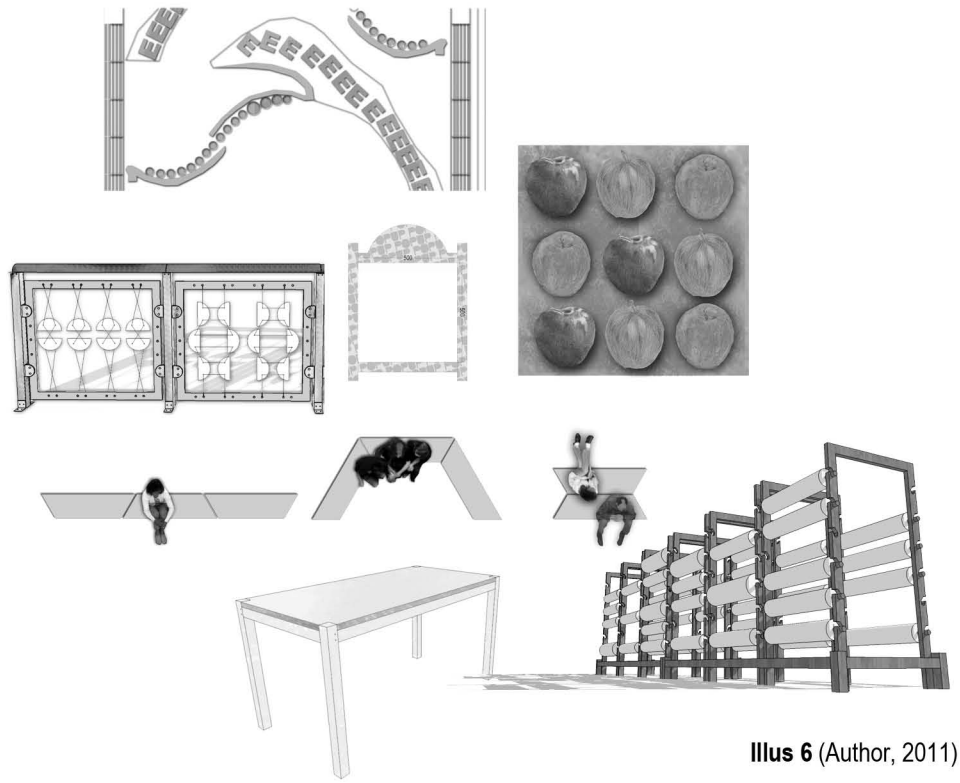
6

Technical Development



Illus 6 (Author, 2011)

6.1 INTRODUCTION

This chapter will serve to elaborate on the technical development of the design project. The approach to the technical development will be explained and its resolution illustrated in material choice and detailing. Furthermore approach to services, sustainability and inclusive design will be discussed.

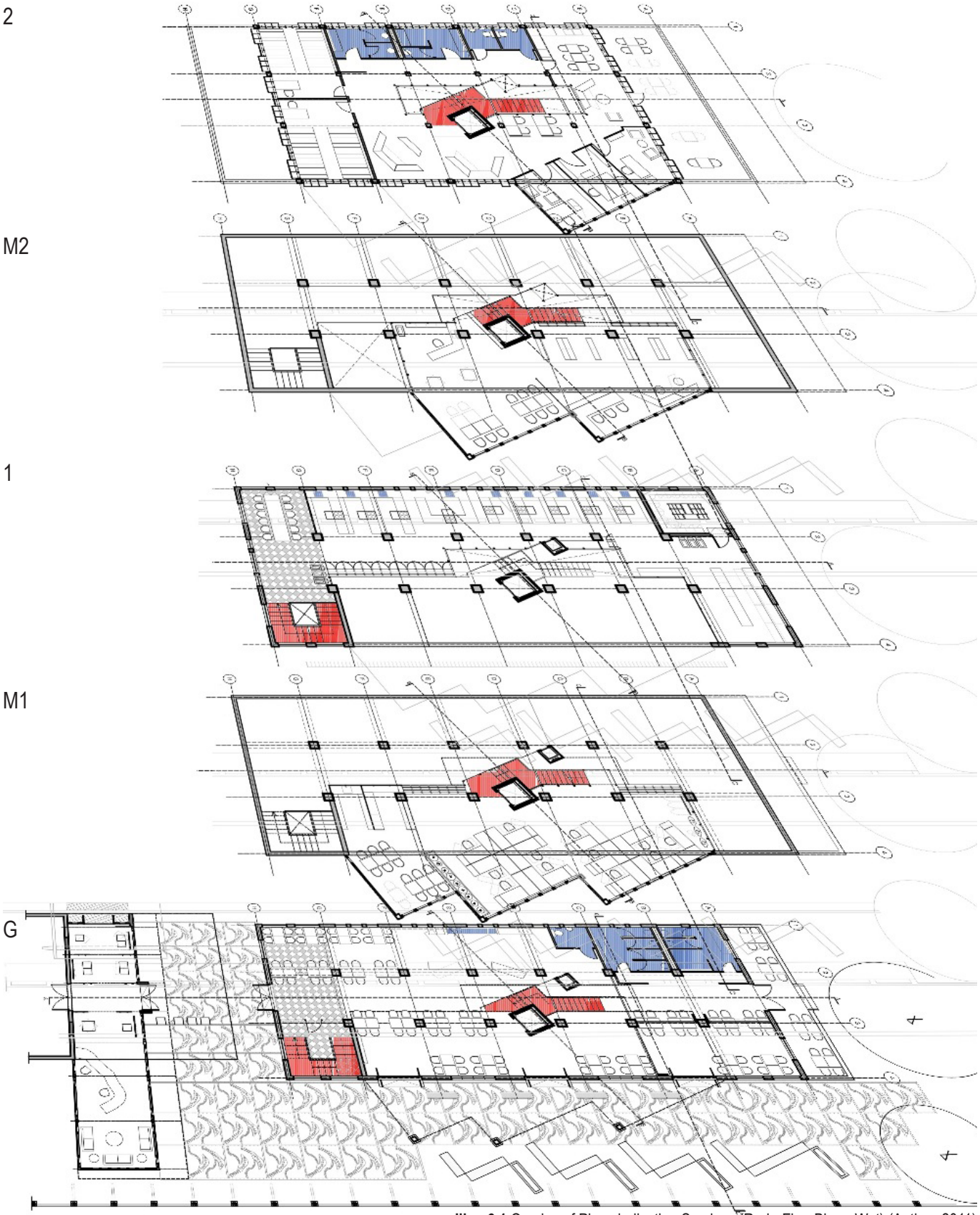
6.2 APPROACH

The approach to the technical development of the design was firmly rooted in the conceptual approach in detailing. The concept of reinterpreting and re-imagining the "historical ideal" through current cultural production has informed the design and construction of furniture and the choice of materials and finishes. Allocation of services was a more rational process of orientation (south facade for wet services), spatial requirements (ceilings for electrical and fire) and legislation (fire).

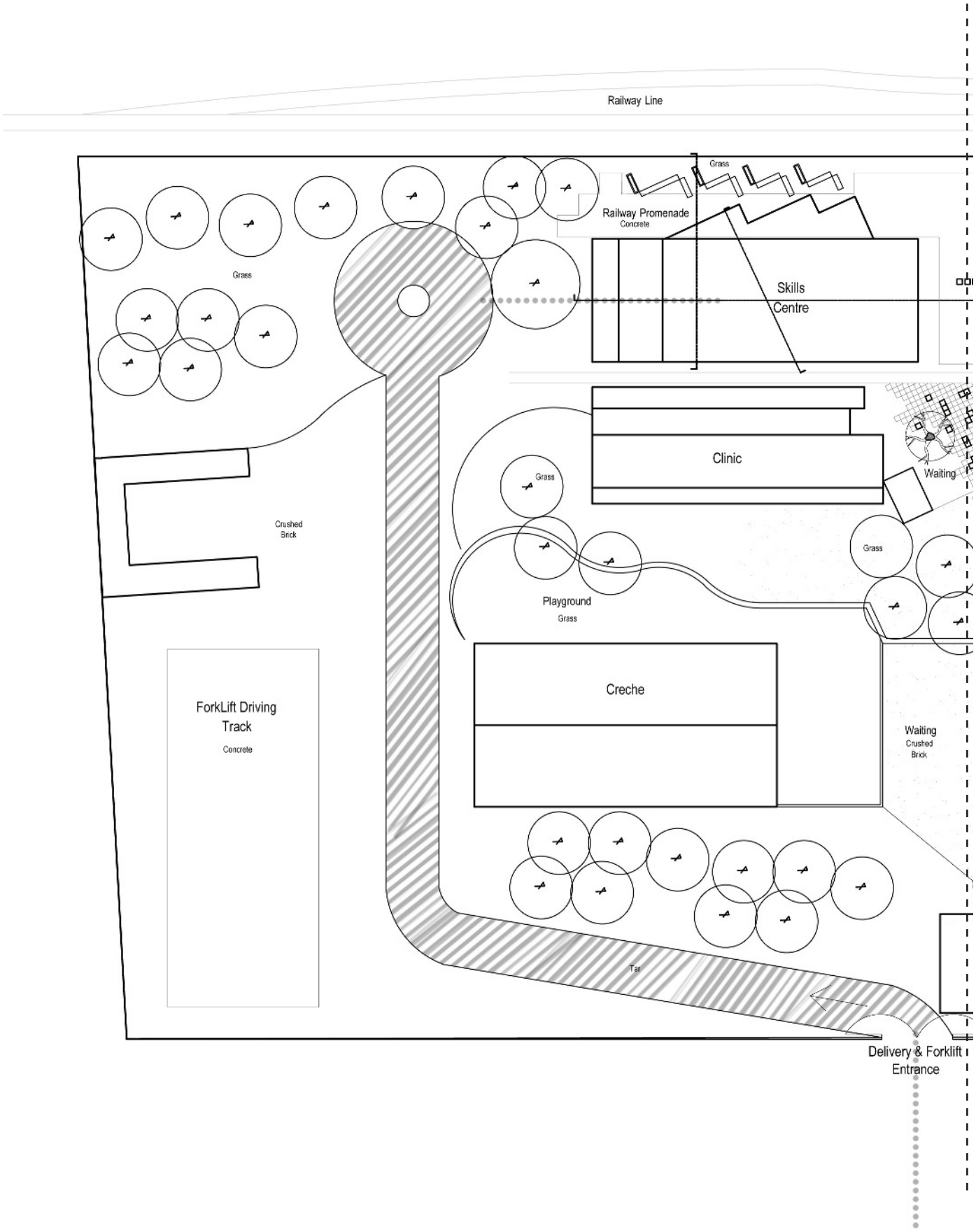
6.3 SERVICES

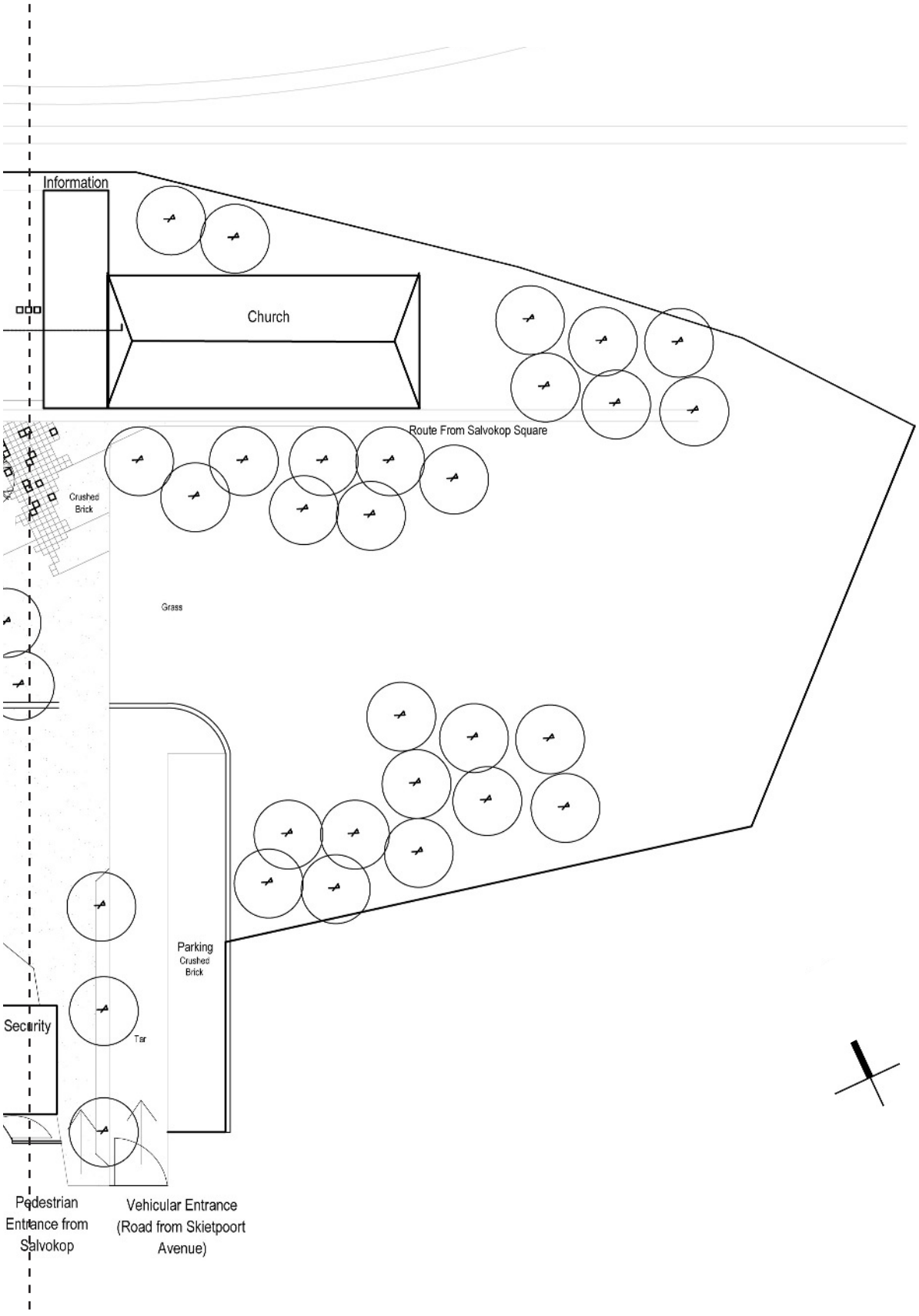
The distribution of services in the building is as follows:

- Wet services (toilets, sinks, basins) are allocated to the southern side of the building (see Illus 6.1).
- Electrical services are to be allocated within the ceiling voids in each floor to supply lighting and power points (Illus 6.5 - Illus 6.7).
- Natural ventilation is implemented throughout the building due to operable windows. Specialised mechanical extraction systems and fresh air supply are to be provided in the Food LAB (see Illus 6.6).
- Fire escapes are considered through the allocation of two staircases (see Illus 6.1) within the building and sprinklers are to be distributed along the ceiling panels of each floor. Fire retardant finishes are applied to new material.
- Deliveries occur at the portico entrance of the building, which does not disturb the pedestrian nature of the main entrance (see Illus 6.2).



