

**d e s i g n   d e v e l o p e m e n t**

s y s t e m

t e c h n i c a l

a e t h e t i c s

c o n c e p t

a s s i m i l a t i o n

"Like the word 'pattern'... configuration seems to be a concept addressed to the whole of a complex rather than to its parts. Intuitively it seen to mean a set of relationships among things all of which interdepend in an overall structure of some kind." (Hillier; 1996: 33)

"The judgment we make that a building is architecture comes when we see evidence in the buildings both of systematic intent... and that this exploration and this exercise of intellectual choice has been successfully accomplished. Architecture is thus both a thing and an activity." (Hillier; 1996: 47)

Architecture is often a concept, an explicit knowledge system (such as sociology, mathematics or mechanics), applied to an ambiguous system of knowledge (space configuration). This concept generates the meaning of the building, which leads to an implicit code applied intuitively to the form. Industrial and scientific principles are then applied rationally to this form after which the 'building' is related to corresponding systems such as ecological, urban and social organisations. The completed product is the application of concept, intuition, technical data and context studies.

Concept → Aesthetics → Technical → System → Application

The problem with this method of buildings is that a concept generating a building is not quantifiable and the success of the building is therefore neither measurable nor properly understood. The process of building should be the deliberate and conscience transmitting of knowledge into object form (Hillier; 1996: 45) and the process of transmitting should be measurable if the success of a building is to be understood.

The design process implemented for this project is as follows:

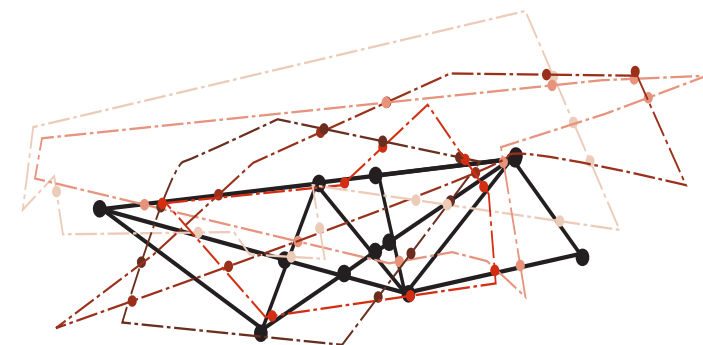
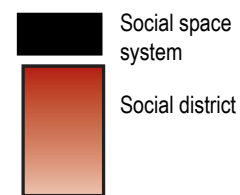
System → Technical → Aesthetics → Concept → Assimilation

The building functions within an urban environment; this urban environment is studied and understood on regional (city) and local (district) scale. This urban system establishes the meaning of the building. Technical systems generate the form of the building and an intuition code manipulates this form; the concept (explicit knowledge) now becomes a building evaluator instead of a generator. The final product is the assimilation of process and product, thing and activity.

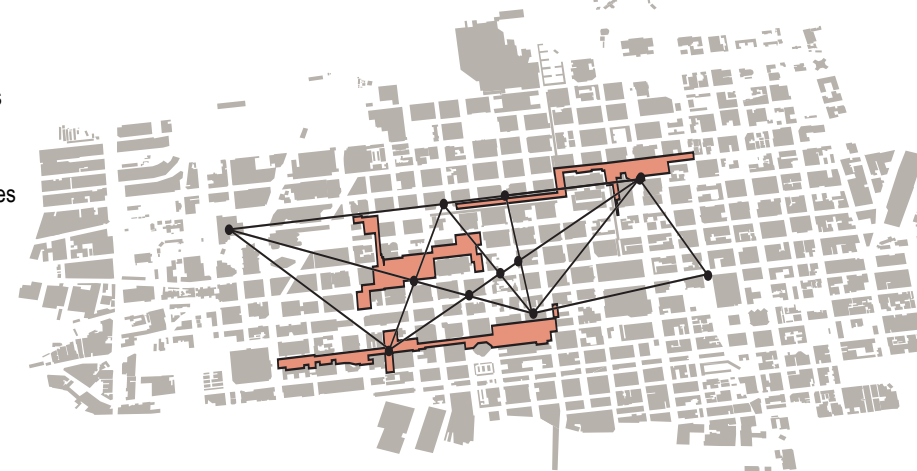
## System

A series of public spaces are connected on street level and related via pedestrian orientated streets, broad sidewalks and arcades (city). The public spaces identified are currently open, unused voids in the city. These voids are re-introduced into the city fabric by, firstly, connecting them to other public spaces (districts) via streets, etc. and secondly by integrating them with adjacent buildings (street). Buildings are made more accessible and available to street traffic. Buildings are opened up to street activity and adapted in include functions that cater for diverse range of users (house).

System of social spaces in relation to social districts



System of social spaces



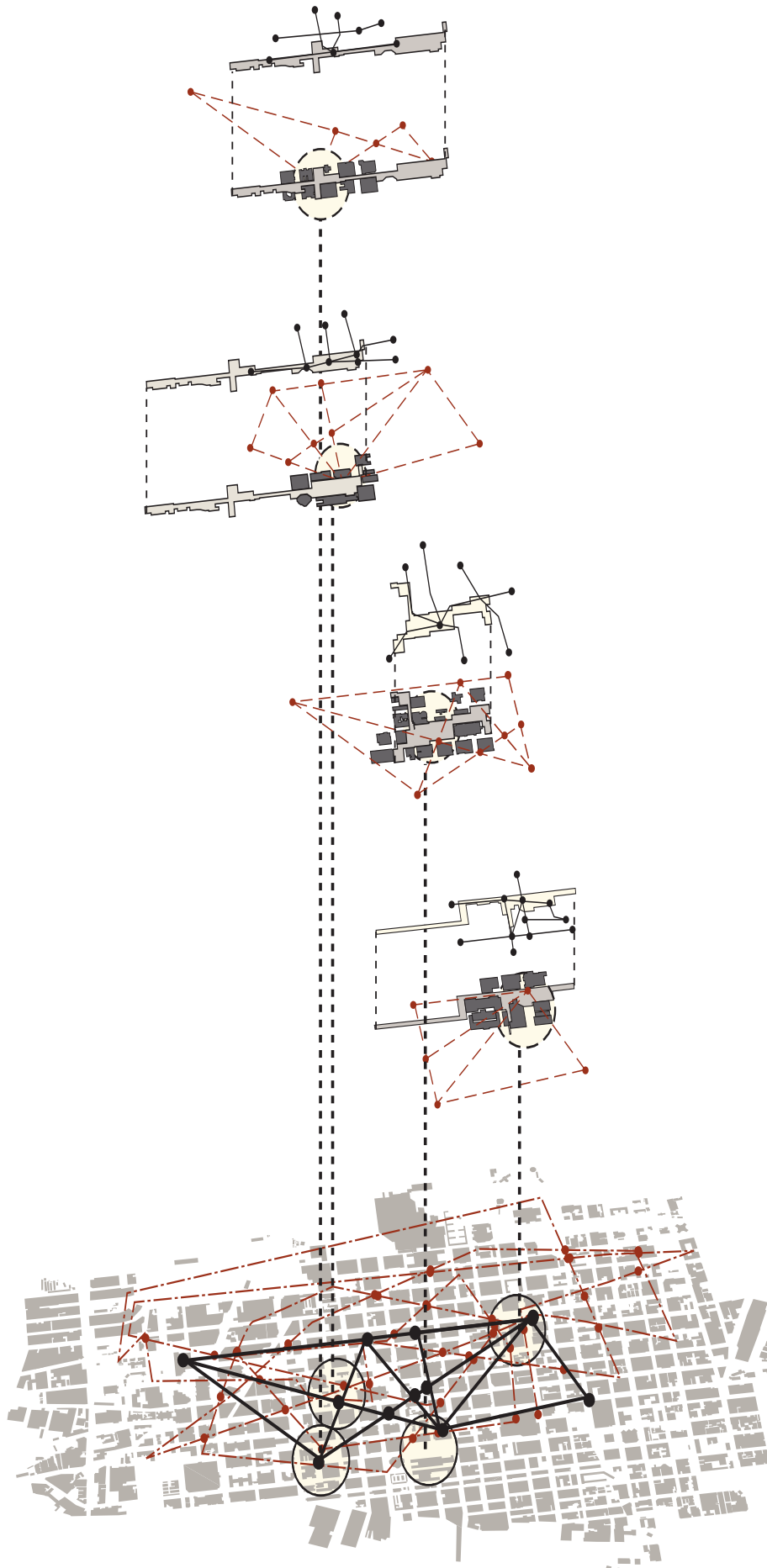
Assembly of social districts



Social districts, lines connecting social attractors.



Fig. 107 System of Social Spaces



Public space to be focused on.

