

PRECEDENT STUDIES

+ Growing Power, Milwaukee, Wisconsin

+ GreenHouse Project, Joubert Park, Johannesburg

+ Living Rooms at the Border , San Diego, Tijuana

+ Nedbank Corporate Headoffice, Sandton, Johannesburg

+ Aronoff Center for Design and Art, Cincinnati, Ohio

+ Museum of Modern Art, Frankfurt, France

+ Agro-Housing Competition, Sustainable Housing Project, China

PERMACUL[TEC]TURE growing for the future

Creating an intervention for the rapid new urban migration of the inner city of Johannesburg

PRECEDENT STUDIES

Introduction

The lessons learnt from the following precedent studies will influence the design decisions made in the scheme of this dissertation. The precedent studies are in the author's opinion examples of architecture that demonstrate lessons in spatial arrangements and may help to inform design decisions for the project.

1: Growing Power Facility, Milwaukee, Wisconsin

The importance of this precedent study serves to illustrate an existing successful urban agriculture project which also highlights the many different types of agriculture farming methods types and methods to maximise the use of space.



2: GreenHouse Project, Joubert Park, JHB

This case study was chosen as a local example of an inner city urban regeneration project. It explores the types of devices and low tech 'green' construction.



3: Living Rooms at the Border; San Diego, Tijuana by Teddy Cruz

This was chosen as an urban community project to highlight the large open spaces in which the community utilizes in a joint effort.



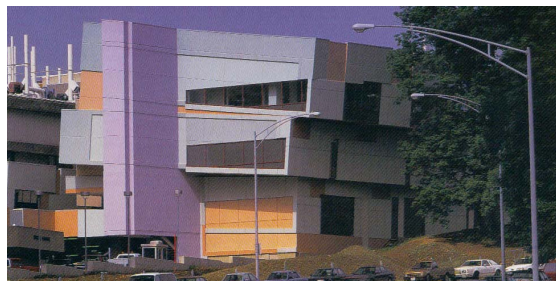
4: Nedbank Head Office; Sandton, JHB by GLH and Associates Architects

This case study looked at the integration of open green spaces with the built form and establishes uses of space according to use.



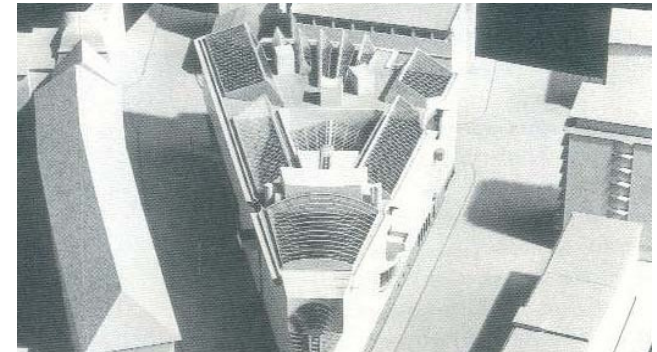
5: Aranoff Center for Design and Art; Cincinnati, Ohio by Peter Eisermann

The importance of this precedent study is to explore the movement through the building. The issue of threshold and the way in which the architecture, both the new and the old begin to speak in dialogue with one another.



6: Museum of Modern Art by Hans Hollein.

This building is set on a triangular site and attempt to play with the users perception. The exploration of the vertical and horizontal circulation sets up the main core which house the main gallery.



8: Agro-Housing Competition, Sustainable Housing Project, China

This case study is a competition case study which addresses the need for sustainable living in the city by bringing farming into a building and how agriculture and living can work harmoniously.



PRECEDENT STUDIES

Case study 1 : Growing Power Facility, Milwaukee, Wisconsin

This case study looks at the an example of a successful community food center. A community food center is a food place where people can learn sustainable practices to grow, process, market and distribute food (livestock and vegetables).

The problem: - “Those who live in poor, urban areas often have little access to high-quality food. As large grocers flee inner cities, convenience stores and other high-priced alternatives become these neighbourhoods only sources of groceries.” (leadershipforchange.org)

The Growing Power Facility first started in 1993 with teenagers in mind to provide them with work and an opportunity to empower themselves. The founder, a Will Allen had a piece of land along the north side of Milwaukee in which he wanted to provide teenagers the skills to empower themselves. Since then, it has become a example of sustainable food systems, a living museum and idea factory for a range of people from teenagers, elderly, professionals and urban planners.

Will Allen quoted:

“My motivation comes from a family tradition of passing on food and knowledge about the agriculture system to others. I grew up on a farm and in a culture that used food and way to bring people together and transform society. Inner city youth, in particular, have very limited access to fresh, safe, and healthy food or the knowledge to prepare it, and that motivated me to do community-food-systems work for the future... I believe we cannot have healthy communities without a healthy food system”

The Growing Power Facility is the only remaining farm and greenhouse operation in the city and contains the following facilities within it:

- Six greenhouses which include six hydroponic systems which looks at growing various types of fish along with herbs, salad greens and red wriggler worms pits for faster compost making;
- Aquaponics hoop house with two types of fish and additional vegetable and seedling farming;
- Worm depository hoop house;
- An eight beehive apiary;
- Three poultry hoop houses containing hens and ducks;
- Outdoor pens with goats, rabbits and turkey livestock;
- Composting operation systems;
- An anaerobic digester which creates energy from wastes;
- A market store selling compost, meat produce, all of which is grown on the land.

In addition, training areas of this facility include the acid-digestion, anaerobic digestion, soil health education, aquaculture systems, vermiculture, composting, urban agriculture, permaculture, marketing and youth development.

A close collaboration between schools, universities, governments agencies, farmers, activists and members of the community means that skill trainings and educational trips through the Food Center means that more and more people are becoming aware of the advantages of locally grown foods.

Conclusion

This project is a successful project as it looks at the basic needs of people and what they need and allows for locally grown foods to the community. It also addresses the need to provide skills.



Community teaching program
(www.growingpower.org)



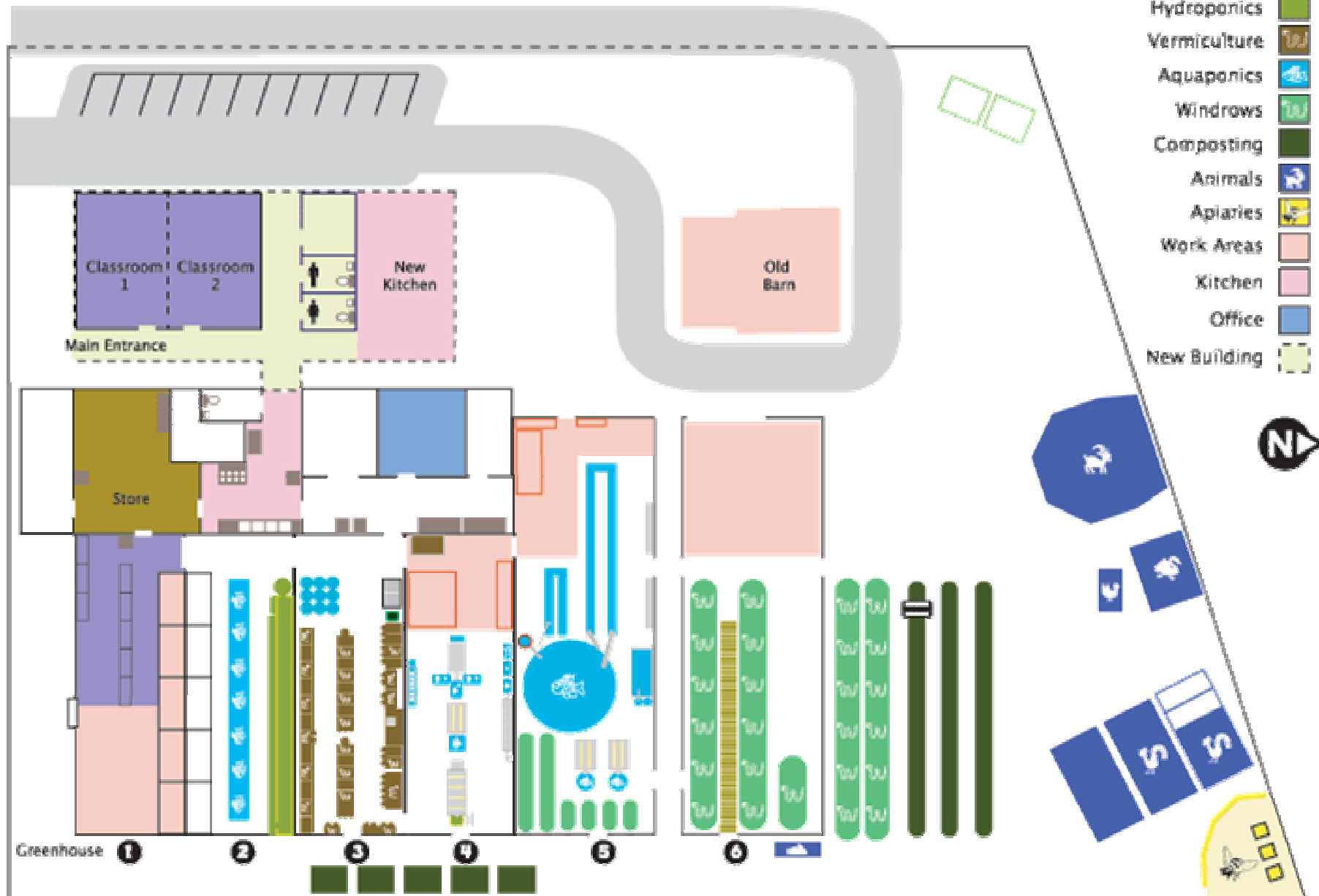
Plant growing beds to aquaculture tanks
(www.growingpower.org)



