Fig 3.0 Integration into everyday life, collage, Author (2016)

36

3 Architectural Intent

3.1 Spatial consequences of school design

Reproducing inequality

Chapter 2 highlighted the complex nature of South Africa's education policies and implementation thereof in practice. The question then remains whether the spatial layout of schools has enabled inequality or reduced it? School design has lagged behind social and educational development, as schools are *outdated buildings that are unsuitable for the curriculum they are asked to deliver* (Mirchandani & Wright 2015:4). The result has been to enable or even aggravate inequality South Africa. School design therefore plays a significant part in the inequalities faced in society as Hertzberger (2008:71) describes schools as having *Introverted layouts*, which are *isolated, mono functional and functionally dominant and intimidating spaces*. Lister (1974) goes as far as comparing schools to prisons:

> *The headmaster is the prison governor; teachers are warders; the prisoners are the pupils, in the obvious instance, but the teachers are prisoners too... Pupils have to attend by law. ... The deprivations of school include being deprived of the company of human beings other than members of the pupil's peer group* (Lister 1974: 85-86).

The social intentions, as discussed in chapter 2, have a direct influence on the spatial implications of school designs. Therefore an investigation into examples of school design and the spatial consequences thereof is necessary in order to suggest what form of spatial intent will promote citizenship education and what form of spatial intent does not promote citizenship education.

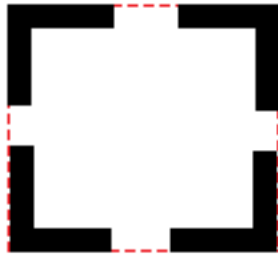> *Schools have always been a reflection of a society's stage of development* (Kuhn 2012).

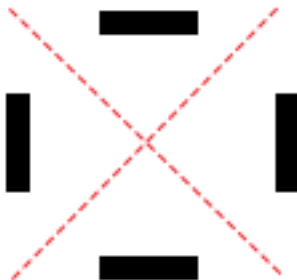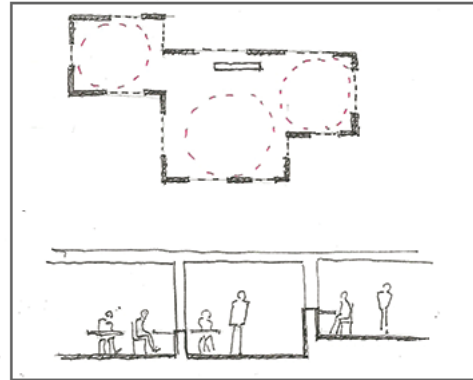Fig 3.1 Introverted approach, diagrams, Author (2016)

Fig 3.2 Extroverted approach, diagrams, Author (2016)

Middle ages learning environment

Illustrated in a painting by Dutch artist Jan Steen, a 17th-century village school is portrayed as a room in which the children hardly appear to be engaged in learning as we know it today (Kuhn 2012). In the middle ages learning environments were merely collections of teachers who students were attracted to because they had knowledge of something to offer (Alexander 1977:232). The scene captured in the painting, as strange as it seems, actually portrays children who are actively involved in a learning process.

Industrial era- Scholastic learning environment

The industrial era brought about change in schools, designed to be highly controlled environments, in order to promote obedient citizens in the machine age. In a painting by Albert Anker in 1848 the scene sets a classroom of a German village school, portraying rows of benches with the boys occupying the middle and girls placed on the side. The classroom is a hollow stone space where the windows are placed high enough to limit the learners view to the outside, thus instilling the idea that a school is designed to teach people to be efficient and obedient workers in order to grow the country's economy (Hertzberger 2000 :54). In Chapter 2 a similar approach to schools was undertaken by the British and Dutch who colonized South Africa as the educational intent was to teach students to be obedient and submissive citizens in a thriving economy.
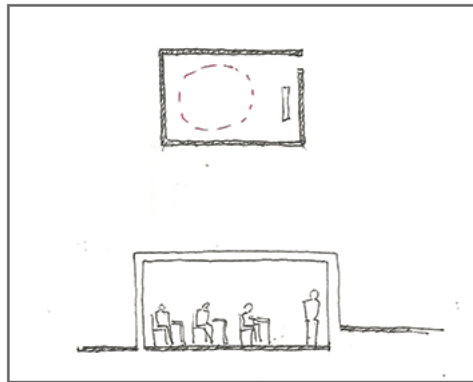
Modernist era- Open air learning environment

The aftermath of the industrial revolution saw a paradigm shift and response by the Modern Movement. An example of this shift can be seen in the open air school in Amsterdam built in 1927-30 by Jan Duiker . The open air school forced one to rethink the nature of school architecture as the design focused on addressing the poor physical conditions of neglected children of urban workers in the industrial era. Instead of the closed off classrooms, which had no interaction with the external environment, the open air school approach encouraged openness, getting rid of walls in order to become spacious and light. However as open as it was it was a highly controlled space as the classroom layout itself was set up in rows which faced a teacher who taught them (Kuhn 2012).
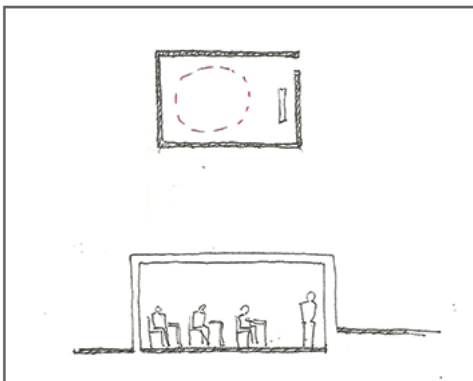
Fig 3.3 Classroom layout on plan and section, diagrams, Author (2016)   39

Fig 3.4 Middle ages, painting, Kuhn (2012)

Fig 3.5 Industrial era, Photograph, adventureswithagile.com (2016)

Fig 3.6 Modernist era, Photograph, thearchitectureofearlychildhood.com (2016)

Fig 3.7 Wood hill college, Photograph, Author (2016)

Fig 3.8 Current day classroom layout on plan and section, Diagram, Author (2016)
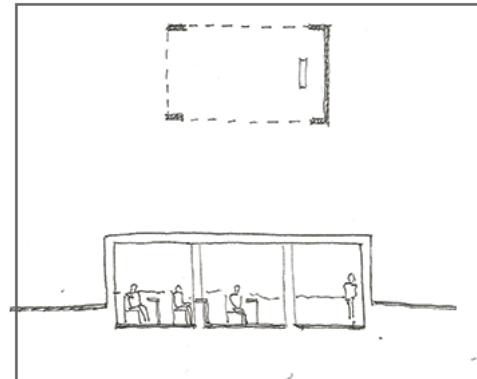

Current day- Scholastic learning environment

In today's society as noted in Chapter 2 the standard model of schooling is one of an authoritarian approach which lacks the rigor citizenship education has to offer to society. Educational facilities of today reflect industrial age origins as the spatial layouts promote rigid schedules, inflexible facilities and set boundaries between grades, disciplines and classrooms (partnership for 21st century skills:23).

Field research was conducted by the author in order to identify the extent to which a few educational facilities in Pretoria reflect a scholastic learning environment within their spatial layout and programmatic intent. The method of research consisted of identifying and analyzing one private and one public school which are both located in the East of Pretoria within near proximity to the chosen site. Both a private and public school were chosen in order to make a more generalized conclusion of educational facilities within our current day society, and more specifically learning conditions present in Pretoria East.

The field research method included visiting both schools on one occasion each, observing, taking photos and walking around the educational facility within school hours. The visit was done in school hours as it was important to understand the school dynamics in terms of teacher, pupil relationships and what effect this had on the spatial and programmatic requirements within the school design. The analysis had a particular focus on whether or not the spatial and programmatic conditions promote citizenship education and contribute to creating a socially corrosive environment. A table was drawn up that was used as a basis on which to analyze the schools and were informed by the conclusions made in Chapter 2 which is the following:

• Spaces of interaction: To what extent does the school encourages spaces where learners/ teachers and community can interact.

• Urban conditions: To what extent does the school consider the urban conditions surrounding it.

• Multi functionality: Whether or not the facility is multifunctional and/or offers generational learning.

3.2 Case Studies

Project Name:
**Wood hill College
(Private school)**
Location:
Pretoria, Moreleta Park

Spaces of interaction:	
Corridors	Used as circulation space and where school bags are left
Hall/ main gathering space	Used to brief children and on occasion for performances.
Meeting spaces	Found indoors in offices, classrooms
Urban conditions:	
Access	By appointment
Barriers	Double security: Security guards, boom gated, fencing
Street edge condition	Isolated from the environment
Multi functionality:	
Adaptability/ multi functionality of classrooms	Basic classroom layout which indicates a subject teacher centered approach.
Generational learning	No form of adult learning provided.

Project Name:
**High school Garsfontein
(Public school)**
Location:
Pretoria, Garsfontein

Spaces of interaction:	
Corridors	Used as circulation space
Hall/ main gathering space	Used to brief children and on occasion for performances.
Meeting spaces	Found indoors in offices, classrooms
Urban conditions:	
Access	By appointment
Barriers	Fencing
Street edge condition	The street edge is used to drop off and pick up children
Multi functionality:	
Adaptability/ multi functionality of classrooms	Basic classroom layout which indicates a subject teacher centered approach.
Generational learning	No form of adult learning provided.

Conclusion

The field research concluded that the current spatial layouts of the schools lack space for interaction between teachers, students and the community. The schools did not contribute positively to their urban surroundings or offer alternative ways in which the schools can be used multifunctionally.

• Spaces of interaction:

The corridors of schools are merely used as circulation spaces and the central space/ hall is used purely to brief the learners and on occasion host events and do not encourage public interaction with one another (Kuhn 2012).

The interaction between students, teachers and the community highlights the extent to which meeting spaces are considered in the design. Most meeting spaces and spaces of interaction are found inside the buildings (such as offices and classrooms) creating spaces that are isolated from each other. There are few architectural resources used to create as many places as possible for people to meet and interact, for example: full or half-height walls and steps.

The result is that learners do not know how to interact with one another, how to take each other into consideration and understand one another which is vital in order to mould citizens who know how to act with others in the public sphere.