Fig. 108 District Surrounding Each Social Space

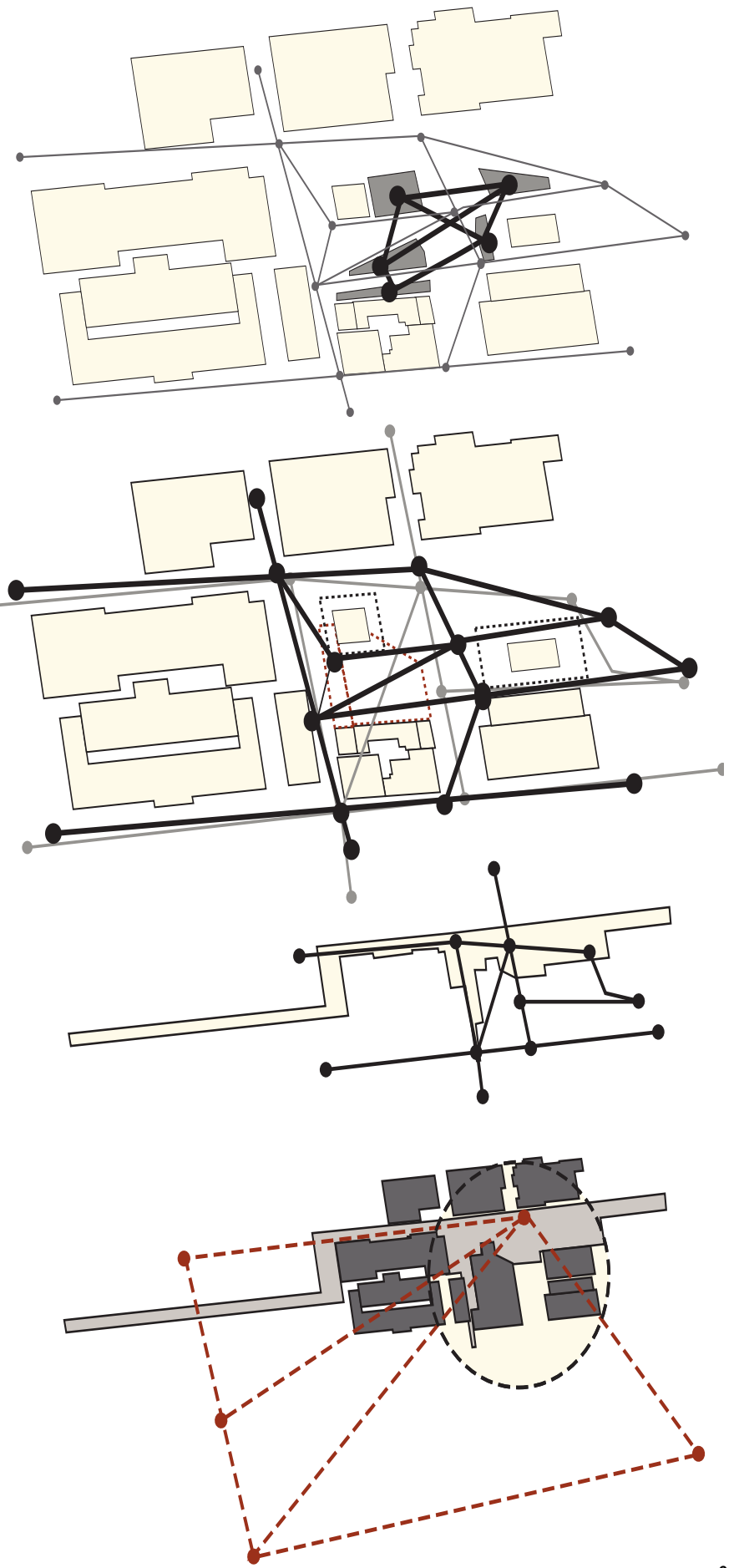
Pocket of public space linked to form a local public system

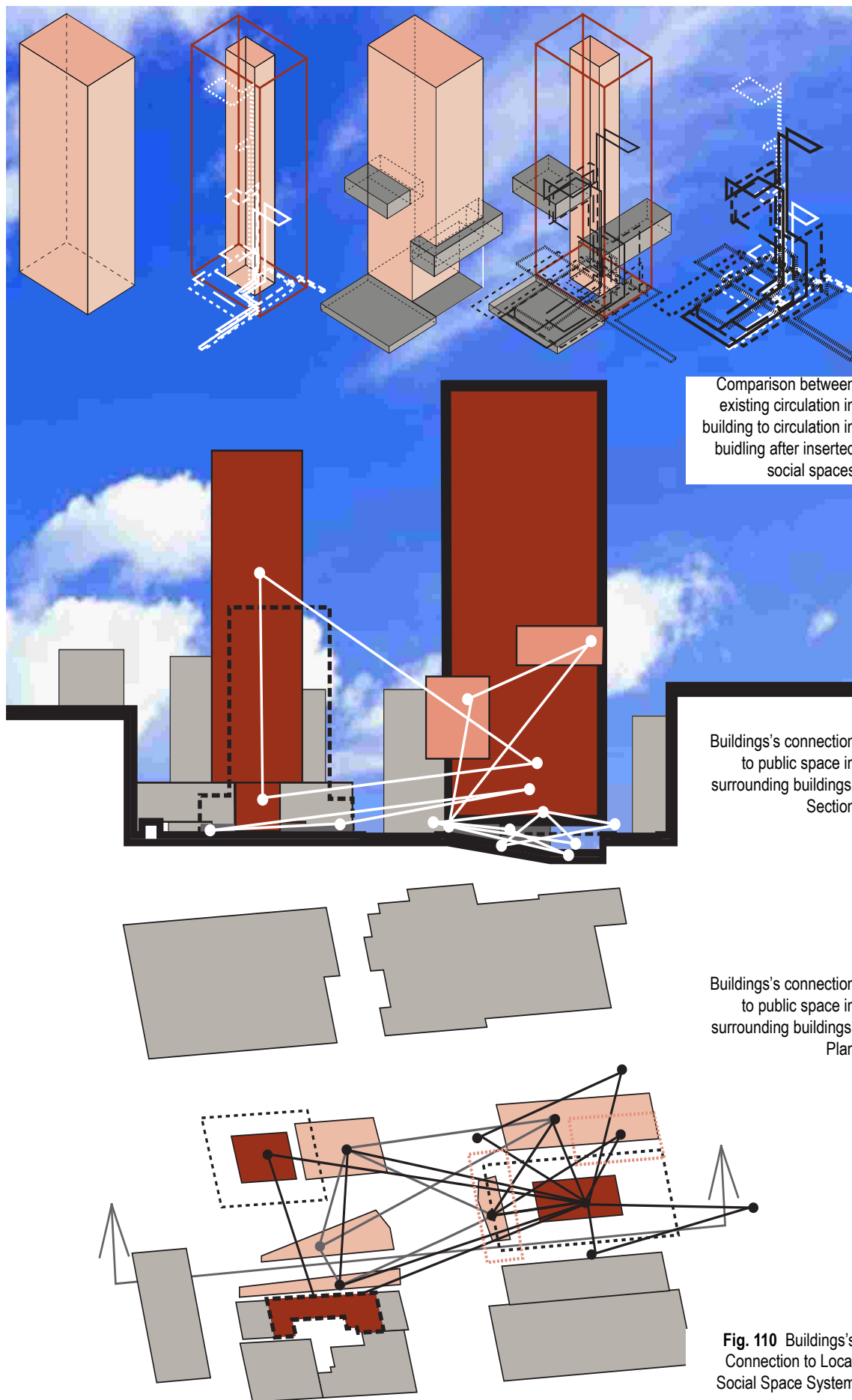
Pedestrian movement pattern after implemented intervention

Pedestrian movement pattern that need to be established if disif space is to be part to a system

Open space to be converted to social spaces

Fig. 109 Social Space within District





## Technical

The following parts were investigated and contributed in generating form: functions, security, movement, materials, services, sun angles, planning and construction.

## Function

Functions for the site were required to meet four criteria;

- the project should contribute in fulfilling Johannesburg's 2030 long-term strategy
- guidelines stipulated by the Regional Spatial Development Framework must be met,
- existing facilities that have been mis- or underused should be employed and
- functions should lead to an architectural expression of principles and concepts articulated.

## Johannesburg 2030 Vision

"In 2030 Johannesburg will be a World Class City with service delivery and efficiencies which meet world best practice. Its economy and labour force will specialise in the service sector and will be so strongly outward oriented that the City economy will operate on a global scale. The strong economic growth resultant from this competitive economic behaviour will drive up City tax revenues, private sector profits and individual disposable income levels. This will ensure that the standard of living and quality of life of all the City's inhabitants will increase in a sustainable manner." (City of Johannesburg 2004/5:49)

To reach the status of 'World Class City' the Integrated Development Plan for Johannesburg lists creating an environment conducive to economic growth, increasing the efficiency of investment and accelerate growth as primary steps. To achieve this Executive Mayor Amos Maseko identifies the following as priorities:

- economic development and job creation
- public safety
- inner city regeneration. (City of Johannesburg 2004/5: 50-1)

## Regional Spatial Development Framework Johannesburg Metropolitan Open Space System

An integral component of the City's Spatial Plan is a well-defined open space system that seeks to conserve and enhance the City's existing and future physical and natural resources." (City of Johannesburg 2003:28 )

The JMOSS (Johannesburg Metropolitan Open Space System) is an organised network of open spaces within Johannesburg that aims to increase interaction between social, economic and ecological activities. The JMOSS policy supports the expansion of open spaces in the city provided spaces are: accommodating, accessible, appeal to a variety of generations and culture groups, are safe, available to individuals with varying physical and cognitive abilities and accommodate diverse user groups (City of Johannesburg 2003:28-9). Open spaces are categorised as primary, secondary and tertiary spaces; these spaces should be managed in such a way that form as a structured network of public spaces.

General guidelines for the development of open spaces are as follows:

- Open spaces should aid in a sustainable provision social, economic and environmental services to local communities
- Open spaces that link existing open spaces to form a continuous system have precedence over developments
- Roads and pedestrian activities should be placed adjacent to open spaces to increase safety. (City of Johannesburg 2003:33).

## Precinct Plan

The site lies between Sub-area 2 (Inner Core) and Sub-area 7 (New Doornfontein).

The intention for Sub-area 2 is to “promote the sub-area as a mix use with special emphasis on the legal and retail sectors”. The following objectives for the area were issued:

- create clean, secure and well managed public spaces
- implement the Ernest Oppenheimer park upgrade initiative
- implement informal trade strategy where informal trade is limited to market nodes (City of Johannesburg 2003: 54)

Sub-area 7 houses an emerging garment and jewellery industry. With a cluster of garment industry operators and around 80% South African’s jewellery industry located in this area, the focus for the area is the creation of mixed use development around this emerging market. The following objectives for the area were issued:

- implement programmes that develop the garment and jewellery industry, specifically: markets, houses for workers and public space upgrades
- support the conversion of single-use buildings into multi-functional entities (City of Johannesburg 2003: 61)

### Existing Facilities

A vacant hotel with conference facilities, basement parking and two towers sits between Smal and Von Wielligh Streets opposite Marble Towers, an office block (not fully occupied) with an unused sunken plaza and under used retail facilities.

