8

TECHNICAL RESOLUTION

The dynamic nature of architecture implies constant change. This study has thus far investigated the notion of change affecting a building or *place* prior to its alteration. It is this change that signifies the need for altering architecture. Of equal importance is the change that is required during the process of alteration and intervention, and the resulting change the future user might experience as a result. In order to facilitate change, a technical intervention is required in this study. The execution of this intervention, however, should serve as a reinterpretive gesture and should add to the overall improvement of the programme it facilitates. David Chipperfield (Ryan 2001:30) acknowledges a technically sound intervention by defining his approach to altering the Neues Museum:

> *The intervention should accentuate a symbolic structure whilst at the same time allow the user to orientate himself and house temporary exhibitions.*

The technical reinterpretation of the Administration Building will in this chapter be approached as a linear process.

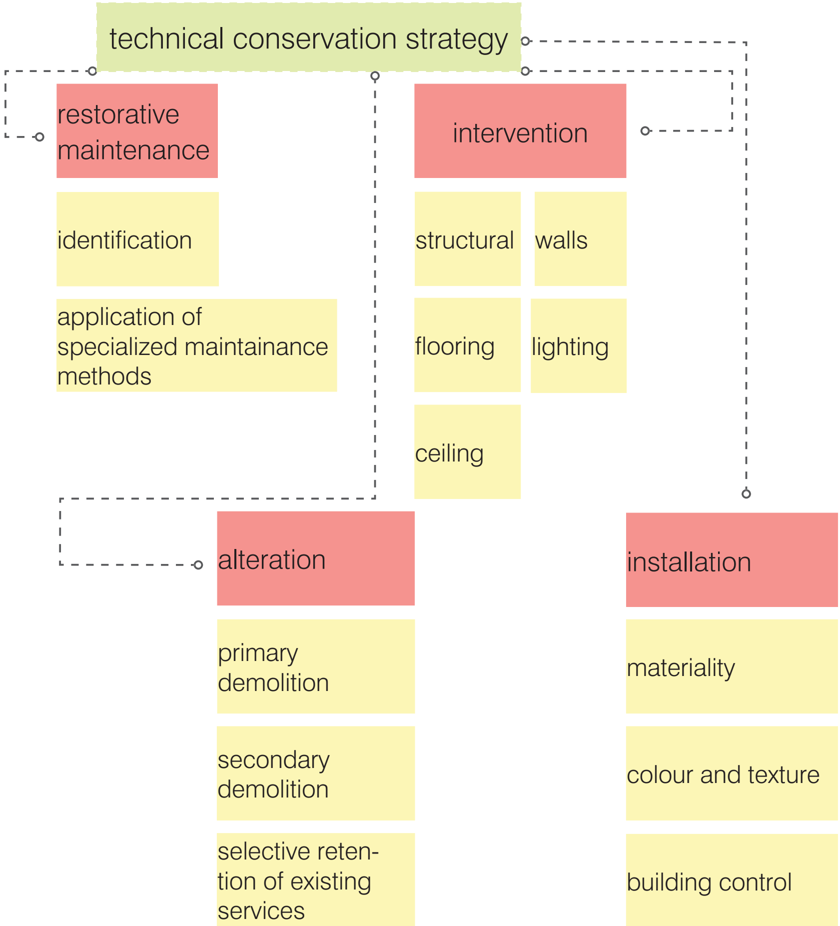


Diagram 8.1 The technical strategy to the reinterpretation of the Administration Building highlights key factors that will be addressed according to Scott's theory of stripping back. Thechapter will discuss the approach to each of these elements from an interior perspective.

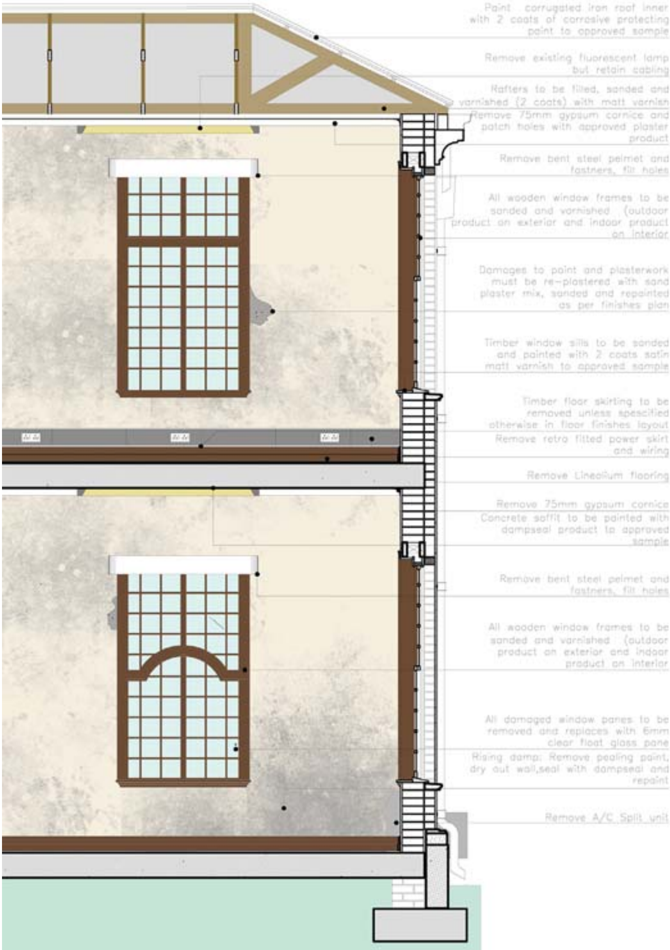


Diagram 8.2 Typical restorative maintenance section.

8.1 Restorative Maintenance

8.1.1 Addressing the Problem

Insufficient maintenance may endanger the cultural significance of a place. As noted in *Section 5.3*, the ICOMOS Burra Charter (1999:6) requires routine maintenance in order to prevent the above. In the instance of the

Administration Building, maintenance has been focussed mainly on the exterior of the building, thereby neglecting the interior. Through the application of specialised maintenance to key areas of the built fabric (indicated in *Table 8.1*), Carroon (2010:9) argues that repair ability contributes to the historically green nature of a building. His argument implies that focussed maintenance could reduce the need for the replacement of building components. It can further be argued that the intervention of to the Administration Building should continue its *passive survivability (ibid.)*. Seeing that the Administration Building was built before the demand on energy, it was designed to function without the introduction of technological building control devices. The building has the ability, therefore, to last without these elements.

8.2 Alteration

8.2.1 Demolition

The grid-bound spatial layout of the Administration Building has to effect that its adaptability to public functions is limited. Opening the interior environment up should allow for the introduction of the Human Anatomy Centre in this project, but should also allow for the introduction of alternative exhibition programmes in future. A distinction should be made between two scales of demolition. Primary demolition includes all building components pertaining to the structure of the building, while secondary demolition includes the removal of building components not part of the building structure.

8.2.3 Retention of Building Components

The north-facing walls of the Administration Building contain most of the wet services. The introduction of a newly built programme is placed in relationship with the existing service walls, eliminating the need for the additional disruption of historical fabric in order to house new services. Most wooden framed windows are retained to ensure that the style of the building remains legible. In the hall the existing staircase is modified to remain mostly intact, but to fulfil a new route.