Schools must be an ever changing environment where there is a lot going on and there are choices to be made. Children need to contend with other children, work things out between them, understand each other. This is a great deal more than reading, writing and arithmetic and the school space must encourage it (Hertzberger 2008).
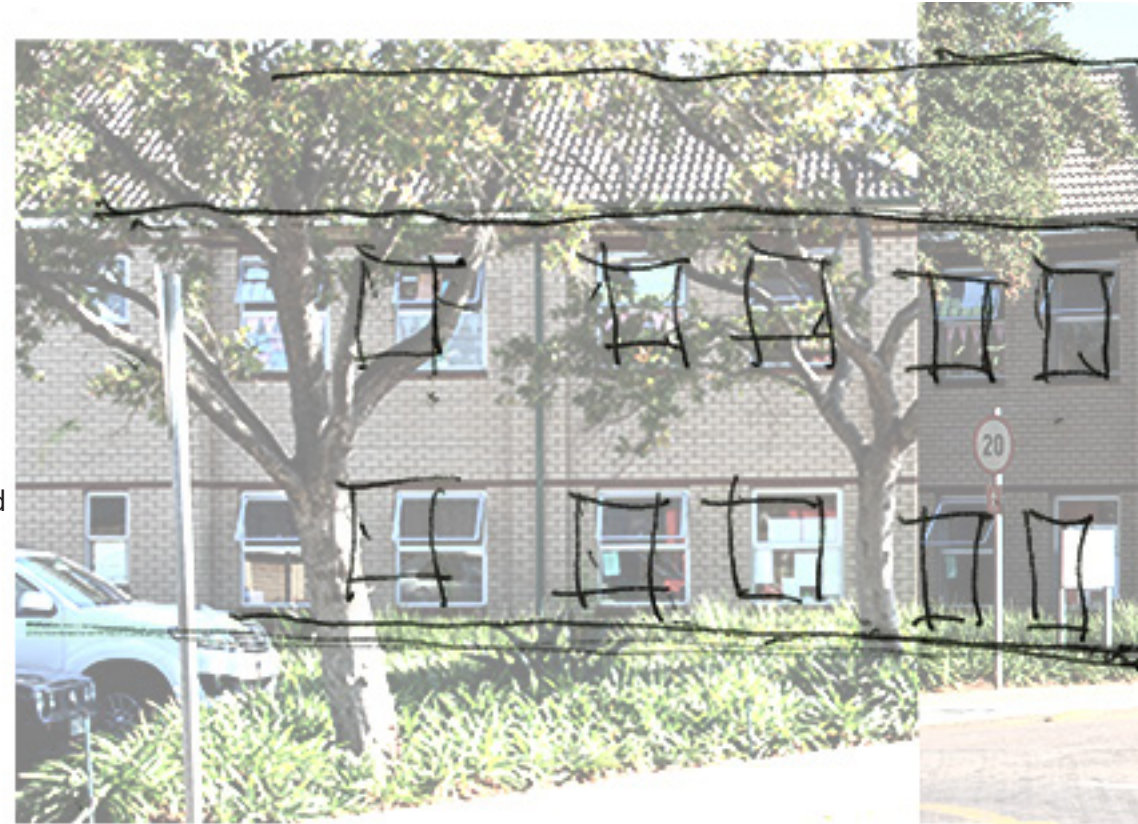

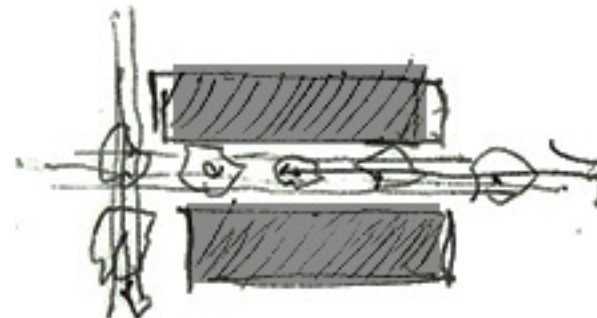Fig 3.9 Wood hill college, photograph , Author (2016)

Fig 3.10 School analysis of classroom layout, diagram, Author (2016)

Fig 3.11 Section of urb
Author (2016)

- Urban conditions:

Schools lack the interaction and participation necessary to be seen as a positive attribute to society.
Barriers and limited access highlights a controlled environment .
The relationship between the educational facilities and street edge indicate a harsh, hostile and isolated edge condition as the facilities physically isolate themselves from the surrounding community.
Not only are educational policies implemented in a top-down manner but so is the managing approach to schools. A centralized school condition results in administration authority, which is not vested in by the local community but, is controlled by a central body which has complete power over decisions made regarding the school (Brennen 2002).

- Adaptability and Multi functionality:

A individual based education model has been the result of an authoritarian approach for over two centuries (Kuhn 2012) where learners act individually as they set their own goals, make their own decisions and take responsibility of the outcomes. The result is that schools require more and more workplaces which have a specific function and cannot easily be adapted (Hertzberger 2008:9).

C2005 intended for an active learner and facilitating teacher approach to take place rather than an authoritarian subject and teacher approach however the spatial layouts of classrooms have not been adapted.

> *The building should provide a general framework for education and learning, while, being flexible enough to respond to changing demands* (Hertzberger 2008:1)
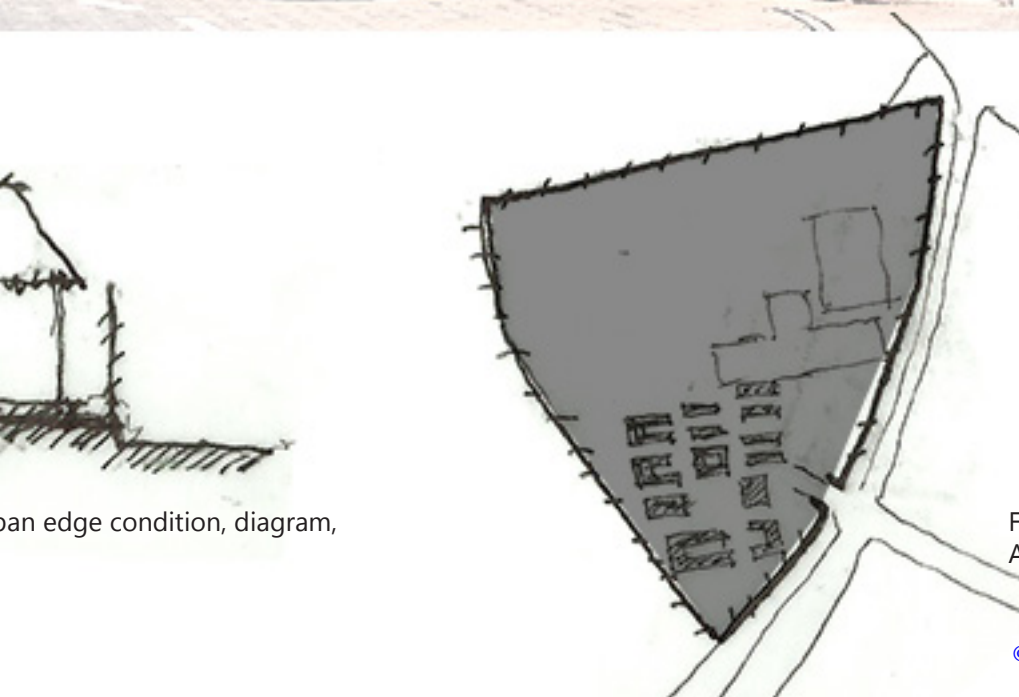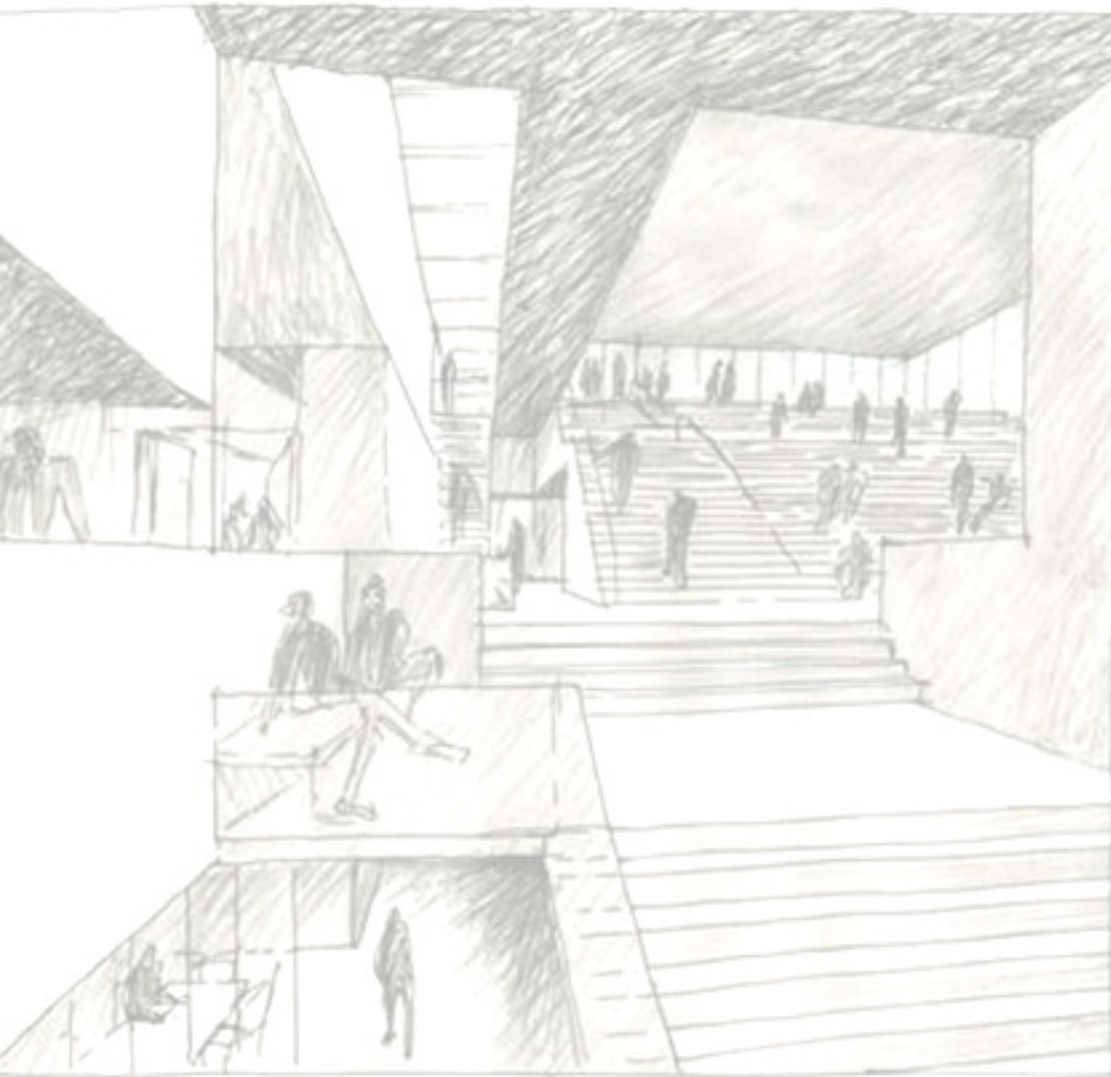
ban edge condition, diagram,

Fig 3.12 Plan of urban edge condition, diagram,
Author (2016)

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3.3 A social paradigm shift

In the industrial era, schools developed as highly controlled environments to instill the discipline to thrive in a machine age. Now, to prepare pupils for success in a knowledge economy, the evolving typology is more fluidly conceived to provide flexibility, connectivity, and spaces for social and educational encounters (Kuhn 2012).

A *community school/ extended school* approach supports a social paradigm shift which encourages alternative thinking on how schools are organized in order to encourage a new spatial notion which is to encourage social exchange among learners, parents and the community. Theorist such as Herman Hertzberger (2008), Christopher Alexander (1977), support a citizenship approach to education and describe how this can be achieved spatially suggesting that an educational facility is seen as a micro-city. This offers a new dimension to how communal space in educational facilities is viewed: corridors are seen as learning streets, classrooms as the domestic domain and the junction of streets as the central communal square. This allows for an ordered system of social space provoking communal interaction between learners, teachers and the community to occur, forming a network of learning.

Theorists such as Jan Gehl (2010), and Serge Salat (2011) support an ecological approach to the design of the urban environment. The supportive theory helps to identify and explore further what a successful urban environment is made up of. It is essential to understand the components of a successful urban environment as it is suggested that the educational facility acts as a micro-city itself.

Fig 3.13 A socially interactive environment, sketch, bdp.it (2016)

Lefebvre's (1987) theory on the production of space is used as an architectural informant as it supports the idea of a *community school* approach. This stems from the idea that participation of the community is an integral part in the production of space . A citizenship education approach directly relates to Levebre's (1987) theory as space is seen as a social construct that is socially produced and shaped by those who live in it.