### Function:

**Requirements** > connected open spaces, social space (spaces that encourage interaction between a variety of cultures, generation and economic groups), relaxation spaces for local communities and workers, educational facilities that cater for both adults and children and retail facilities that focus on the jewellery and garment industries.

**Street** > Reopen the sunken plaza, reopen the first tower as a hotel (Towers Hotel was built in 1966 and is self-sufficient without the conference facilities or second hotel tower both which were added in 1984), convert the one hotel tower to residential units, remove the conference facilities and create a public park and informal trading market in its place and redevelop Marble Towers as a multiuse capacity. Link Smal street to public park, market and sunken plaza.

**House** > Functions inserted into Marble Towers are: public open space in the sunken plaza, restaurants, gallery, library, auditorium, lecture halls and extend the retail facilities. These spaces will allow for adult literacy and education (seminars, short-term courses and conferences), children’s education, the promotion of the jewellery and garment industries (retail facilities that cater for young designers), social interactions and public contact.

### Movement

The building is currently difficult to access making spaces isolated from the street. In order to integrate the building with the street and surrounding public activity, interior spaces need to become more accessible and movement from street to buildings easier. Once interior spaces are more inviting, they can become well-used social spaces that compliment surroundings outdoor parks and plazas. The first step to achieving this is to make the building easily accessible on ground level (with functions that will attract users) and then to make functions that are housed above ground legible from street level. Functions above ground should not simply be legible but there should be a clear path leading to these functions; a user should immediately understand how to reach these functions.

The sunken plaza should have a good street relationship. This means that the plaza should be visually stimulating to pedestrians, accessible (preferably from more than one access point) and should house one or two functions that will attract users down into the plaza.

3-d diagram of circulation from street to office. The office is the seventh space you move through. Six door need to be opened to reach this space.

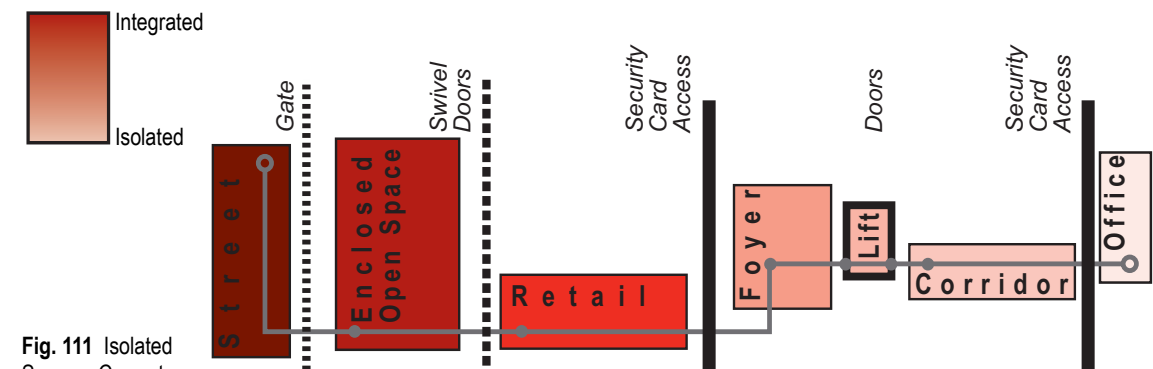
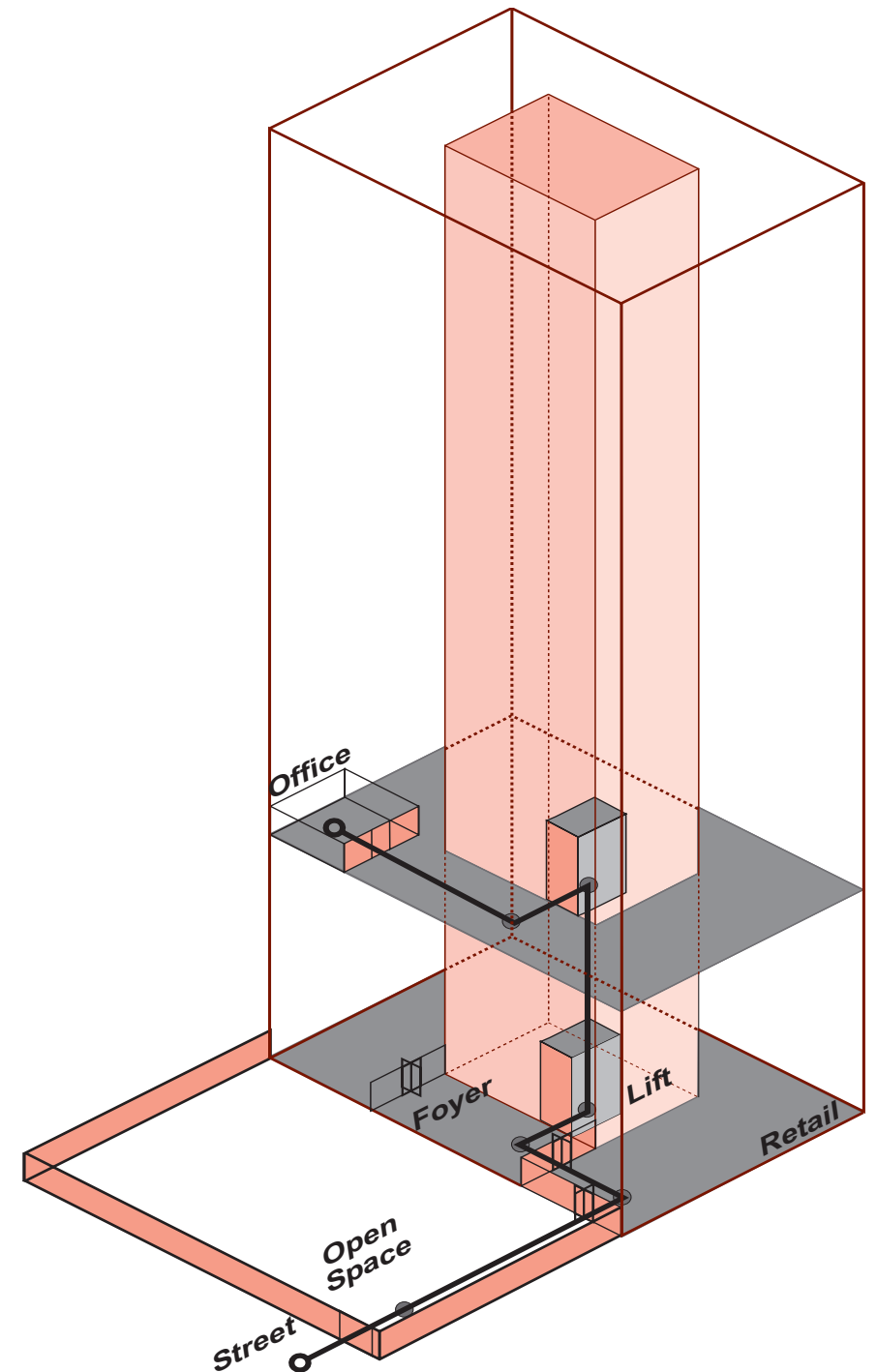
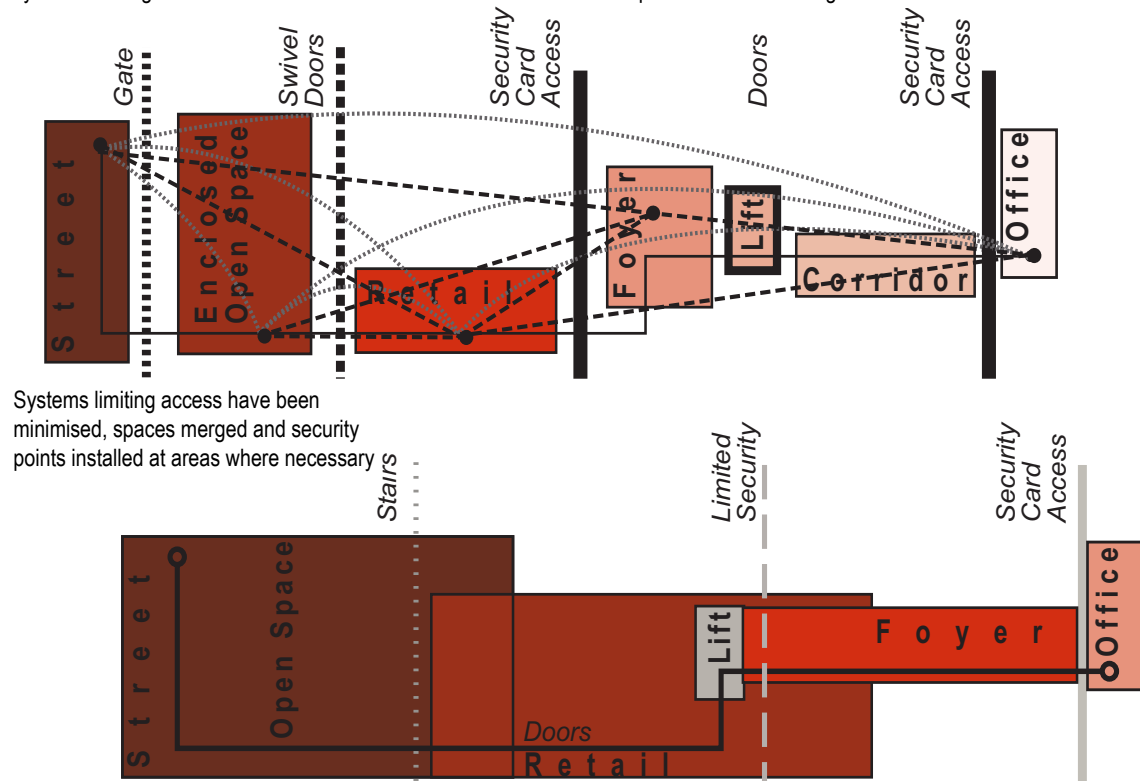