Table 8.1 Secondary demolition elements

building component	task	aim
Floor finishes	Remove existing floor finishes without historic value	To make it possible to install new specialized flooring materials
Floor skirting	Partial demolition of existing floor skirtings	New floor finishes will require a different junction to the wall plane
Doors	Remove specified doors	To open up the interior spaces it is required to re-move some doors
Ceiling	Demolish first floor ceiling	By exposing the rafters an enlarged interior volume is possible on the first floor
Bathrooms	Demolish existing bathrooms	The envisioned programme requires a new placement of bathrooms

8.3 The Intervention

8.3.1 Structural Intervention

The structural working of the Administration Building could not be altered in

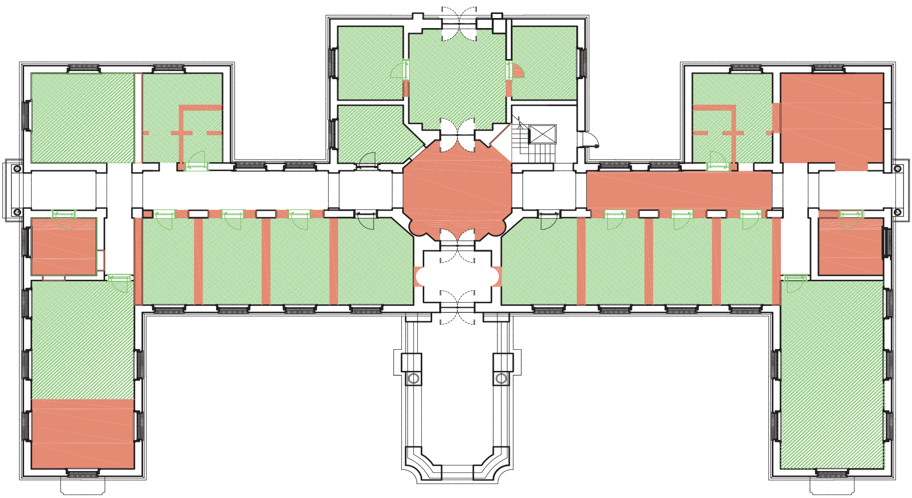
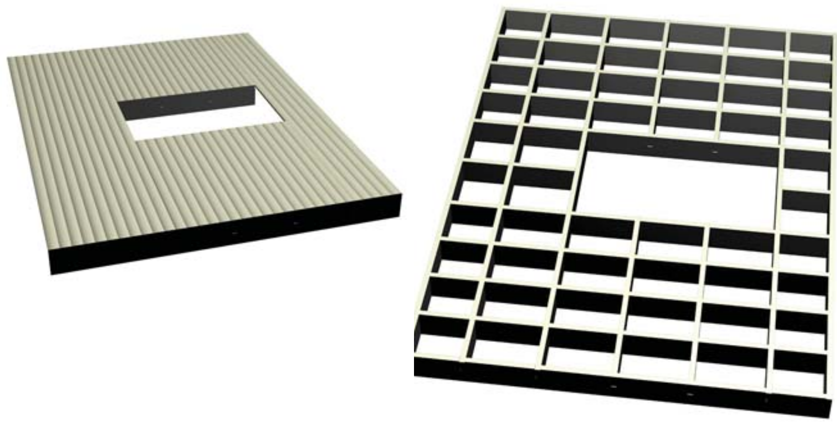


Diagram 8.3 First floor demolition plan: Orange indicates primary demolition elements while green indicates secondary demolition elements

order to accommodate partial penetrations through the first floor slab. As a result, double volumes are created by the entire demolition of selected areas, followed by the replacement thereof with new building material that has the ability to facilitate an opening signifying a double volume.



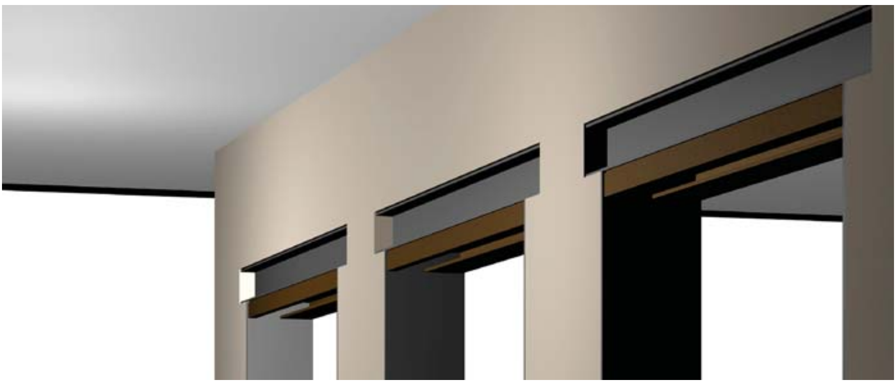


Illustration 8.1 Structural intervention after new wall penetration.

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The partial demolition of selected wall areas calls for the installation of additional structural support. *Illustration 8.1* indicates such structural installation.

8.3.2 Flooring

8.3.2.1 Surface treatment

Existing floor finishes are kept in the foyer and entrance hall. These floor finishes add a significant addition to the character of the interior environment. A linoleum finish was later added to the rest of the ground floor. This linoleum finish will be removed. Replacing this finish is a stretched vinyl finish. The versatility and durability of this floor surface type, together with the intended homogenous application, should prove to be beneficial in a display space. The starched vinyl floor will be applied on a dry sub floor that will be discussed later in the chapter. The third floor type is a Flowcrete anti-bacterial and chemically inert floor finish that will be applied in rooms where medical professionals interact with open human tissue. For hygienic purposes these floors should be sloped towards a specialized “blood” type floor drain that feeds into a medical waste container that will be emptied periodically by a medical waste contractor.

8.3.2.2 Dry Sub-Floor

Dry sub floors provide a self-levelling function to the floor it is applied to. The

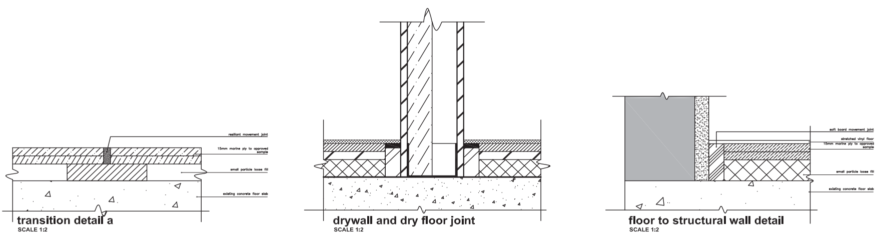


Diagram 8.3 Articulation of dry sub floor joints

under floor structure reduces the transfer of structure borne noise up to 28dB when installed over a concrete floor (Hausladen & Tichelman 2010:158).

The constant movement of this floor implies that large tiles are prone to crack (*ibid.*). The specification of a stretched vinyl floor in the instance of the Human Anatomy Centre should allow for this movement. The fire rating of a dry sub-floor is dependent on the placement of the board product specified over the loose fill. If the latter is a timber board product, the interior of the fire rating is generally accepted as 30 minutes. For gypsum board products the rating is 60 minutes.

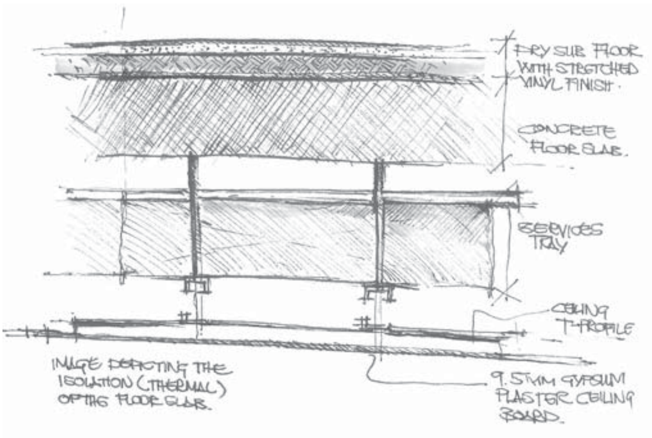


Illustration 8.2 Exposing overhead service tray through removal of first floor ceiling

Services may be placed under the dry sub-floor. In such instances, however, care should be taken to fix the services to the structural floor in order to secure it in place before the loose fill is added around the elements and the board product is placed over it (*ibid*.:158).

The articulation of floor joints should allow for the movement of board products, allowing the floor finish to move with the expansion and contraction of the host building. *Diagram 8* indicates the execution of these typical floor joints.

8.3.3 Ceiling and Roof Structure

8.3.3.1 Ground Floor Ceiling

The introduction of a ceiling to the first floor soffit acts as an insulative acoustic barrier eliminating structure borne sound resulting from the use on the first floor. The introduction of acoustic absorbent material ensures a reduced reverberation time on the lower floor. The provision of a marginal ceiling void should serve as an overhead plane to allow for the placement of lighting, mechanical ventilation ducting and the services associated with the above.

The ceiling of the first floor will be removed in an attempt to expose the roof trusses visible on the first floor. The need therefore arises for the introduction of newly placed thermal insulation. Overhead services on the first floor are to be exposed, and the articulation of the aforementioned is envisioned to be integrated as an aesthetic component.