If the production of space is produced for domination (production for capital) issues begin to arise such as increased fragmentation and disagreement among urban inhabitants which indicates that the space has a limited capacity to be meaningful, inclusive and democratic (Stout 2008:10). Serves to highlight issues in schools as school designs are outdated buildings which are inappropriate for the societies they need to deliver for and support (Mirchandani & Wright 2015:4).

Lefebvre (1987) suggest that space needs to be produced for appropriation which serves human need (Moltch 1993:889) rather than for domination. Thus space values local knowledge and the social dynamics of people becomes critical in shaping that place (Stout 2008:25).
People shape space naturally, socially and simply by how they use it therefore the architecture explores the scale to which individuals and communities begin to inhabit, change and appropriate the building. In order to provide for more democratic and participatory places the space needs to reflect the values and attitudes of the people in all its diversity and differences: this offers the potential for lived and everyday space that produces a stronger cultural and social significance in a place (Stout 2008:31).

> *Architecture, human densities, locational relations are a force in structuring what can be done in space itself. Walls and roads obviously privilege certain kinds of activity and inhabit others, support the projects of one type of actor and deter the goals of others. Beyond such material impediments are the symbols and styles that also influence behavior: elements of grandeur that disempower, monotonous cubes and towers that stultify rewarding forms of sociability. Space contains more than we ordinarily appreciate. A space is thus neither merely a medium nor a list of ingredients, but an interlinkage of geographic form, built environment, symbolic meanings, and routines of life.* (Moltch 1993:889)

3.4 A city in miniature

The Community Vocational facility is seen as a micro-city, a social or relational entity in its environment

The educational facility, a micro-city, needs to integrate into its environment forming a space where social exchange occurs, a public space. The educational facility should aim to draw people together and hold them there forming *meeting places* (Gehl 2010:25) or *living rooms* (Hertzberger 2000:135) of the city. Architecturally this can be described as a street or square as these components of the city provide space for social exchange to occur.

The treatment of the facade is also a significant component, Gehl (2010:77) describes the ground floor condition as important determining whether or not the walk is interesting or not. Therefore the complexity, layering and depth of the facade is essential in order to create a comfortable but enticing experience for the community members walking by in order to provide opportunities for social interaction and community engagements to occur.

The precedents are critiqued on the conclusions made in Chapter 2 which suggest that spaces of interaction, the urban conditions and how multifunctional the CVF is, will play a huge role in the success of the project being able to integrate and play a productive role within its environment.

Fig 3.14 Sketch of a street in Istanbul, Author (2016)

46

| H. Hertzberger	C. Alexander	J. Gehl	S. Salat
Educational facilities should consist of both streets and squares forming a small city which encourages the greatest amount of social contact between people. (Hertzberger 2008:123)	*The simple intercourse created when people rub shoulders in public is one of the most essential kinds of social glue in society* (Alexander 1977:489)	*People come where people are* (Gehl 2010:81)	*In order for a community to be sustainable it needs to be structured around public spaces where social interaction is intense* (Salat 2011)

Pass by space

Pass through space

Linear street

Variation in street
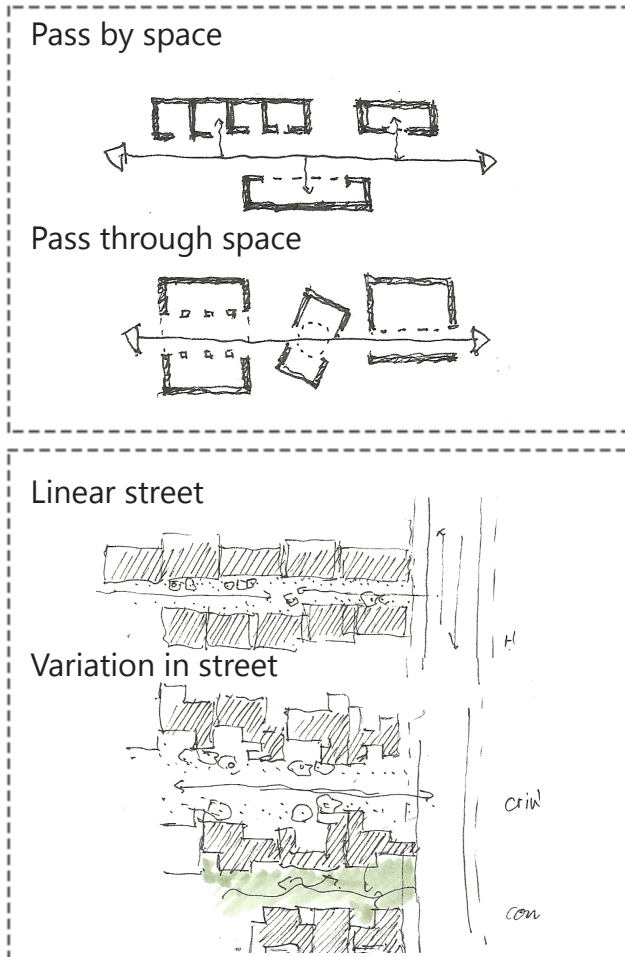
The street as a socially cohesive element where the street stiches individual entities together
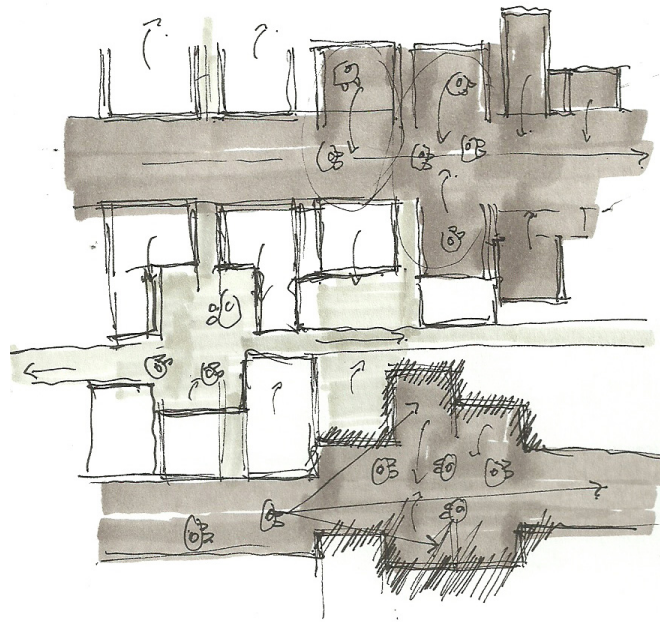
The street as a socially interactive element where the street becomes an extension of the built environment
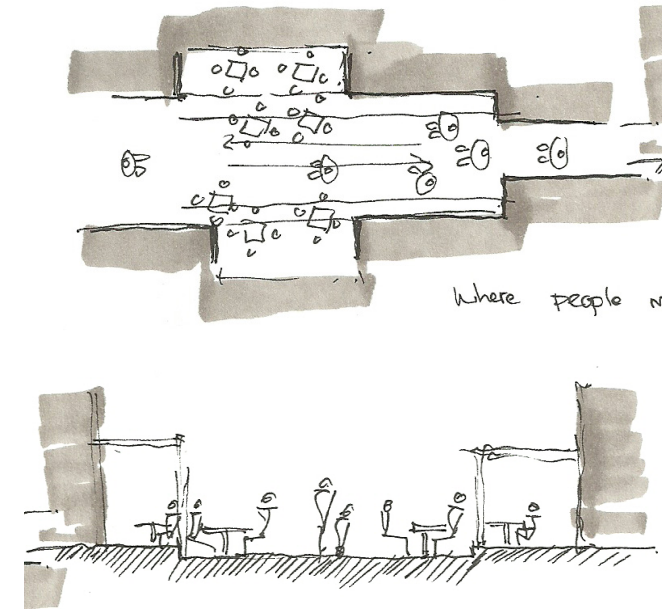
Fig 3.15 Diagrams of street conditions, Author (2016)

47
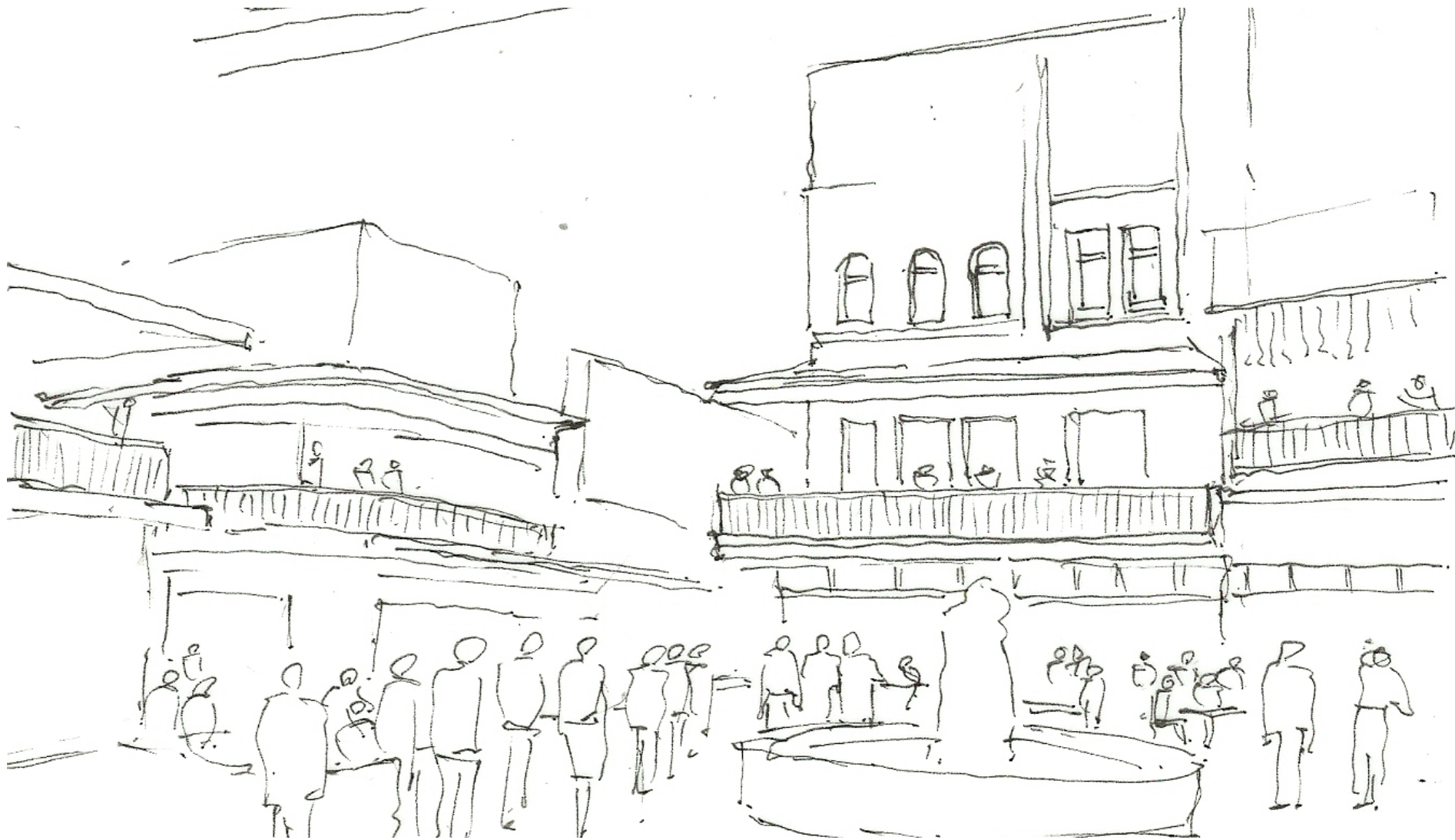
Fig 3.16 Sketch of a square in Istanbul, Author (2016)
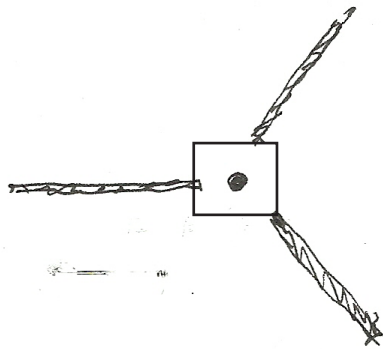
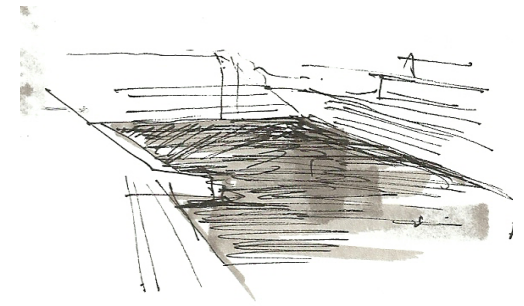A square becomes a node of interlinking paths
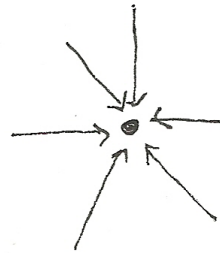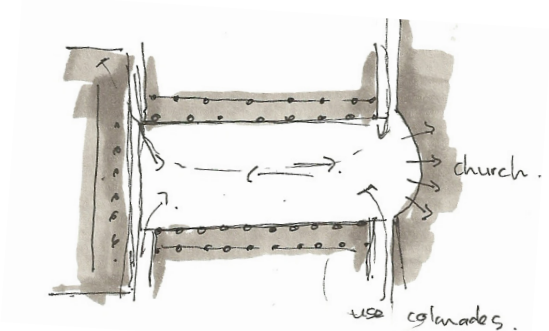
A square becomes the central focus
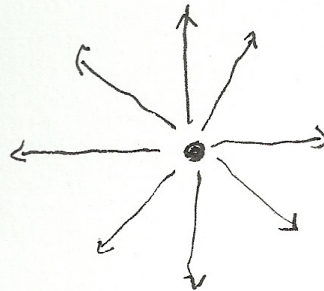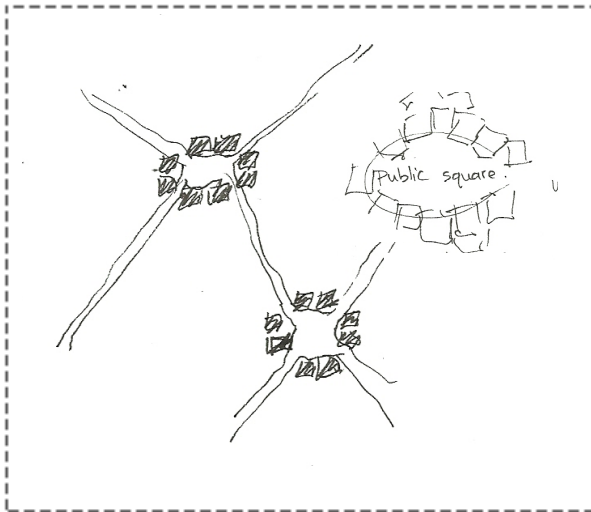
A square becomes a node that radiates out