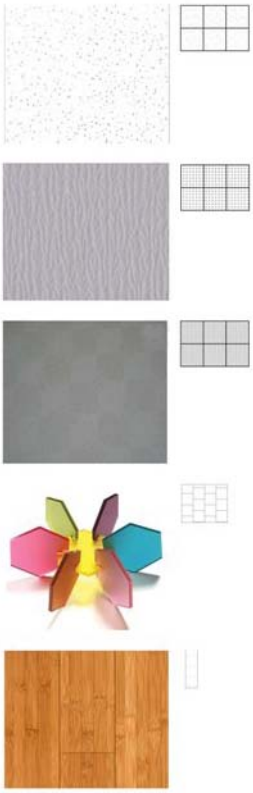
Illus 6.1 Overlay of Plans indicating Services (Red - Fire, Blue - Wet) (Author, 2011)


Railway Line
Grass
Railway Promenade
Concrete
Skills
Centre
Grass
Clinic
Waiting
Crushed
Brick
Grass
Grass
Playground
Grass
Creche
ForkLift Driving
Track
Concrete
Waiting
Crushed
Brick
Tar
Delivery & Forklift
Entrance

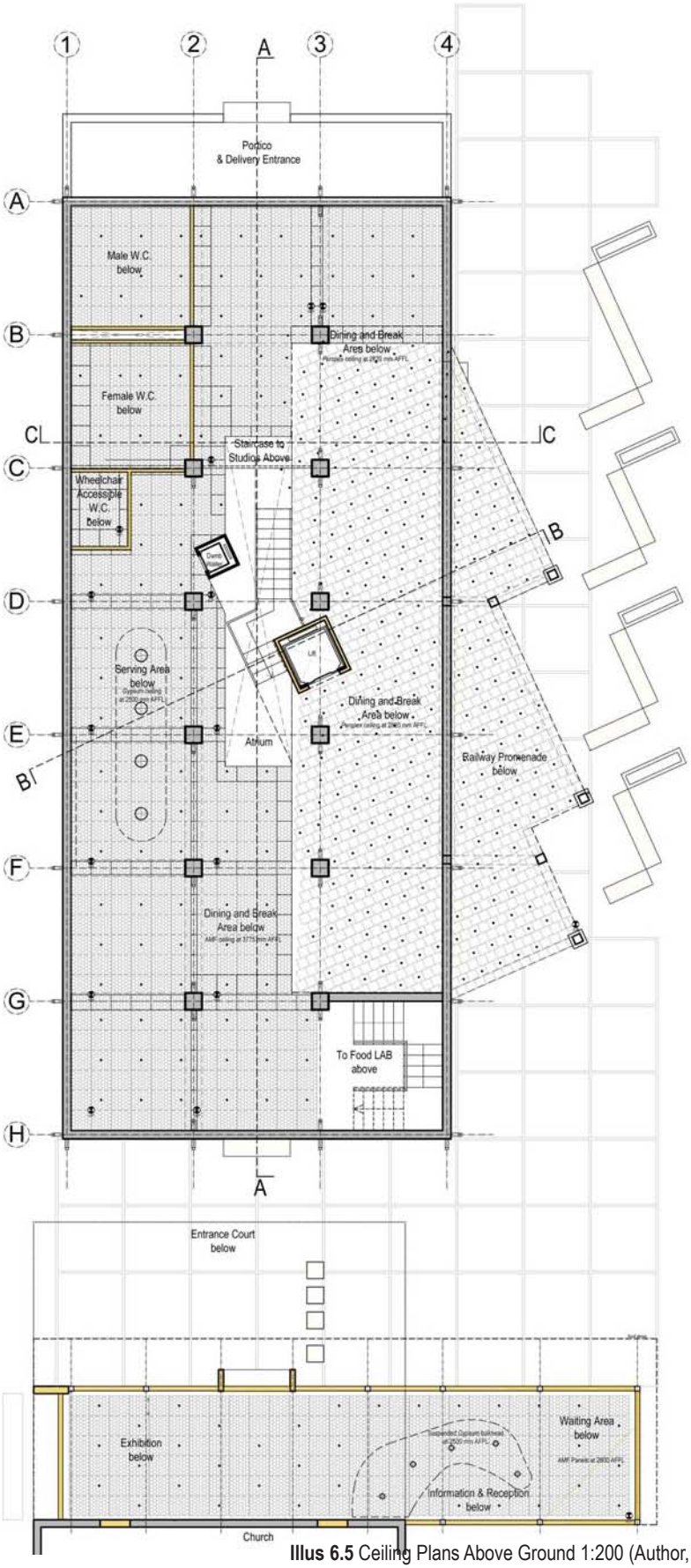


Illus 6.2 Site Plan indicating delivery entrance along west 1:500 (Author, 2011)

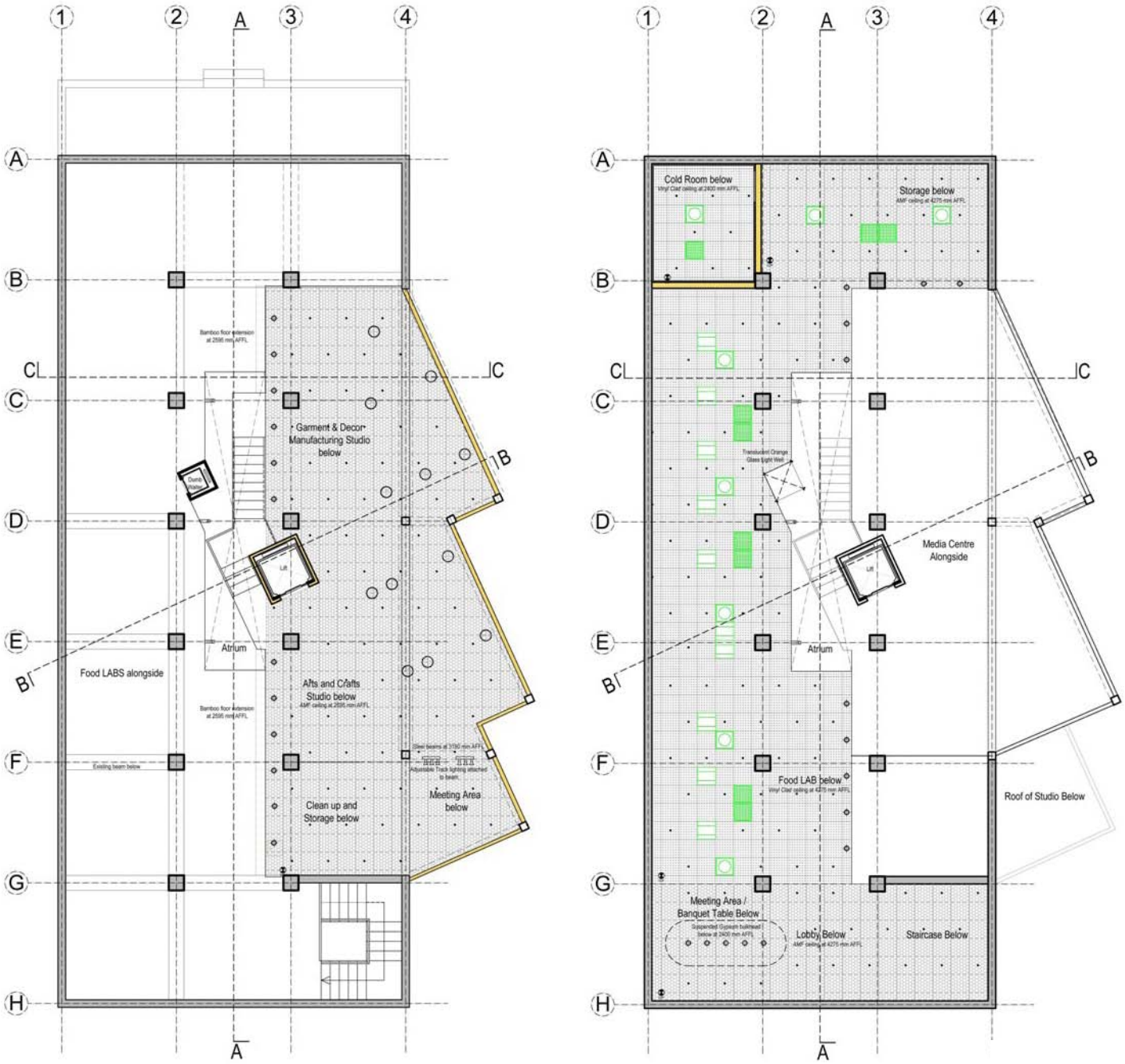
Illus 6.3 Fittings (Radiant, 2011)



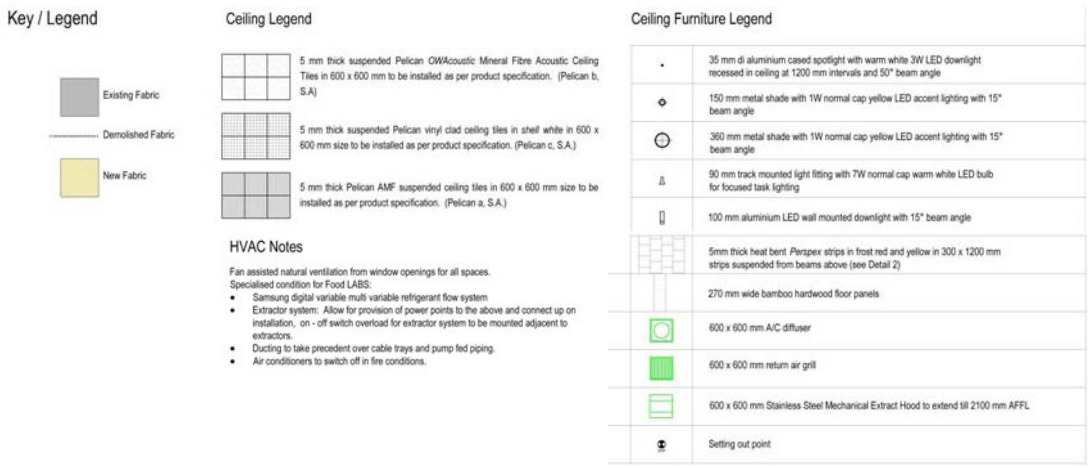
Illus 6.4 Materials(Author, 2011)

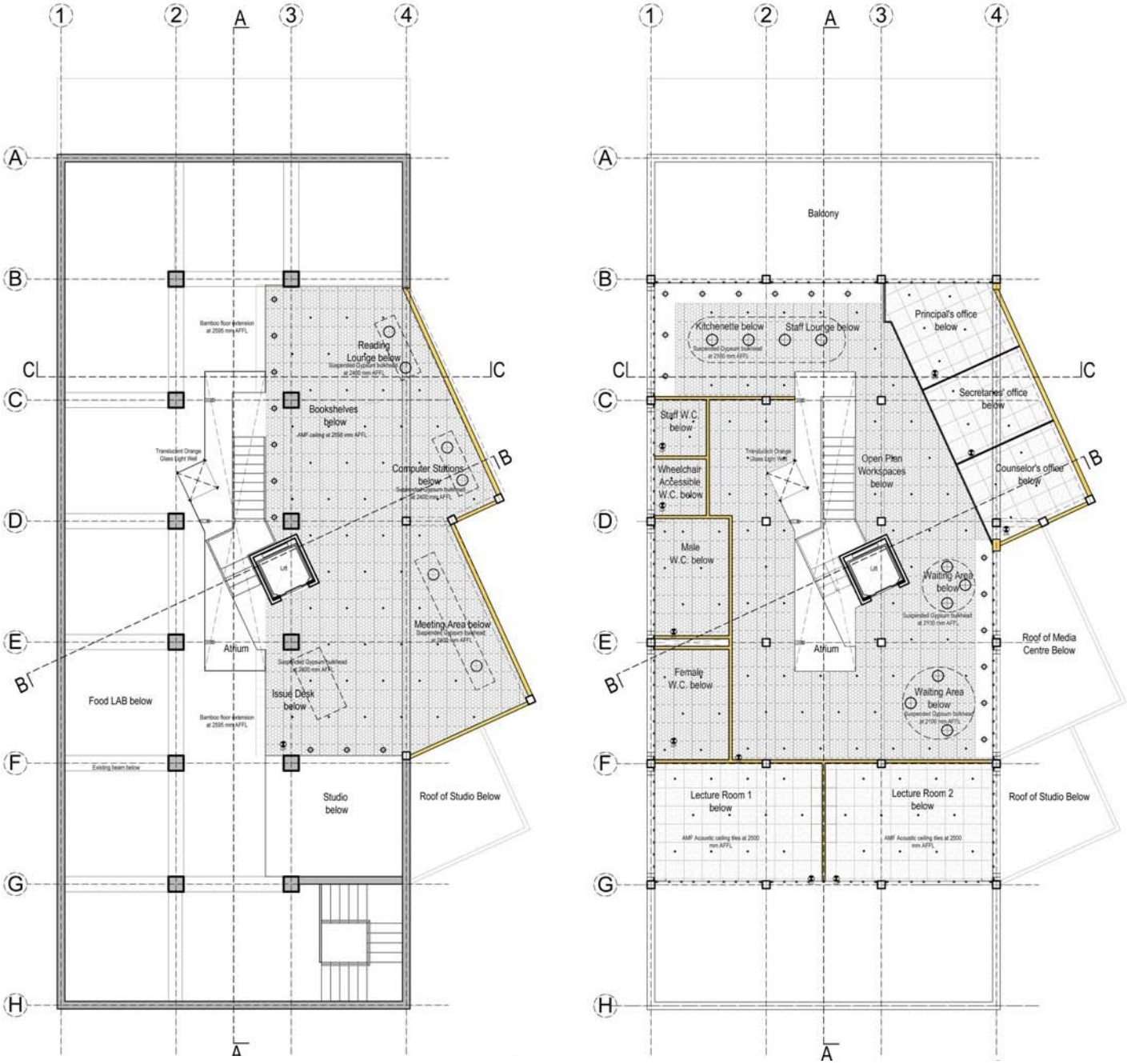


Illus 6.5 Ceiling Plans Above Ground 1:200 (Author, 2011)