8.3.4 Walls

8.3.4.1 Treatment of Existing Walls

The introduction of interior insulation over massive walls, like in the Human Anatomy Centre, has the potential to be detrimental to the structure. Carroon (2010:185) warns that interior moisture entrapment may result. Moisture entrapment occurs when moisture particles move through the porous brick structure from the exterior to the interior and the path of this airborne moisture becomes blocked by the placement of an insulative membrane.

The result of moisture entrapment is water damage and the growth of mildew that deteriorates historic built fabric, and may in some instances even lead to structural failure (*ibid*.). Carroon (2010:186) also remarks that recent in-situ testing has found that traditionally built brick have better U-values than initially

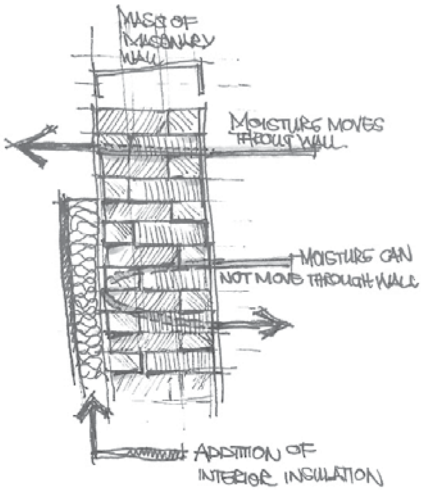


Illustration 8.3 Typical application of interior surface insolation and the resulting moisture entrapment

assumed. The approach in the instance of the Human Anatomy Centre is to allow the building to "breathe". This notion should allow marginally less insulation than that of insulated walls, but will drastically reduce the danger of the deterioration of historic built material.

8.3.2.2 Addition of New Walls

Similar to the approach of the dry sub-floor, the addition of drywalling as new wall system is meant to enable disassembly, should it be required for the building to accommodate a new programme. This term is coined as "the long life/loose fit approach" (Carroon 2010:11). In the instance of the Human Anatomy Centre a single-stud wall with one layer of gypsum fibre board, internally filled with 30mm acoustic insulation will be applied. Due to the height of the walls in some instances, plasterboard panels will be staggered; skim plastered and painted a colour to approved sample.

8.3.5 Lighting and Electrical Installation

8.3.5.1 Control of Natural Light

The designed control of natural light can ensure the use of high quality illumination onto subject matter whilst reducing the immediate demand for artificial illumination (Hausladen & Tichelman 2010:48).

Three lighting control mechanisms are proposed to allow different intensity, and quality of natural light is manipulated to create a display space.

Light Box

A light box is added that allows for elements to be illuminated from the side. This eliminates direct glare typically experienced by the user when gazing from an environment with low illumination levels into a brightly illuminated light source. The side illumination panels will be equipped with retractable blinds that would allow lighting to pass through.

Shading Panel

The shading panel allows the occupant of the space to adjust the levels of illumination by moving the lighting panel either in or out of the existing window opening.

Lighting Diffuser

The incorporation of lighting into the existing opening allows for natural illumination to be used in as rear lighting. It is in this application that natural lighting be used as effect lighting, more on this later.

8.3.5.2 Artificial Light

The luminance of specific interior spaces is listed as a requirement in lux in the table below:

Table 8.2 Luminance requirements of interior spaces

Activity	Illumination (lux, lumen/m^2)
Warehouses, Homes, Theaters, Archives	150
Easy Office Work, Classes	250
Normal Office Work, PC Work, Study Library, Groceries, Show Rooms, Laboratories	500
Supermarkets, Mechanical Workshops, Office Landscapes	750
Normal Drawing Work, Detailed Mechanical Workshops, Operation Theatres	1,000
Detailed Drawing Work, Very Detailed Mechanical Works	1,500 - 2,000

Thttp://www.engineeringtoolbox.com/light-level-rooms-d_708.html

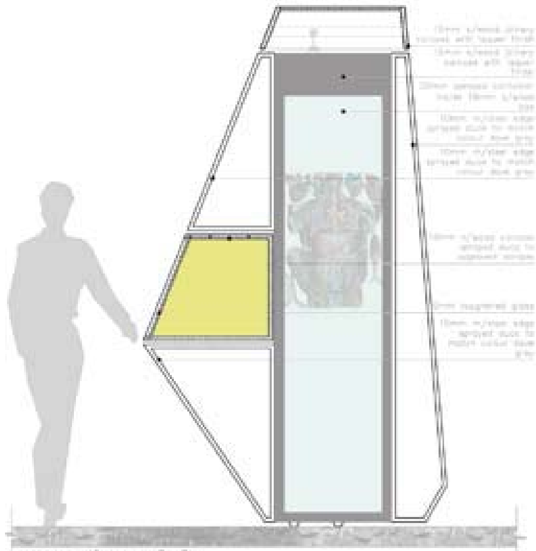
Table 8.3 Lamp type attributes

Lamp type	Colour rendering (CRI)	UV sensitivity	Wattage (Watt)	Luminous Efficacy (lm/watt)	Lifespan (hours)
LED	70-90+	High	6 W	54 lm/watt	30 000
HID	96	Low (filter required)	150 W	50-90 lm/watt	50000
Tungsten Halogen	100	Low (filter required)	50 W	15-20 lm/watt	3000
Fluorescent	51	moderate (filter required)	24 W	35-65 lm/watt	5000-20000

Three different strategies are applied to the lighting in the Human Anatomy Gallery. These are:

- ambient lighting
- focussed lighting
- specialised lighting.

8.4 Technical Investigation



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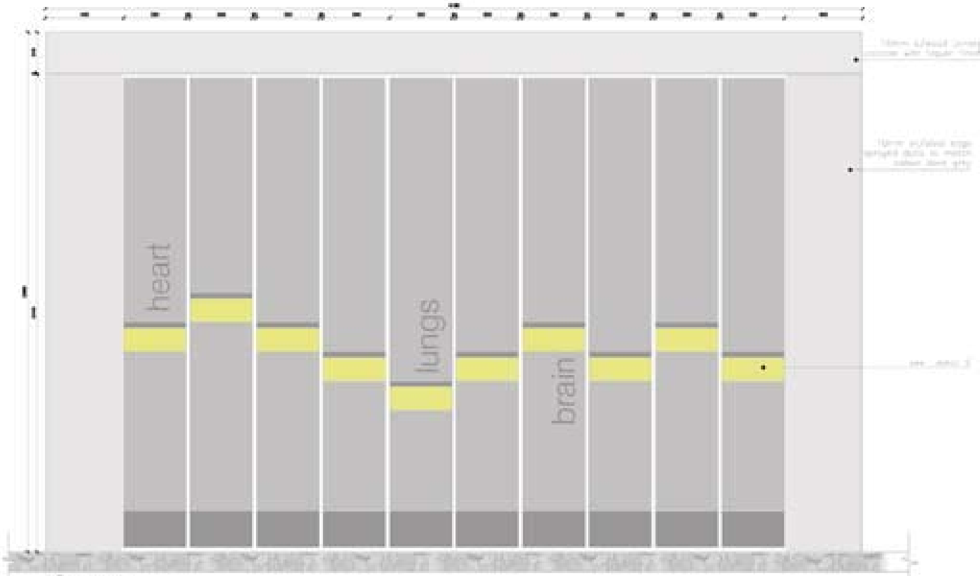
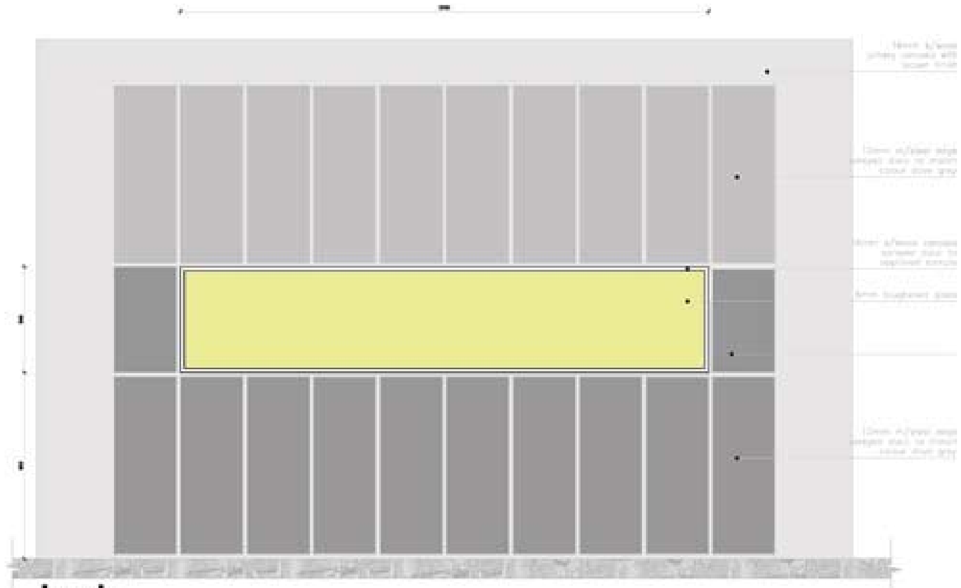
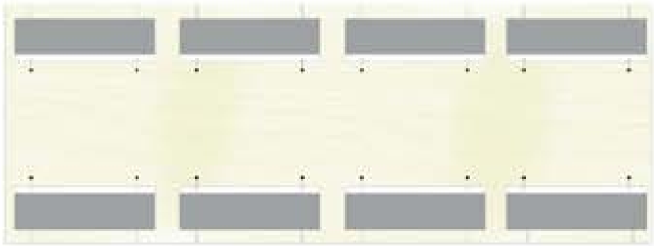