The negative space is framed by the form, Monte Alban, Mexico

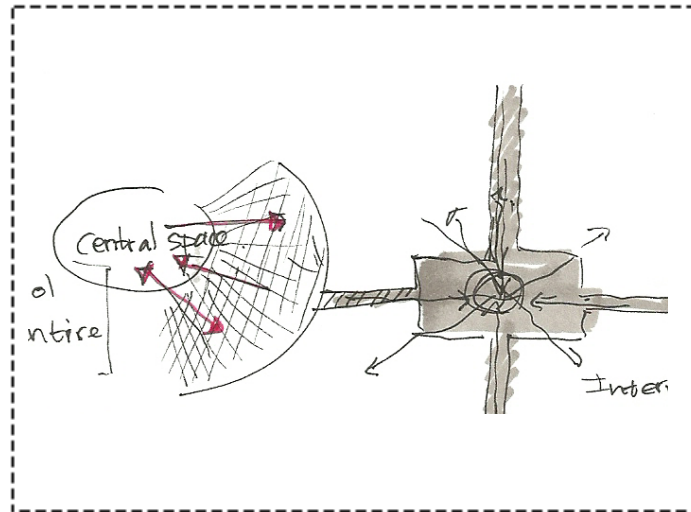The square is deliberately formed by the buildings, Central piazza, Italy

Small clusters of work places, paths and community facilities make up squares

Square is a place that expresses a sence of collectivity. Where streets intersect and therefore pedestrian movement is organized to run through,drawing people together and holding them there.

The square is formed from left over space, Castelvittorio, Italy

Fig 3.17 Analysis of public squares, Author (2016)

49

Defining the urban conditions and multifunctionality of space

Edge conditions

Hard edges

Soft edges

Accessibility

Disclude

Include

Visual accessibility

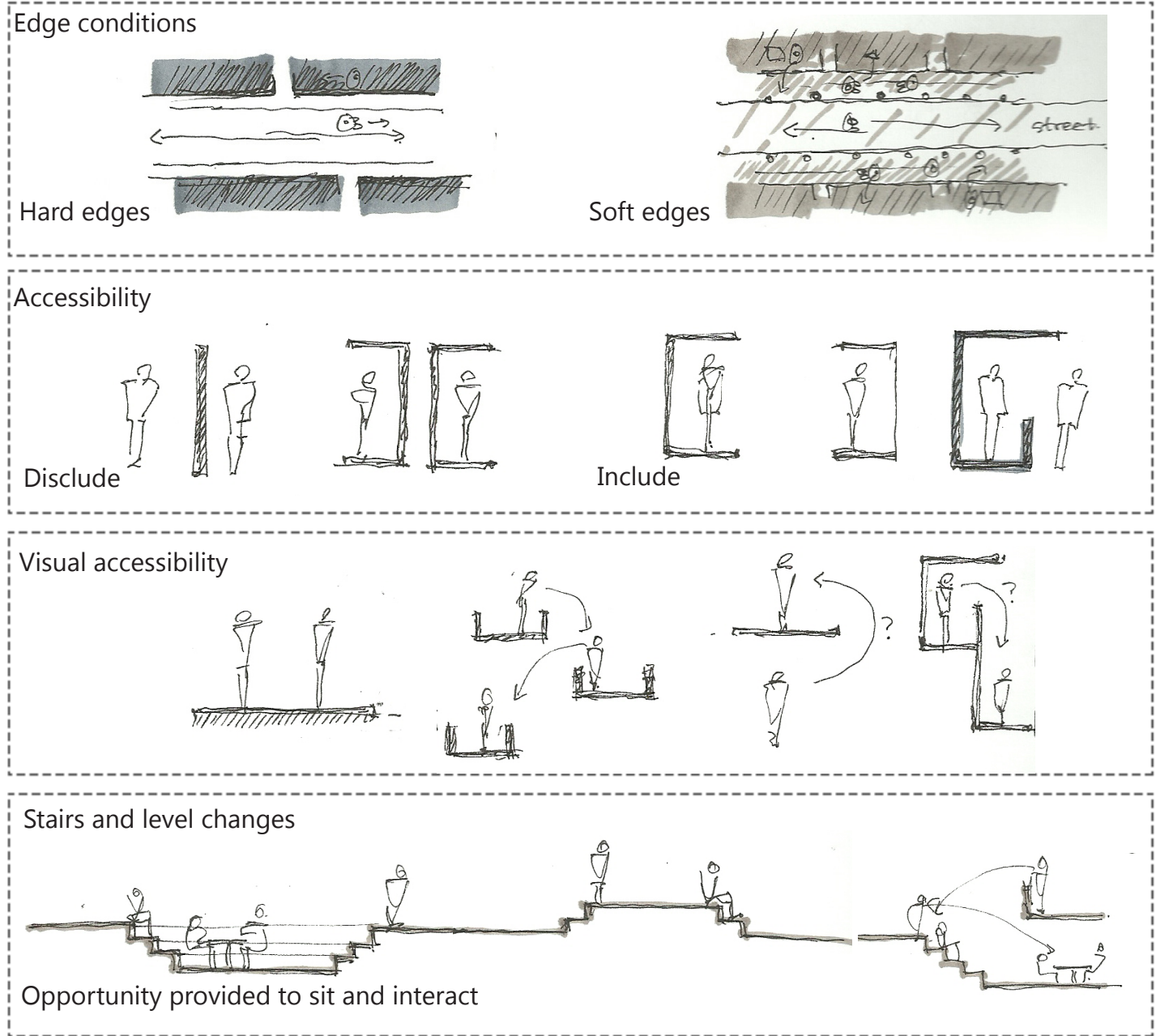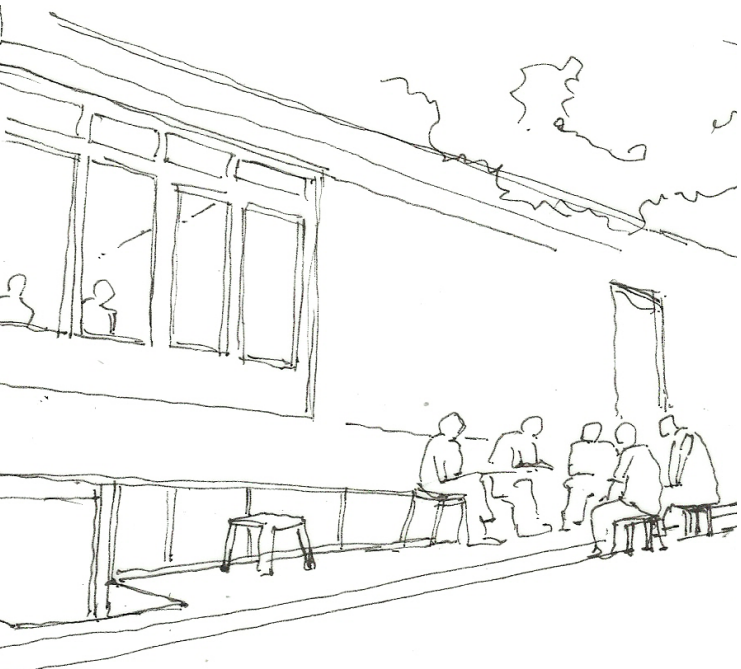**Stairs and level changes**

Opportunity provided to sit and interact

Fig 3.18 Sketch of an urban condition in Istanbul, Author (2016)

Fig 3.19 Diagrams of urban conditions and multifunctionality, Author (2016)

50

H. Hertzberger

The main street needs to be spatially visible and accessible to everyone using the space as this is important in promoting social cohesion.
(Hertzberger 2008: 123)