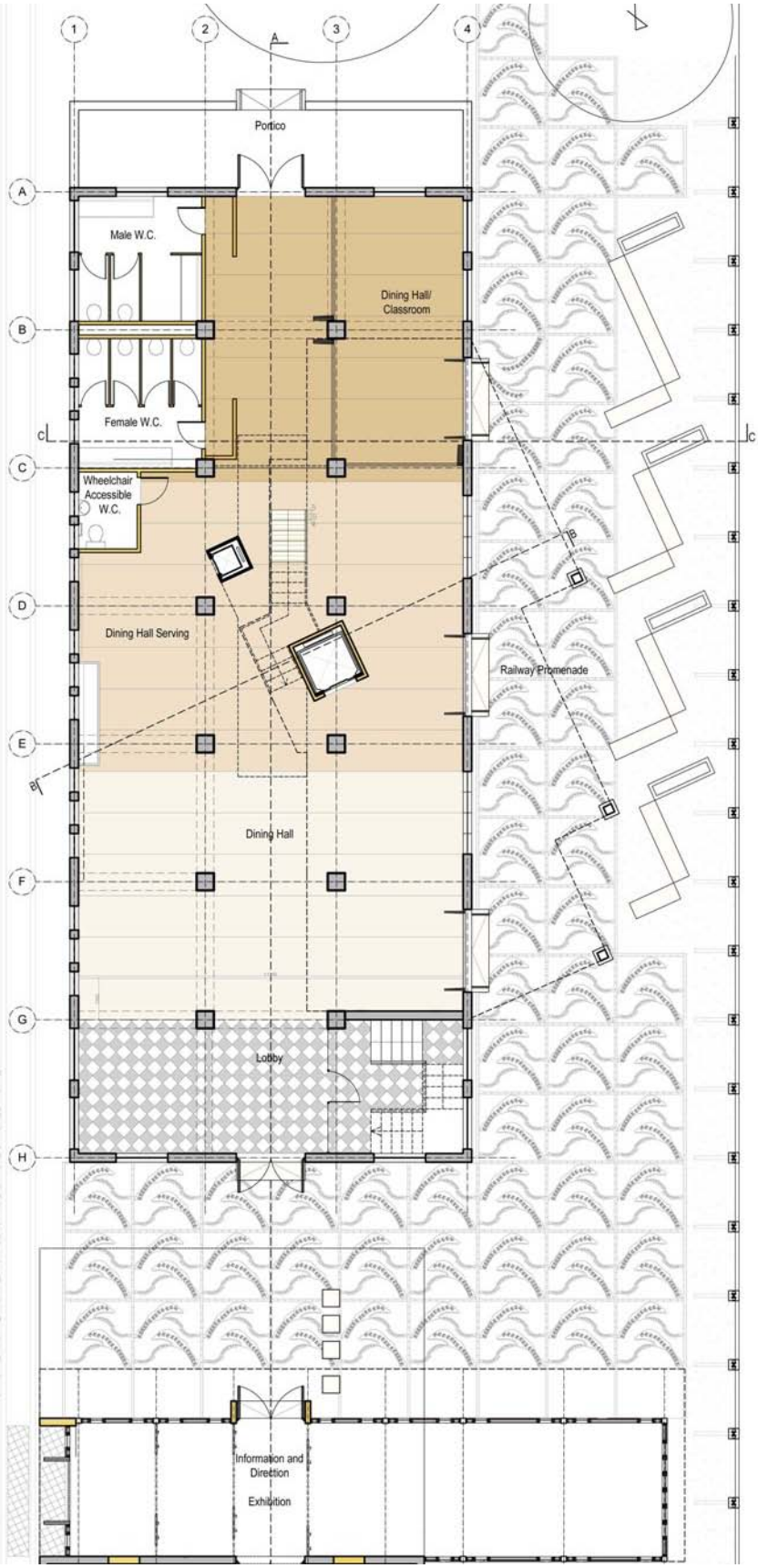
Illus 6.6 Ceiling Plans Above M1, Above First 1:200 (Author, 2011)



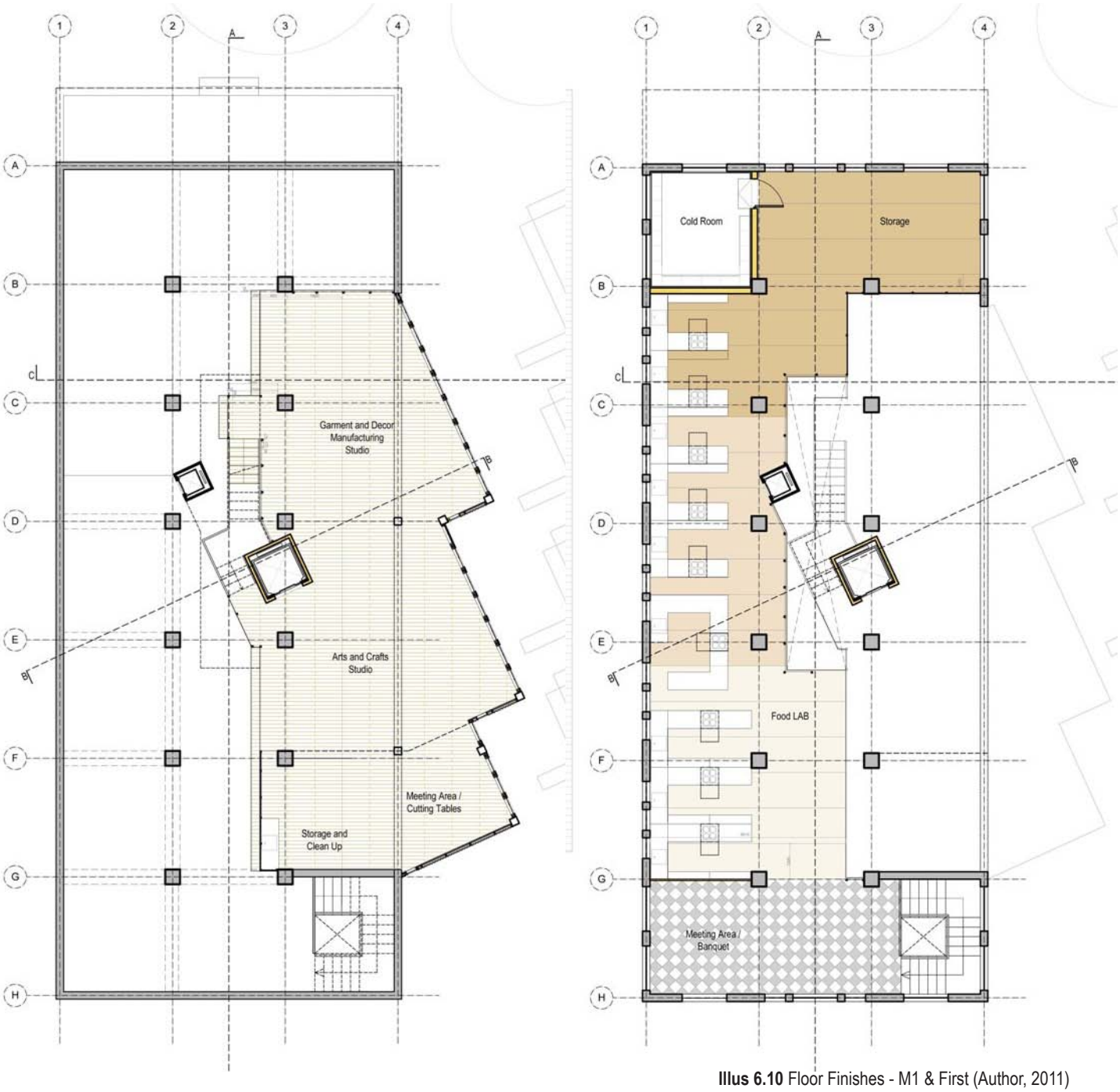


Illus 6.7 Ceiling Plans Above M2, Above Second 1:200 (Author, 2011)

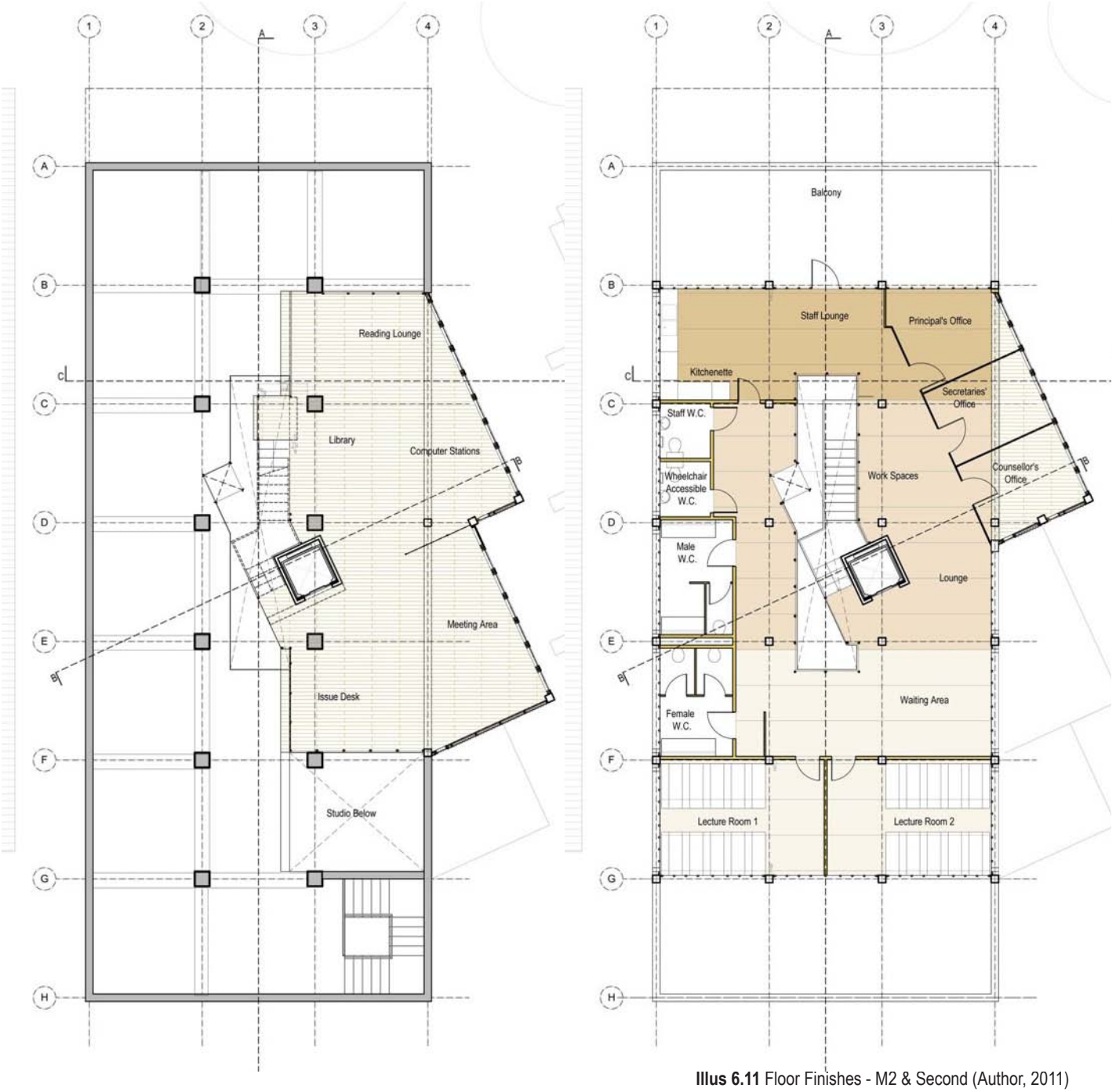
Illus 6.8 Materials and Key (Author, 2011)



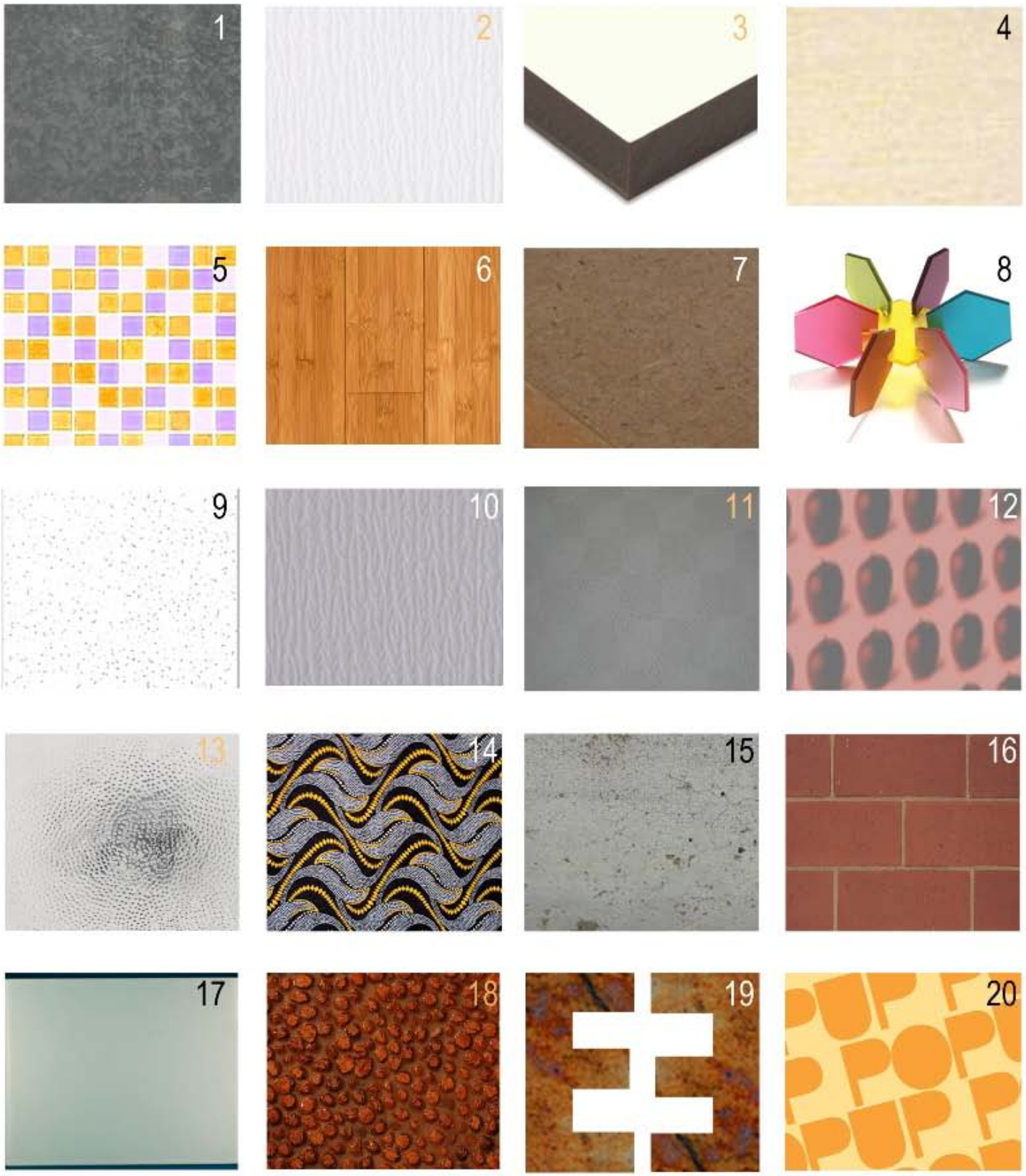
Illus 6.9 Floor Finishes - Ground (Author, 2011)