front
SCALE 1:20

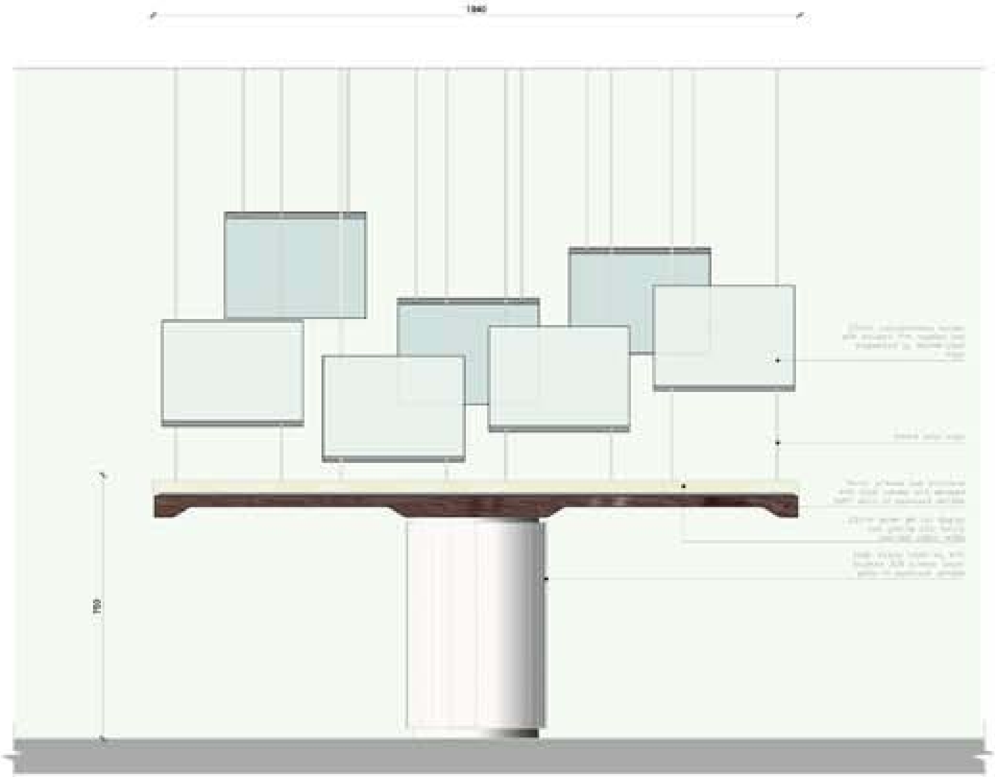


back
SCALE 1:20

_sliding body storage unit



plan
SCALE 1:10



side

front

_horisontal plasitination display

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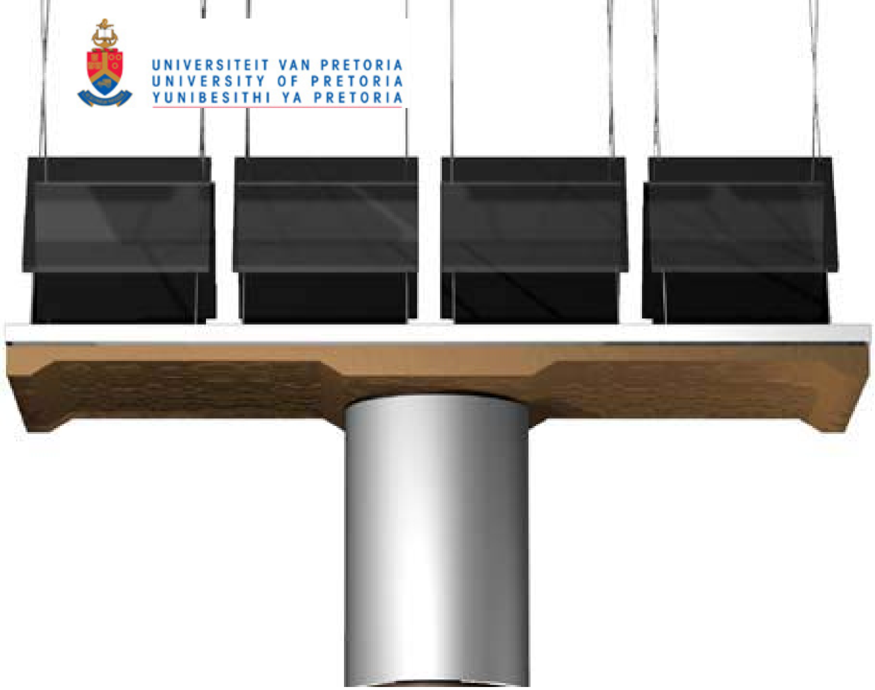