Yellow Perch and Tilapia freshwater fish used in the aquaculture plant
(www.growingpower.org)

PRECEDENT STUDIES

Growing Power Inc. 2.0 Acre Lot
Community Food Center and Training Facility



Map layout of the community food center
(www.growingpower.org)

PRECEDENT STUDIES

Case study 2: GreenHouse Project, Joubert Park, Johannesburg

This case study looks at the an example of a local urban agriculture initiative which utilizes various types of green architectural ideas.

Introduction

The GreenHouse Project came to fruition in 19 August, 2002 and is a collaboration of the City of Johannesburg and the (N.G.O.) non-governmental organization called the 'GreenHouse Project'. It is situated in Joubert Park, in Johannesburg's inner city which is the largest inner city open space. The then Inner City Office initiated a new urban regeneration pilot project to address social and urban degeneration through a precinct approach. The Parks maintenance depot in the corner of Joubert Park was a poor use of public land and the Inner City Office proposed relocating it to make way for a more public function. The GHP had established that communities wanted a site that was near public transport. With Joubert Park cradling a taxi rank in its north-eastern corner, existing green spaces and an art gallery, crèche and other community centers nearby, it seemed almost perfect.

Goal

"The vision of the G.H.P. is to contribute to transforming Johannesburg into a green city by empowering the people of Johannesburg to create and recreate the city in ecologically, socially and economically sustainable ways."
(G.H.P programme brief:3)

Programme

The G.H.P takes the old Parks Agency maintenance depot, which included an old potting shed and various other brick and prefab buildings. This pilot project explored the use of various 'green' (eco-friendly) devices and techniques to promote the idea of recycling of existing buildings. The potting shed houses the administrative offices and the resource center.

The project has three main goals it aims to fulfill in order to be successful:-

- Providing a working demonstration of sustainable ways to plan, build, landscape, manage energy, water and material resources;
- Supporting organisations working to improve our urban environment, particularly community based organisations;
- The dissemination of information that will enable individuals in all sectors of our society to sustainably improve the quality of life in their communities.

Architectural contribution

The project is an excellent example of re-using and recycling of materials in the existing urban fabric. The building shows the feasibility in the use of 'green' building principles. These principles include:

Materials with low embodied energy-sourcing materials which can be found locally around the site and reusing existing building components which would make the project more cost effective.

The harvesting of rainwater as well as greywater through the use of **sod roofs** and a **willow wall**.

The willow Wall is constructed using building rubble, with trees planted within the wall. Held together with wire mesh. Greywater is released from a pipe at the top of the wall and allowed to filter through the rubble-and-tree root structure. The water can be collected at the base of the wall and then be pumped/gravity flow to gardens for irrigation.

Green/sod roofs decrease thermal heat gain within buildings at the same time, they assist in rainwater harvesting. This water can be used to irrigate the vegetation both along the roof and on ground level. This reduces the consumption of the main water supply. Water is a valuable commodity in Johannesburg.

Solar panels are used around the main building in order to heat the water which is used in the building as well as to cook food. "Solar hot water heaters are at present the simplest and most effective means of saving energy and promoting renewable energy sources." (G.H.P programme brief:25)

Critique

The use of various green building technologies needs to be constantly maintained in order to be effective. This requires skill and manpower in order to be feasible.

Green/sod roofs can become problematic if not constructed and maintained well. The risk of water leaks is more common with sod roofs than in conventional roofs owing to the fact that water is harvested and used on the roof for the plants whereas in conventional roofs, the water is simply drained from it by the use of gutters or bore outlets.

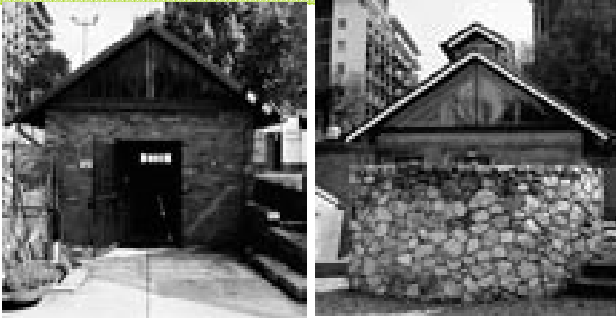
Conclusion

Although there are many different types of green building technologies which one can use, constant maintenance is required in order for these devices to be effective. Green building devices are initially more expensive, however it is more cost effective in the long run.

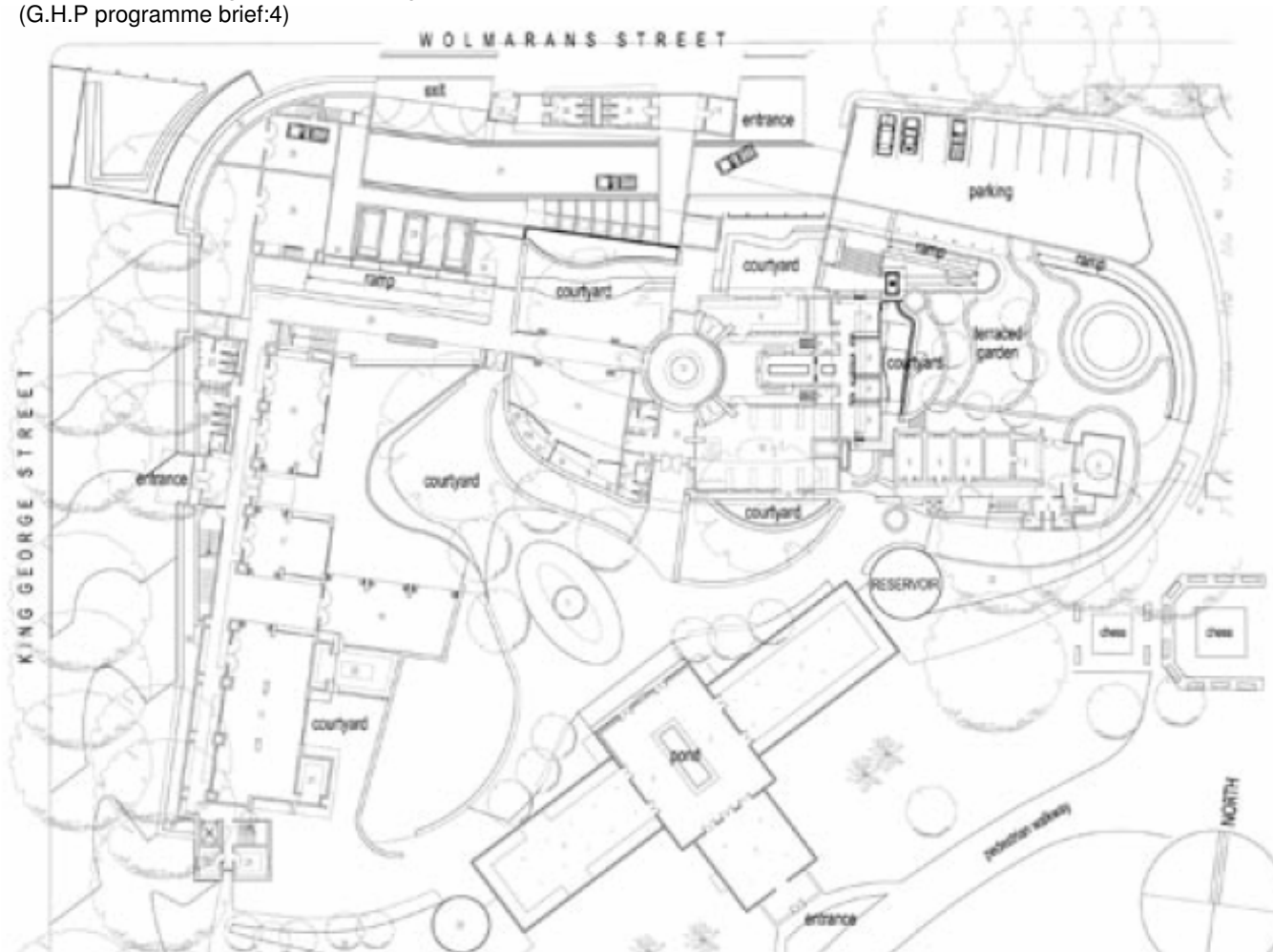


Upgraded potting shed
(G.H.P programme brief :3)