Illus 6.10 Floor Finishes - M1 & First (Author, 2011)



Illus 6.11 Floor Finishes - M2 & Second (Author, 2011)



Illus 6.12 Materials Palette (Author, 2011)

6.4 MATERIALS

1. Mild Steel Structure for the construction of Mezzanines.
450 x 250 mm Galvanised mild steel cold rolled I beams
250 x 150 mm Galvanised mild steel cold rolled I beams
250 x 250 mm Galvanised hollow mild steel square columns
240 x 75 mm Galvanised mild steel C sections (joists for flooring)

2. 100 mm Thick WDVS Weber St Gobain Insulated Exterior Facade Panels to be nailed to structure and finished with cement plaster, with stamped recessed patterns and acrylic paint to product specification (Saint Gobain Weber, S.A.) (See Illus 5.40).

3. 20 mm Thick PG Bison black Formica Solid Core interior cladding in 3050 x 1220 mm sheet sizes laminated with custom printed melamine impregnated paper bolted to interior of steel facade structure (PG Bison a, S.A.) (See Illus 5.40, Illus 6.33 - Illus 6.46).

4. 2.5 mm Thick *Floorworx Superflex* Sheet Vinyl in *MS051 Wheat (S 1010-Y20R)* in 1.2 x 15 m lengths to be applied on dpm and fixed with *Floorworx No. 60* and acrylic adhesive to product specification (Floorworx, S.A) (See Illus 6.9 - Illus 6.11).

5. 3 mm Thick Glasstile mosaic glass tiles in orange (275) mid grey (095) and dark grey (090) in 50 x 50 mm size to be applied using latex and white thin set adhesives and grouting (epoxy based grouting and adhesives to be used in Food LABS) to product specification (Glasstile, S.A.) (See Illus 6.9 and Illus 6.22).

6. 15 mm Thick *KAINDL* engineered hardwood bamboo flooring in 127 x 1850 mm lengths joined in tongue and groove, in low gloss *Strand-woven Bamboo Honey* and finished with aluminium oxide urethane to product specification (Flooring Depot, S.A.) (See Illus 6.9 - Illus 6.11).

7. 22 mm Thick PG Bison Supawood Medium Density Fibre Board in 3660 x 1380 mm sheet sizes laminated with custom printed melamine impregnated paper & to be CNC cut and joined using acrylic adhesives (PG Bison b, S.A.) (See Illus 6.23 - Illus 6.27).

8. 5 mm Thick *Perspex* (Poly methyl methacrylate) sheets in matte frost red and yellow, and clear in 3200 x 1930 mm to be heat bent using heat strips to product specification (Perspex, S.A) (See Illus 6.21 - Illus 6.22).

9. 5 mm Thick suspended *Pelican OWAcoustic* Mineral Fibre Acoustic Ceiling Tiles in 600 x 600 mm to be installed as per product specification (Pelican b, S.A) (See Illus 6.7).

10. 5 mm Thick suspended *Pelican* vinyl clad ceiling tiles in *shell white* in 600 x 600 mm size to be installed as per product specification (Pelican c, S.A.) (See Illus 6.6).

11. 5 mm Thick *Pelican AMF* suspended ceiling tiles in 600 x 600 mm size to be installed as per product specification (Pelican a, S.A.) (See Illus 6.5 - Illus 6.7).

12. Custom Printed Vinyl Adhesive Wallpaper applied to clean, smooth and prepared surface (see Illus 6.18 - Illus 6.22).

13. Hand Crafted beaten steel panels to crafter's discretion (see Illus 6.21 - Illus 6.22).

14. Hand Sewn textile scrap to crafter's discretion (see Illus 6.28 Illus 6.33 - Illus 6.39).

15. Lafarge cement concrete poured and dried at 50mm depth (see Illus 6.14 - Illus 6.17).

16. 110 x 220 x 50 mm Corobrick Clay Brick Paving laid on soil (see Illus 6.14 - Illus 6.17)

17. 2400 mm High *Dorma HSW-GI* single point connector glass sliding folding door at 600 mm lengths to product's detail (see Illus 5.40).

18. Peach Pip inlays to be laid to crafter's discretion (see Illus 6.14 - Illus 6.17).

19. Industrial packaging inlays to be laid to crafter's discretion (see Illus 6.14 - Illus 6.17).

20. *PG Bison* custom printed melamine impregnated paper fixed to *Supawood* board and *Formica Solid Core* with high heat and pressure in 3660 x 1380 mm and 3050 x 1220 mm sheet sizes (PG Bison a, S.A) (See Illus 6.25, Illus 6.27, Illus 6.33 - Illus 6.46).

6.5 INCLUSIVE DESIGN

Inclusive design has been considered through accessibility of space to all persons. Entrances are ramped to ensure ease of access. A lift and staircases have been provided within the building to accommodate vertical circulation.

Wheelchair accessible toilets have been provided on the ground and second floor within proximity of the ablution block for ease of orientation and service articulation.

In the case of fire conditions, the lift would be shut down for safety and the staircase routes indicated in Illus 6.1 are the only means of escape. The *Evac+Chair* (Illus 6.13)has been specified as a solution to fire escape for the wheelchair user and other incapacitated or injured individuals. The chair is guided by another able-bodied individual to glide down staircases and roll across flat surfaces, ensuring speedy and efficient evacuation (Evac+Chair, s.a).

An open design platform lift is provided for travel between ground and first floors at a distance of 5m for wheelchair users and 2 trolleys in the case of ingredient delivery.

Directional signage is present outside the building in poles (c.f. 5.5.1) along the primary pedestrian route. The use of the POPUP logo acid etched on the concrete boxes in the sculpture court serves to orientate the user and create a sense of arrival. The POPUP information and direction building exists as an additional guide to the site complex. Directional signage within the skills centre is to be located at the main entrance, lobbies and W.C.s.

Photoluminescent emergency signage is to be located on every floor, directing users to the nearest fire escape and emergency exits in green and white, with fire extinguisher signs being red and white. These are to be suspended from the soffit or steel structure above so that they are 2400 mm above finished floor level. Printed plastic is to be pressed between two layers of clear *Perspex*, which are to be heat sealed and drilled, then suspended using aluminium cables.

Informative signage serves to enlighten the user with a sense of knowledge of a space or exhibition. These are to be located in the exhibition and information portion of the POPUP Student Information and Visitors Centre in the form of changeable roll up screens fixed to the steel beams above. Informative signage will also be located in the dining hall with the purpose of notifying users of daily meals and general notices of the skills centre. This is to be located within the ground floor lobby as a freestanding element.

The use of new bamboo flooring on the intermediate mezzanine levels visually contrasts the finishes on floor slabs and allows the atrium space to be perceived within the context of old and new. Brightly coloured and tactile wallpaper (Illus 6.20) and floor finishes (Illus 6.17) are clues to the difference in spaces. The atrium, as a space washed with natural light, is a visual clue to the circulation core, encouraging a sense of special hierarchy without the need of formal direction.

Illus 6.13 *Evac+Chair* (Evac+Chair, 2004)

6.6 SUSTAINABILITY

Although environmental sustainability has not been a primary focus of the study, consideration was given in the design project.

The introduction of new mezzanine levels within the existing volume increases usable floor area and appropriates the existing building to suit the program of a skills training centre.

Flexibility through the design of modular sized furniture (Illus 6. 28 - Illus 6.39) ensures adaptability and minimises cost and use of resources through the provision of identical table units which would be utilised throughout the building.

Bamboo, as a material choice, is sourced sustainably and is a renewable resource. Steel is a material which may be recycled. The use of plant material and industrial waste as floor materials minimises waste disposal through recycling and adds unique value to the building environment.

The new mezzanine levels are oriented to face north, enhancing the thermal and lighting properties of the space. Natural ventilation is used throughout the building, apart from the Food LAB, which utilises low energy ventilation systems of extraction and fresh air supply.

Natural light through the atrium minimises the need for artificial lighting in the dining hall and the second floor during the day. Other rooms require low energy LED artificial lighting to be active due to the task-oriented activities (lectures, studios, LABs, offices) in these spaces and are chosen for general lighting throughout the building, which minimises energy use (see Illus 6.3 - Illus 6.7).

Social sustainability has been considered as a focus of the project.

The use of crafted elements in new design intervention borrows ideas from the historical but is reinterpreted through craft. This ensures a sense of connection with the existing while lending ownership to the building's users through reflecting them. This is demonstrated in the details provided later in this chapter.

The introduction of new mezzanine spaces changes the building's form and reflects transformation in the building's programme, while consequently allowing specialised spaces for certain activities.

The use of the atrium edge allows that spaces of different levels may be able to look across, up and below into each other, improving a sense of visibility and inspiration from different skills fields. The positioning of clear storage boxes (Detail 3) along these edges provide clues of the activities occurring within the spaces behind, while, consequently, exhibiting works-in-progress from each of the spaces.

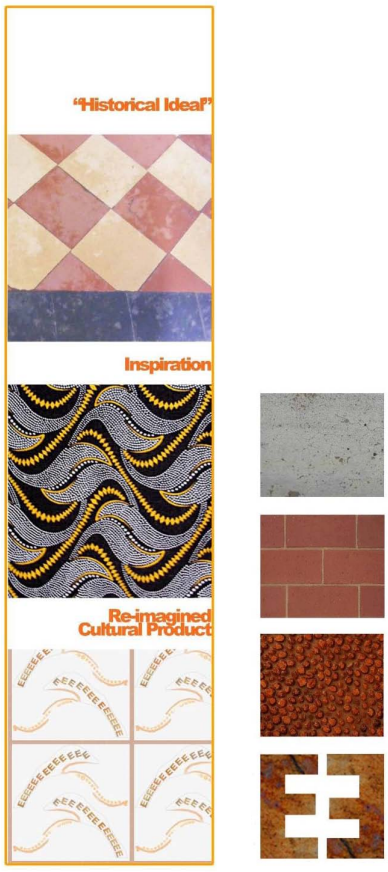
A sense of arrival to the building is created through a sculpture courtyard and information, exhibition and direction built structure. These serve to orientate the visitor and to also expose the recent work of POPUP students to the public.

6.7 DETAILS

The following details were chosen for development due to their relationship with the design concept. In each case, the "historical ideal" is identified and the re-imagined cultural product demonstrated, with the inspiration for development also illustrated. These elements are significant within spaces in the building and contribute to the new character which borrows from the building's history but delivers a new and appropriate layer through current cultural production.

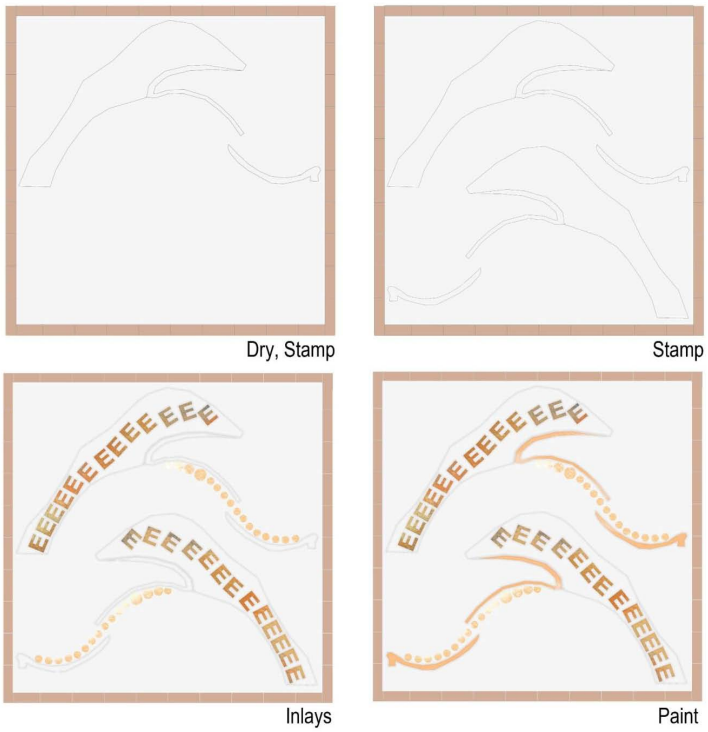
6.7.1 Detail 1: Shwe Shwe Floor: Railway Promenade

This floor finish detail, inspired by the patterns of South African traditional fabric, *Shwe Shwe*, reinterprets the surviving historical chequered floor tiles in the building's lobby and first floor (Illus 6.14).



