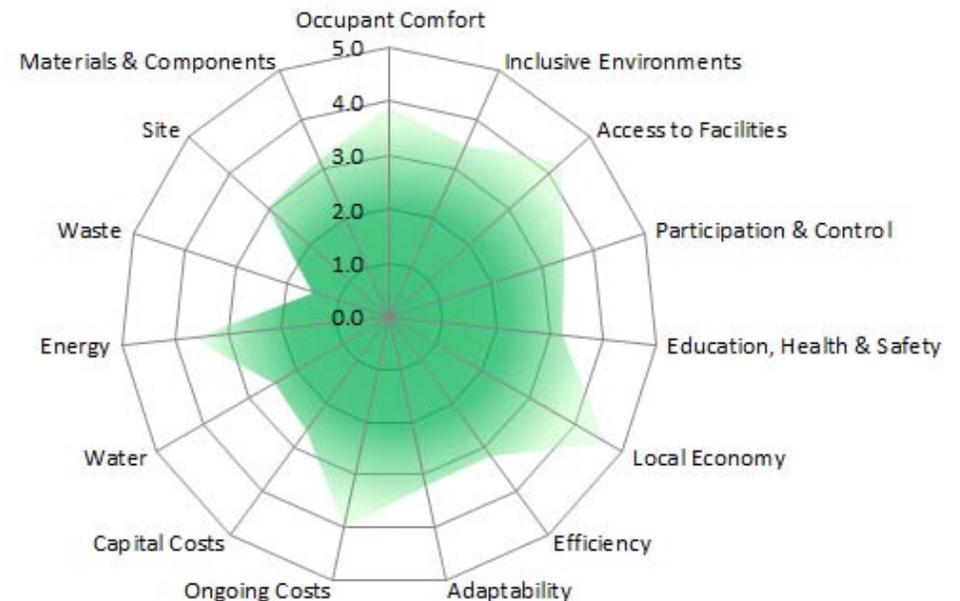
Project title: Germinate: Architecture of Growth Date: October 2011
 Location: c/o Skietpoort Avenue and Koch Street Undertaken by: Author
 Building type: Mixed-use residential

Sustainability

The Sustainable building assessment tool (SBAT) as developed by the CSIR was tool was applied to the design in order to measure the impact on the environment. Application of the tool showed strengths in the social area - particularly in the fields of occupant comfort and access to facilities. This is due largely to the development's central location and its nature as a primarily housing scheme.

Lower scores were recorded in the environmental section showing that the more attention could be given to the development of a recycling system as well as the installation of alternative energy harvesting sources. A retrofitting of these systems is possible and could drastically increase scores in this section. These considerations were initially not applied due to restrictions in budget.

Overall the scheme is classified as GOOD. This supports the aim of establishing a well-blanced development which supports the community. (See Addendum A for full tool).