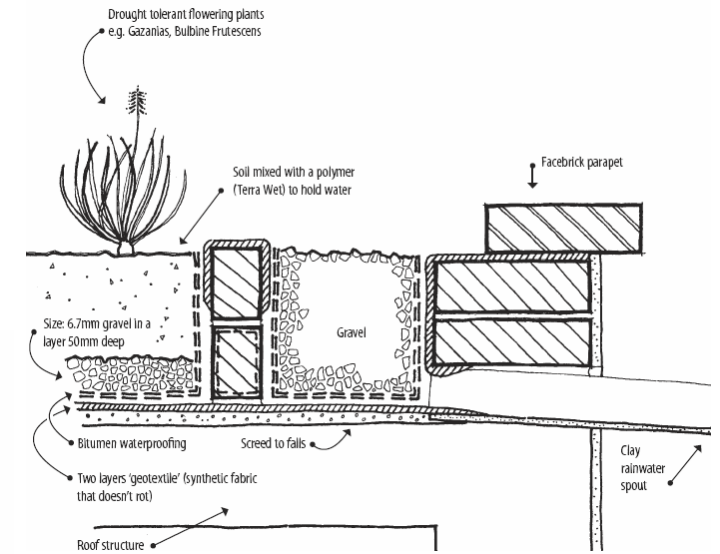
PRECEDENT STUDIES



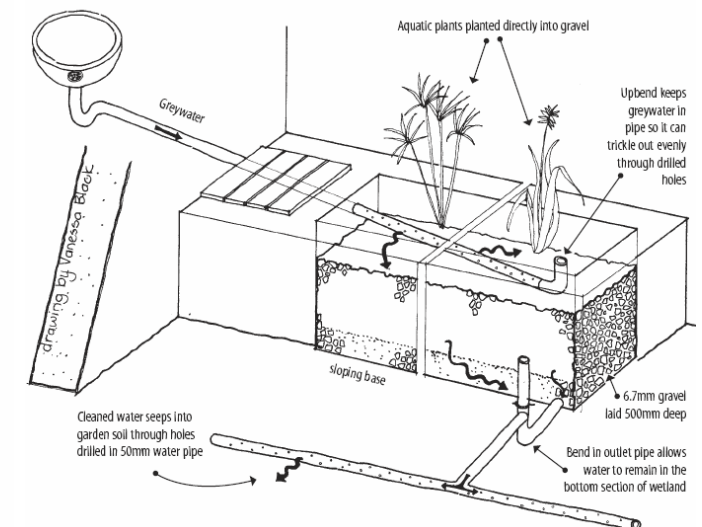
Before and after image of main building
(G.H.P programme brief:4)



GreenHouse Project plan layout
(G.H.P programme brief:6)



Sod roof construction
(G.H.P programme brief:41)



Mini wetland for cleaning greywater
(G.H.P programme brief:42)

PRECEDENT STUDIES

Case study 3: Living Rooms at the Border; San Diego-Tijuana, Architect: Teddy Cruz

This study looks at housing and its relationship to the urbanism it occupies. "Conventional ideas of housing: in government, financial, and academic institutions, for example, generally define it as an equation, a number. In the same way, density has been understood solely in terms of building size and mass. Housing and density need to be seen not as an amount of units but as dwelling in relationship to the larger infrastructure of the city." (www.residentialarchitect.com)

Introduction

This project addresses San Diego's much needed densities and mixed uses in particular with its residential areas. It is a project which addresses culture and accommodation mixed that with the existing urban fabric in order to create a successful housing model scheme.

Goal

The project aims to distill the essence of the community patterns of use, and to let these patterns become the basis for incremental design solutions which may have dynamic affect on the urban fabric.

Programme

Through negotiated space usage (i.e. kitchens), a diverse use of spaces was reached through the interaction of the community.

The programme included: 12 housing units, child care areas; community center which looked at and included the use of the existing church which was constructed in 1927; offices for the nonprofit developer involved in the project which is housed in the attic of the church; and a community garden space which included street markets and kiosks.

The current regulation only allowed one use for the entire space. The new proposal looks at five

uses that support one another. This project has become a density project based on social contributions rather than bulk.

Architectural contribution

Addresses zoning policy and affordable housing options.

- Mixed use high-density
- Minimalist interlocking units
- Concrete, metal and wood construction
- Housing out of community interaction
- Goal to achieve maximum effect with minimal gestures
- Proposes fragments, voids and leftover urban spaces be transformed

All the units are primarily made up of concrete which is arranged in an interlocking formation with a wood framing. The roofs are made of metal and aims to have an alternating rhythm to allow for ventilation and light to enter the units.

The development gardens and alley pathways are connected by a promenade with the public aspect of the project aimed at the very center in the traditional Mexican plaza.

Food is a Mexican celebration of their culture, so there is also a senior centers food counter which is built into the façade. This allows the senior residents to sell food to locals in order to gain extra income.

Critique

An interesting way in which housing may be addressed through the exploration of the building shapes and arrangement of materials. Spaces of mixed use which have a logical arrangement.

Conclusion

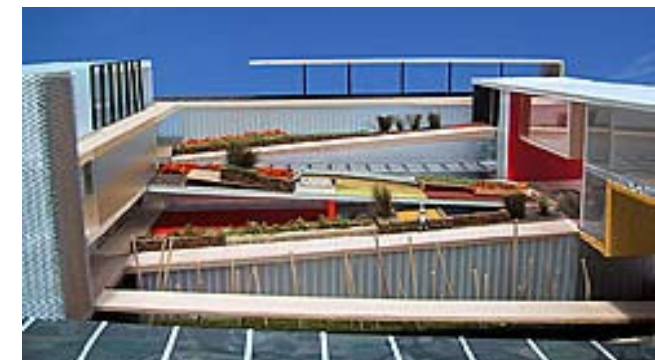
The Living Rooms at the Border is a novel and interesting approach in addressing housing in a less than conventional manner, rather than by the standard bulk sizes determined by the amount of units allowed on a particular size of land.



Interlocking units with spaces underneath for mixed use. (www.residentialarchitect.com)



Central community interaction space (www.residentialarchitect.com)



Church remodified connecting the housing through usage. (www.archrecord.construction.com)

PRECEDENT STUDIES

Case study 4: Nedbank Headoffice; Sandton-Johannesburg, Architect: GLH & Assoc. Architects

This case study looks at the an example of a local 'green' design of building on existing buildings to create a mixed use development.

Introduction

Nedbank's Corporate head office first completion was in 2001, which then, was already an energy-efficient building but was nevertheless only aimed for commercial usage. The head office is located along Rivonia Road in the Sandton CBD.

Goal

The site for the new Nedbank head office phase building will consist of retail, commercial and residential apartments. Since it is the head office, the main component will be that of offices while the residential and commercial side will give the building a 24 hour cycle. "In line with the current thinking around maximising opportunities and creating vibrant urban precincts adjacent to the Gautrain transport nodes. As a mixed-use development it will incorporate passive design and energy efficient systems." (Urban Green File, June 2008:6)

Programme

"We are in a high transport node, which is a good thing in itself." (Urban Green File, June 2008:6) The Sandton Gautrain Station is within close proximity to the Sandton Head office. This allows the densification of the existing urban fabric. This allows for energy to be saved by commuters using public transport rather than individual vehicles. That along with the bus transit stops in front of the building.

The retail component which is in front of the parking area opens up onto Maude street, defining the street edge and creating a vibrant street edge. In this way, it improves the quality of the city and the interface of the project with the city.