Illus 6.14 Concept and Materials (Author, 2011)

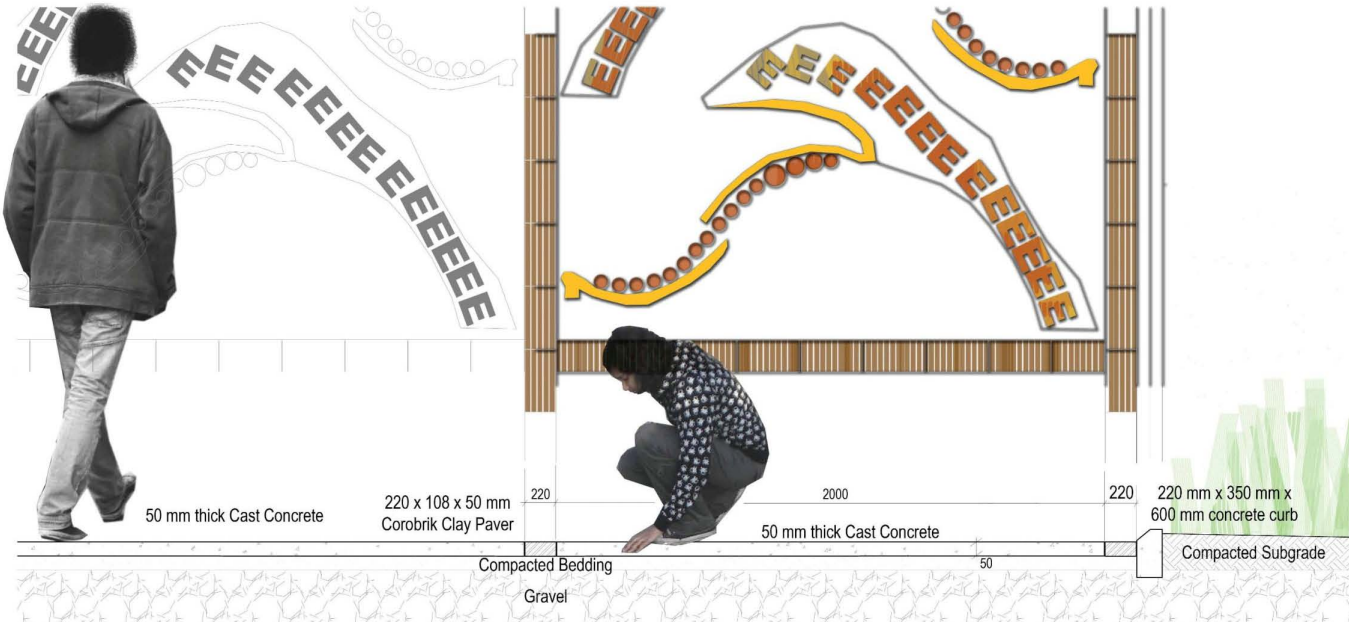
Illus 6.15 Stages 1 - 4 (Author, 2011)



These concrete tiles would be cast by craft learners, then stamped with a steel stencil, drying time will be allowed and then inlays of peach pips and industrial waste packaging placed. Once dry, parts of the concrete will be finished with *Plascon Floor Paint* in satin burnt orange (Illus 6.15 - Illus 6.16).

The result would be a vibrant, tactile, textured floor finish of public pedestrian scale (2 m x 2 m tiles) (Illus 6.17).

Illus 6.16 Stages 5 - 8 (Author, 2011)



Illus 6.17 Section and Plan 1:25 (Author, 2011)

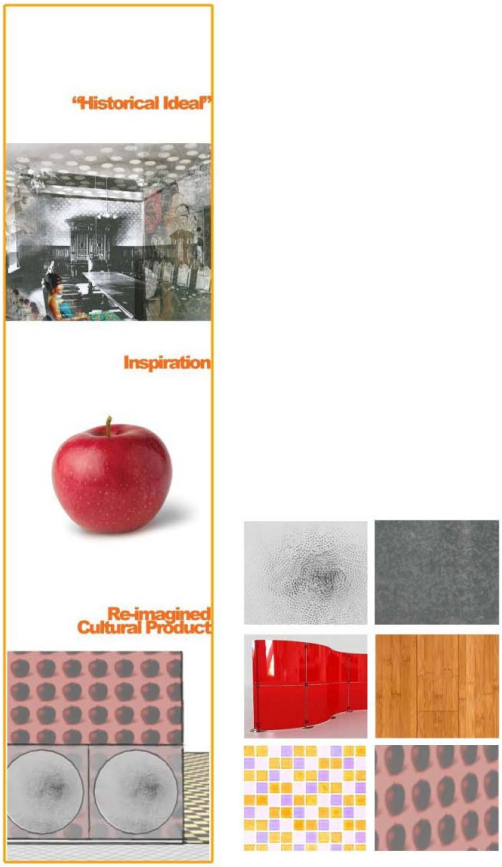
6.7.2 Detail 2: Wall Finish: Dining Hall

The wallpaper finish, inspired by the apple serves to reinterpret the use of wallpaper in the 1909 interior photograph of the CEO (Illus 6.18). This image, depicted in the mood board in the previous chapter, has given rise to a decorative, patterned, vibrant graphic of apples which are to be taken directly from the artworks of POPUP's Art learners (Illus 6.19). These have been utilised as the main graphic on the wallpaper (Illus 6.20).

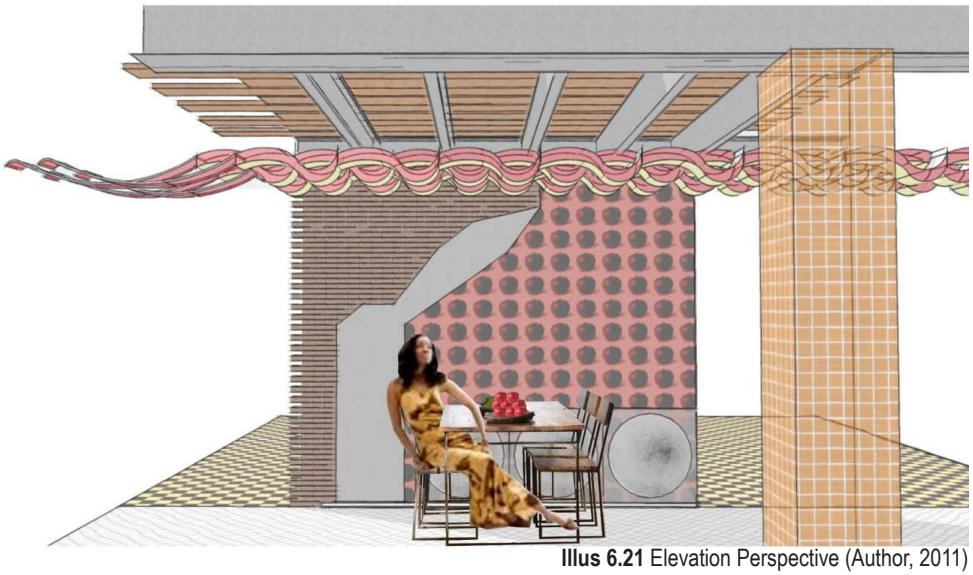
Clear *Perspex* panels are bolted to the bottom of the wall, over which crafted beaten steel panels will be fixed. This detail re-imagines the interior of the 1909 CEO in a manner that is culturally inclusive (Illus 6.21 - Illus 6.22).

Illus 6.19 Inspiring Artworks (POPUP Students, 2011)

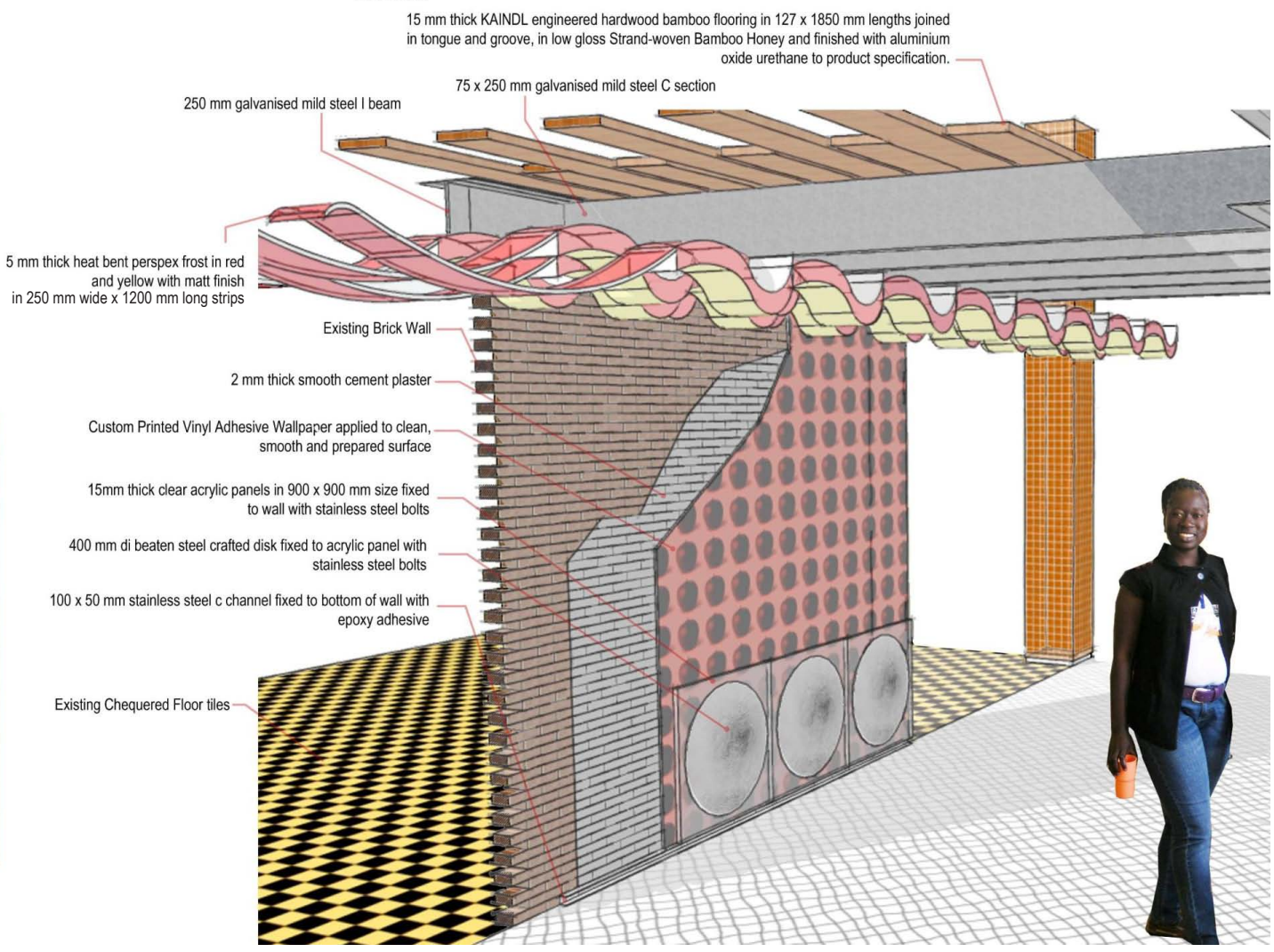
Illus 6.20 Wallpaper Graphic (Author, 2011)



Illus 6.18 Concept and Materials (Author, 2011)



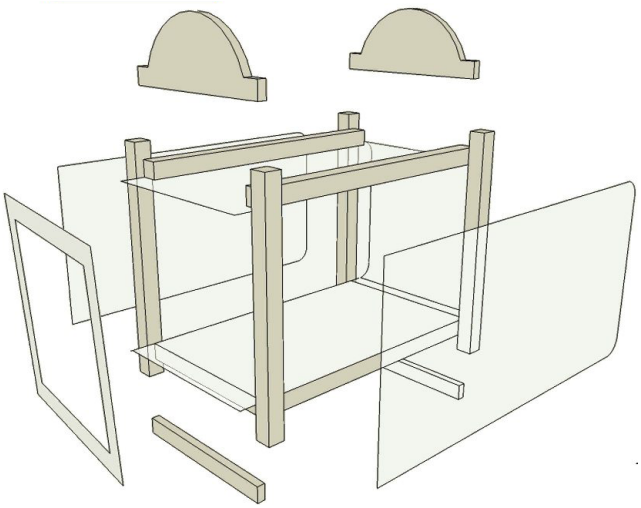
Illus 6.21 Elevation Perspective (Author, 2011)

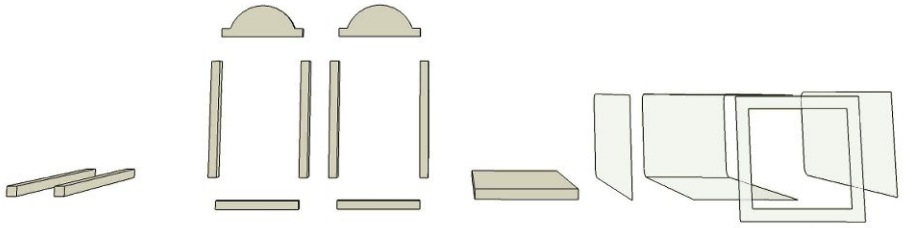


Illus 6.22 Sectional Perspective (Author, 2011)

6.7.3 Detail 3: Storage Boxes: Studios, Food LAB, Media Centre

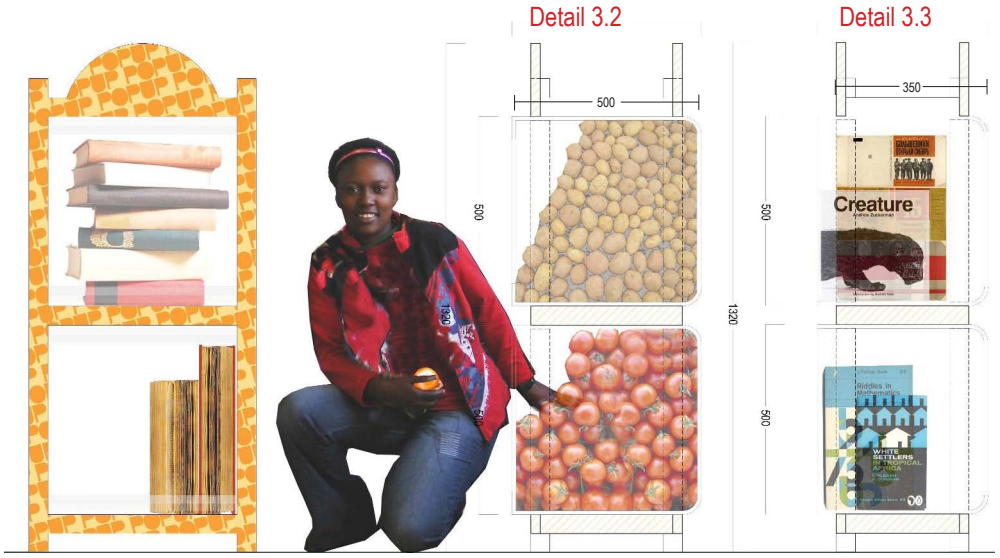
The storage box variations, inspired by the furniture design exploration in the precedent study, *Jolie Toujours*, seeks to reinterpret and re-imagine the furniture of the 1909 CEO as depicted in the mood board in Chapter 5 (Illus 6.23). These storage boxes represent cultural production through their aim to exhibit stored items along the atrium edge. The transparent heat-bent *Perspex* boxes are visible from above, below and across the atrium, and expose items such as decor in process in the studios, fruit and vegetables in the food LAB and books in the media centre (Illus 6.24 - Illus 6.27). *Supawood* panels are nailed together and fixed using volatile organic compound (VOC) free adhesives.