Fig. 111 Isolated Spaces: Current

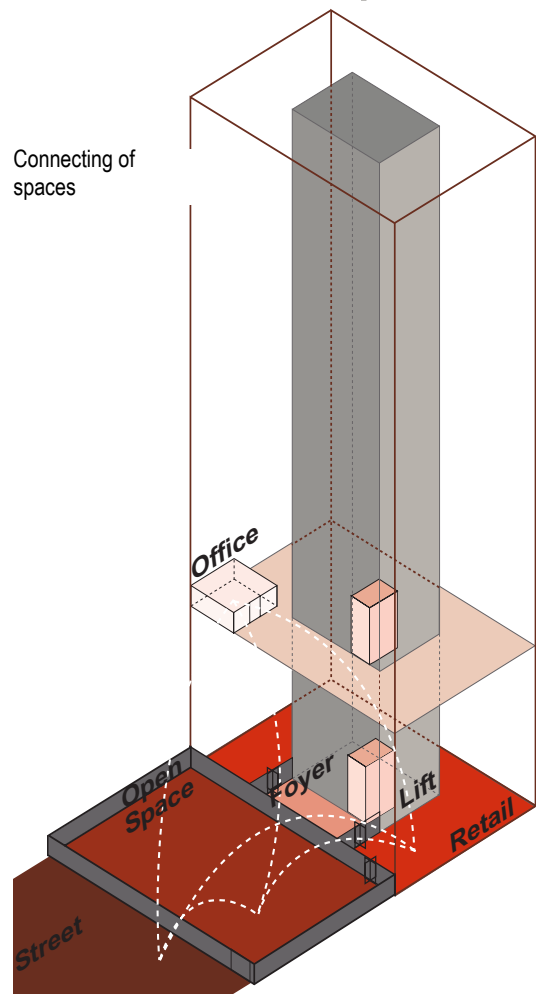
Circulation showing security check points and systems limiting access.

--- Lines showing areas that need to be connected in order for spaces to become integrated.



Systems limiting access have been minimised, spaces merged and security points installed at areas where necessary

Connecting of spaces



Inserted social space and the connections made between spaces

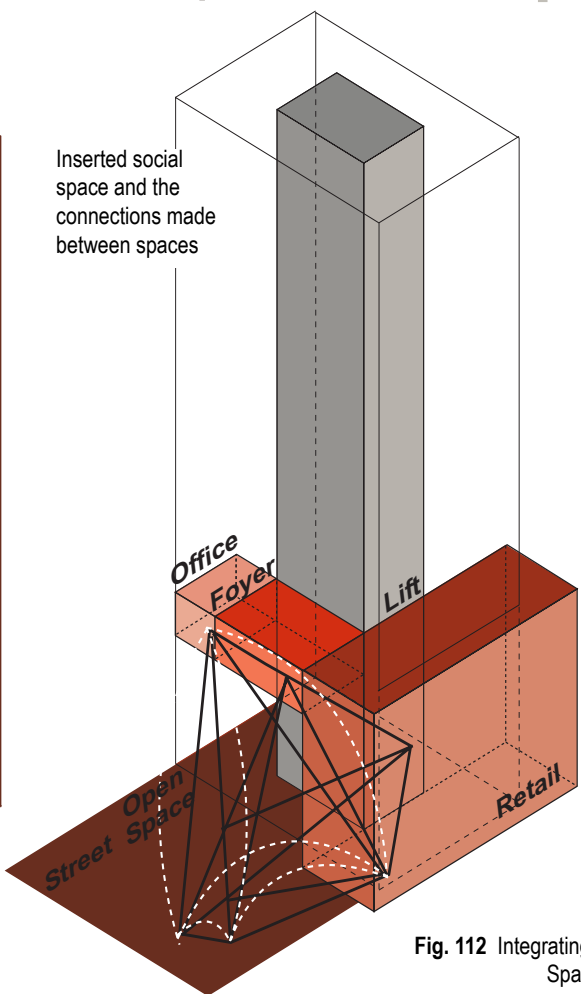
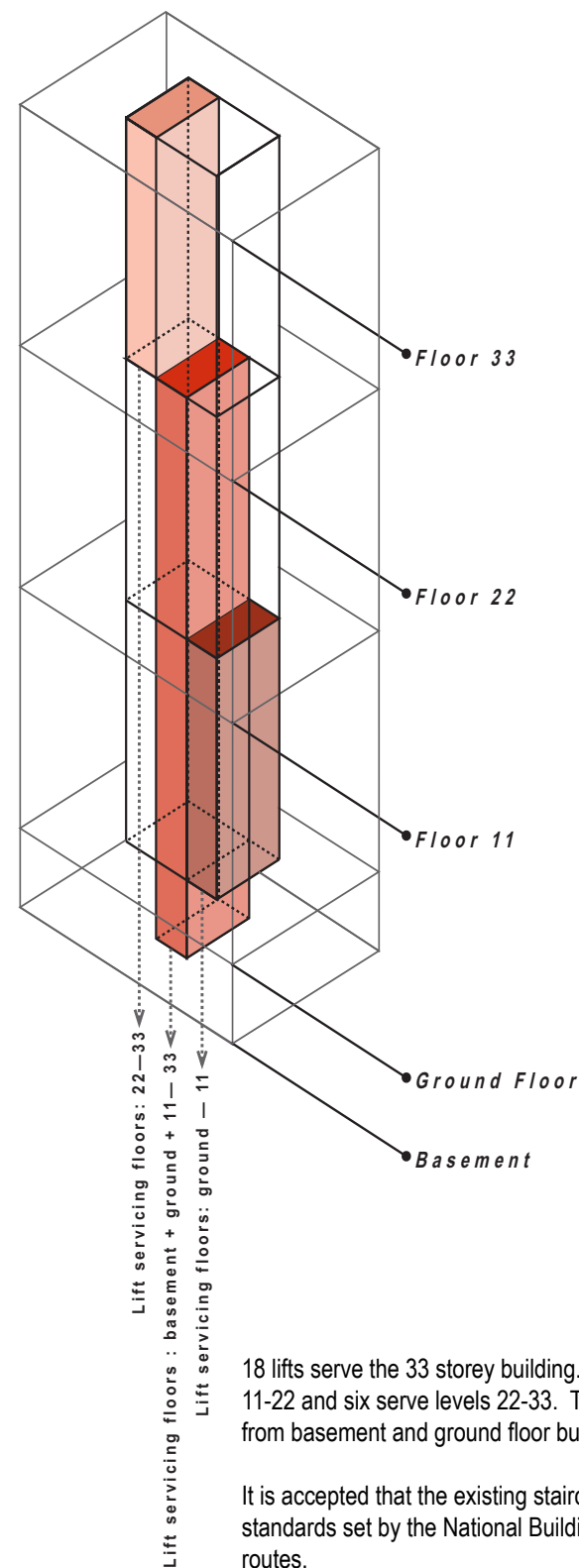
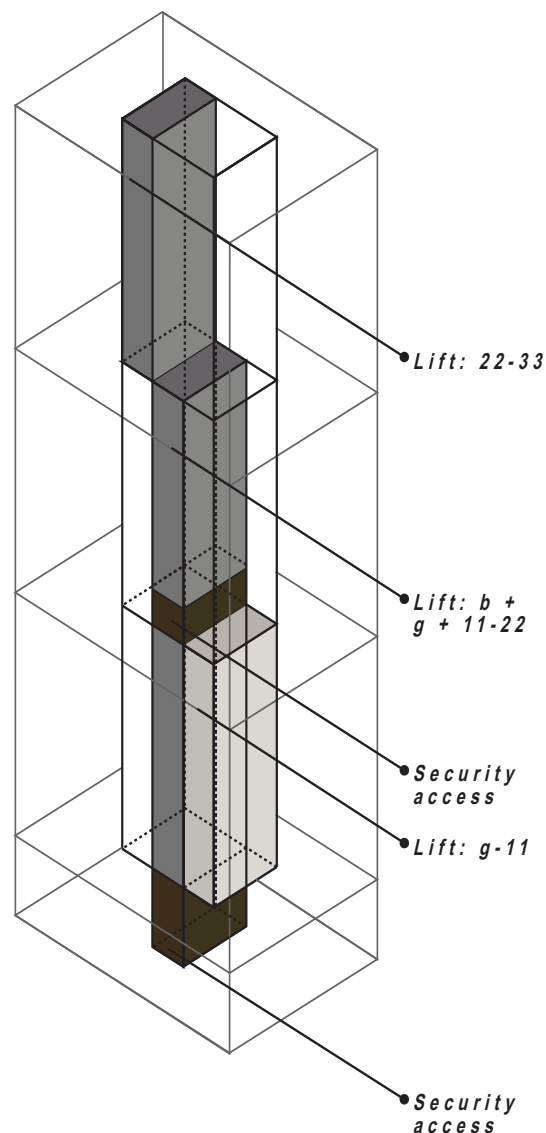


Fig. 112 Integrating of Spaces

Lift System



Medium-rise lift: Security card access on basement level and floor 11. Unaccessible on ground level



18 lifts serve the 33 storey building. Six serve floors ground to 11, six serve floors 11-22 and six serve levels 22-33. The medium-rise lift (floor 11-22) can be accessed from basement and ground floor but do not stop at floors 1-10.