The retail component will include:-

- Shops
- Showrooms
- Restaurants
- Coffee shops.

Architectural contribution

The project consists of a crescendo of buildings, in this way, the northern most is the lowest and the southern most is the highest. This allows for the exploitation of natural light.

The various buildings which make up this project is organized around two large gardens, which become the green lungs to the complex with restaurants opening up onto the green spaces, giving people space of activity and engagement.

Since the large atrium is such that of a high volume, passive ventilation is possible. If the air outside is right, the fresh air can be pushed right through the large atrium space and in this way, the idea of a large open space is realised.

Various technologies has been looked at for heating up water, but since there is inadequate roof space for panels and/or other alternatives had to explored.

"We have a lot of waste heat that we're rejecting from the air-conditioning plant so it's a lot more economical to take the heat through a heat exchange and use it for water heating. Solar is the buzzword at the moment but it's not necessarily the most cost efficient, elegant or environment-friendly solution.

Critique

Green design is a new thing for the building industry as a whole in South Africa. The incorporating of green design in buildings which were constructed before green design became an issue became a challenge.

Conclusion

As more people are becoming environmentally aware of resource depletion, green building technology is growing, and there is more of a need in commercial industries. Green design should be prioritized from the first inception.

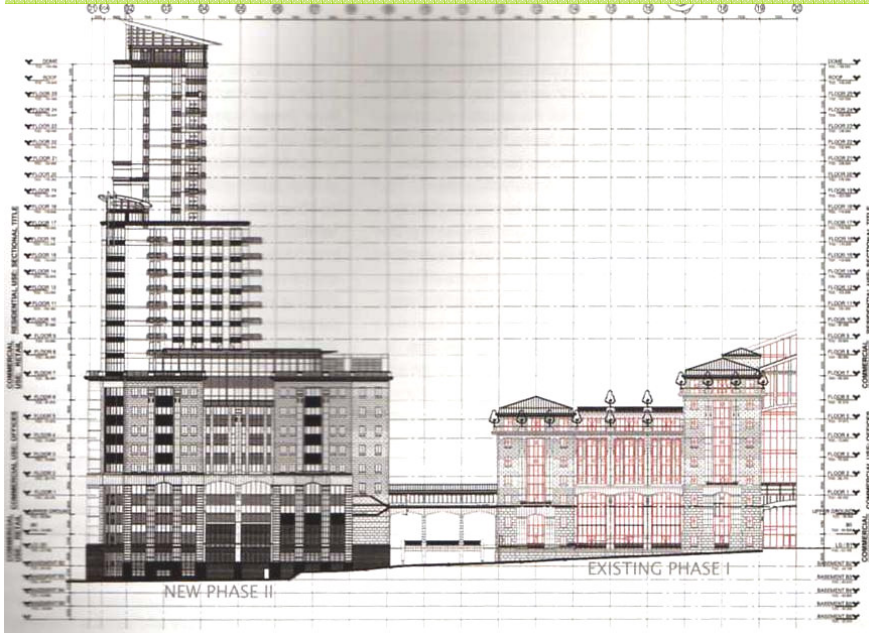


South Perspective
(Urban Green file, June 2008:6)



North perspective of new phase
(Urban Green file, June 2008:6)

PRECEDENT STUDIES

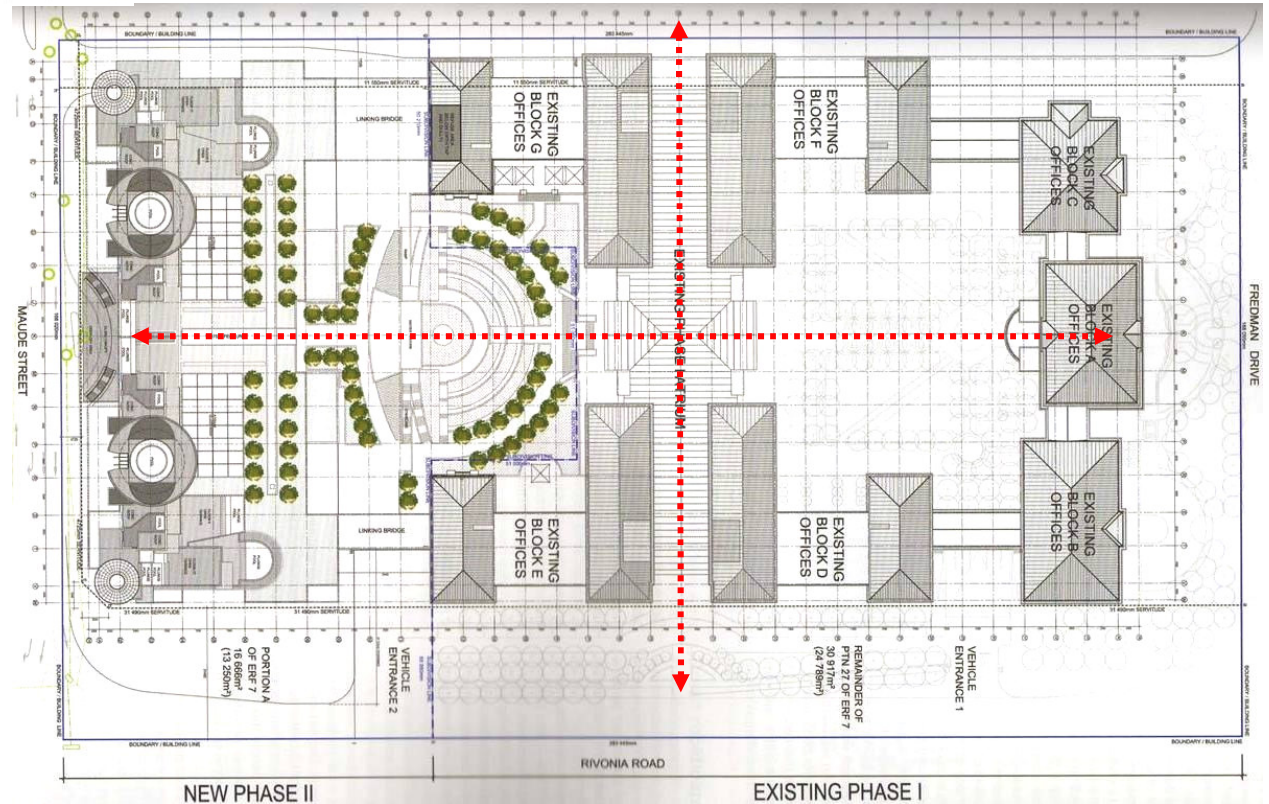


Section of new phase to existing
(Urban Green file, June 2008:9)



Interior Perspective
(Urban Green file, June 2008:8)

New phase of green Building
(Urban Green file, June 2008:7)



PRECEDENT STUDIES

Case study 5: Aronoff Center for Design and Art, Cincinnati, Ohio 1988-1996

Architect: Peter Eisermann

This case study looks at spaces which was created by the staggering building shape according to the site. The spaces were informed by the function in which that space was designated for.

Introduction

With the school gathering more student enrollments every year, it was imperative that a new addition be made in order to facilitate the many aspects needed by the student body. The new addition to the Design and Art school was commissioned to incorporate the existing building with the new.

Goal

The initial idea was to develop a program to reorganize the existing building and build an additional exhibition, library, theater, studio and office space. The project aimed at unifying the four schools within the college, in order to:

- Encourage interaction within the school
- Alleviating overcrowding that was experienced by both students as well as staff