_horizontal plastinated display

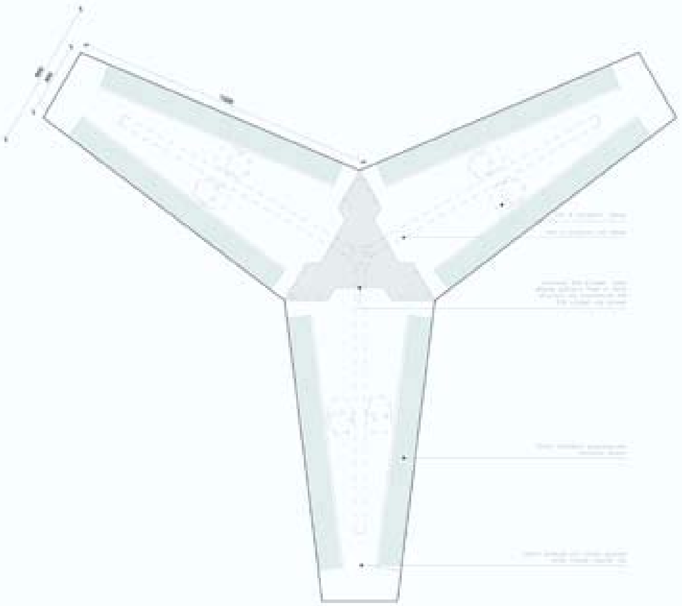
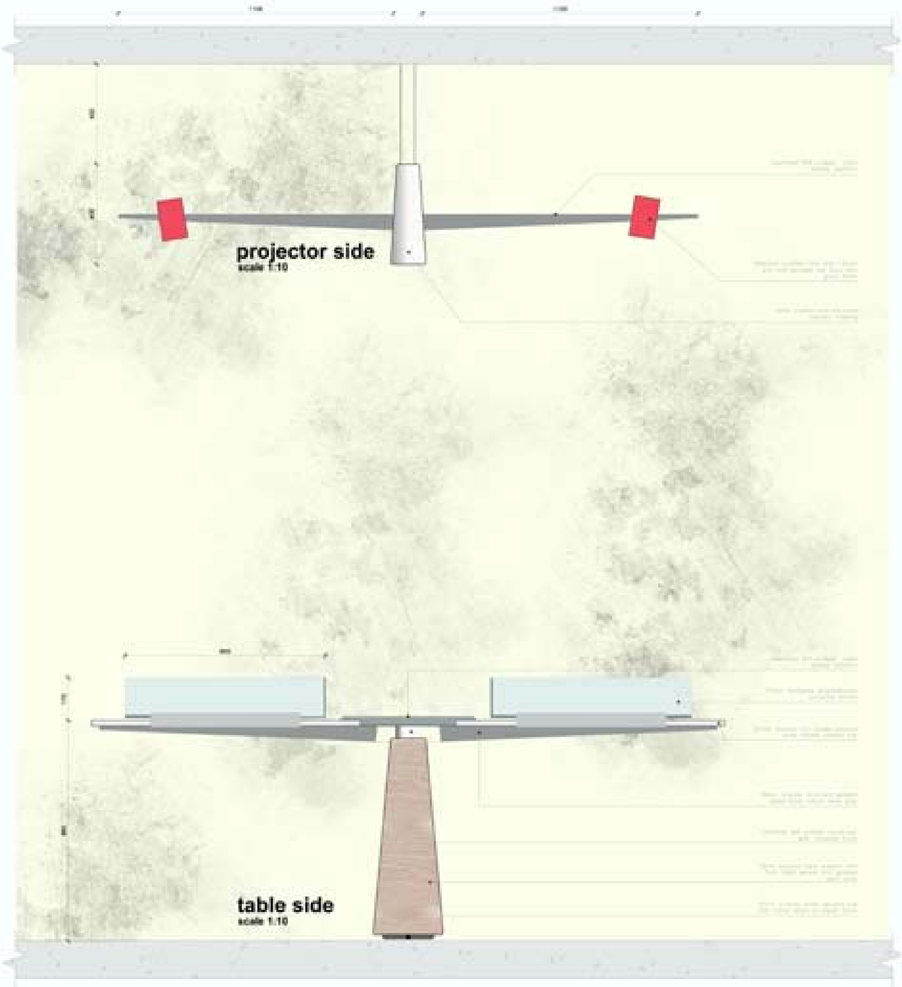
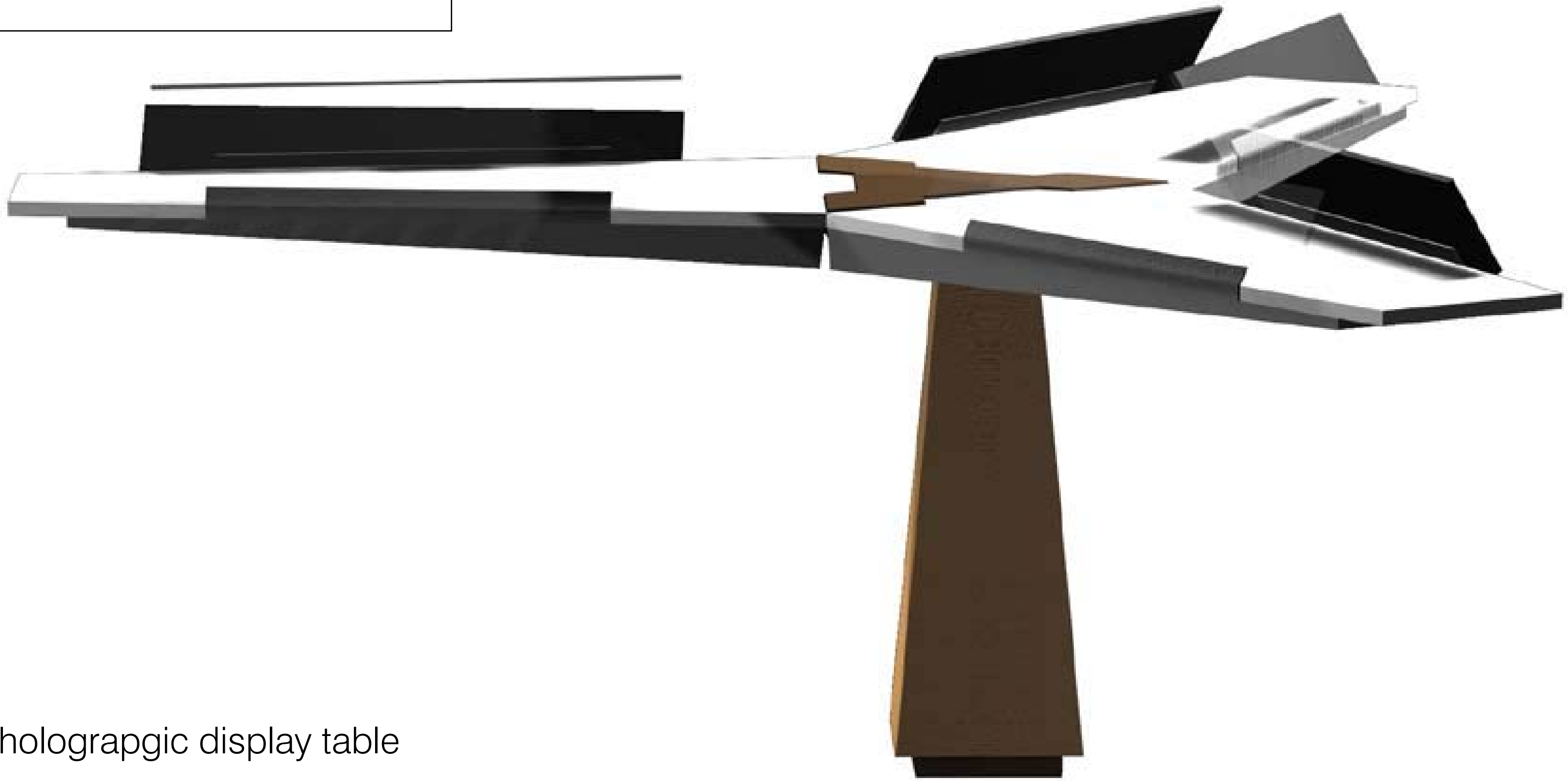