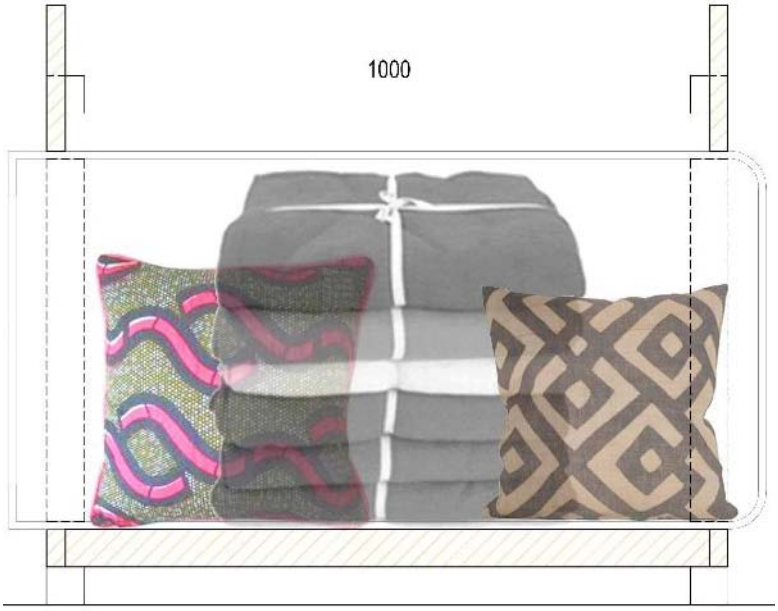
Illus 6.24 Pieces for Assembly (Author, 2011)

Illus 6.23 Concept and Materials (Author, 2011)

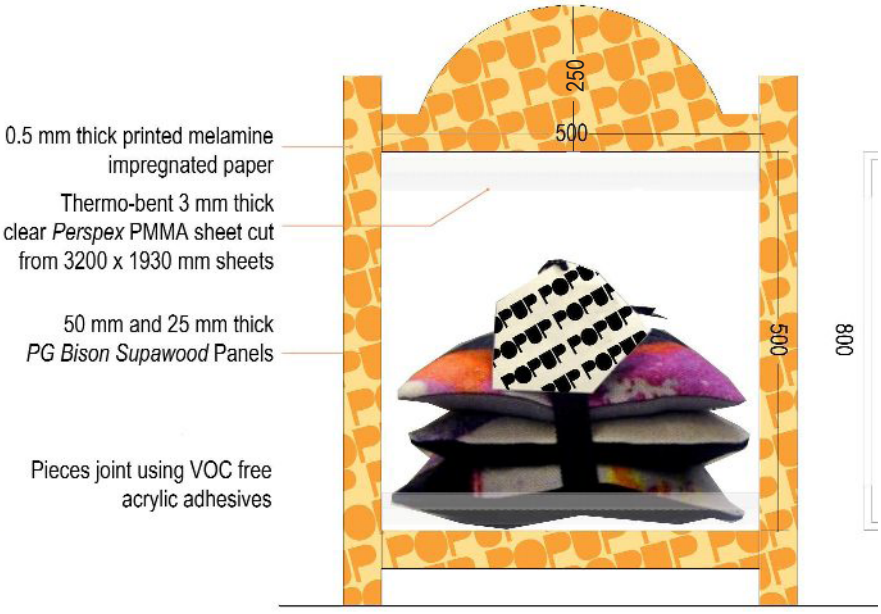


Illus 6.25 Section and Elevation of Food LAB and Media Centre Boxes 1:20 (Author, 2011)

Detail 3.1



Illus 6.26 Section of Studio Storage Box 1:10 (Author, 2011)



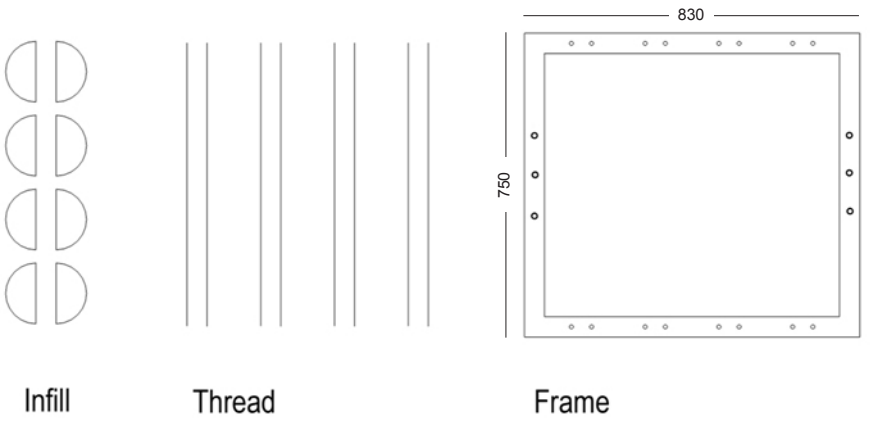
Illus 6.27 Elevation of Studio Storage Box 1:10 (Author, 2011)

6.7.4 Detail 4: Balustrade: Atrium Edges

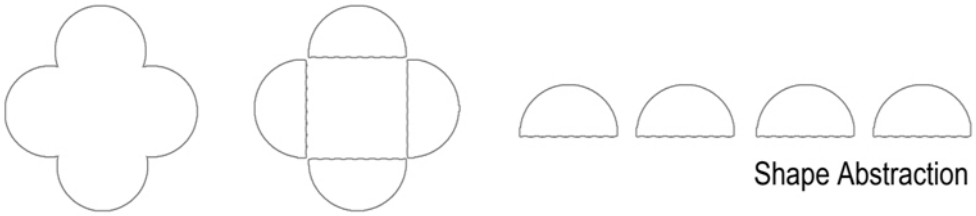
The balustrade design, informed by the "historical ideal" of the existing cast iron posts, predominantly reinterpret the design of infill between the posts through shape abstraction (Illus 6.28, Illus 6.30). The rose window shape is abstracted to a half circle shape which is used as a basis for infill size. The infill, to be of craft materials such as beaten steel, timber off cuts and textile laminated *Supawood*, are cut and assembled within the frame and fixed with threads of wire, textile scraps or rope on the galvanised steel frame by the craft learners (Illus 6.29, Illus 6.32).

The means and configuration of tying is to the discretion of the crafter and possible options are demonstrated alongside (Illus 6.31).

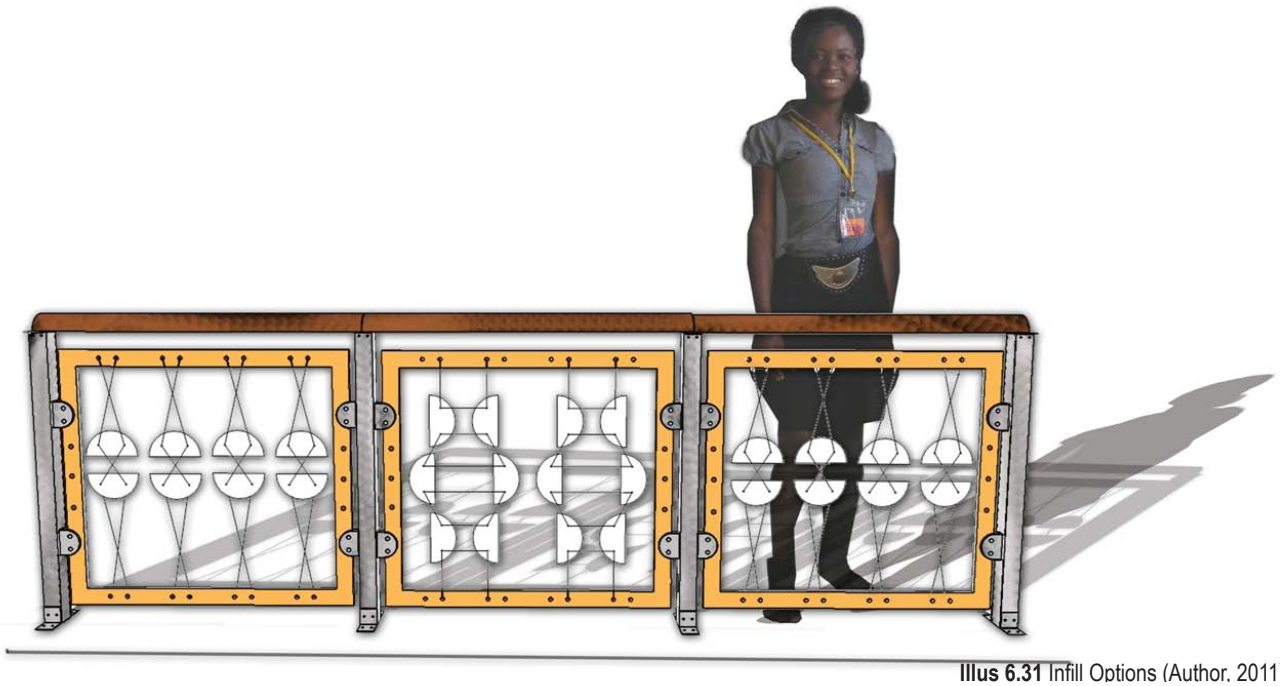
Illus 6.28 Concept and Materials (Author, 2011)



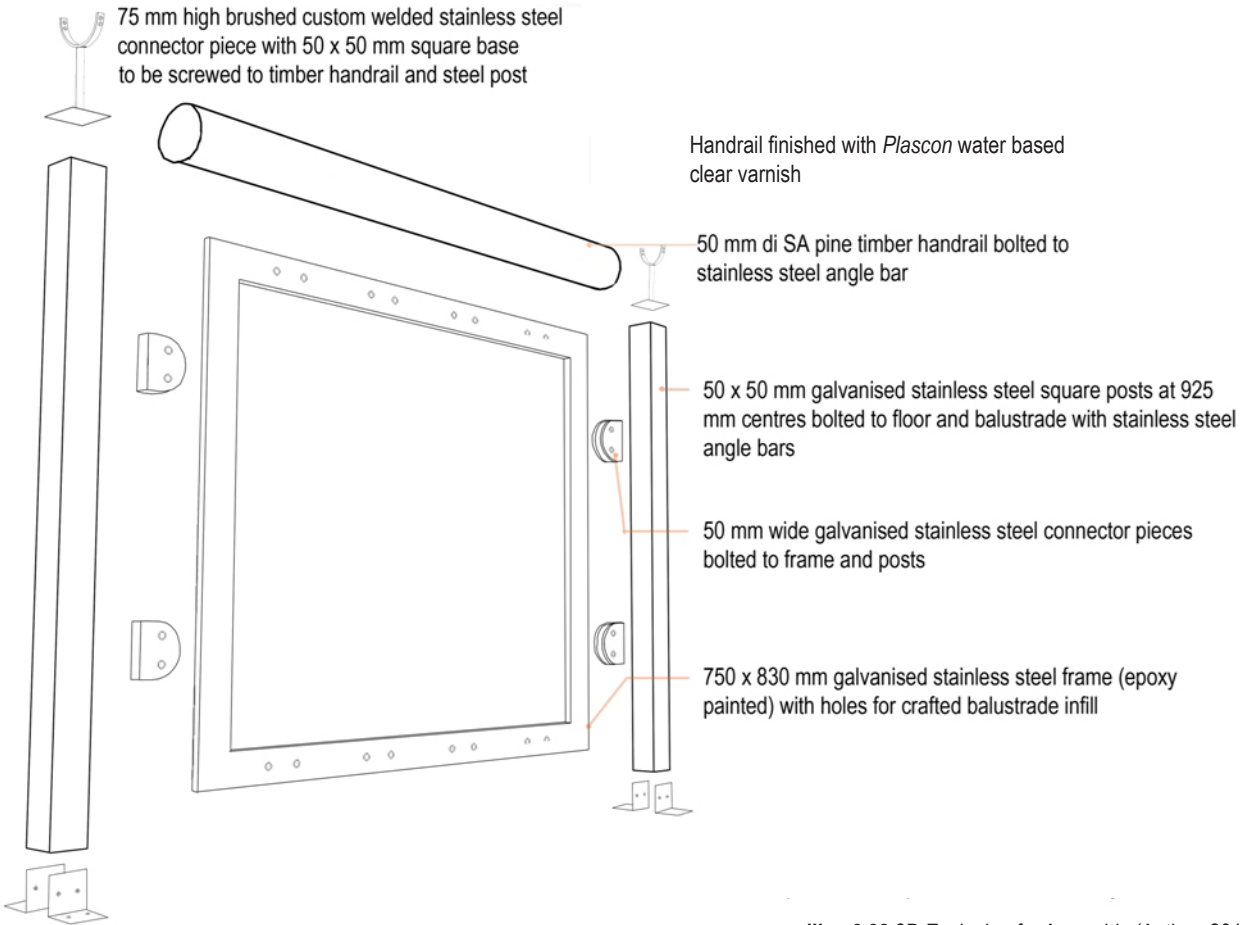
Illus 6.29 Infill, Thread and Frame pieces for crafter's use (Author, 2011)