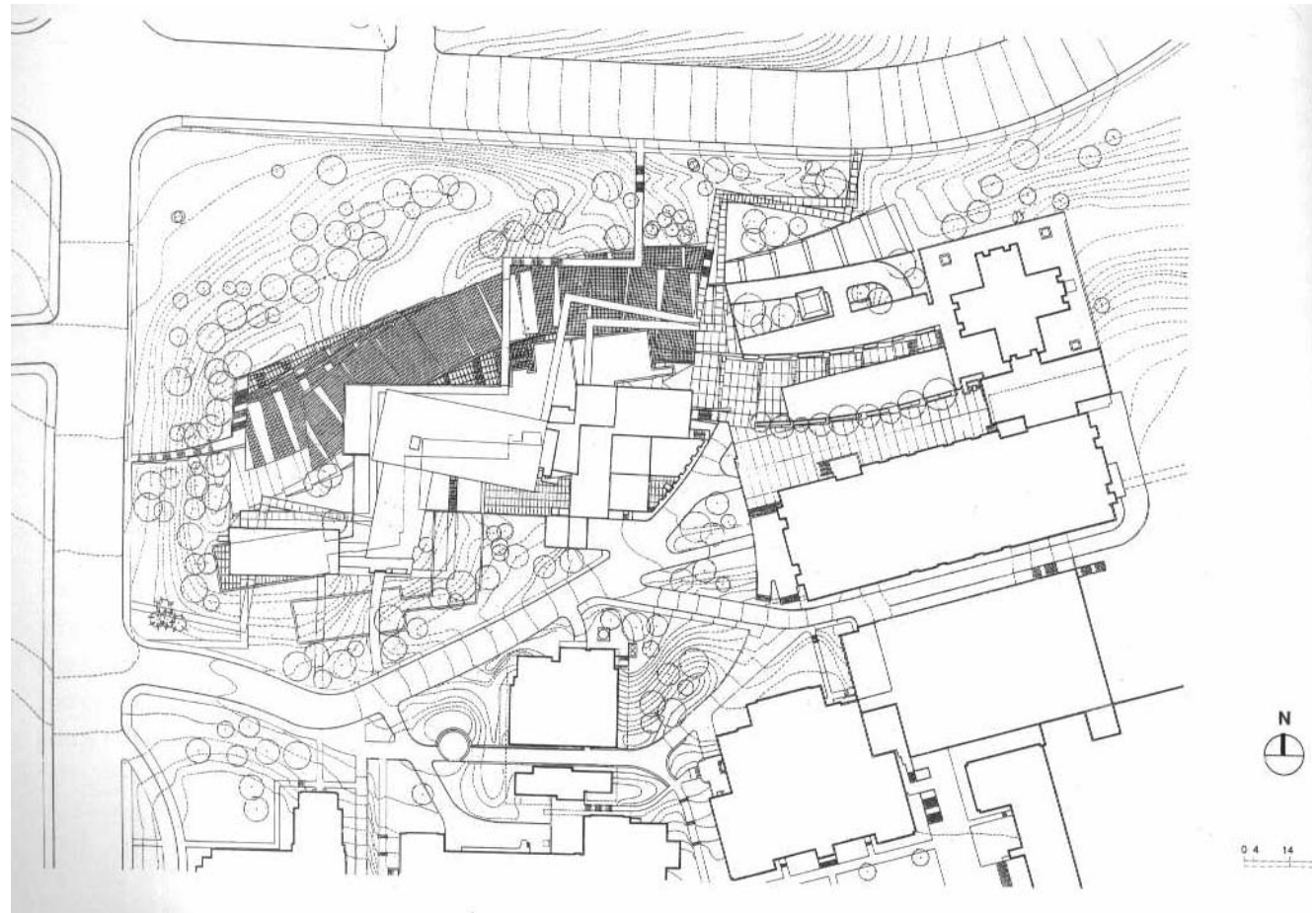
Form

The building derives its shape from the curves of the land mixed with the chevron forms of the existing building. In this way there is a dynamic relationship between these two forms and thereby spaces are arranged within these spaces.

Planning

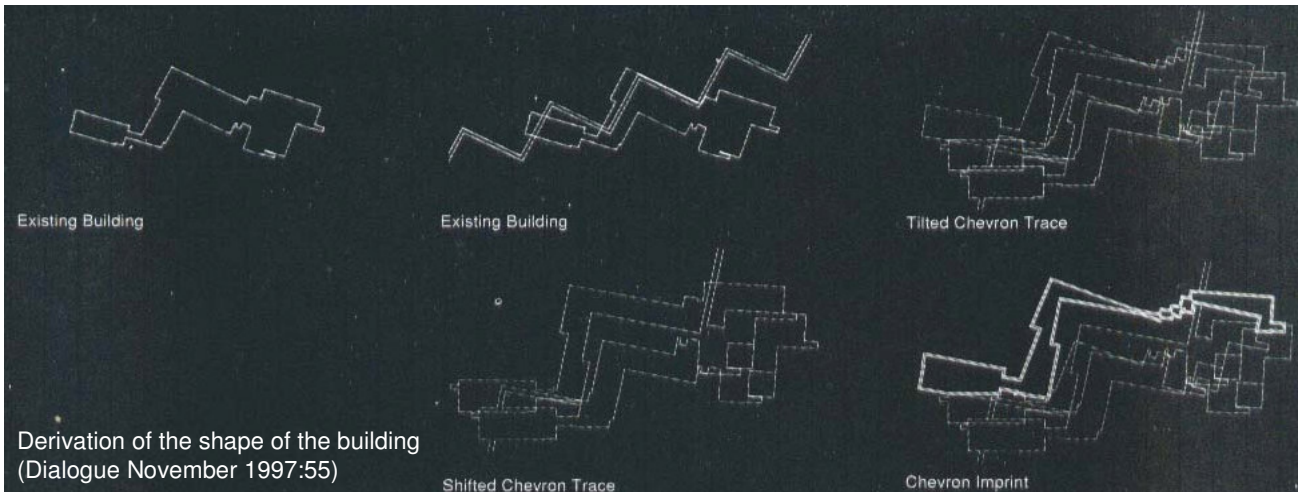
The radical design and shape of the building operates on the basic organisation of a wave line of studios, auditoriums and offices curving around the back of the three existing building and settles into the landscape. The new and existing buildings opens around the public space which is activated by the bookstore, cafeteria, library, gallery and corridors.

The plan was simple but enhanced. Looking at the plan through the breakdown of the complex shape, it must be stated that the main foot print of the building was a simple staggered shape which was contorted in order to achieve different spaces.



Site plan of building on site
(Dialogue November 1997:44)

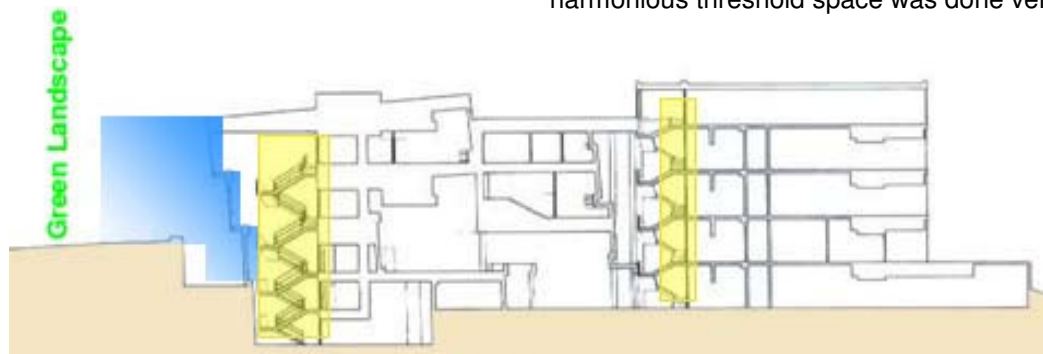
PRECEDENT STUDIES



Derivation of the shape of the building
(Dialogue November 1997:55)

"The sinusoidal line composed of equal sized boxes for studio and offices stacked several times is not a regular curve with a fixed radius but an asymptotic curve without a center. The resulting volume is cellular but each cell is different from all others" (Dialogue November 1997:47)

Behind the complex shapes and elaboration of spaces, the building operates on the manner in which people move and pass through the building. The corridors stepped and staggered creating an opportunity for a more interactive engagement with other people.