table plan
scale 1:10



Unit: IT_01

_interactitive information station



_holograpgic display table

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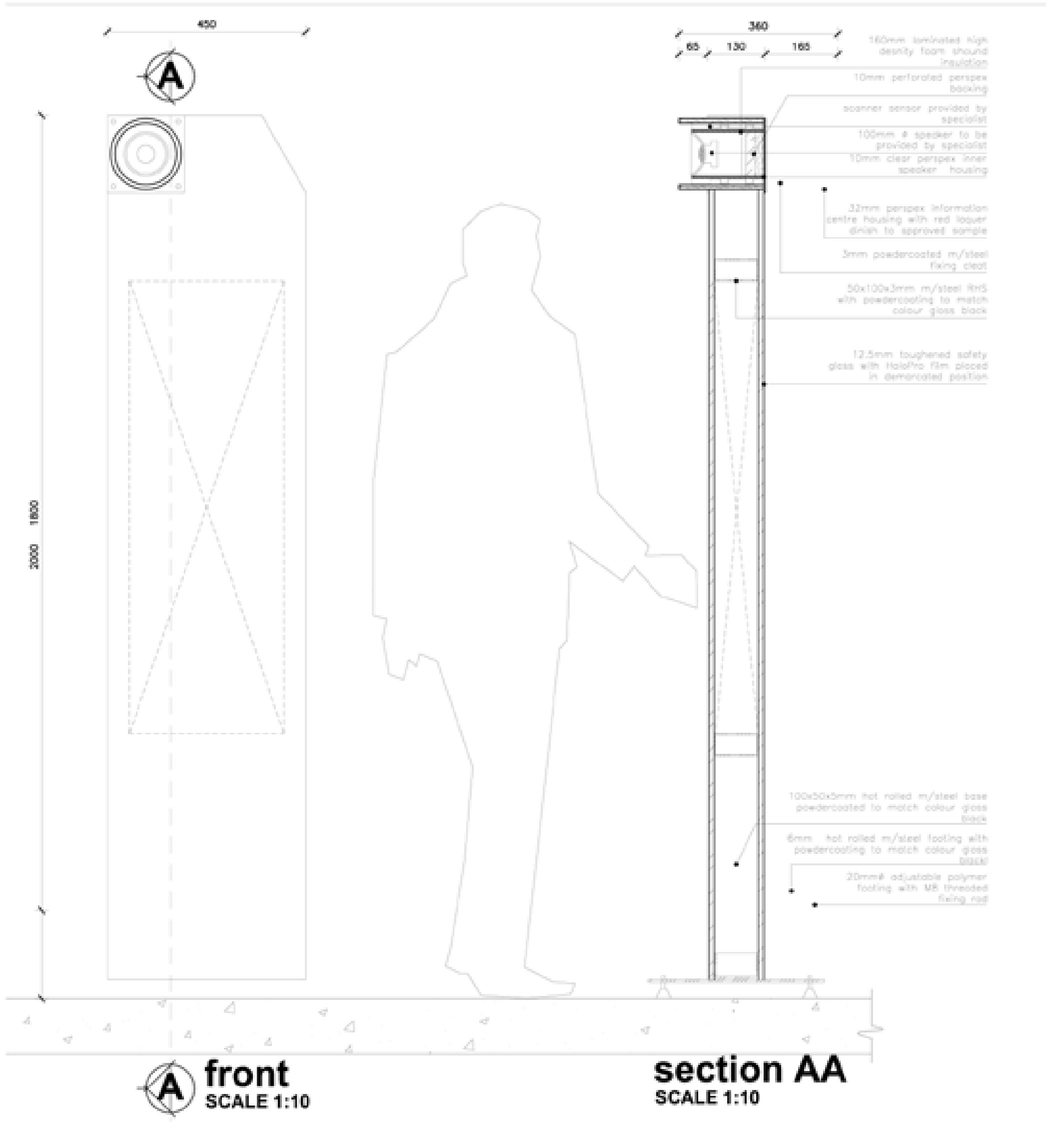
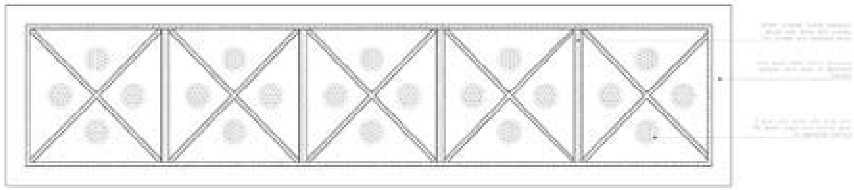
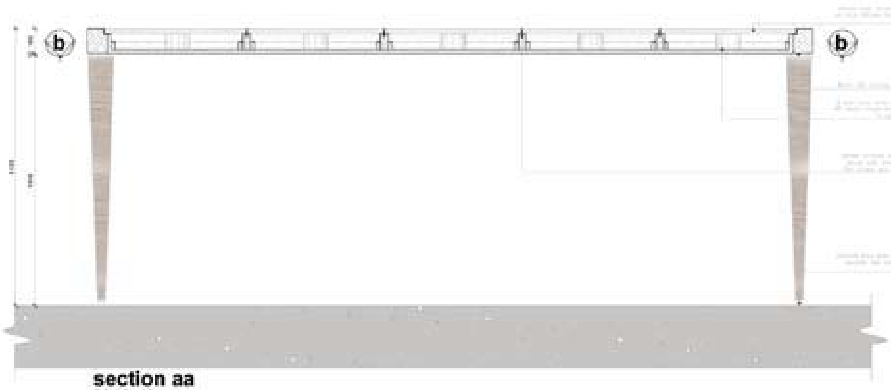