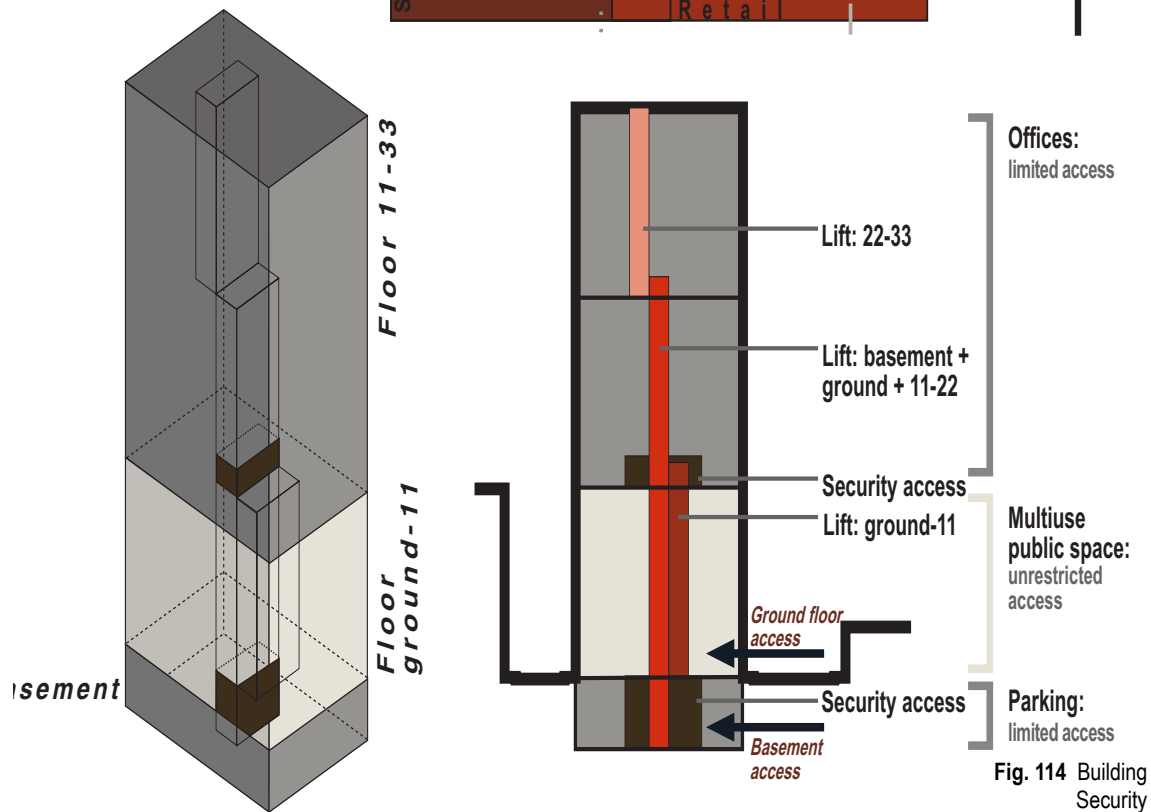
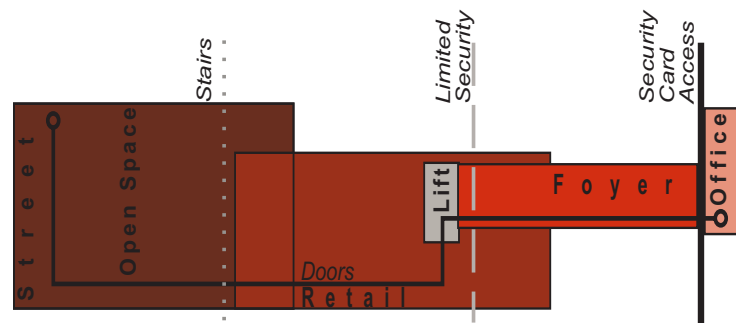
It is accepted that the existing staircases, located in the central service core, meet the standards set by the National Building Regulations for fire escapes and emergency routes.

Fig. 113 Building Circulation

### Security

With the aid of swipe cards, remote controls, written permission or an accompanying security guard there are six doors/check points/gates that need to be accessed for a person to reach an office. Corridors are bleak and empty and offices are quite and sheltered from activities happening on street. Knowing that offices receive visitors, include expensive equipment and require privacy, the need for security points, central foyers and peace and quite to work is acknowledged. The problem is that in the process of securing spaces they have become isolated and valuable space along the street that could be used for retail or similar social spaces is going unused. The solution is to reconfigure these spaces so that become less accessible the further to move up the building instead of immediately making most spaces in the building inaccessible from ground level.

The building's foyer has been moved from ground floor to the 22 floor. Offices on floors ground -11 have a small foyer on levels that can be accessed. Social spaces occupying most of floor ground -11 floor do not require foyers. In order to reach floors 11-22 on needs to take the low-rise lift to floor 11 gain security clearance at the foyer and then take the medium rise lift. To accessing the medium-rise lift from basement level you would need security clearance. The mdeium-rise lift does not stop at floors ground-10.



### Sun Angles

Three of the building's façades need protection from sunlight, which is currently controlled with tinted windows. Tinted windows work for offices above ground but are harmful for spaces such and restaurants and shops that benefit from pedestrian viewers. Tinted windows will suffice for the current office conditions but the following spaces would benefit from well designed sunscreens:

Gallery: a visual connection between the gallery and the sunken plaza would create a more interesting social space for both the gallery and the plaza. A sunscreen that hinders the sun without imparing visual access would be ideal

Retail: a visual connection from the street into the shop offers free advertising, stirs attention and creates a more interesting interior environment. Replace tinted windows with normal windows and design a sunscreen that doesn't limit visual access into the building. Exploit façades that do not receive sun by creating glass boxes that protrude from the building.

Library: design a sunscreen that filters light into the buildings creating an atmosphere that has good natural lighting without a glare. The sunscreen shouldn't restrict readers from seeing onto the street during the day and should provide visual access into the library in the evenings.

Fig. 115 Summer Solstice; 08h00, 12h00, 17h00



Fig. 116 Autumn/Spring Equinox, 08h00, 12h00, 17h00



Fig. 117 Winter Solstice, 08h00, 12h00, 17h00

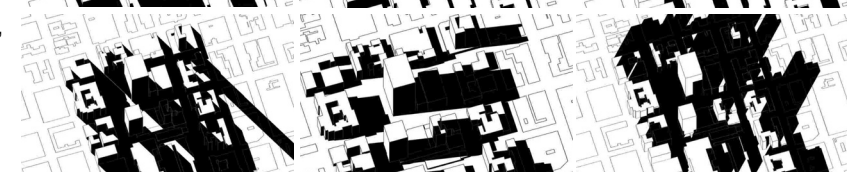
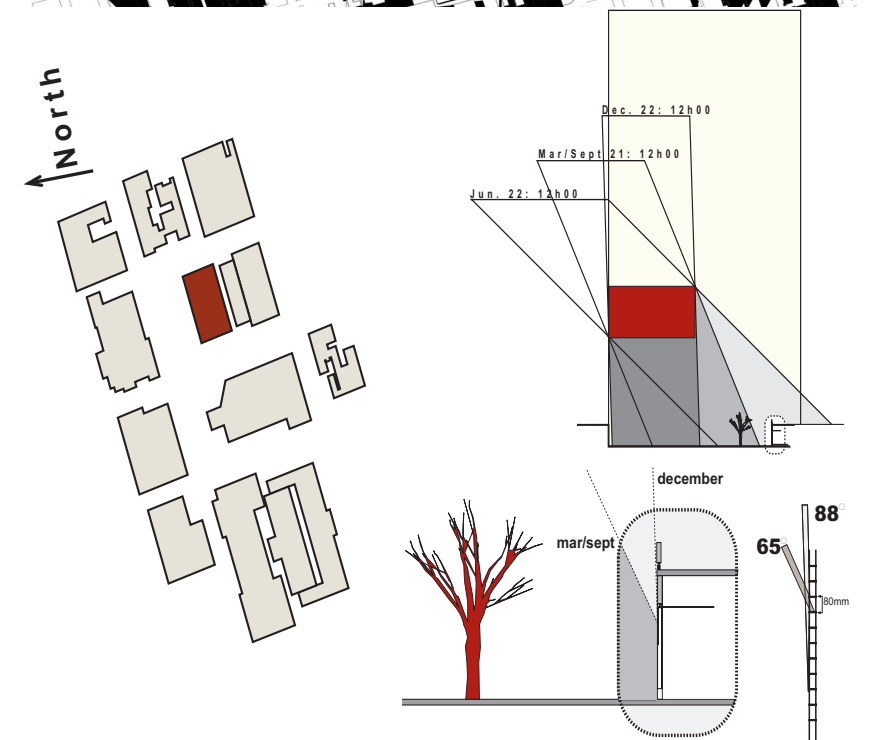


Fig. 118 Site Plan

Fig. 119 Aluminium sunscreen for gallery



## Materials

The building is a stiff framed concrete structure with marble cladding. For the project to appear being attached or inserted, materials contrasting the concrete and marble should be used.

### Steel:

Galvanised steel H-profile member are used for columns and I-profiles as beams. For distances further than 5m steel composite beams will be used. Steel stringers will be used in staircases. Glass boxes constructed on the south façade are to be constructed of steel.

### Timber:

Saligna was selected for its availability, appearance, cost and strength (although still a softwood, Saligna is stronger than S.A. Pine). Sunscreens needed on the east and west façades, suspended floors and stair treads should be made timber. Treads should be made from end grain laminated Saligna. The timber needs to be treated at least every seven years.

### Reinforced Concrete:

Columns, where steel is not a viable option, will be designed from reinforced concrete. 150mm concrete floors cast into permanent steel IBR shuttering will be used for floors; for loads less than 300kg/m<sup>2</sup>, steel decks can span 7-8m but for usual loads of around 600-2000kg/m<sup>2</sup> spans should be limited to 1.5 — 4m. In-situ concrete is used for the exterior staircase and ramps.

### Masonry:

Disa Travertine — FBS, a red Corobrick face brick will be used for masonry walls. The auditorium walls will be made from 330mm masonry brick; the mass of the wall will provide acoustic insulation against noise.

### Aluminium:

Aluminium is more precise and lighter in weight than steel and although it is more expensive and has a higher initial energy cost, it can be recycled. Aluminium will be used for window frames, curtain walls and sliding glass doors.