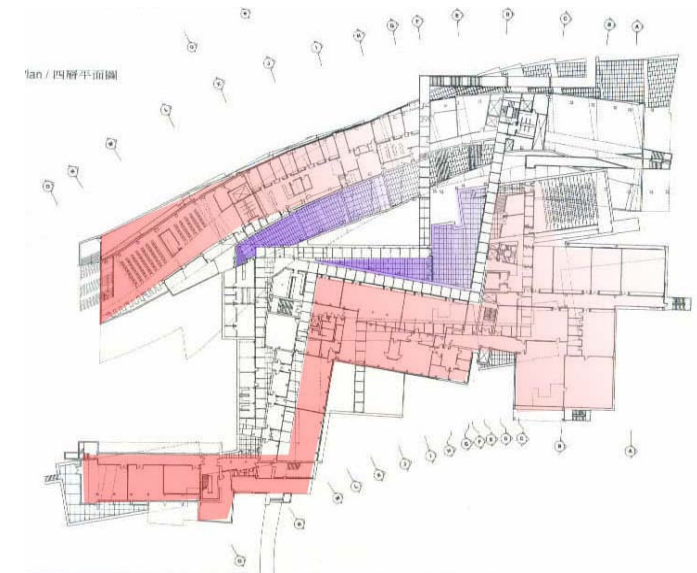


Section shows the vertical circulation and the modesty of the building set in the landscape
(Dialogue November 1997:49)

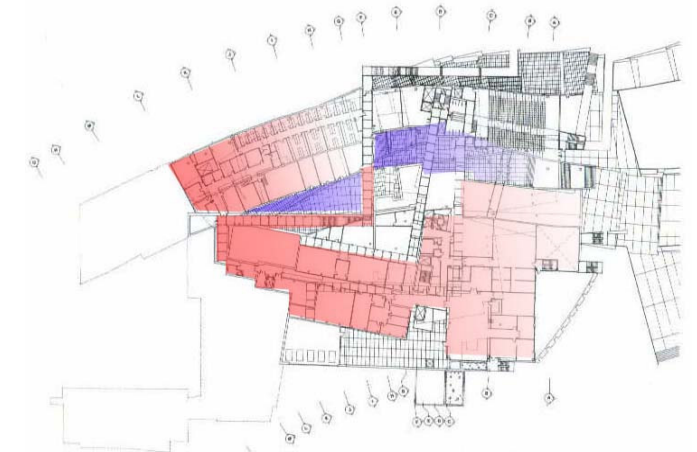
The façade is simple concrete beam construction, but the manner in which it is used creates that notion of a building that speaks and moves with the user.

The curved volume is duplicated and displaced one from another. The atrium is created between the two spaces. There are shifting stairs that move along with the hillside with walls and ceilings that are fragmented but crash in uniformity- creating a complete space.

The articulation between the new to the old with the common material of concrete to create a harmonious threshold space was done very well.

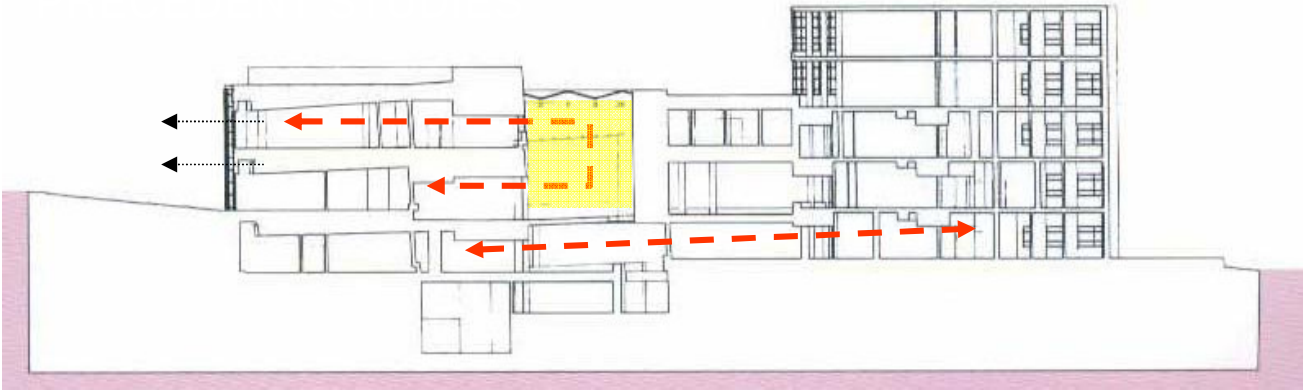


Forth Floor Level Plan
(Dialogue November 1997:48)



Fifth Floor Level Plan
(Dialogue November 1997:48)

PRECEDENT STUDIES



Section shows the open plans with changes in volume spaces
(Dialogue November 1997:49)



Image showing new building contrasted with old rectilinear building.
(Dialogue November 1997:48)



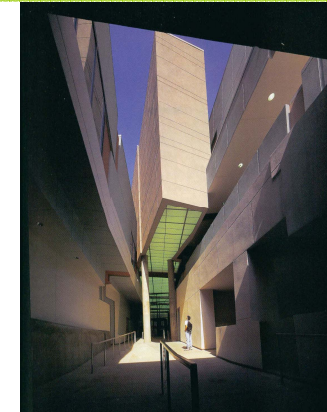
Open plan gallery with expressive ceilings.
(Dialogue November 1997:48)



Stairs showing the fragmented change in floor and ceilings
(Dialogue November 1997:49)



Gallery space ramp running along side triple volume space
(Dialogue November 1997:47)



Intersection point and threshold experience
(Dialogue November 1997:51)

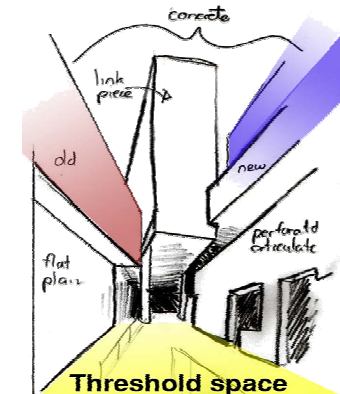


Illustration threshold division between old and new buildings
(Sketch Author's Own:2006)

Conclusions:

- Dynamic spaces created by dialogue between the buildings and the landscape
- Centers around a public space
- Individualized rooms
- Movement unhampered and free from closed off sections

PRECEDENT STUDIES

Case study 6: Museum of Modern Art, Frankfurt, France, Architect: Hans Hollein

This case study looks at movement and the spaces which are defined by such movement through a building. The use of light and how that light is allowed and carried through the building makes this building a success.

Introduction

The museum was built between 1987 and 1991, and takes into consideration the city's image as well as general urban planning with regards to the triangular shape of the site and the need for a building for the display of visual arts. The use of traditional building materials like red sandstone and plaster was decided to be harmonious with the existing buildings.

Space

The museum is built upon a bombed site in Frankfurt from the Second World War with the building maximizing utilization of space that is available. The building is placed right up to the street edge with the main goal to provide as much useful space as possible.

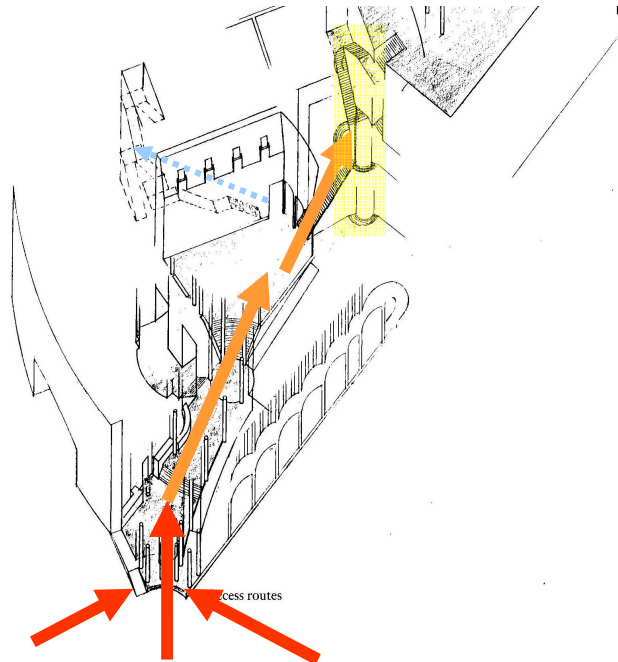
Planning / movement

The main entrance is on the corner facing the historical center of Frankfurt, the cathedral and the Römer. The entrance from the corner is used to serve as a connection to the historical part of the city and to offset the balance of a symmetrical space. A long vista opens from the foyer through the central hall and the stairwell to the apex.

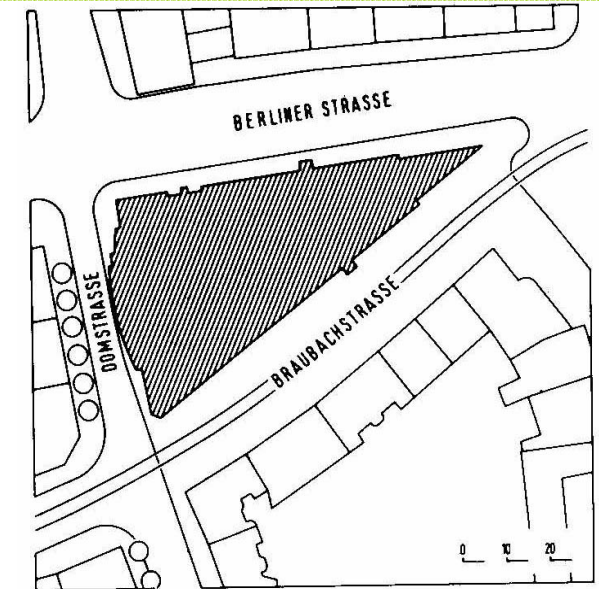
There is a flight of stairs set diagonally through the building which plays with the light and space. The apex is the largest linear distance between two points in the whole building.