C. Alexander

Decentralized learning approach where classrooms can be ordered around a central space that has a social function
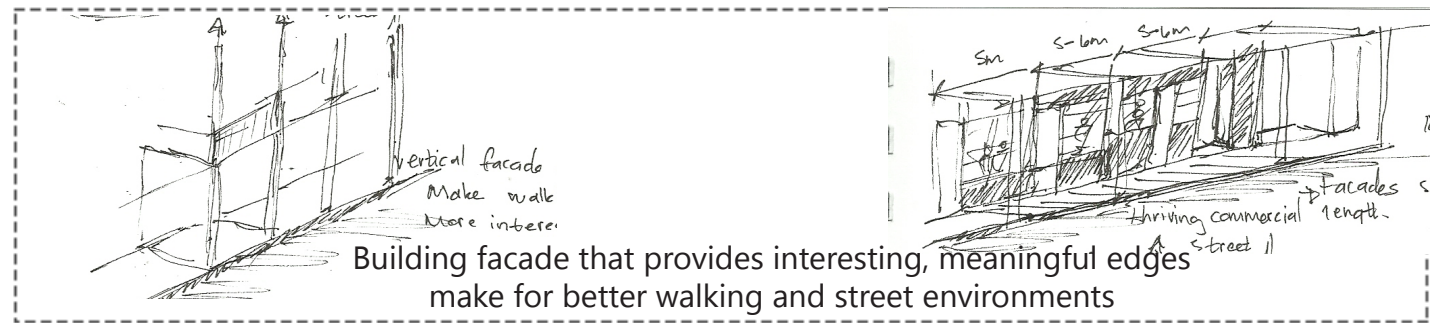(Alexander 1977:425)

J. Gehl

A good view of people is essential. A good city for meeting is one that offers good opportunitites for seeing, hearing and talking
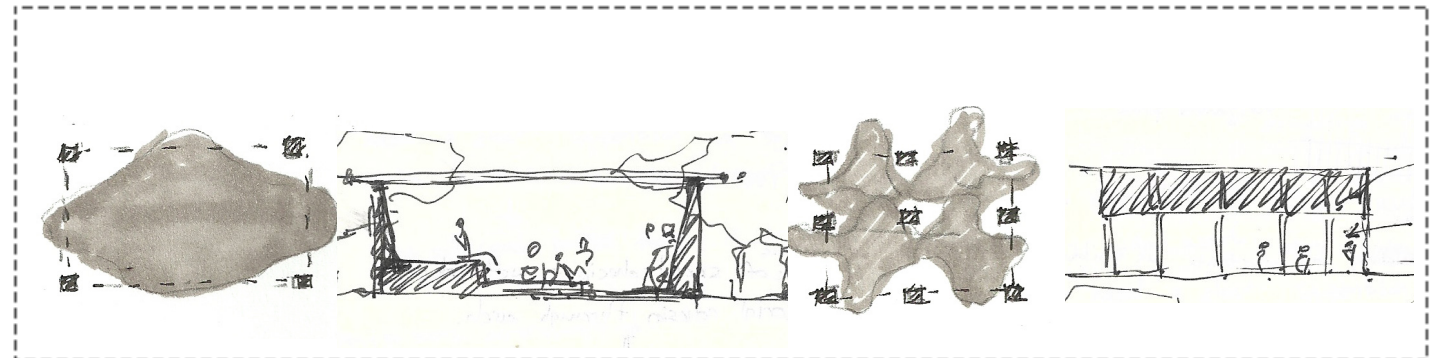(Gehl 2010:148)

H. Lefebvre

People shape space naturally, socially and simply by how they use it. Space is then produced for appropriation as everyday life produces and transforms our social worlds.
Lefebvre (1987)

Verticality and horizontality

Building facade that provides interesting, meaningful edges make for better walking and street environments

Multifunctionality of space

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3.5 Precedents

The following precedents look at alternative ways in which a school can be spatially organised in order to promote citizenship education and interaction among learners and the community.

Project name: Meeste-a-Bophelo Primary School, 2009
Location: Mamelodi East township, Tshwane (Pretoria)
Architect: Humphries Jooste Practice. Architects

Background:

The ArcelorMittal South Africa Foundation has initiated 10 new building projects within underprivileged areas and Meests-a-Bophelo Primary School is one of them. There was an existing school, made of temporary classrooms, on site which needed to remain operational while construction commenced and therefore the work had to be phased. The new school design incorporated the existing community school activities such as the soup kitchen (now a central nutrition centre) and community gardens. The edges of the school consist of 50 % residential zone and 50% commercial high traffic zone. The intent of the design was to reinterpret the traditional school typology of an authoritarian character in order to explore a more social interactive spatial layout to occur (Raman 2011: 13).

Fig 3.20 Meeste-a-Bophelo Primary School, Photograph, constructalia.com (2016)

Supports Architectural intention by:

- Spatial interaction:

The layout of the school indicates that a student-centered educational approach was promoted. At the school's heart one finds a nutrition centre with covered outdoor and indoor seating areas where meals are eaten and the community and learners gather after school hours encouraging a sense of collectivity amongst one another.

The corners of the triangular courtyards are dealt with well as they create small amphitheatre spaces which function as external classrooms.

- Urban condition:

The computer room and library are positioned near the entrance of the school which suggests an active edge condition between the community and school facilities.

All areas of the school are observable which highlights the consideration to safety as well as a social consideration. By being able to view others and the many activities taking place the spaces become less isolated as people are able to interact with one another more easily (Hertzberger 2008:126).

- Multifunctional and generational learning:

Fresh vegetables can be grown for the children as around thirty ladies from the local community have been trained to manage the vegetable gardens.

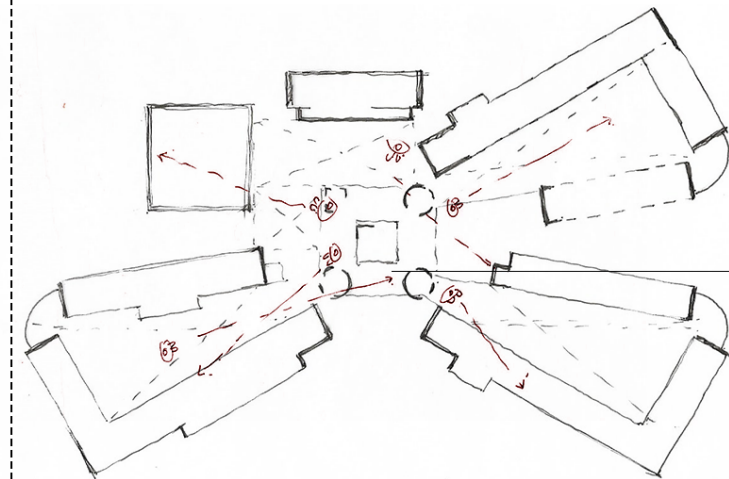Spaces of interaction
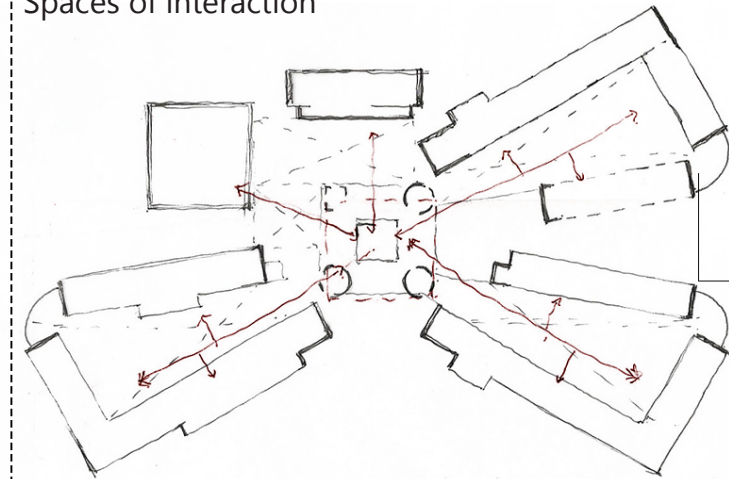
Urban condition

Fig 3.21 Meeste-a-Bophelo Primary School analysis, Diagram, Author (2016)

Critique:

• Spatial Interaction:

The interaction between the students and teachers is limited as the teachers have separate administration offices instilling an unnecessary hierarchy. Rooms that can be accessed and used by pupils encourages a learning environment (Hertzberger 2008:150).

• Urban condition:

The edge conditions and urban relationship of the school are not addressed successfully with the result that the school is fenced off from the community.

The parking area is situated in front of the entrance separating the site from the street edge.

The school design spatially suggests an introverted approach rather than
extroverted approach as the spaces are shut off from the surrounding community and results in the fact that the school design does not contribute to the existing urban fabric of the community.

More seating space is needed in the courtyards in order to encourage interaction between learners of different ages or race who might never socialize. This form of citizenship education is a training ground forsociety as is reflects the complex social patterns of the world (Hertzberger 2008: 117).

Fig 3.22 Meeste-a-Bophelo Primary School analysis,
Photograph, P. Wolmarans (2016)

54

Project name: Usasazo Secondary School 2004
Location: Khayelitsha, Cape Town, Western Cape
Architect: Noero Wolff Architects

Background:

In an area where all of the surrounding buildings are constructed by the people themselves, the project realizes the critical role that schools play in promoting permanent, durable public infrastructure in order to form a good quality environment. The spatial layout of the school shows an understanding and respect for the spatial character of the informal settlement as the main circulation space mimics the street conditions in Khayelitsha.

Fig 3.23 Usasazo Secondary School, Photograph, Noero Architects (2016)

55

Supports architectural intention:

• Spatial interaction:

The main circulation space is given an undulating character which defines the in-between space successfully. The street is sheltered by trees and sitting space is provided along the street where learners can gather. The street varies in size as one moves along it mimicking the character of the street in the informal settlement.

The spatial layout of the school suggests that the main circulation space connects the individual entities forming a communal public space where the learners and community can interact with one another.

• Urban condition:

The main circulation space is visually accessible from the classrooms allowing the public space to become more appealing and inviting to the users.

Communal sports fields and a productive agricultural area take up the remaining land becoming a soft edge condition towards the residential side of the site.

The roves allow for variation in scale as they successfully define a human scale along the main circulation space while filtering light in from higher roves.