Illus 6.30 Shape Abstraction (Author, 2011)



Illus 6.31 Infill Options (Author, 2011)

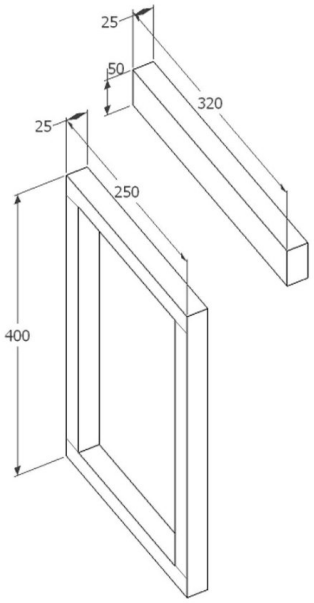


Illus 6.32 3D Explosion for Assembly (Author, 2011)

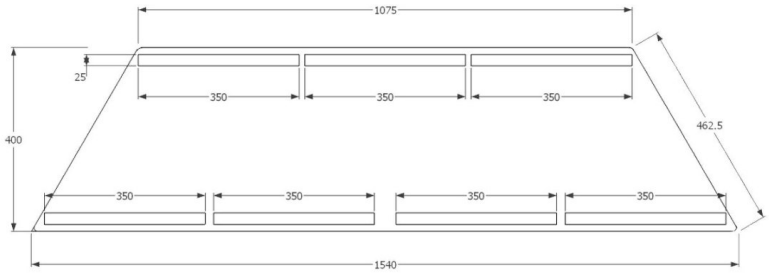
6.7.5 Detail 5: Seating: Waiting Areas, Lounges

The "historical ideal" of the boardroom furniture (Illus 6.33) has influenced the design of the linear, rectangular legs and back rest (Illus 6.34, Illus 6.35, Illus 6.38, Illus 6.39), as well as the material choice of SA Pine in this seating unit. The inspiration of colourful textiles and the craft of weaving gave rise to the decision to allow textile scrap infill to soften and liven up the furniture, while adding the crafter's touch. The melamine impregnated paper finish on the *Formica* surface, with the POPUP log print, also assists in softening and brightening up the seating unit. The modular seating unit was derived in shape from the hexagon (Illus 6.36). A number of configurations are possible for use in social areas, as a linear bench or as a two sided seating unit ideal for a wide corridor (Illus 6.37).

25 x 25 x 250 and 25 x 25 x 400 mm SA pine battens to be joined using mortise and tenon junction (Illus 6.46)

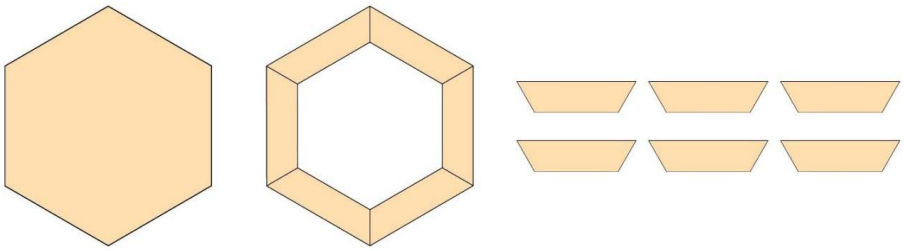


Illus 6.34 Isometric of Leg and Beam (Author, 2011)

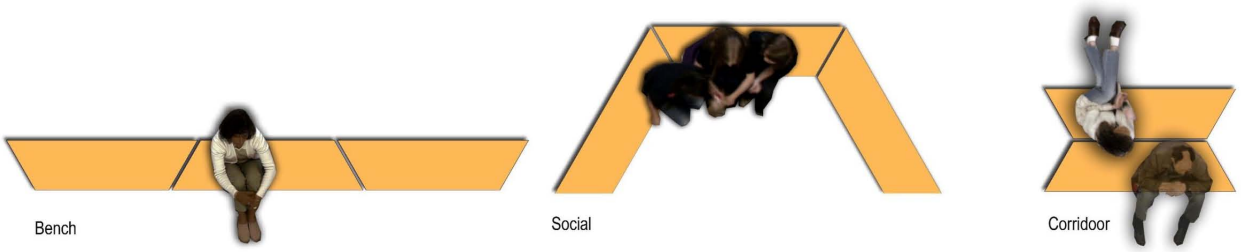


Illus 6.35 Plan of Seat (Author, 2011)

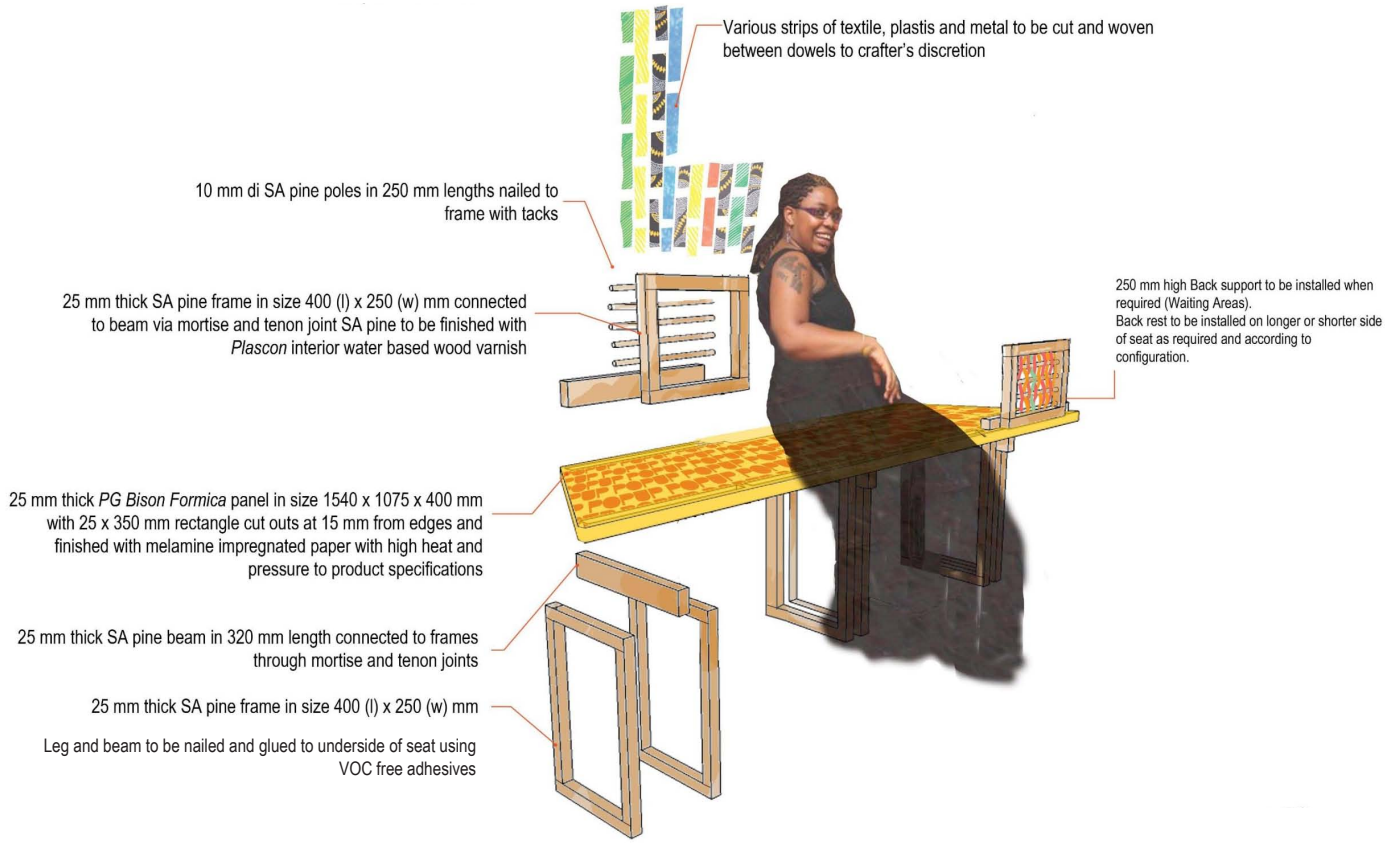
Illus 6.33 Concept and Materials (Author, 2011)



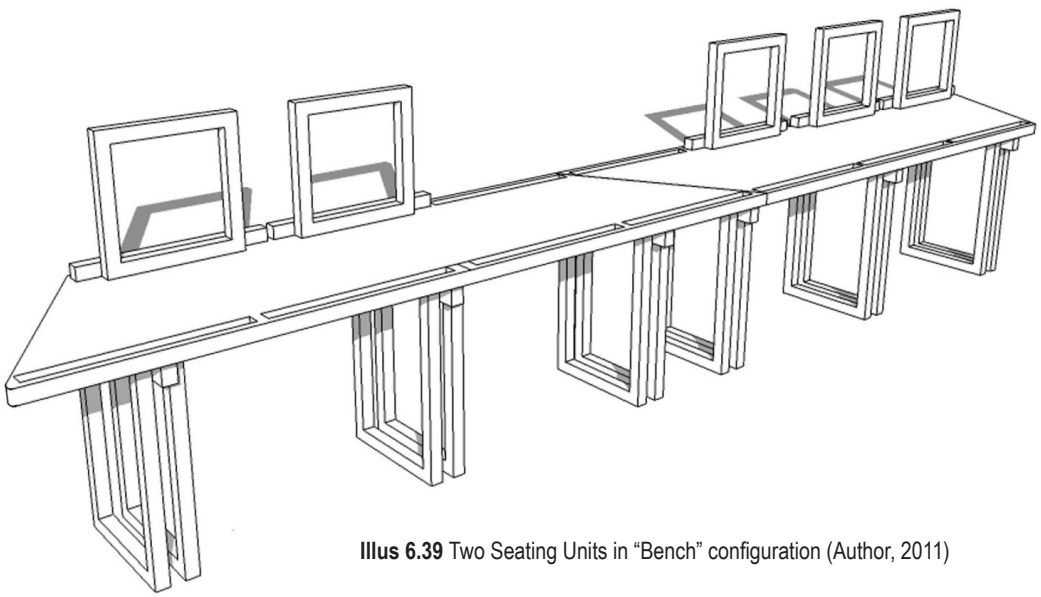
Illus 6.36 Shape Abstraction (Author, 2011)



Illus 6.37 Seating Configurations (Author, 2011)



Illus 6.38 Partially Exploded 3D of Single Seating Unit (Author, 2011)



Illus 6.39 Two Seating Units in "Bench" configuration (Author, 2011)

Illus 6.41 Perspective of Dining Hall with Tables (Author, 2011)

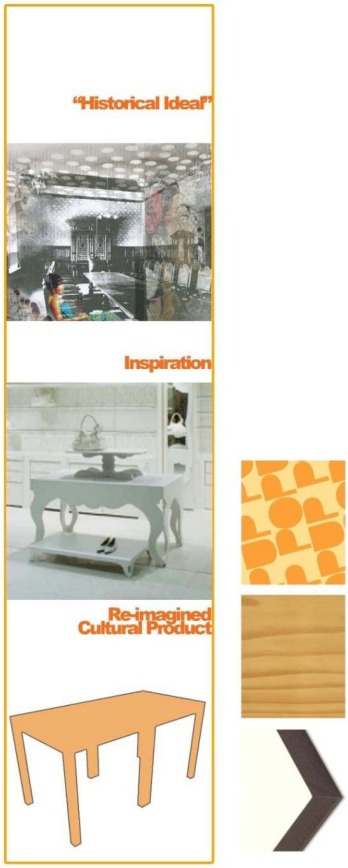
6.7.6 Detail 6: Tables: Dining Hall, Studios, Offices

This modular sized table unit refers to the profile of the boardroom chairs depicted in the mood board and reinterprets this as a simple, altered square which sits on its frame and exposes the top of its legs (Illus 6.40, Illus 6.42). The use of SA Pine also refers to the "historical ideal" of wooden furniture. The size 700 x 700 mm and the height of 750 mm is informed by the seating conditions outlined by Neufert and demonstrated in Illus 5.27 (1999:16).

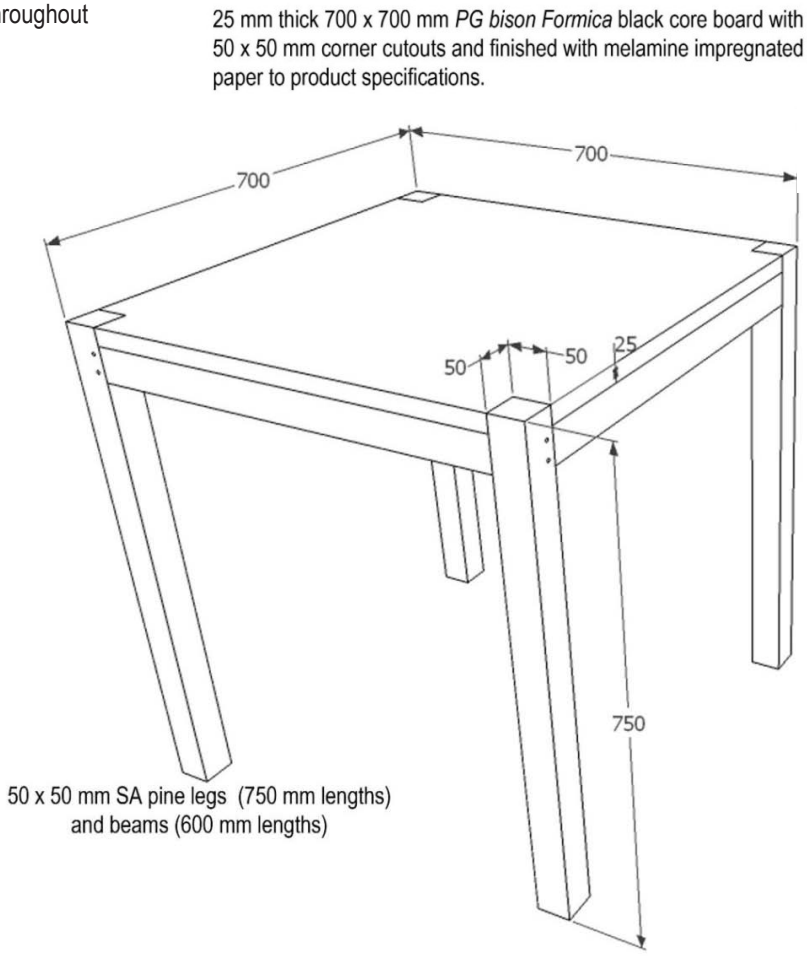
Different finish colours have been selected for various spaces in order to suit the spatial use and allow differentiation between spaces while maintaining the same furniture element throughout the building (Illus 6.43 - Illus 6.45).