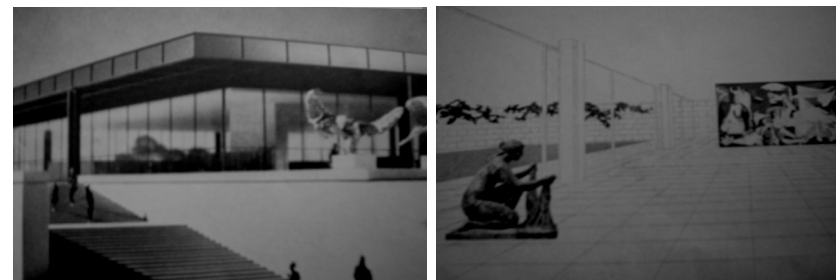


Fig. 120 Gallery of the 20th Century, Berlin (1942); An example of using glass in a museum.

Fig. 121 Stairs Leading to Entrance

Fig. 122 Exhibition Overlooking Museum Garden

### Glass:

Glass should be used wisely on east, north and west façades and, when present, should be integrated with sunscreens. Glass should be carefully considered in the places such as the library and gallery where a balance between natural and artificial lighting is important. For areas less than 1m<sup>2</sup> on ground floor glass less than 6mm can be used but for sliding doors, curtain walls and windows above ground safety glass is required. Glass boxes need to be made from safety glass and although they are on floors 1 and 2, wind exposure needs to be designed for.

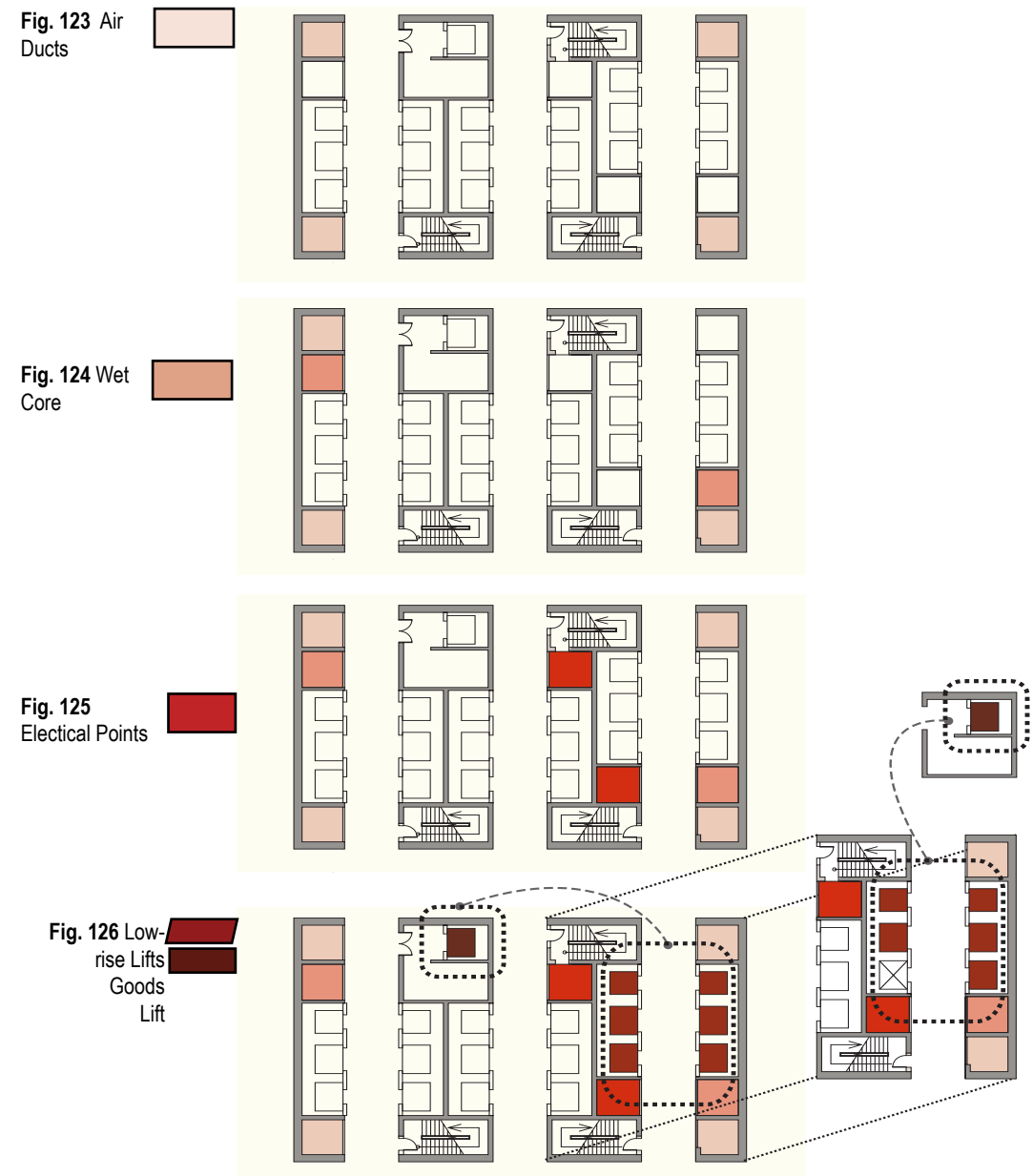
## Services

The building has a functioning service core with sufficient wet cores, air duct and lifts to sustain the building. Although adding structure and function, the intervention in the building also removes, in similar quantities, offices and residential units (caretakers flats on the mezzanine level). It is assumed that the existing service core is sufficient to maintain the building after the intervention.

On levels where having services in the ceiling is not practical, services can be placed beneath a suspended timber floor. If additional toilets are needed on these floors, waste water pipes could be placed beneath a suspended floor at a slope of 1:60m for a maximum of 18m.

The library and certain offices on levels ground — 11, would need access to a private lift if the office/library extends for more than two floors. Making one of the six lifts available only to library and office workers on these floors would solve the problem.

Special delivery entrances are needed for the restaurant, gallery, library and auditorium. A goods lift is located separately from the low-rise lift core and can be used to serve these spaces.



## Planning

### Gallery:

Needs: access to goods lift, good natural lighting, access to garden (garden can be used for receiving guests on exhibition evenings), visual contact with pedestrians/public, security controlled access

Acc. Schedule: atorage area, safe, offices for three workers, good arrivals area, staff toilet and kitchen, exhibition space, shop and entrance area.

Solution: place gallery in sunken plaza with offices to the south of the building where access to goods lift is possible.

### Library:

Needs: access to private lift, visual access to street, limited security control at access. The library should integrate spaces inside the building with those outside.

Acc. Schedule: children's and adults lending sections with reading rooms, referencing, periodicals, offices, staff room, staff toilets, public toilets, study areas and a music library.

Solution: have one lift serving the library and local offices; have the library occupy three part-levels. This means that instead to the library occupying one floor and being disconnected from surrounding offices, the library now shares spaces such as a possible triple volume foyer with offices (creating visual access between the two), circulation areas and access points to the building.

### Auditorium:

Needs: the size of the auditorium renders in impossible to remain indoor and needs to project out of the building. The auditorium needs to be removed from the noise of street activity .

Acc. Schedule: seating for 750 ppl, projection room, smoking area, storage facilities, toilets, kitchen for caterers, administration offices, reception and exhibition area.

Solution: have the auditorium projecting out of the building on a higher level and resting of columns.

### Restaurant:

Needs: access to goods lift, private delivery entrance, positioned close the wet core, have an outside area.

Acc. Schedule: kitchen, office, staff toilets, private delivery entrance, pantry, walk-in fridge, indoor seating area and outdoor seating area.

Solution: place the restaurant in the sunken plaza where tables can spill onto and where people from the gallery and sidewalks would have a clear view of.

## Structure

The building is a stiff frame concrete building with 1040 x 520mm concrete columns and a service core supporting the building. 600mm columns support three basement levels. The building was completed in 1973; the concrete frame structure is therefore stronger than what is was designed for and can support extra load.

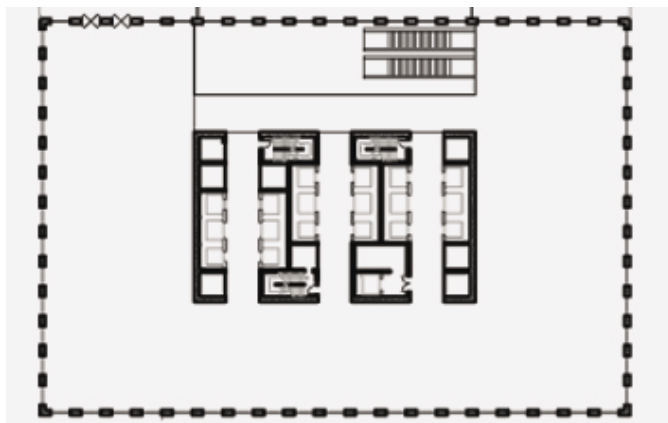


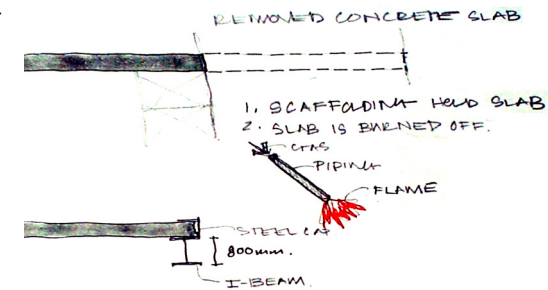
Fig. 127 Plan

## Construction

### Removing concrete floor slabs:

Cutting a concrete floor slab can be done with a burner. Steel piping is used to channel gas, which is lit on the other end, through. The concrete floor and steel reinforcing is then burned through. Once the unwanted floor section is removed, the remaining floor slab is ended off with a steel cap.

Fig. 128 Removing Floor Slabs



### Ramp:

The ground floor slab on the south façade is removed and replaced with a 1:12 ramp leading to the sunken plaza. A steel truss girder (depth = span/15) supports the ramp. The pedestrian walkway is extended and the supporting wall (230mm masonry) with steel H-column is supported by the ramp.