The central area has a trapezoidal shape, creating a greater visual dynamic space but also serves a practical purpose of providing additional hanging space for large-sized works. The various rooms are linked up in such a way that at least three rooms open up from a single point.

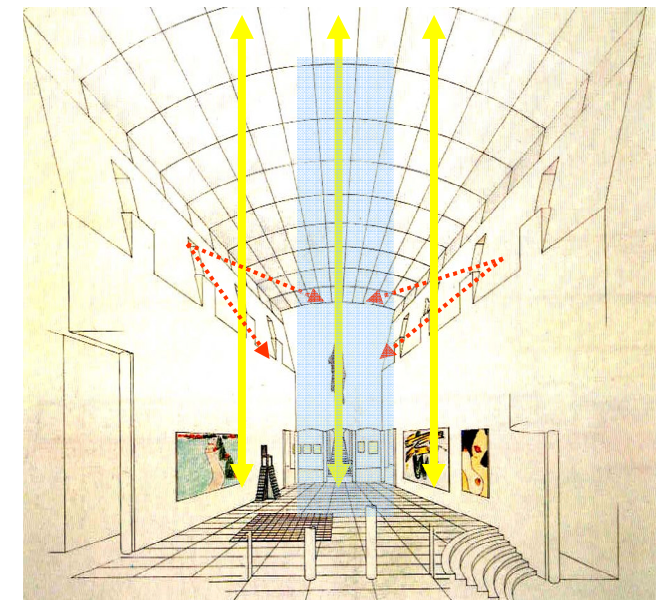
The rooms are all accessed centrally from the stairwell which runs through the building vertically. The exhibition rooms are all 5m high and run along the triangle shape of the site with the center atrium being kept.



Access
Lampugnani *et al.*, 1990: 82



Site
Lampugnani *et al.*, 1990: 75



Passive
interaction

Vertical link

Indoor/outdoor Fusion

Perspective
Lampugnani *et al.*, 1990: 84

PRECEDENT STUDIES

The central hall has been designed with the idea of a “house within a house” with balconies on the upper storey, and internal walls which leads up to the glass roof. Creating the illusion of the central interior as an outdoor space.

Light in the museum was an important factor, with that Hollein used oblique studio skylights on the roof like solar reflectors, bringing vast amounts of light. With only the rooms on the acute angled eastern corner being dark, these rooms were ideal for installations.

The rooftop was given attention of doing away with the unsightly view of a normal tar and stone with and air-conditioning plant roof top. Hollein instead made a landscape comprising of houses and huts. Though effort was placed in even this small part of the building, the roof top was not designed for the public and so was left as underutilized.

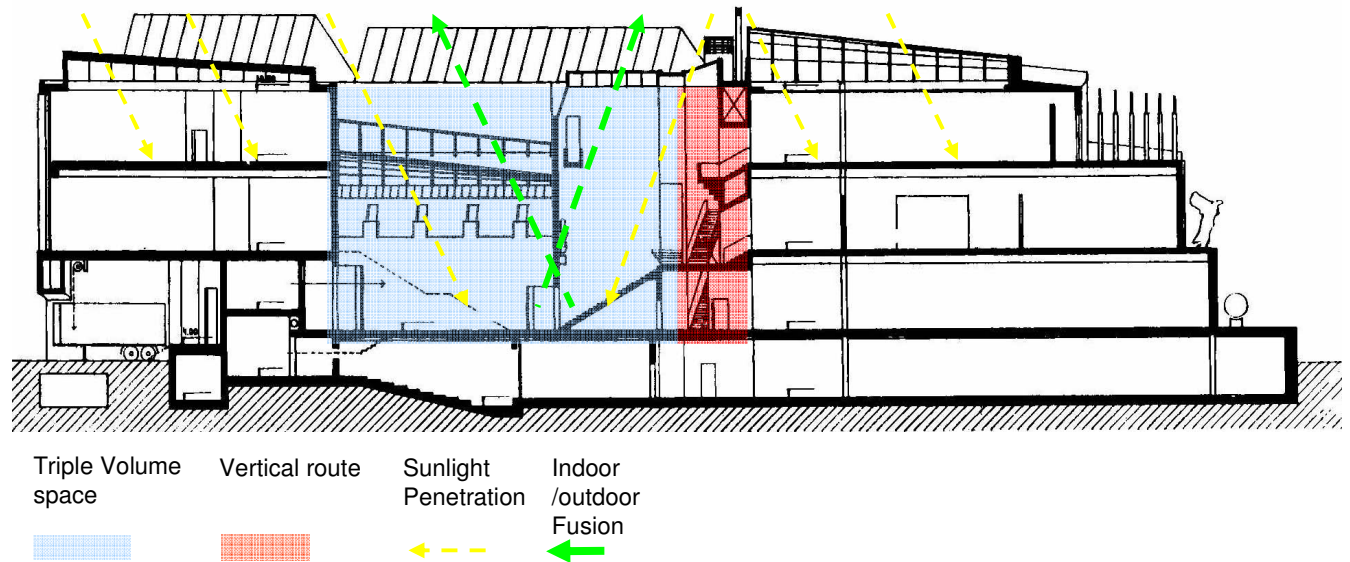
Sense of place

Though radical in design, the sense of place is heightened through use of traditional materials, so the building is read into the surrounding urban fabric

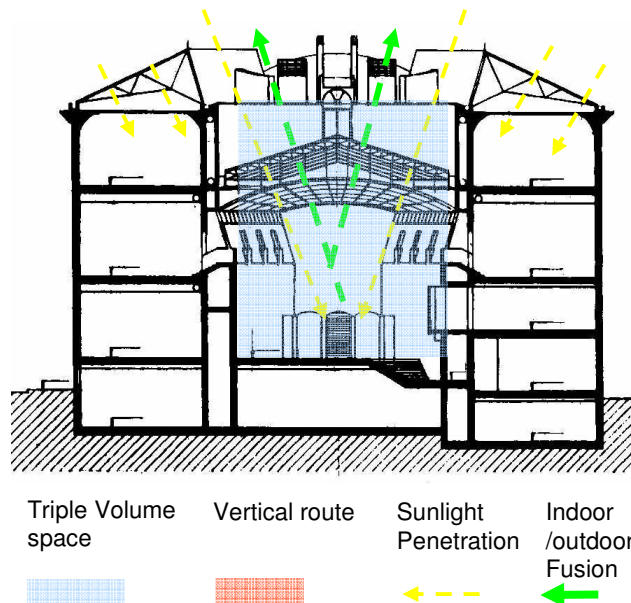
Conclusions

The tightness of the site presented a challenge of creating a building which would create interesting spaces within a bombed site. This resulted in a slightly off axially design but enhanced the overall perception of the space and the making a seemingly outdoor space within the building brought out the notion of bring the building out.

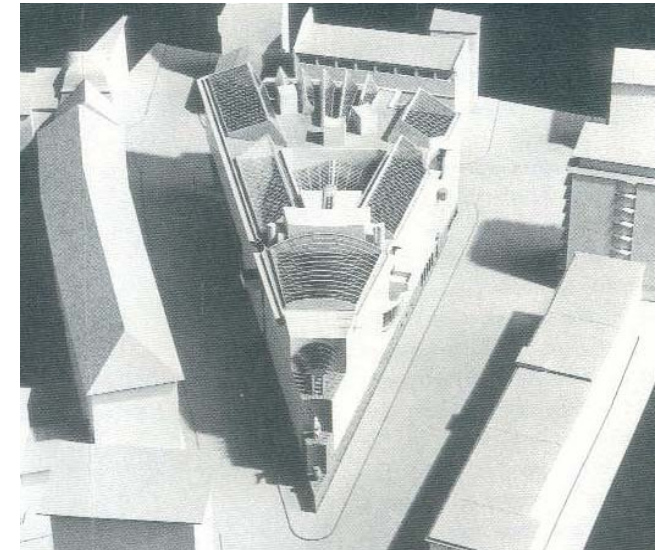
Unfortunately, the planning of the landscape on the roof failed possibly as a result of unclear movement to the roof as well as a strong flat vertical façade which breaks ties from the rest of the city.