_horisontal plasitination display

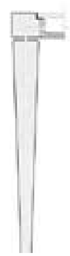


structural sectional plan bb
SCALE 1:10

plan
SCALE 1:10



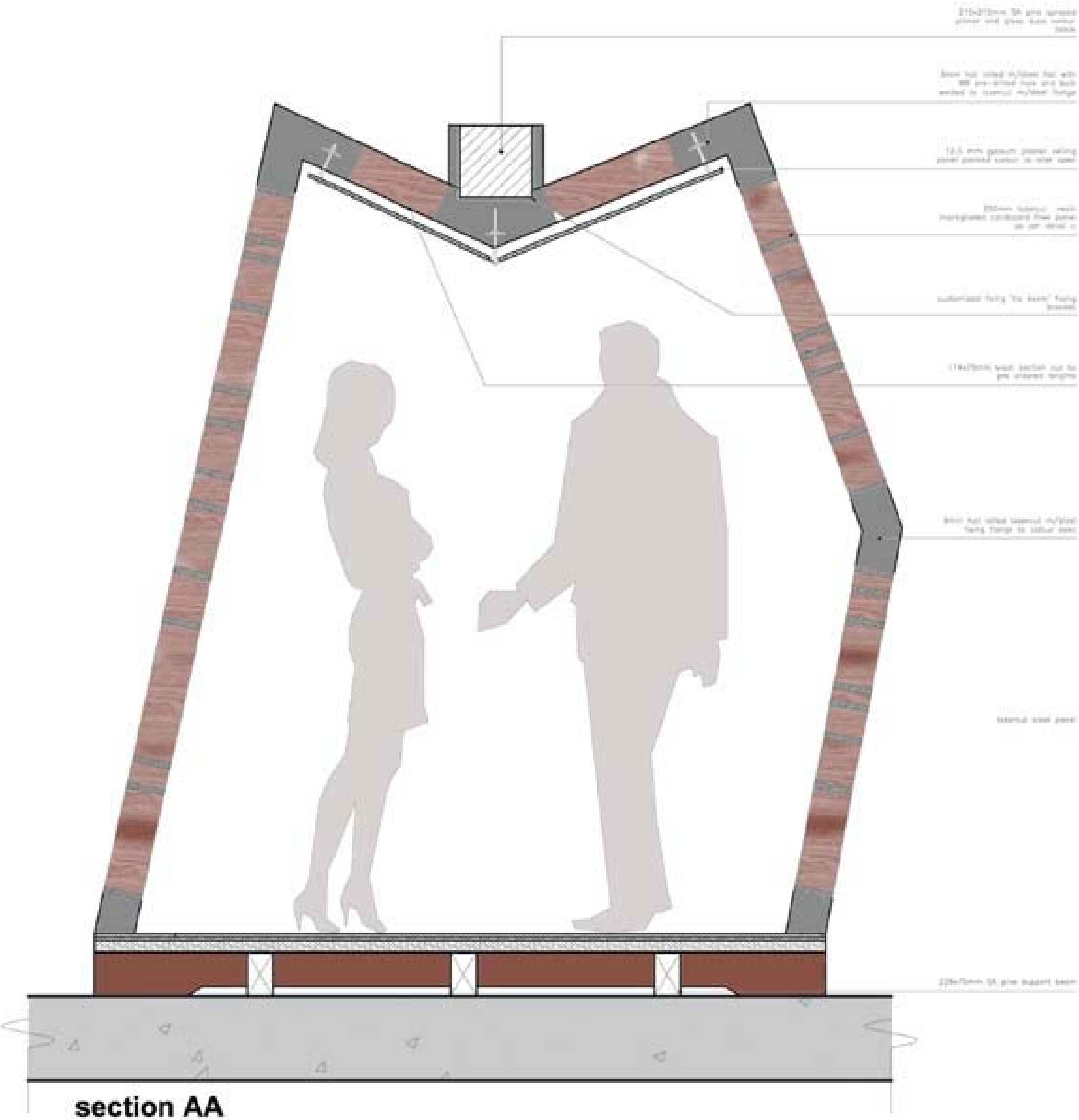
section aa
SCALE 1:10



Unit: LT_01

_light table

_kight table



section AA

SCALE 1:20

_measuring station

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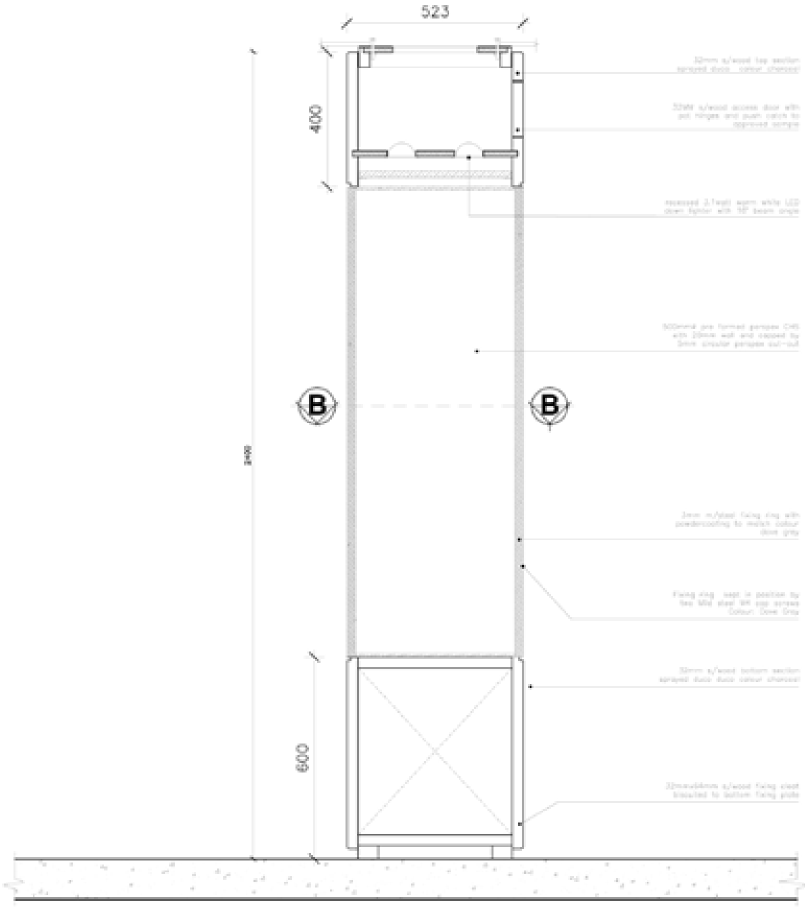

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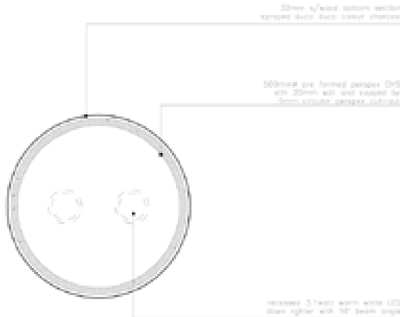

horizontal section BB
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_wet sample display carcass

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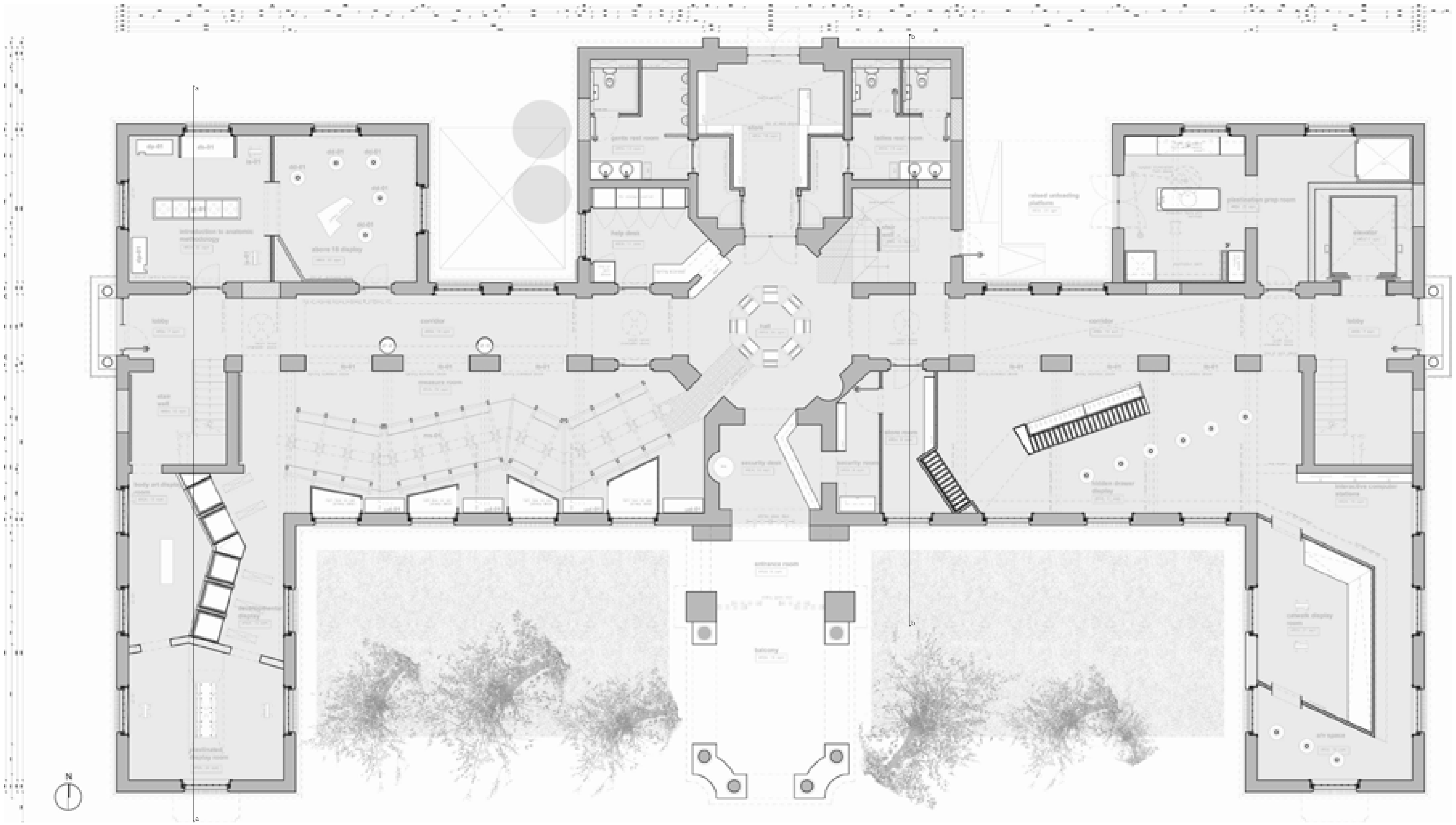
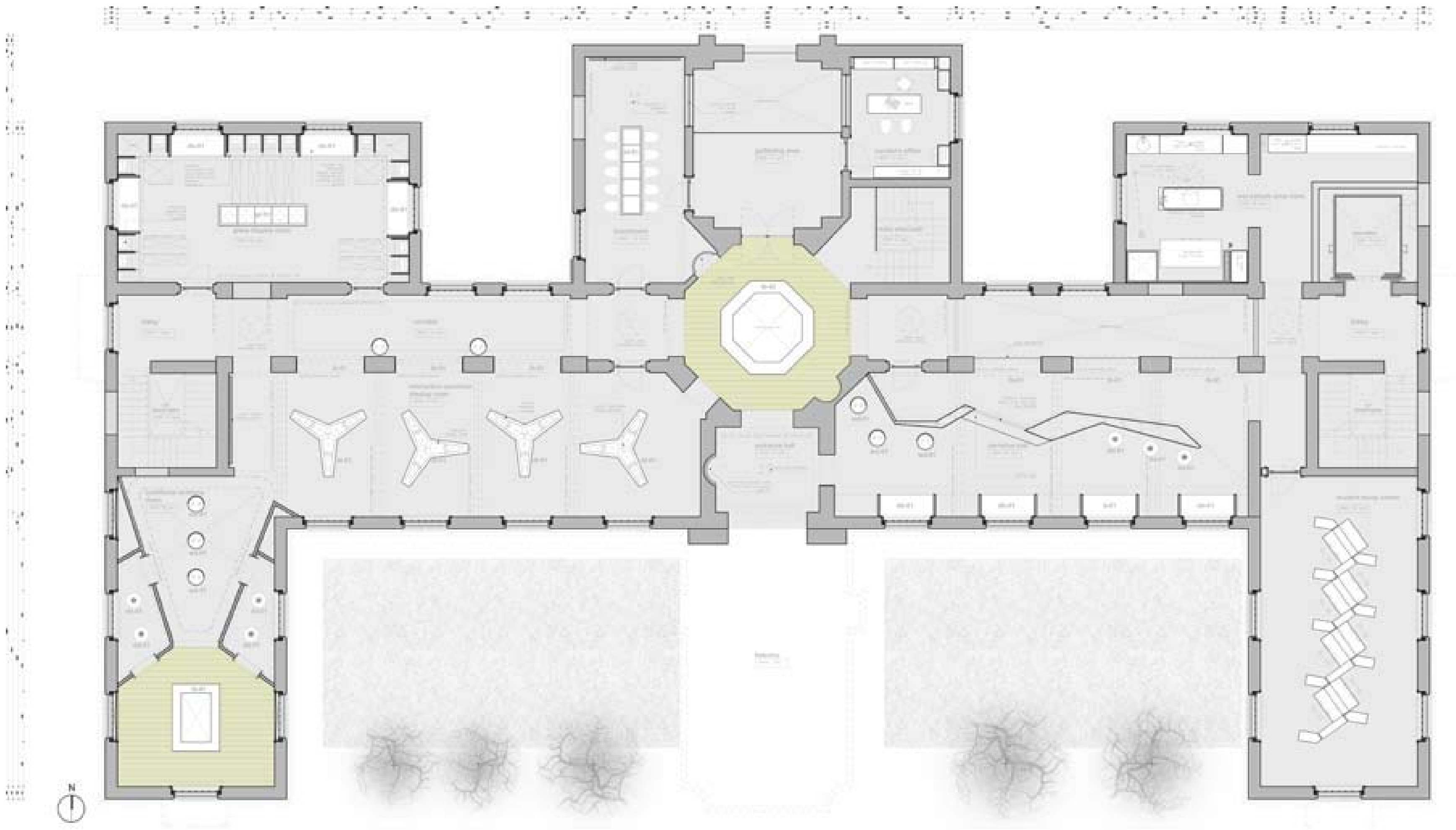