Spaces of interaction

The main circulation space

Urban conditions

Visual accessibility

56
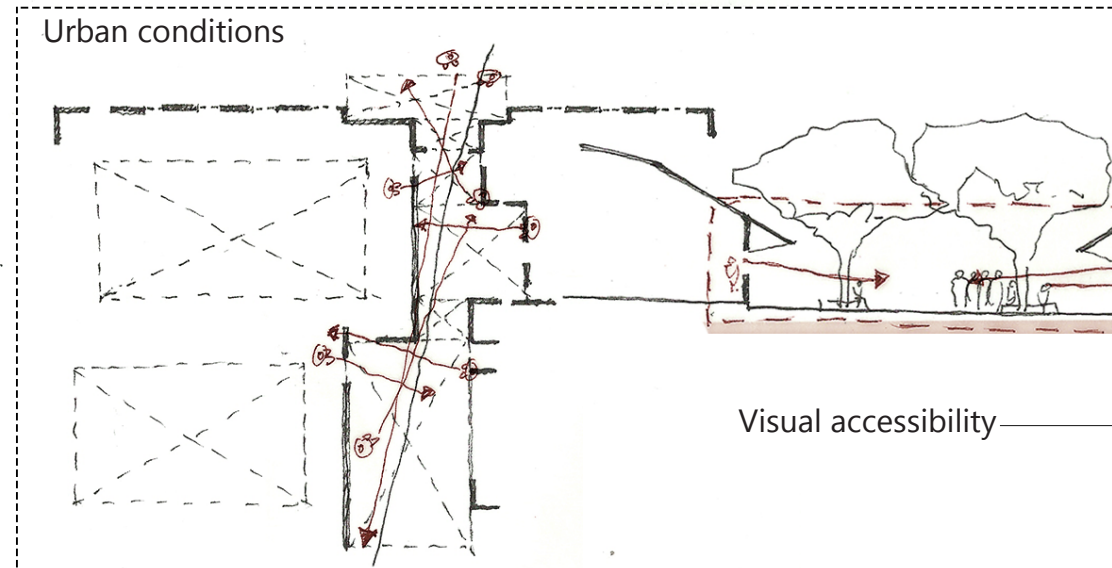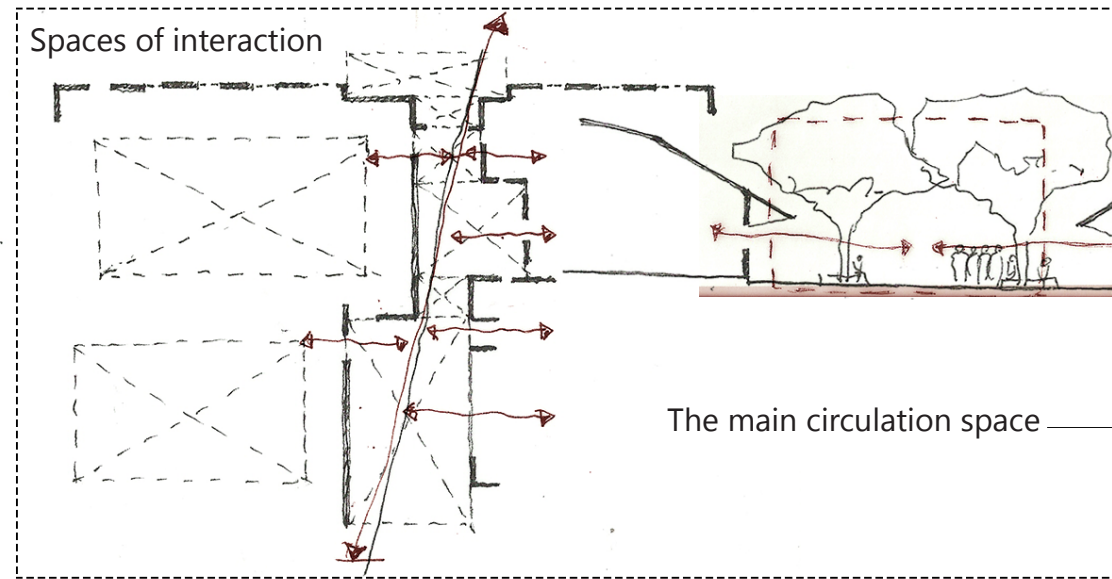
Critique

- Urban Condition:

The street edge condition of the entrepreneurial training facility does not speak of the same interactive language on elevation as it does on plan. If the shutters of the training facility are closed the students using the training facility are not visually accessible, thus creating an isolated space.

- Multi functional and generational learning:

The entrepreneurial training facilities are also used as classrooms. The class-rooms however cannot be adapted in order to create larger or smaller rooms if needed for entrepreneurial training.

Hard edge condition

Fig 3.24 Usasazo Secondary School Analysis, Photograph, Noero Architects (2016)

57

Project name: Service Centre and Pay Point
Location: Khayelitsha. Cape Town, Western Cape
Architect: Piet Louw Architects

Background:

The service centre which are modest in form rise above the mixture of formal and informal houses in Khayelitsha. The centre is clustered with existing community facilities, forming places of civic significance. The entrance to the building forms a portico which is used as a gathering and recreational space. The service centre includes offices for local councillor's and courtyard areas for public interaction.

Provision made for sheltered gathering spaces

Fig 3.25-27 Service centre and pay points, Photograph,
Piet Louw Architects (2012)

58

Robust and layered entrance

Supports architectural intention:

• Spatial interaction:

The robust form allows for interaction and social engagement to occur by making provision for gathering spaces which are sheltered, with steps to sit on and a courtyard.

The service centre is raised from ground floor which defines space but does not isolate it from its urban context.

The architect is able to design spaces for appropriation which takes into consideration the social dynamics of people in space. The spaces are used freely by the community, specifically the robust forms at the entrance which people sit on and sell things from.

• Multifunctional spaces:
The centre incorporated and includes existing community facilities which forms places of civic significance.

The robust but minimalist form allows for flexible and adaptable spaces.

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Project name: Urban Park and integrated complex of Primary and Secondary School and Public facilities- Romania School, 2010
Location: Palermo IT, Rome
Architects: Herman Hertzberger, Marco Scarpinato, Dickens can der Werff

Background:

The project is located in a new urban centre highlighting the important role it plays in introducing a space that incorporates a communal area with facilities for the community. Two entrances on opposite ends of the site frame two communal gathering spaces, which are intended for recreation and socializing, and is divided by a central connecting street. A park, teaching garden and sports and recreation facilities surround the school. The facility becomes an integrated space with areas dedicated to both socializing and learning.

Fig 3.28 Urban Park, Photograph, architectural-review.com (2012)
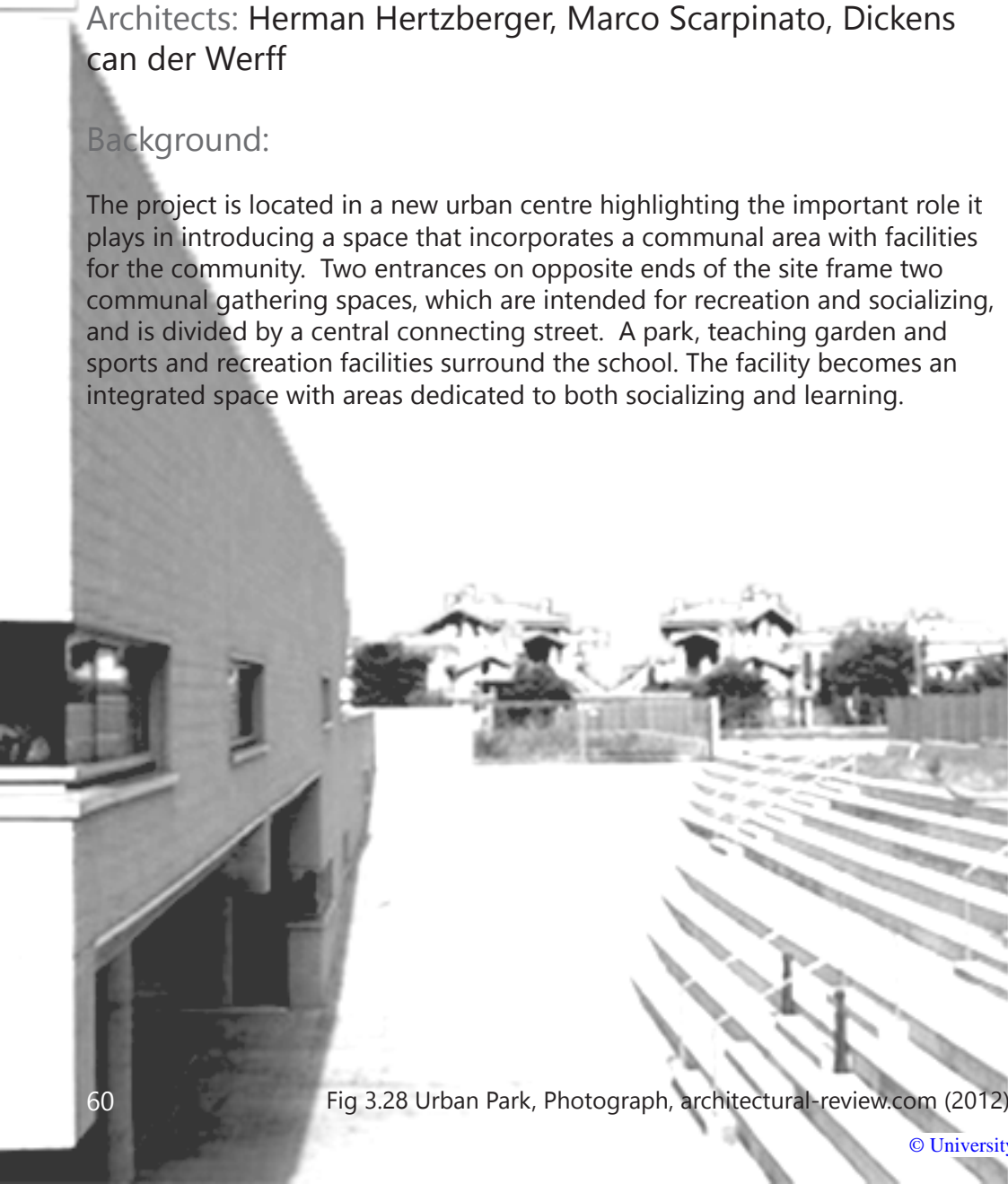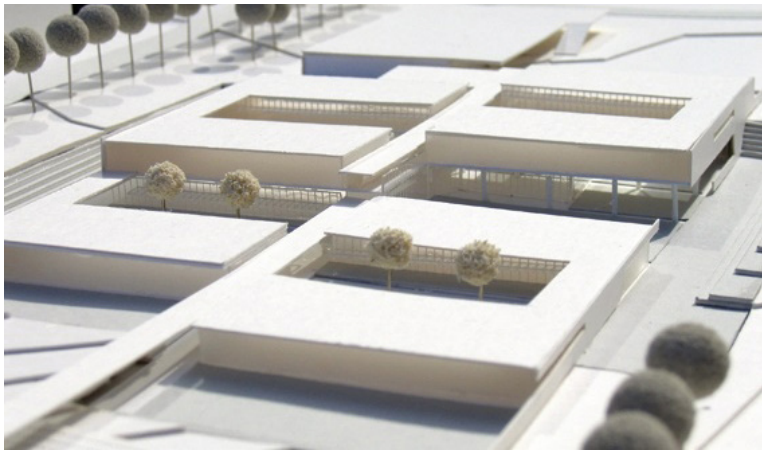
Spaces of interaction
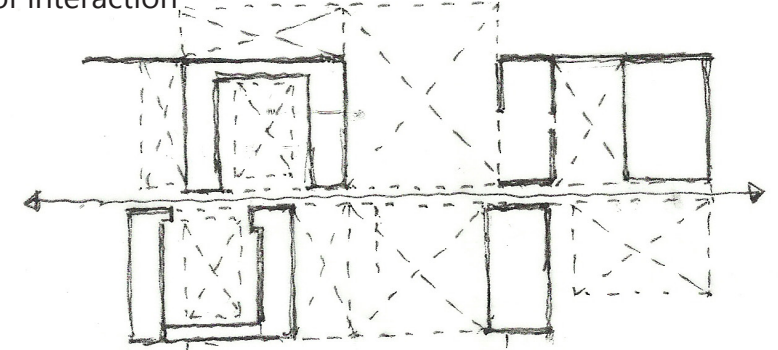
The street acts as a unifying element

Urban conditions
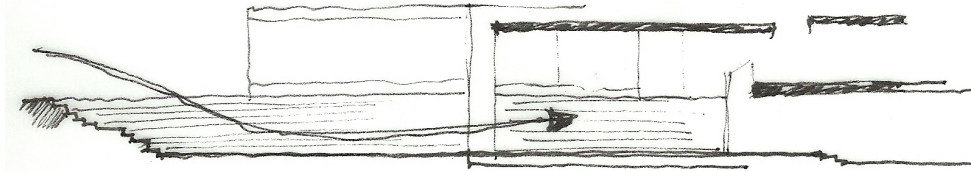
The level changes and stairs are used as a social element where people can sit and gather

Multifunctionality
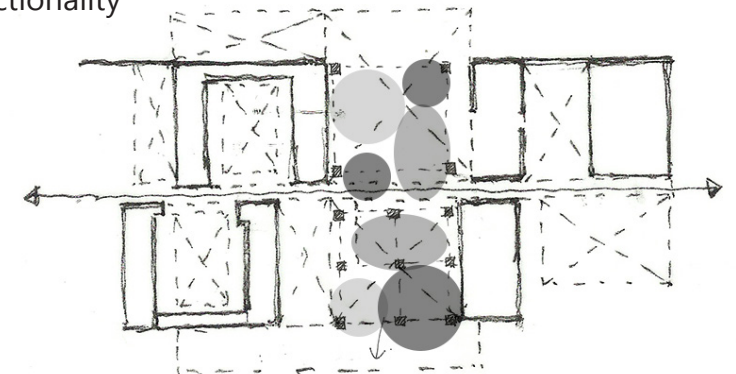
Supports architectural intention:

- Spatial interaction:

The project is an example of Hertzberger's (2008) extended school theory which allows for a socio-cultural exploration of educational facilities.