Fig. 129 Section of Ramp

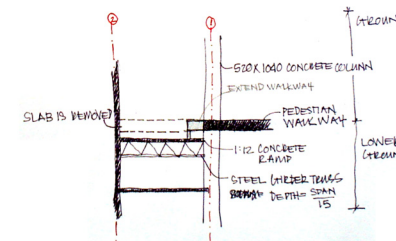
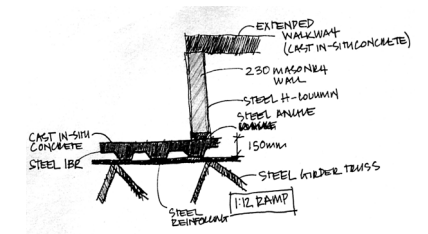


Fig. 130 Detail of Wall and Ramp



### Auditorium:

A ring beam is constructed from steel I-profile beams, this ring beam is supported newly constructed 600mm reinforced concrete columns and by a 471 X 191mm steel I-beam which rests on 140 x 60mm steel channel profiles, spaced at 2m intervals, strapped to the existing columns.

### Columns:

The columns are 600mm dia. reinforced concrete and are cast at an angle. Spanning the length of 24m, 600mm is suffice to support its own weight and the auditorium without being braced (information according to personal conversation with structural engineer). The column will be cast in-situ at 6m intervals. The columns rest in steel footed pin-joint.

Fig. 131 Collar detail

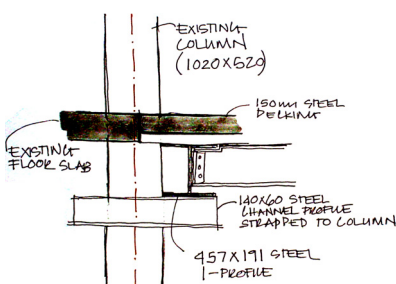


Fig. 132 Beam Grid and Pin Joint

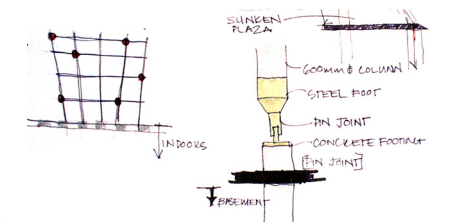


Fig. 133 Plan of Collar Strapped to Column

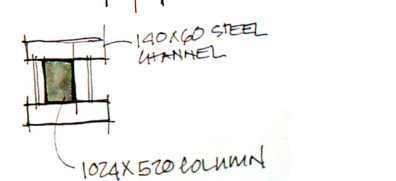
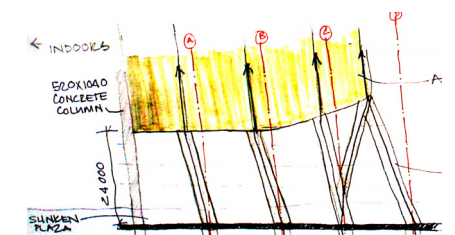


Fig. 134 Load of Auditorium



### Aesthetics

Aesthetics is an intuitive expression of form and the process of expressing is personal and relies on tools developed through experience. The following images are diagrams (design tools), drawn during the design process. The diagrams are visual representation of ideas and are seldom understood by spectators; they are there to guide the designer.

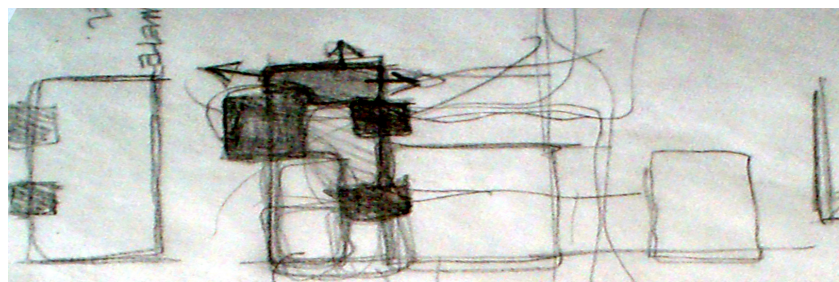
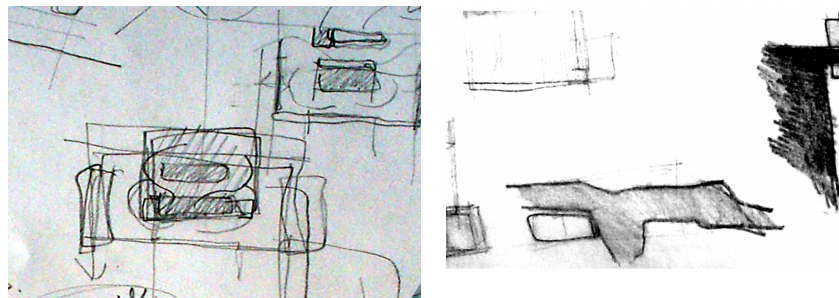
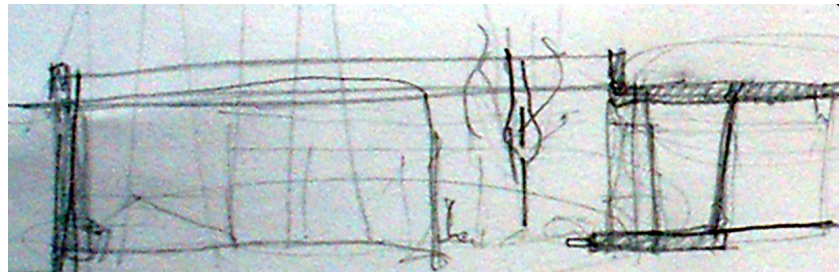
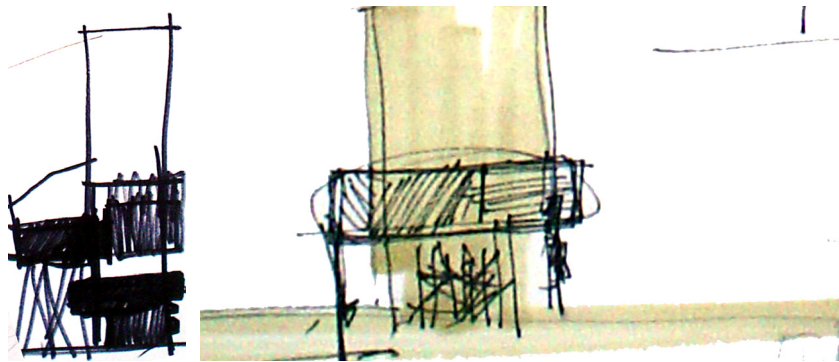
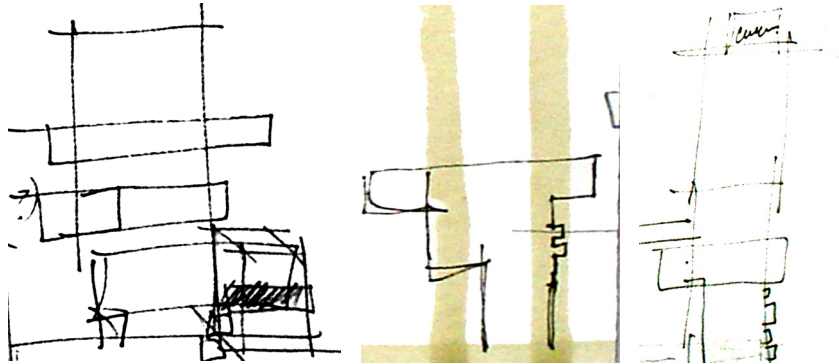
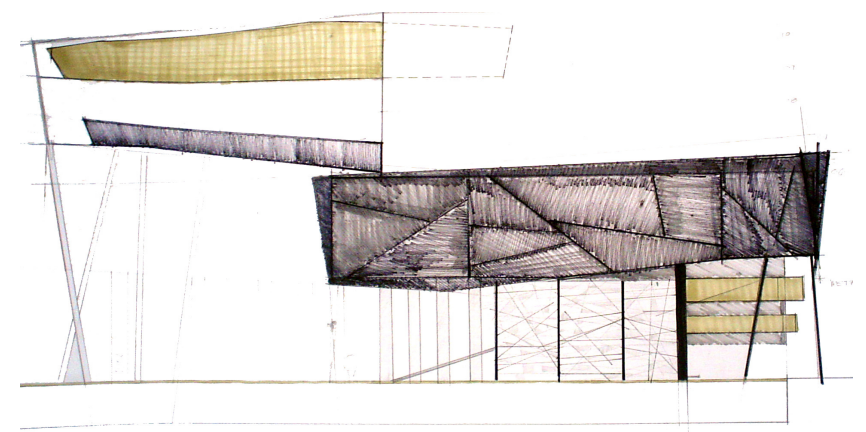
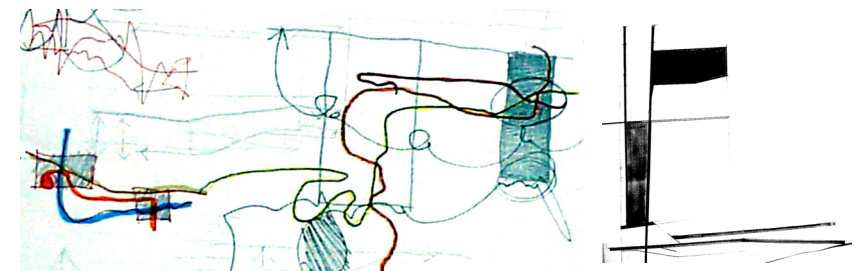
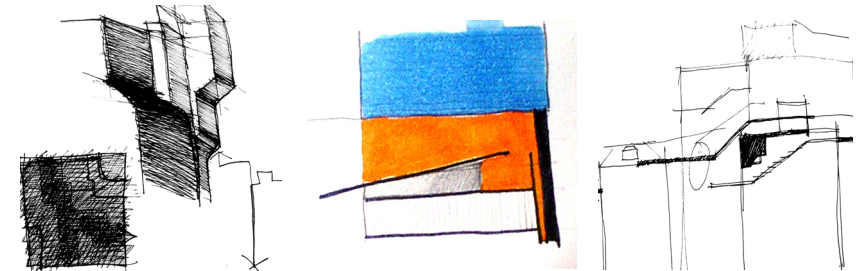
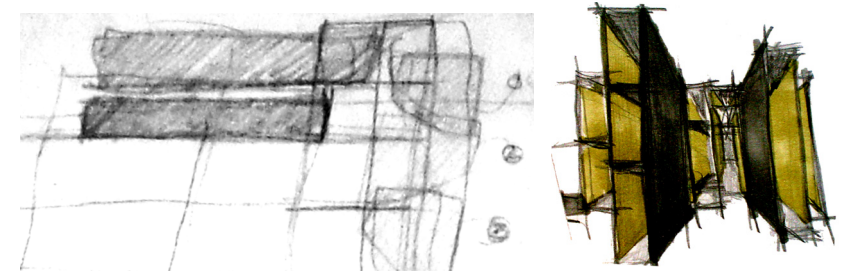
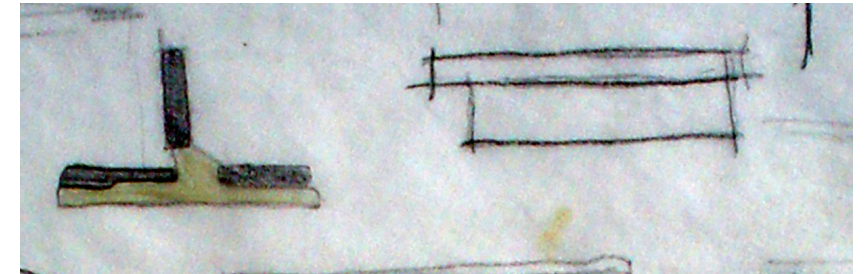
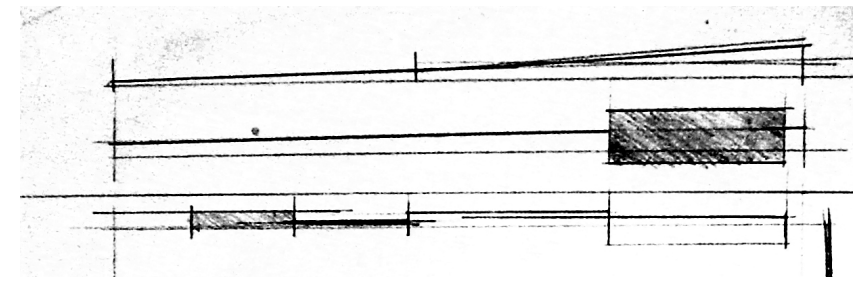
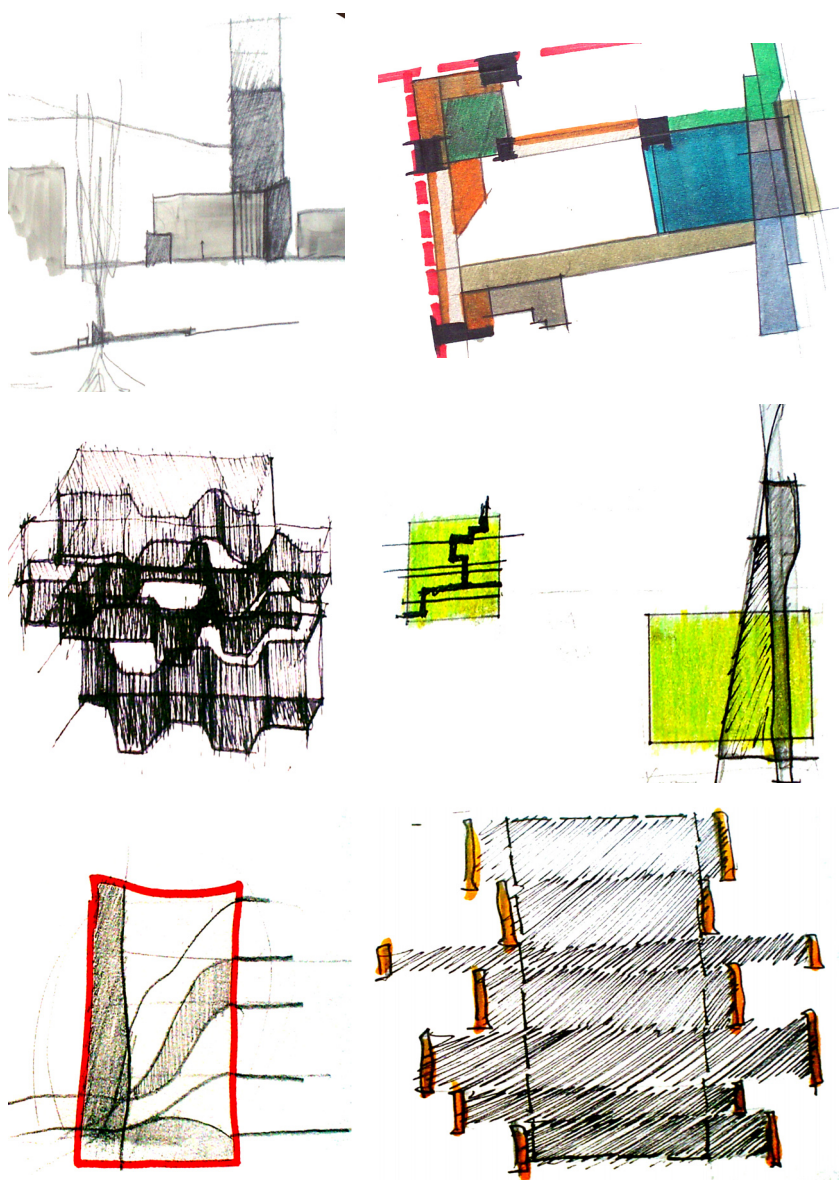