GROUND FLOOR PLAN 1:50

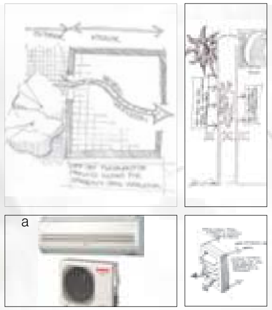


_ground floor plan

BUILDING SYSTYEMS ANALYSIS

ventilation cooling_

This building has a high level of heat gain from the northern facade in summer. This is largely due to the fact that there are very few shading devices provided on the northern facade, resulting in an uncomfortable working environment. The solution to this challenge was to add air conditioning in order to cool the structure in summer. This building, however, has the potential to have effective cross ventilation due to the offset placement of openings, as well as the provision of openings in the internal structure to aid the flow of air.



materiality_

The relationship between place and architecture has thus far been established by contextualising the Tshwane District Hospital within its setting. The relationship between architecture and place has only been explored on mostly an intangible level. Righini (2000:21) notes that architecture was, and in certain places still is, place bound. He extends his argument by investigating the writings of Geddes, famous environmentalist and regional planner, with specific reference to the valley section. In this theory it is argued that a section through any valley on earth implies crossing several different when moving from the top to the higher to lower side of this valley. Geddes (ibid.) argues that this climatic differentiation implies different architectural requirements for each zone. Each zone has different plant species and a varied geological composition. His findings highlight that the most typical valley section has more or less the same type of architecture in the same places along the slope of the section, and therefore concludes that the architectural setting of architecture can affect the material selection and aesthetic appearance.

The material palette of the Tshwane District Hospital is limited in its composition. It may be argued that the initial building was contracted between two wars, having a severe implication on the money available for the construction. It may also be argued that material is used in a rather conservative application. Ashby & Johnson (2006:78) indicate that what may possibly be perceived as conservative material application, may indeed by and hones approach to the application of material to architecture. This is evident when a material is applied to depict its strengths i.e. steel represents strength, polished wood represents craftsmanship and granite an idea of performance etc. (ibid.:81).

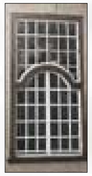
Informed by the arts and crafts movement, the 'honesty' of materials in their application is evident in the Tshwane District Hospital. Expression is obtained through material form, and not always material type. Snyman (1977:28) argues that the architect allowed as far as possible to reflect the local environment in the interior of the Pretoria Algemene Hospitaal.

lighting_

a. Natural light

The Edwardian design principles evident in the architectural form of the Administration Building, dictate a constant rhythm, regarding the placing of openings. With this specific building being part of the classical revival phenomenon in the Edwardian movement, the elaborate size of window openings, as well as the frequency of its placement on the facade, becomes a distinctive trademark of the time. The result of this approach to openings allows for the interior to be washed with an abundance of warm natural light, despite the cellular interior layout. It appears that care has been taken by the architect to allow the most light into the building from the southern facade (which is also the front elevation). This notion allows a high quality of light (with effective intensity and colour rendering) to penetrate the facade without the accompanying heat gain. Openings on the western facade have been executed differently with the provision of timber louvers in front of these openings. These elements, however, were later found to be reduced to mere aesthetic elements, the addition to steel verandas on top of each window in order to reduce late afternoon glare and heat gain, made the louvers redundant.

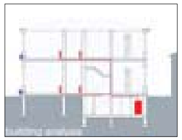
The design of the envisioned project should therefore engage with the existing natural lighting strategies. This poses a challenge as the control of natural illumination in the interior environment is of the utmost importance in the visual communication of elements on display. Firstly, it should be possible to control the natural lighting levels in specific spaces inside the structure; secondly, it should be possible to isolate specific lighting levels to specific spaces (in order to eliminate the 'bleeding' of unwanted light into adjacent spaces). Finally, it should be possible to provide a mechanism for the control of natural illumination without disturbing the style or the future historical value of the architecture it engages with. As mentioned previously, the fenestration of the existing Administration Building is a valuable architectural component and should arguably be retained.



typical as built section_

ventilation heating_

The building also has an electric boiler that heats the structure during the winter months.
The building has been fitted with a boiler radiator heating system.
The boiler is currently located in the basement.



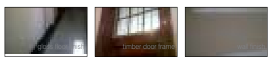
acoustics_

This building is located in a relatively quiet street. The challenge, however, is that the hospital staff and students make their way home either around the Administrative Building or through it. As a result, it may be a disturbance to the users of the building, should they be exposed to this noise pollution. The noise imposing on the building use can be divided into two categories: firstly, there is sound conveyed through the building structure and (G), secondly, there is sound carried through the air(F). Hausladen and Tichelmann (2010:39) term these principles "air borne and structure borne sound".

Air borne sound can be delivered where different users meet. These sounds may be conducted through ventilation ducting, flanking paths and cable ducting. In the case of the Administration Building, the constant flux of people through the foyer contributes greatly to air borne sound. The building is also one with a remarkably high mass and has no structural acoustic insulation at the present time. At present there is a multitude of hard surfaces in the interior spaces of the building, resulting in poor acoustic reverberation times, with the exception of the first floor offices, which are covered in an industrial carpet.

colour and texture_

The use of colour in the Administrative Building seems not to exist. The figure below indicates a selection of the existing colour pallet. It is clear that most of the colour perceived originates from the existing materiality of elements in the interior. There are wooden doors and window frames, the building exterior and interior are painted beige and a blue linoleum floor has subsequently been added. As already mentioned, the use of this building has ranged from residential to administrative. A human anatomy centre will require a well-considered colour expression. Ching (1996:86) states that texture and colour together affect the visual weight and scale of a plane and the degree to which it absorbs or reflect sound. Colour should allow the user to orientate himself and at the same time enable the curator to draw the visitor's attention to specific elements on display.

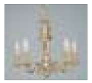


lighting_

b. Artificial light

The incremental changes in the use of the building and its spaces justified the retrofitting of artificial lighting over the years. The initial intention was to accentuate the luminaire as object with specific focus on its materiality, positioning and size. The lighting seems to have been treated as a mere result of this elaborate luminaire, and the quality of illumination provided can at best be described as low intensity ambient light. The initial positioning of task lighting was limited to one lamp per room. The quantity of lamps, combined by their placement in the ceiling or soffit above, must have allowed for a stark atmosphere with arguably uncomfortable shadow interfering with a simple task, like working at a desk at night.

As a result, fluorescent tube lighting was added to the existing offices over time. The materiality of the existing structure, combined with the warmth of the natural illumination by day, is contrasted by the introduction of cold white fluorescent lighting to be used at night. Also, the allocation of a new use for the Administration Building justifies the introduction of new specialised lighting types and luminairs, as the lighting requirements of a typical display gallery is vastly different from that of a typical office space.



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