The mortise and tenon joint is demonstrated as a solution to the joining of timber pieces with more support than a conventional butt joint (Illus 6.46).

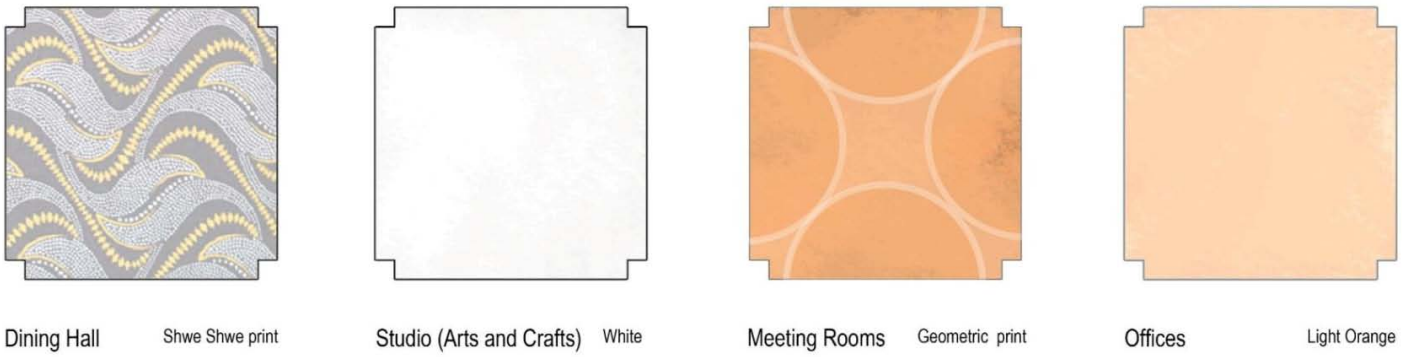
Illus 6.41 relates the table's use to the dining hall space.



Illus 6.40 Concept and Materials (Author, 2011)

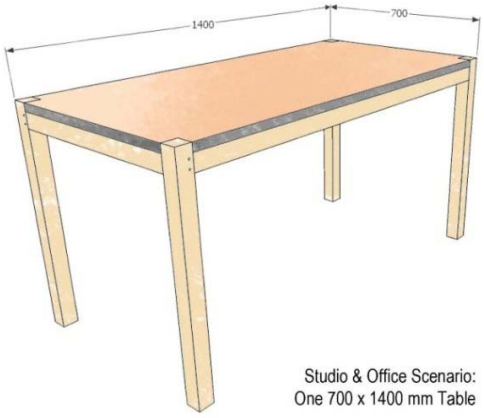


Illus 6.42 3D Detail of Table (Author, 2011)

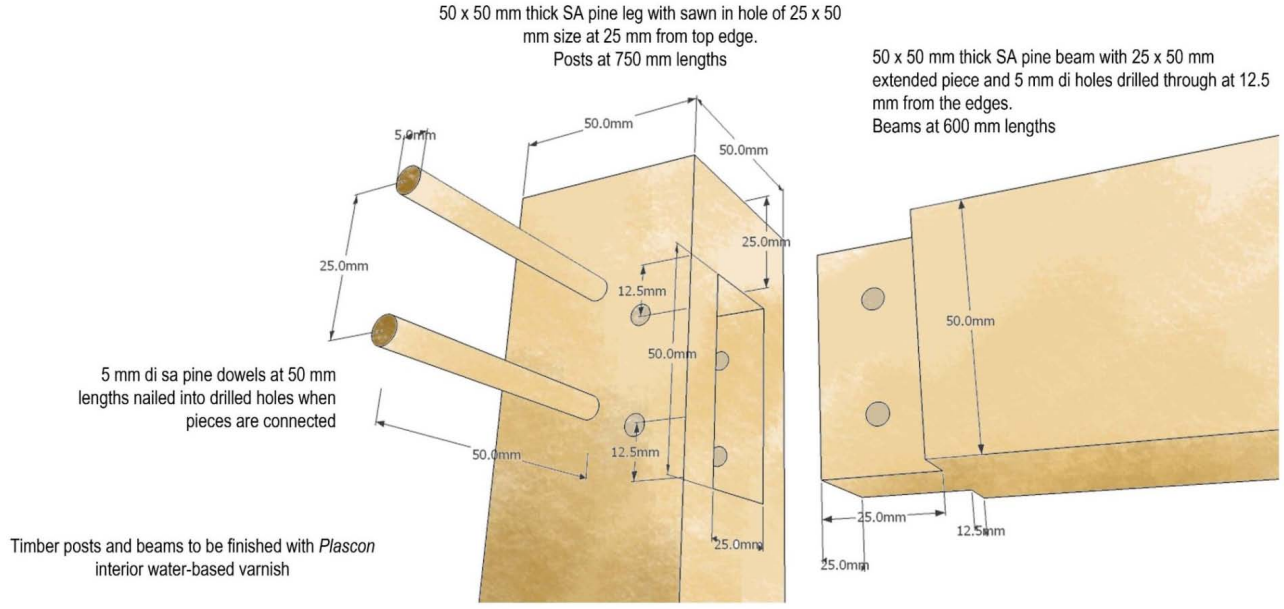


Illus 6.43 Table Surface Finishes in Spaces (Author, 2011)

Illus 6.44 Two 700 x 700 mm Tables (Author, 2011)



Illus 6.45 One 700 x 1400 mm Table (Author, 2011)



Illus 6.46 Mortise and Tenon Joint (Author, 2011)

6.7.7 Detail 7: Textile Roll Screen

This screen reinterprets the horizontal lines and flat profiles of the "historical ideal" of the boardroom furniture in the 1909 CEO, while maintaining the use of timber (SA pine) as a principal material for construction (Illus 6.47). As with detail 6, the mortise and tenon joint are utilised to join individual timber pieces in the base component (Illus 6.51). The frame (Illus 6.49) is attached to the base via nails and VOC free adhesives.

This furniture element (Illus 6.50) serves to store fabric rolls, acts as a screening device between the meeting room and studio spaces and exposes the colourful and rich variety of traditional, conventional and contemporary fabrics (Illus 6.48) as inspiration to the creative process of garment manufacture.

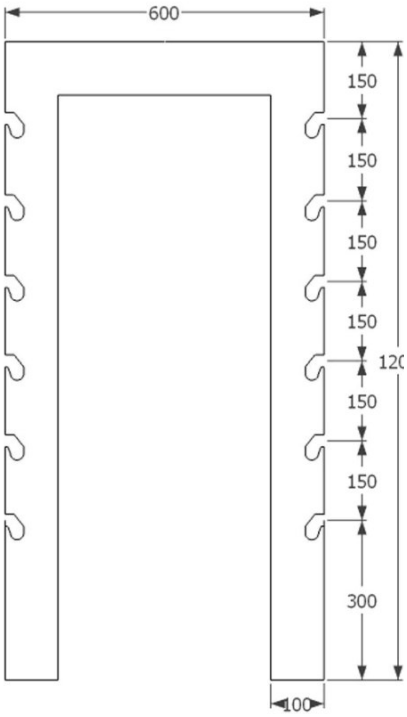
Illus 6.48 Inspiration Images (Mode de Mundo, 2010; Dan's Upholstery, S.A. Mary, 2010)

The base element (Illus 6.51) reflects the same construction method and language evident in the construction of the support (legs and beams) of Detail 6, the table, also utilising the modular dimensions of 700 increments, with each independent base piece being 700 mm x 2100 mm in plan.

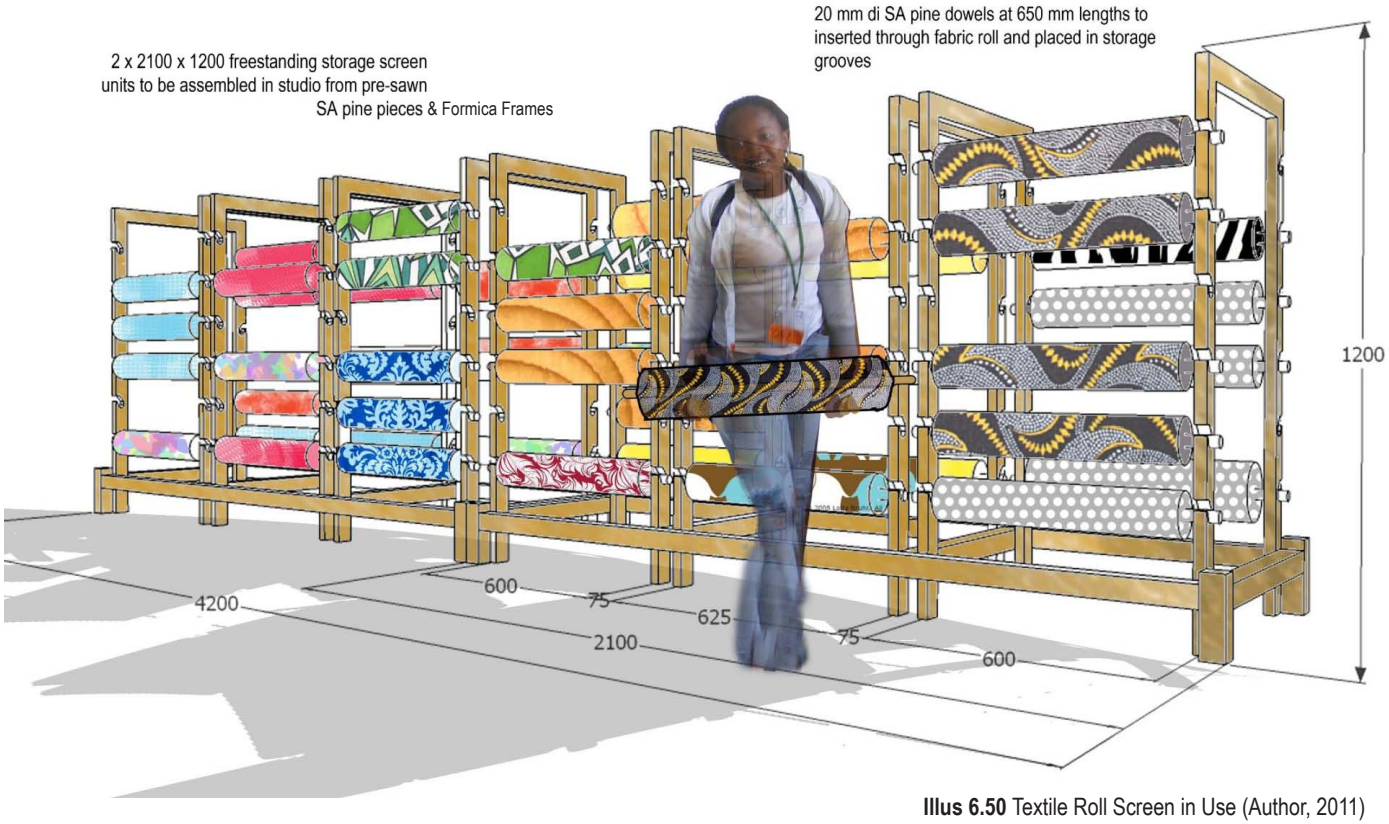
Illus 6.47 Concept and Materials (Author, 2011)

25 mm thick *PG Bison Formica* frame in 100 x 1200 x 600 mm size with 20 mm di grooves at 150 mm centres, finished with melamine impregnated paper

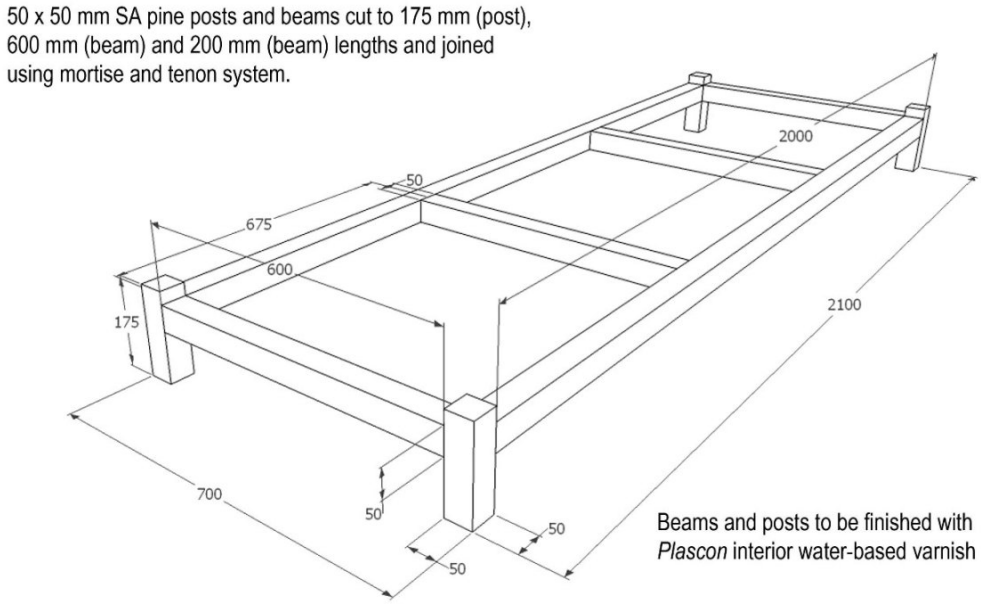
Frames to be nailed to base component



Illus 6.49 Frame Component (Author, 2011)



Illus 6.50 Textile Roll Screen in Use (Author, 2011)



Illus 6.51 Base Component (Author, 2011)

6.8 CONCLUSION

This chapter has elaborated on the technical development of the design project.

Services, material choice, sustainability and detailing have all been explored with illustrations to supplement the explanation.

The design concept has been related to the process of detailing through the goal of reinterpreting the “historical ideal” in the design of new elements which reflect current cultural production (the activities and products related to POPUP users). These have mostly been addressed in furniture design, fixtures and finishes; elements which serve to add value to a space through creating an atmosphere which relates to the building’s historical interior, but concurrently reflects the activities, interactions and habits of its current users.