A connecting street acts as the main artery of the school that leads to and from a public gathering space while joining the classroom units. The street acts as a socially unifying element within the space.

The school is successfully seen as an interactive public space within the community

- Urban Conditions:

The site sinks into the ground, accessed by steps which can be used as seating. The steps frame the central square. The level differentiation between the site and urban context helps define the school perimeter yet does not separate the school from the public space that surrounds it.

Stairs, seating, ramps and courtyards allow for a range of gathering spaces for the learners and community.

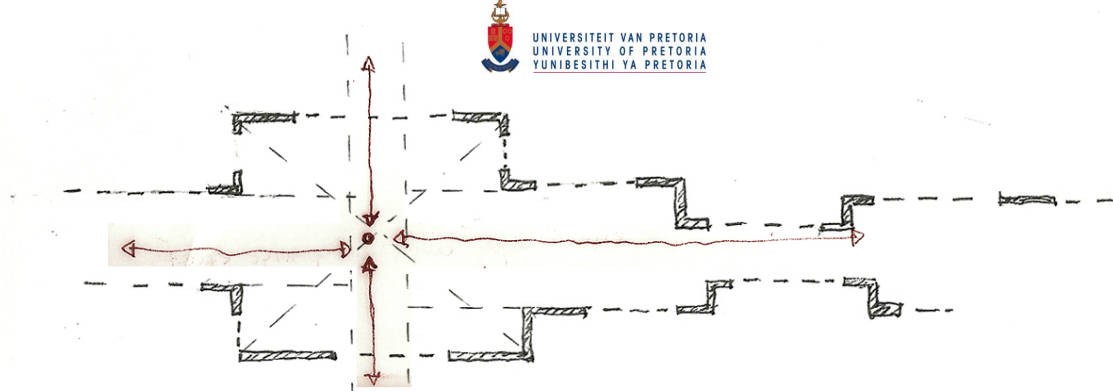- Multi functional and generational learning:

Community facilities are integrated with learning spaces by lifting the built form off the ground floor, allowing the ground floor to be opened up. This allows the public space to become adaptable and versatile.

The school facilities link with the central communal gathering space promoting shared facilities as well as cross discipline multifunctional activities.
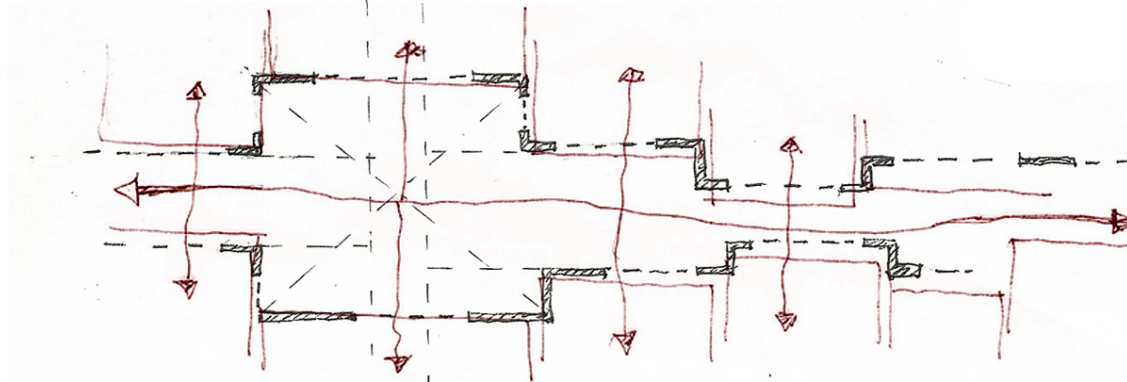
Fig 3.29 Urban Park analysis, Photograph, architectural-review.com (2012)
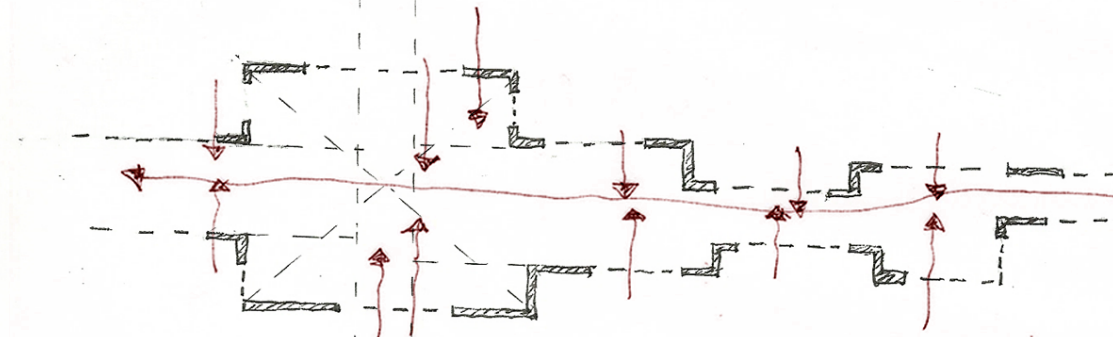
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Spaces of interaction

A public square becomes a node from which streets interlink

A street is used to connect and stitch individual entities together in order
to create socially cohesive spaces that encourage social exchange to occur

The built forms frame the public street and square becoming an extension of the interior spaces

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3.6 Architectural Conclusion

This dissertation supports a citizenship approach to education. This is achieved spatially by interpreting the CVF as a micro-city that integrates into its environment. In support of the theory and precedents considered above, the conclusion of the spatial potential is as follows:

Spaces of interaction: The spatial intent of the dissertation promotes an active and participatory environment by introducing elements that provoke communal interaction, thus social cohesion could begin to form between people. This is in response to identifying that educational facilities are isolated entities in their environment. The diagram's below, that conclude on the theory and precedents discussed previously in the Chapter, interpret the principles used going forward when defining spaces of interaction spatially. Hertzberger (2008) suggests that public communal gathering spaces (public square) express a sense of collectivity where streets that intersect squares can be used to draw people together. A street is seen as a symbol of social cohesion as they can be used to connect entities together while forming public spaces where social interaction can take place.

Urban conditions: The urban condition promotes the idea of boundless education (Hertzberger 2008) in order for the CVF to become undividable and integrated within the community. Diagrams that can be seen in Figure 3.31spatially achieve this by incorporating soft and permeable edge conditions, allowing spaces to be visually accessible to everyone using the space which is important in promoting social cohesion.

Multifunctionality: According to policy on citizenship education discussed previously in the dissertation, educational facilities need to become the centre of community life incorporating spaces that can adapt for multifunctional activities. The CVF can then possibly become a vital hub in the community. The diagrams indicate how this can be achieved spatially by incorporating vertical and linear elements that define space yet do not restrict the layout.
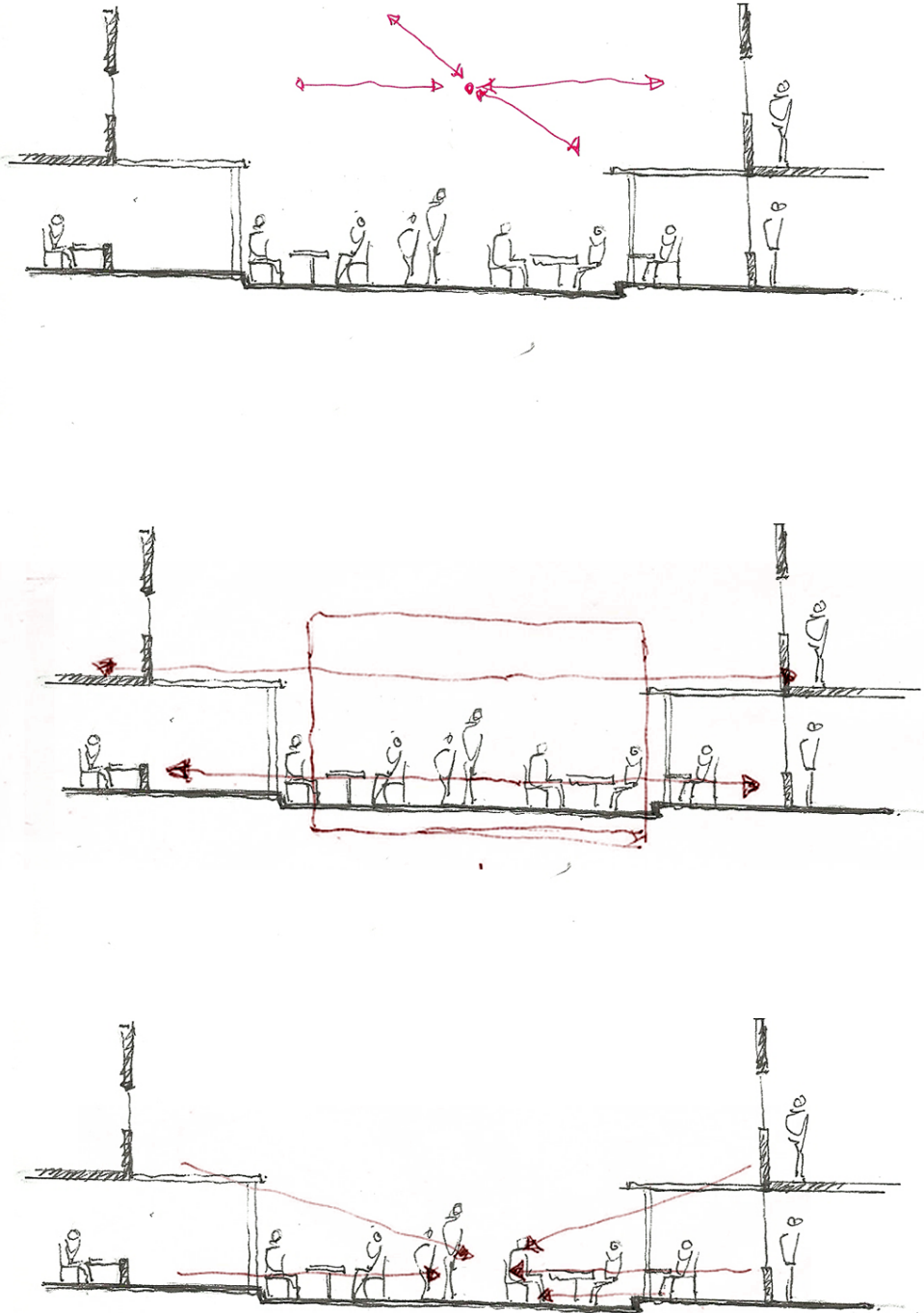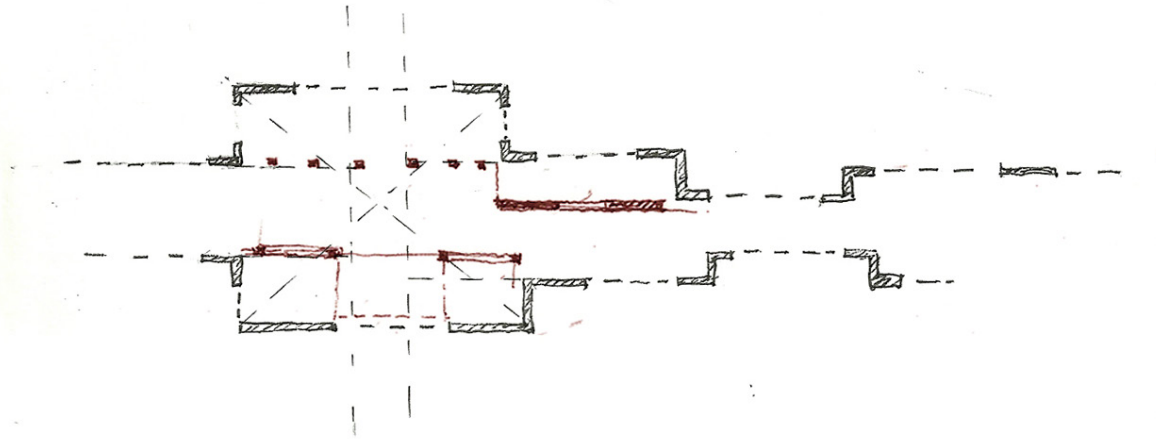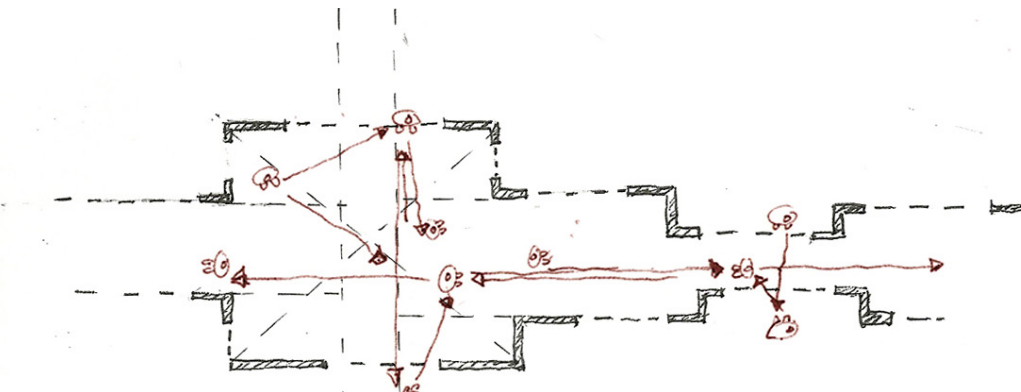
Fig 3.30 Spaces of interaction conclusion, Diagrams, Author (2016)