Fig. 134-59 Diagrams





### Concept

The initial idea for the project was a space in the city that that would integrate the publicness of street space with the segregated interior spaces of buildings. This concept, by applying and testing forms at a later stage in the design process, becomes a form evaluator. The following are diagrammatic investigations of form.

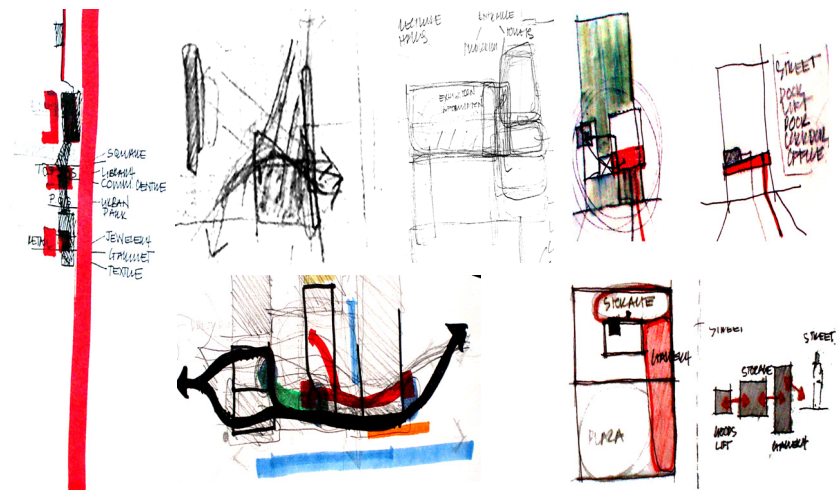
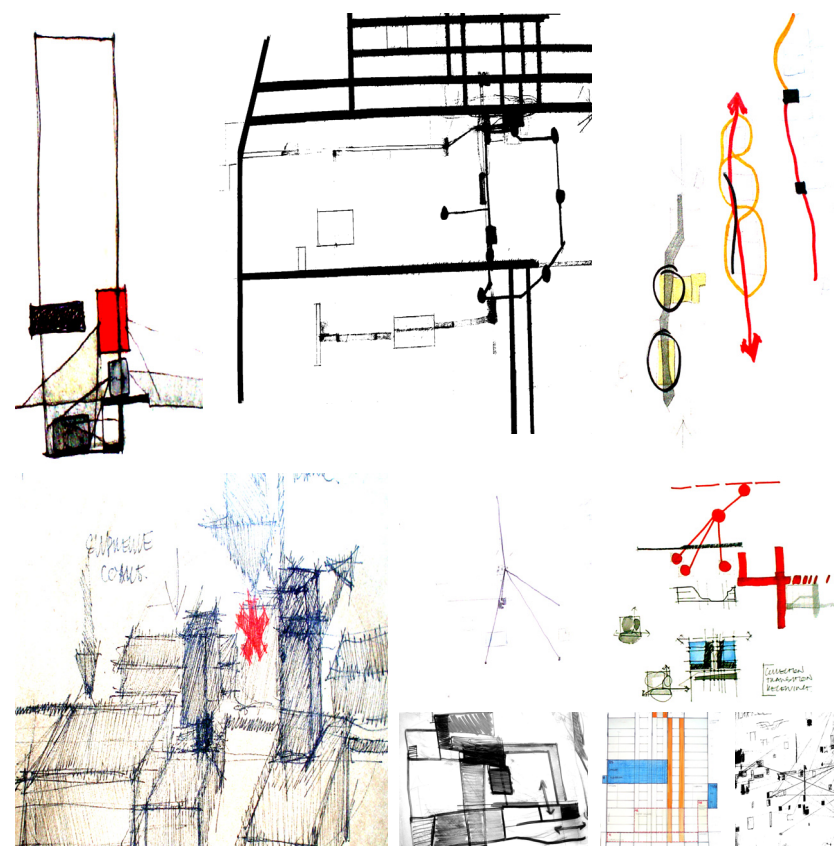


Fig. 159-73 Diagrams



### Assimilation

The realisation of product and process. The building is assembled from ideas, technical knowledge, intuition and experience and can therefore be understood within a much broader context than buildings designed purely on intuition or technical knowledge.

Fig. 173-83 Images of Conceptual Models





Fig. 164 Intervention