Social	3.7
Economic	3.5
Environmental	2.8
Overall	3.3

Classification: GOOD

Figure 7.3: SBAT graph



Material overview

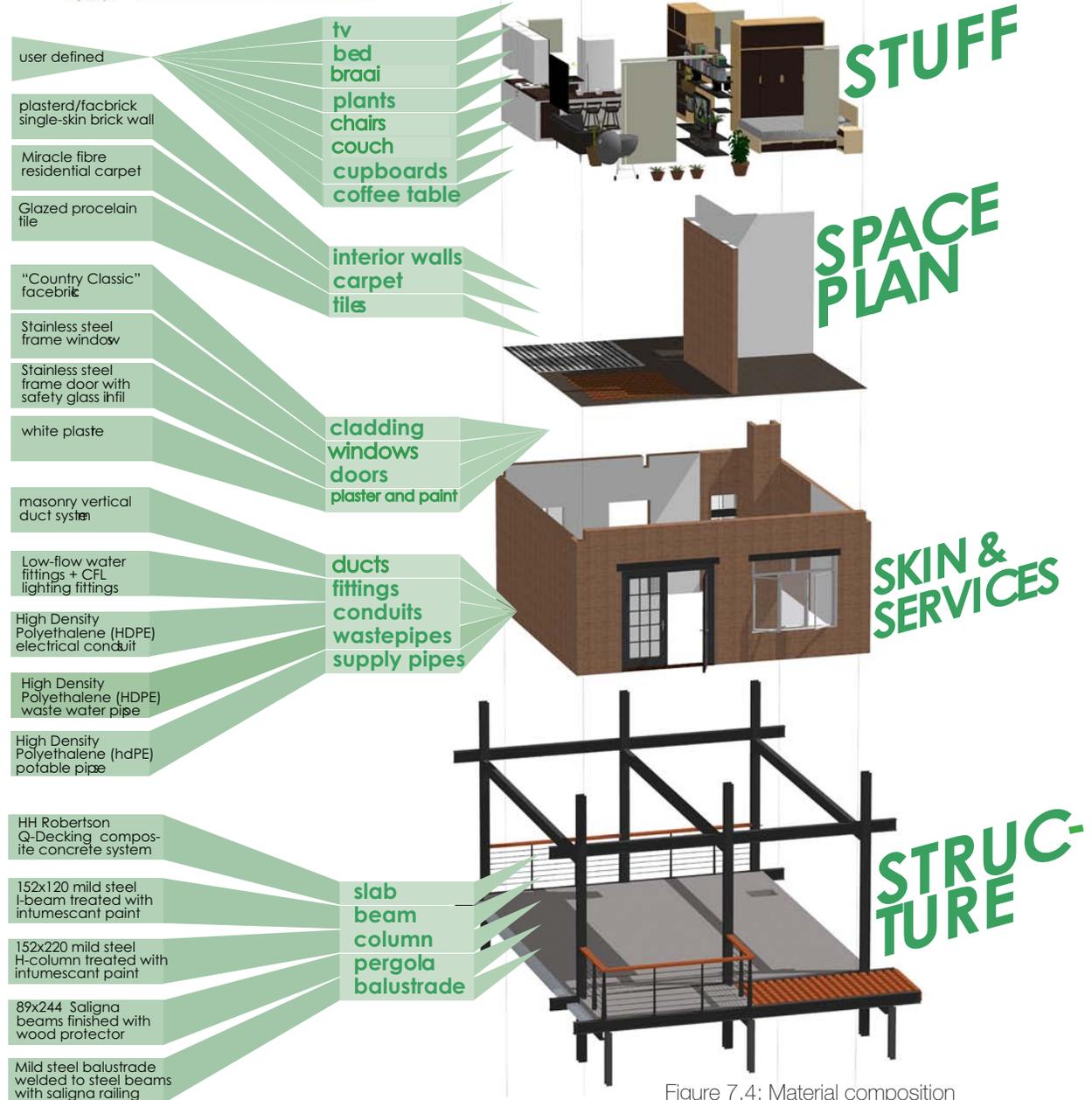


Figure 7.4: Material composition

Materials

Building Skin

For the infill, a combination of white plastered masonry and a red “Country Classic” style face-brick from the Satin Corobrick range was selected. Both materials are represented in many of the existing free-standing dwellings in the area. The natural red or tan colour of the exposed soil in the region also influenced the selection of colour of face-brick for the Freedom Park development and in this case is also a contributing factor in the choice made.



Country Classic Satin FBS





Clockwise from top right

Figure 7.7: Map showing the red/tan colour of exposed earth

Illustration 7.8: View of the Freedom Park building

Illustration 7.9: Typical Salvokop residence with facebrick and plaster combination finish

Opposite page

Illustration 7.5: Plastered wall finished with white paint

Illustration 7.6: Country Classic Satin FBS

Precast slabs vs cast-in-situ

For a floor slab a conventional reinforced slab was deemed unfeasible due to the larger span distances between the supports of the steel frame. A precast concrete slab with a steel reinforced screed topping and a composite cast-in-situ slab with permanent galvanised steel formwork were the two plausible options explored.

In this specific application the composite concrete decking proved more appropriate.

Although not offering the same long-term flexibility, versatility or aesthetic appeal as the pre-cast slabs, the composite slab proved more cost effective and easier to assemble due to the elimination of a need for building cranes. The more accommodating nature of the slab regarding wired services allowed for the elimination of a suspended ceiling. Compatibility of connection with steel was also a considerable positive factor since the galvanised formwork could be easily attached to the steel beams. This connection would be far more complicated and expensive in the case of precast concrete.

Table 7.10: Advantages of using pre-castconcrete slabs vs composite concrete slabs with permanent formwork

	Pre-cast slabs with topping	Composite concrete decking
cost		
ease of construction		
flexibility		
weight		
span distance		
versatility		
compatibility with steel frame		
aesthetic		
services accomodation		
total	4	6

timber pergola

The intermediate edges created by the timber pergola along the edges of the building were important for the design in that they were required to create thresholds between the open public spaces and the solid mass of these buildings.

A Forest Stewardship Council-approved (FSC) South African sustainable hardwood (Saligna), treated with VOC-Compliant water-based nano-particle wood preservative was selected for the pergola. The timber is mechanically attached to the building columns with a bolt system and supported by steel columns to those of the buildings, to create a boulevard. Amenity lighting, installed on ground level to accentuate the vertical elements, completes the component.

The deep beams ensure stability and block out uncomfortable early morning and late afternoon sunlight, whilst allowing an otherwise well lit, refreshing environment. The high volume ensures summer sun is largely blocked whilst winter sun is allowed to fall deep into the ground floor facilities.



Figure 7.11: Computer generated image of timber pergola during summer

Figure 7.12: Computer generated image of timber pergola during winter

Illustration 7.13: Texture of Saligna

Units

The southern block of the development consists mainly of economically sized 1 bedroom and two bedroom units. A single bachelor unit can also be found on each level.

Some of these units are slightly bigger and can accommodate an extra bed or study nook. Each bedroom can accommodate a double bed or twin beds and is fitted with floor to ceiling cupboards. Additional storage space as allowed for in the entrance area. Bathrooms contain a standard on-counter hand wash-basin, a toilet and bath. A full oven and stove as well as a washing basin are installed amongst standard veneered kitchen counter tops with storage space below counter and overhead where appropriate. Lounges can accommodate one or two couches as well as four bar-stools allowing the kitchen counter to double as a breakfast table.

The intent behind the unit design is to provide comfortable spaces which are feasible in the bigger picture of the entire development. Emphasis was placed primarily on the four spaces that are considered as communal (entrance, kitchen, lounge and balcony) and are therefore arranged accordingly. Units are placed with bedrooms and lounges facing towards north wherever possible, unless where this coincided with the public walk-way in which case privacy was prioritised.

1 Bedroom unit

31-39m²
1-3 people
34 units

2 Bedroom unit

47m²
2-5 people
8 units

Bachelor unit

26m²
1-2 people
2 total units

Short-term unit

6.3m²
1 person
48 units



Typical unit



Figure 7.14: Bird's eye perspective view of a typical 1 bedroom unit