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The facade conditions are layered offering thresholds that allow for various forms of gathering to take place

Urban conditions

Permeable edges that provide visual accessibility for those using the space is needed.

Soft edge conditions such as stairs and level changes help define space yet does not alienate space from its surroundings.
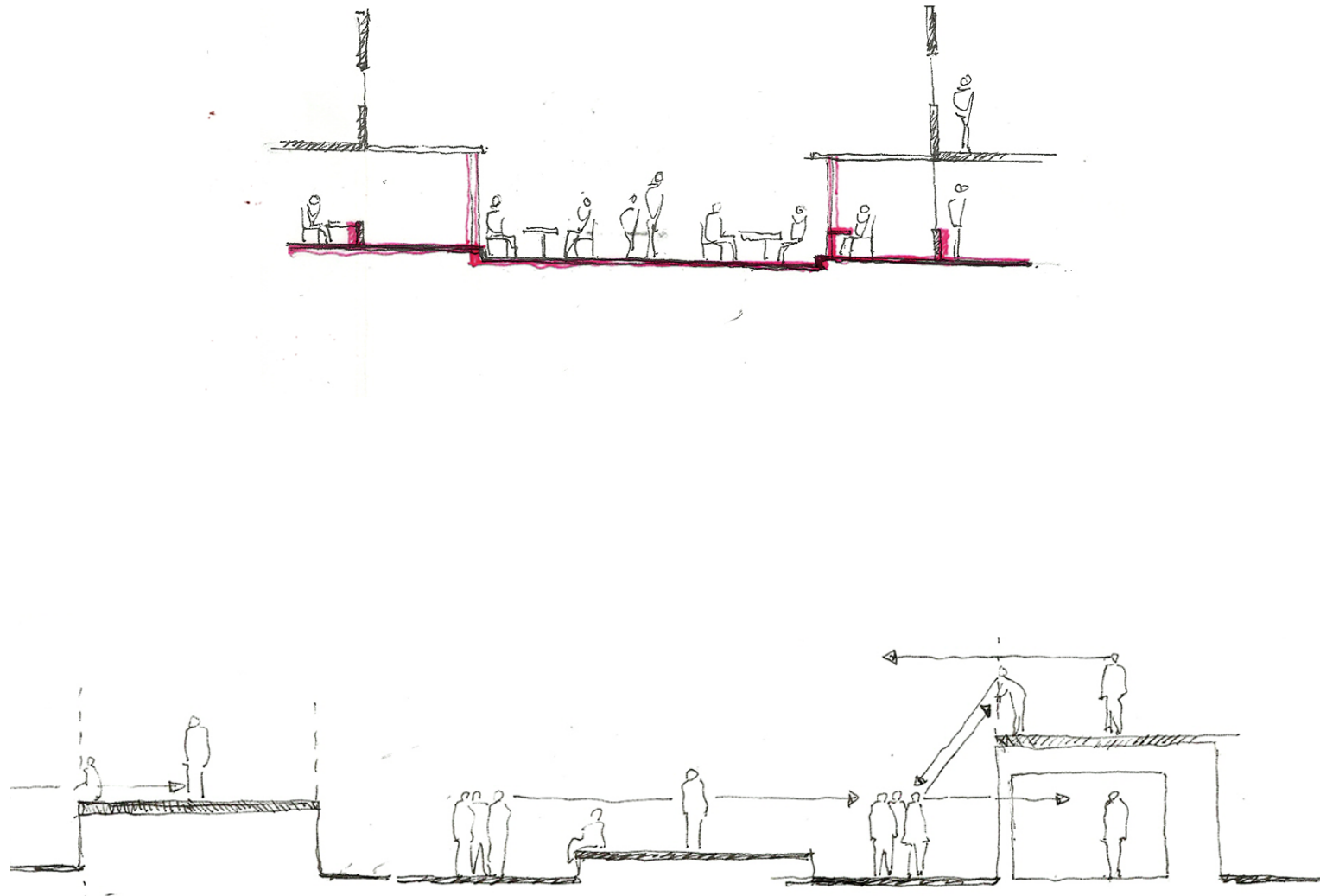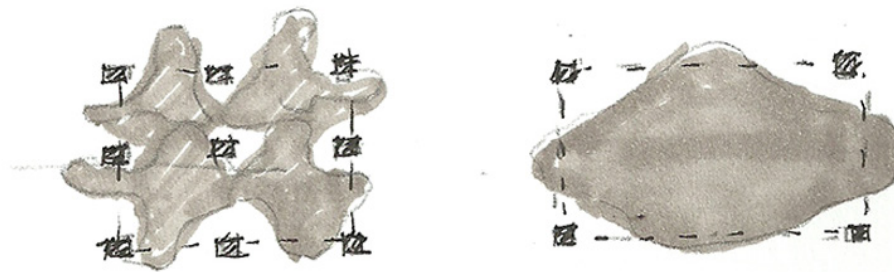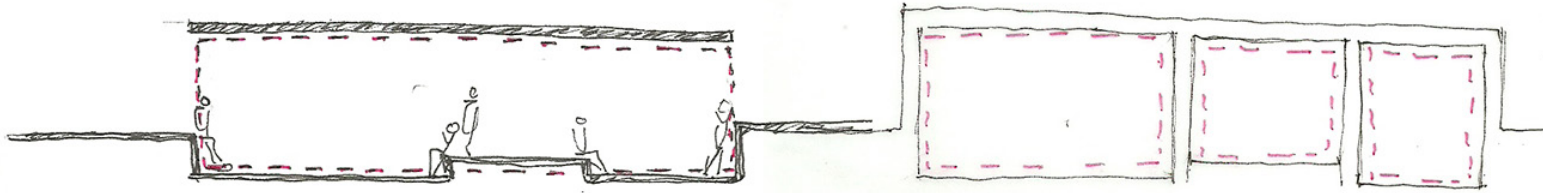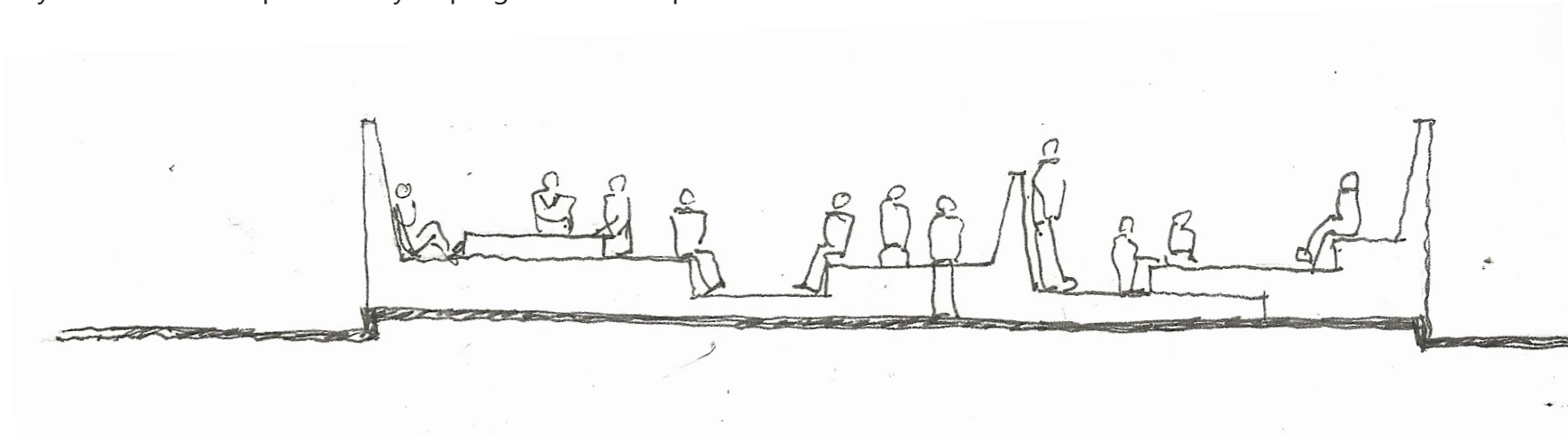
Fig 3.31 Urban conditions conclusion, Diagrams, Author (2016)

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Multifunctionality

Vertical linear elements create spaces than can be defined and adapted for various uses by the user.
The layout is able to respond freely to programmatic requirements.

Robust forms that allow for the space to be consumed and interpreted differently by the user should be considered.

Fig 3.32 Multifunctionality conclusion, Diagrams, Author (2016)

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