Section showing light access into gallery space
Lampugnani *et al.*, 1990: 83



Cross Section
Lampugnani *et al.*, 1990: 83



Roof space: Urban deck created to link to city as a whole
Lampugnani *et al.*, 1990: 85

PRECEDENT STUDIES

Case study 7: Agro-Housing Competition, Sustainable Housing Project, China

This study looks at creating a new urban and social vision that addresses the problems of the rapid urbanization that is occurring in China. It introduces the concept of combining a vertical greenhouse with a high-rise apartment complex.

Introduction

Agro-housing was a competition project by Knafoklimor architects, which won the 2nd International Architecture Competition for sustainable living in 2007.

“This huge migration from rural regions to new urban megalopolises will create a dramatic cultural and social crisis, a loss of existing traditions and considerable unemployment. Massive urbanizations will form random communities, severely deplete natural resources, exhaust urban infrastructures and transportation systems, and will increase air and soil pollution.”
(<http://www.knafoklimor.co.il/living-steel>)

Goal

The aim for this project was to create a close to home space where families can produce their own food supply according to their abilities and choices. This will allow the citizens more independence, freedom, and additional income.

Programme

Since the project is about the combination of housing and urban agriculture, the building comprises of two distinct parts: the apartment block and the greenhouse.

Greenhouse: multiple two level structural box in which cultivation of vegetables, fruits, flowers and spices takes place. This greenhouse is equipped with a drip-irrigation system, heating system, and natural ventilation.



Approach of apartment towers
(www.kkarc.com)



Greenhouse box connection to apartments
(www.kkarc.com)

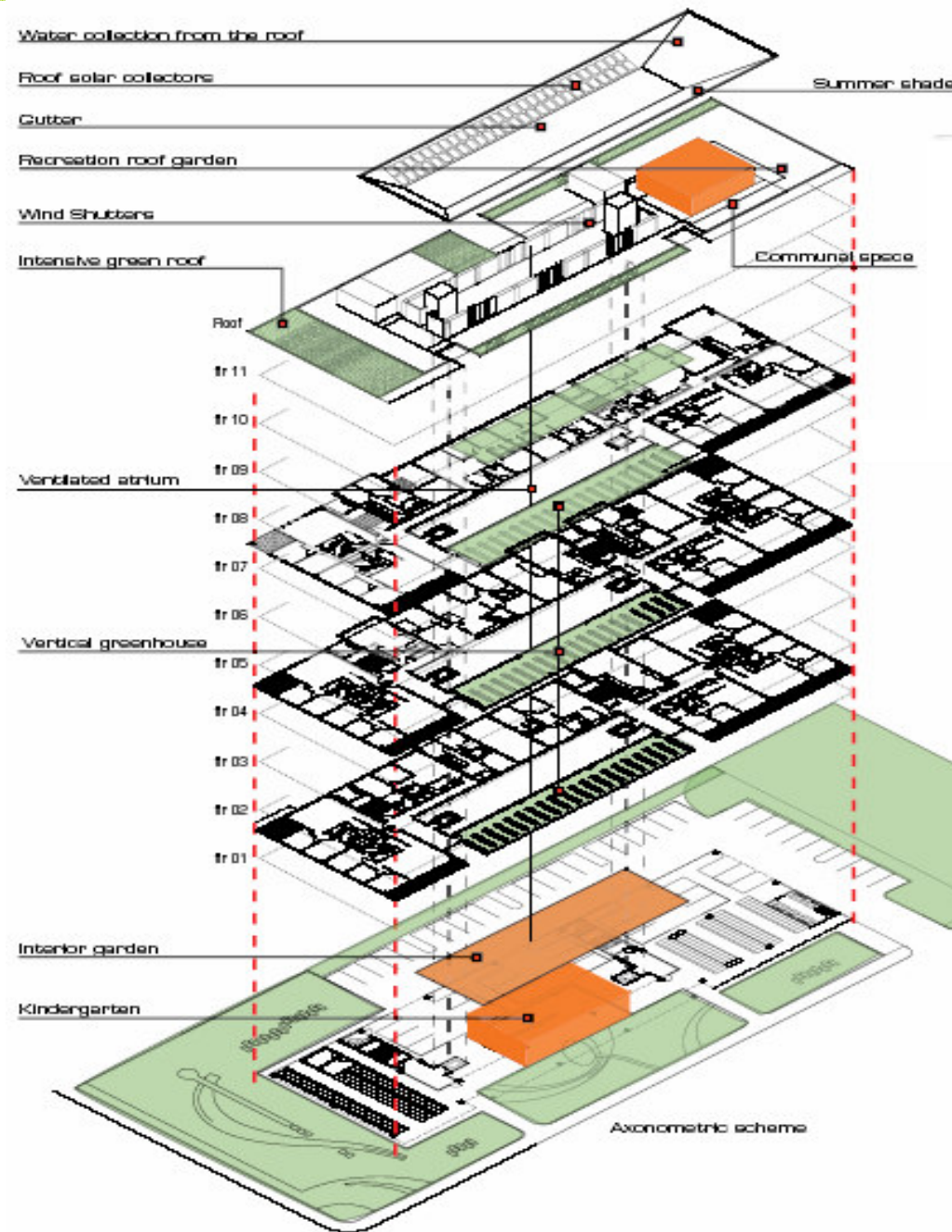


Agriculture merger with housing
(www.kkarc.com)

PRECEDENT STUDIES

Planning / movement

The planning is based loosely on the idea of mixed family typologies which is seen to have emerged with through mass urbanizations and the formation of nuclear families. The interior space of the apartments allows for individuals to design their spaces with personal preferences. Flexibility of spaces is achieved by providing a myriad of units which have a relation to one another and to the greenhouse.



PRECEDENT STUDIES

Architectural contribution

Structure - the proposed structure of the building will be composed of metal columns and beams on a grid of 10m x 9m. Lightweight steel sheets are fixed to this grid. These lightweight steel sheets will be prefabricated and installed on site on to which a concrete layer will be applied. In addition, the concrete staircase will stabilize the building's structure. This prefab steel system will create flexible spaces in the building and will contribute to the sustainability of the project. In the end the building's life, it will be easily recycled.

Facade - the exterior panels will be prefabricated using a modular grid. The glazed panels will have sliding shading in the same dimension. The other panels on the façade will be covered with terracotta tiles, a sustainable material.

Materiality - the choice of materials in the building will consider thermal qualities and abilities to be recycled at the end of the building.

Insulation – using structurally insulated panels to determine the energy efficiency of the building and reduce future energy expenses.

End of life - a majority of the suggested building materials: steel, aluminium, and terracotta tiles are recyclable.

Critique

The project showcases an fresh new insight in addressing the problem of mass urbanization that is occurring globally by combining housing with agriculture particularly in an urban setting.

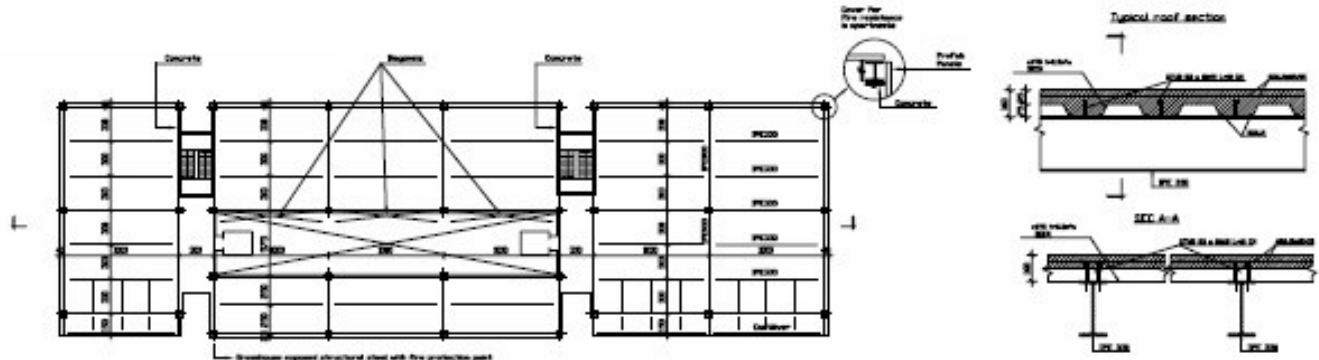
Materials that are chosen in order to make such a building green has been thoughtfully chosen so that the building itself is eco-friendly.

Conclusion

Although this project is a competition entry on sustainable living, it has in fact considered a number of factors which has a particular impact on the construction industry and at the same time addresses social issues which mass urbanization faces.



Structural system
(www.kkarc.com)



NW Balcony view



SW Balcony view

Floor construction and facade
(www.kkarc.com)